SUZUKI SY413/SY416

SUZUKI

SUZUKI MOTOR CORPORATION

SY413/SY416

SERVICE MANUAL

SUZUKI
Caring for Customers

99500-60G00-01E
（英）

99500-60G00-01E
Printed in Japan TK

SERVICE MANUAL

99500-60G00-01E

IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:
Indicates a potential hazard that could result in death or injury.

CAUTION:
Indicates a potential hazard that could result in vehicle damage.

NOTE:
Indicates special information to make maintenance easier or instructions clearer.

WARNING:
This service manual is intended for authorized SUZUKI dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in serve injury.**
- **If the air bag system and another vehicle system both need repair, SUZUKI recommends that the air bag system be repaired first, to help avoid unintentional air bag system activation.**
- **Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.**
- **If the vehicle will be exposed to temperatures over 93· C (200· F) (for example, during a paint baking process), remove the air bag system components air bag (inflator) modules, sensing and diagnostic module (SDM), seat belt pretensioner (if equipped) beforehand to avoid component damage or unintended activation.**

FOREWORD

This manual contains procedures for diagnosis, maintenance, adjustments, minor service operations, replacement of components (service) and for disassembly and assembly of major components (Units Repair-Overhaul).

Applicable model: SY419 on and after the following VIN No.

SEDAN
JSAEGC51S00300001

WAGON
JSAEGC51W00300001

Whenever servicing the above applicable model, consult this manual.
And for any section, item or descripton not found in this manual, refer to the related manuals mentioned below.

The contents are classified into sections each of which is given a section number as indicated in the Table of Contents on the next page. And on the first page of each individual section is an index of that section.
This manual should be kept in a handy place for ready reference of the service work.
Strict observance of the so specified items will enable one to obtain the full performance of the vehicle.

When replacing parts or servicing by diassembling, it is recommnded to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others.
Therefore, note that illustrations may differ from the vehicle being actually serviced.
The right is reserved to make changes at any time without notice.

RELATED MANUALS

Manual Name	Manual No.
SY413/SY416/SY418 Service Manual	99500-60G20-01E
SY413/SY416/SY418/SY419 Wiring Diagram Manual	99512-60G60-015
All Models Deisel Diagnosis Manual	99501-66G10-01E (967-GB-04/97)
Overhaul Checking Tuning Manual	99501-66G21-01E (9608GB 15/06/2000)

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

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NOTE:
The screen toned sections are included in “SY413/SY416/SY418 SERVICE MANUAL”.

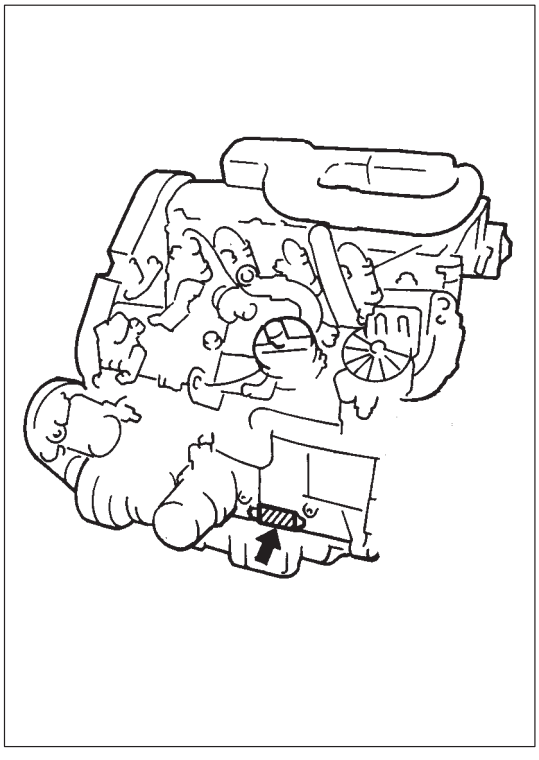
SECTION 0A

GENERAL INFORMATION

NOTE:
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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IDENTIFICATION INFORMATION

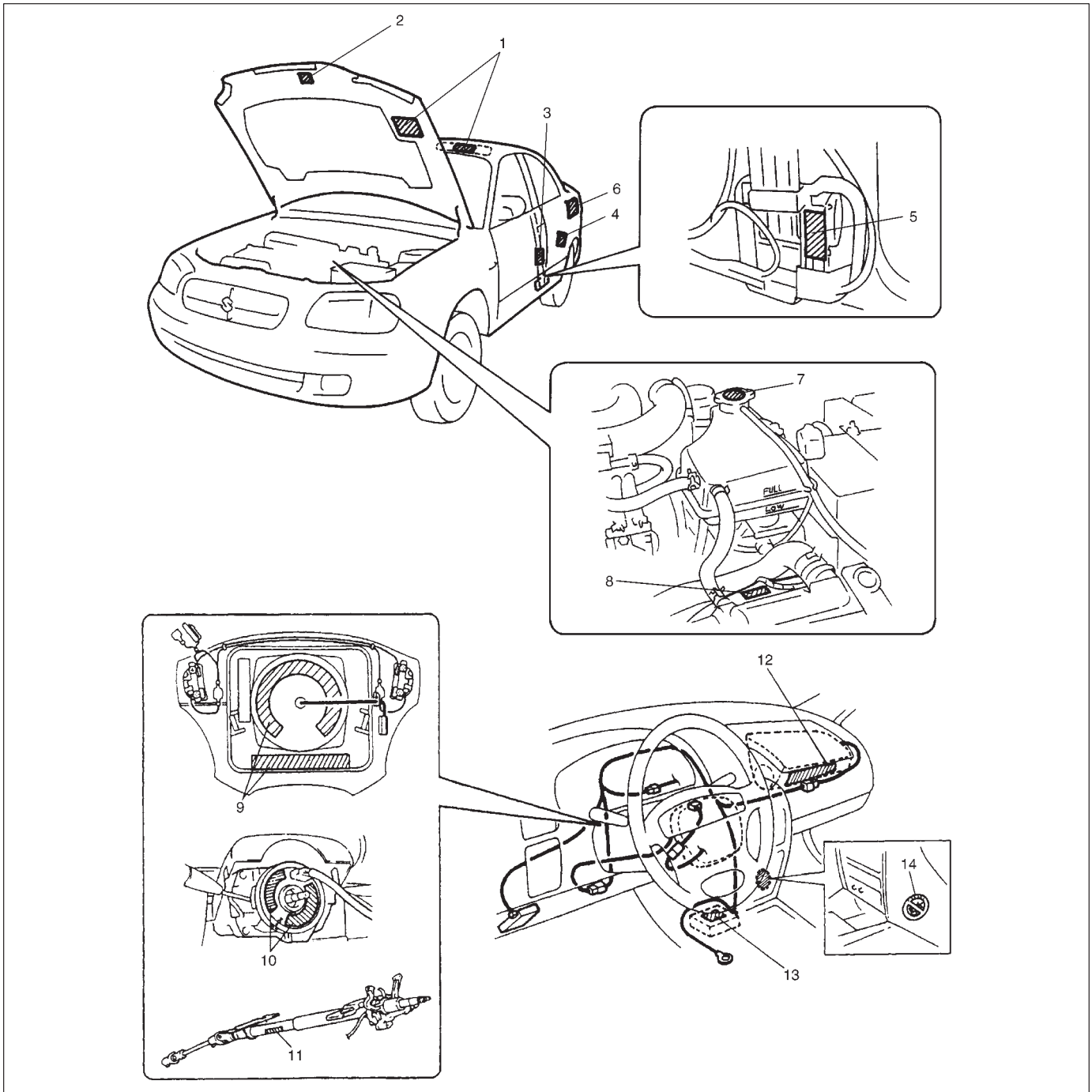
ENGINE IDENTIFICATION NUMBER

The number is punched on cylinder block.

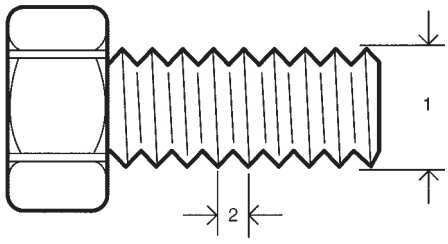
WARNING, CAUTION AND INFORMATION LABELS

The figure below shows main labels among others that are attached to vehicle component parts. When servicing and handling parts, refer to WARNING/CAUTION instructions printed on labels.
If any WARNING/CAUTION label is found stained or damaged, clean or replace it as necessary.

NOTE:
Air bag CAUTION/WARNING labels are attached on the vehicle equipped with air bag system only.



1. Air bag caution label
2. Smoke level label
3. Tire information placard
4. Child lock caution label
5. Seat belt pretensioner warning label (if equipped)
6. Fuel limitation label
7. Coolant degassing tank cap (radiator cap) warning label
8. Engine cooling fan warning label
9. Air bag warning label on driver air bag (inflator) module
10. Air bag warning label on combination switch and contact coil assembly
11. Air bag caution label on steering column
12. Air bag warning label on passenger air bag (inflator) module
13. Air bag warning label on SDM
14. Child seat warning label (if equipped)



1. Diameter
2. Pitch

FASTENER INFORMATION

METRIC FASTENERS

Most of the fasteners used for this vehicle are metric. When replacing any fasteners, it is most important that replacement fasteners be the correct diameter, thread pitch and strength.

CAUTION:
Note that both ISO and JIS type bolts and nuts are used for the engine assembly and related parts. Even when the diameter of the thread is the same, its pitch may vary between these two types. Installing a mismatched bolt or nut will cause damage to the thread. As the first step, make sure to tighten it by hand temporarily and if it feels tight, check the thread pitch for correct matching.

SECTION 0B

MAINTENANCE AND LUBRICATION

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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MAINTENANCE SCHEDULE

NORMAL CONDITION SCHEDULE

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
	km (⌣1,000)	15	30	45	60	75	90
	Miles (⌣1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
1. ENGINE							
1-1. Accessory drive belt		—	—	I	—	—	R
1-2. Camshaft timing belt		Replace every 120,000 km (72,000 miles).					
1-3. Engine oil and oil filter		Replace every 10,000 km (6,000 miles) or 8 months.					
1-4. Engine coolant		—	—	R	—	—	R
1-5. Exhaust system		—	I	—	I	—	I
1-6. Heater (Glow) plugs		—	—	—	—	I	—
3. FUEL SYSTEM							
3-1. Air cleaner filter	Paved-road	—	R	—	R	—	R
	Dusty condition	Refer to “Severe Driving Condition” schedule.					
3-2. Fuel lines		—	I	—	I	—	I
3-3. Fuel filter		Replace at 1st 10,000 km (6,000 miles) and then, every 20,000 km (12,000 miles). Drain water every 10,000 km (6,000 miles)					
3-4. Fuel tank		—	—	I	—	—	I

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
	km (×1,000)	15	30	45	60	75	90
	Miles (×1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
5. BRAKE							
5-1. Brake discs and pads (thickness, wear, damage)		I	I	I	I	I	I
Brake drums and shoes (wear, damage)		–	I	–	I	–	I
5-2. Brake hoses and pipes (leakage, damage, clamp)		–	I	–	I	–	I
5-3. Brake fluid		–	R	–	R	–	R
5-4. Brake lever and cable (damage, stroke, operation)		Inspect at first 15,000 km (9,000 miles) only.					
6. CHASSIS AND BODY							
6-1. Clutch (Travel and fluid level)		–	I	–	I	–	I
6-2. Tires/wheel discs (wear, damage, rotation)		I	I	I	I	I	I
6-3. Propeller shafts (4WD) and drive shafts		–	–	I	–	–	I
6-4. Suspension system (tightness, damage, rattle, breakage)		–	I	–	I	–	I
6-5. Steering system (tighteness, damage, breakage, rattle)		–	I	–	I	–	I
6-6. Manual transmission oil (I: 1st 15,000 km only)		I	–	R	–	–	R
6-7. Rear differential oil (4WD) (R: 1st 15,000 km only)		R or I	–	I	–	I	–
6-8. Automatic transmission	Fluid level	–	I	–	I	–	I
	Fluid change	Replace every 165,000 km (99,000 miles).					
	Fluid hose	–	–	–	R	–	–
6-9. All latches,hinges and locks		–	I	–	I	–	I
6-10. Power steering (if equipped)		I	I	I	I	I	I

NOTES:

○ **"R": Replace or change**

○ **"I": Inspect and correct or replace if necessary**

MAINTENANCE RECOMMENDED UNDER SEVERE DRIVING CONDITIONS

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, it is recommended that applicable maintenance operation be performed at the particular interval as given in the chart below.

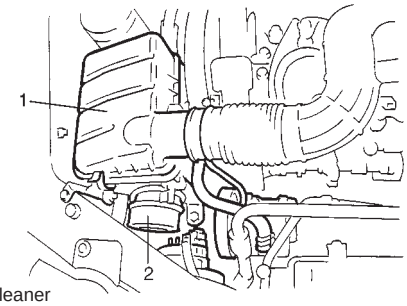
Severe condition code

A- Repeated short trips
B- Driving on rough and/or muddy roads
C- Driving on dusty roads
D- Driving in extremely cold weather and/or salted roads
E- Repeated short trips in extremely cold weather
F- Leaded fuel use
G- Town use/Towing a trailer/Sustained high speed driving/Hot climates above 30· C (86· F)/ Low quality lubricants or fuel
H- Trailer towing (if admitted)

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
– B C D – – – –	ITEM 1-1 Accessory drive belt	I	Every 15,000km (9,000 miles) or 12 months
		R	Every 45,000km (27,000 miles) or 36 months
A – C D E – G –	ITEM 1-2 Camshaft timing belt	R	Every 75,000km (45,000 miles)
A – C D E F G H	ITEM 1-3 Engine oil and filter	R	Every 5,000km (3,000 miles) or 4 months
– – C – – – – –	ITEM 3-1 Air cleaner filter *1	I	Every 2,500km (1,500 miles)
		R	Every 30,000km (18,000 miles) or 24 months
– – C – – – G –	ITEM 3-3 Fuel filter	R	Every 10,000km (6,000 miles) or 8 months
– B C D – – – H	ITEM 6-2’ Wheel bearings	I	Every 15,000km (9,000 miles) or 12 months
– B – D E – – H	ITEM 6-3 Propeller shafts (4WD) and drive shafts	I	Every 15,000km (9,000 miles) or 12 months
– B – – E – – H	ITEM 6-6 and 6-7 Manual transmission oil and differential oil (4WD)	R	Every 30,000km (18,000 miles) or 24 months
– B – – E – – H	ITEM 6-8 Automatic transmission fluid	R	Every 30,000km (18,000 miles) or 24 months

NOTES:

“R”: Replace or change
“I”: Inspect and correct or replace if necessary
***1 Inspect or replace more frequently if necessary.**



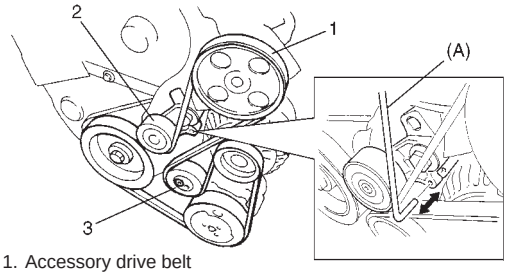
1. Air cleaner
2. Air cleaner suction pipe

MAINTENANCE SERVICE

ENGINE

ITEM 1-1
Accessory Drive Belt Inspection and Replacement
Inspection

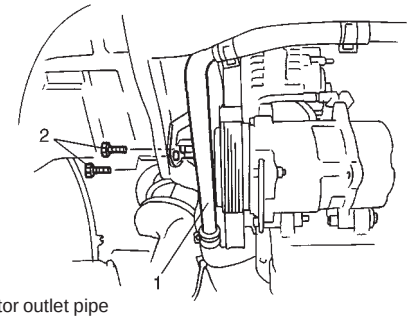
1) Remove air cleaner and air cleaner suction pipe.



1. Accessory drive belt
2. Dynamic roller tensioner
3. Roller tensioner

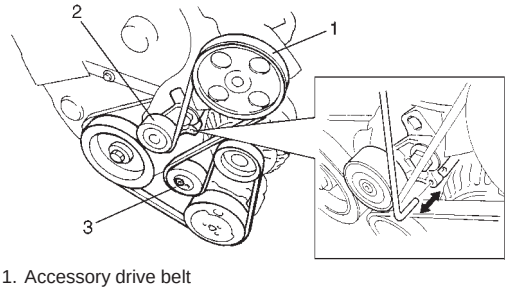
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
   If any of above conditions are found replace accessory drive belt.
3) Using special tool (A), check that dynamic roller tensioner hole and generator mount bracket hole are aligned.
   If they are not aligned, perform following items.

   Special Tool
   (A): 09919-56520/OUT0000075



1. Radiator outlet pipe
2. Radiator outlet pipe bolt

   i) Remove engine right side under cover.
   ii) Remove radiator outlet pipe tightening bolts.

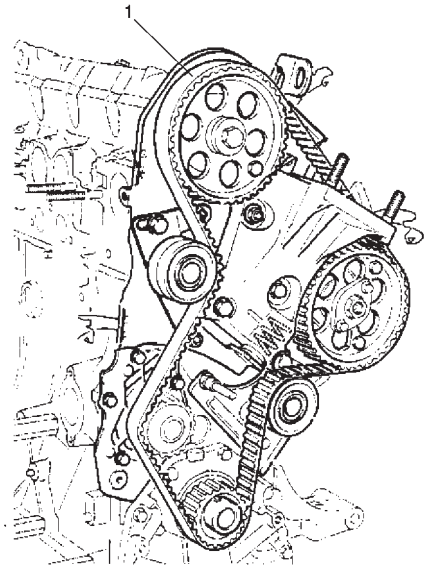


1. Accessory drive belt
2. Dynamic roller tensioner
3. Roller tensioner

   iii) Adjust belt tension by referring to step 3) to 7) of “Accessory Drive Belt Installation” in SECTION 6H.
   If belt tension can not be adjusted within specified tension, replace the generator belt.

Replacement

Replace drive belt with new one. Refer to “Accessory Drive Belt” in SECTION 6H for replacement procedure.



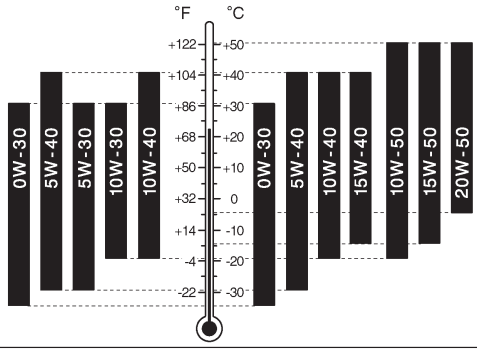
1. Camshaft timing belt

ITEM 1-2

Camshaft Timing Belt Replacement

Replace belt with new one. Refer to “Timing Belt” in SECTION 6A4 for replacement procedure.

CAUTION:
- **Do not bend or twist timing belt.**
- **Do not allow timing belt to come into contact with oil, water, etc.**

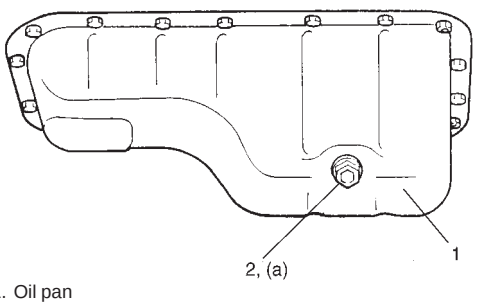


ITEM 1-3

Engine Oil and Oil Filter Change

It is recommended to use engine oil of ACEA B2-96, CCMC PD-2 or API CF (except CF-2) or higher quality level oils.

Select the appropriate oil viscosity according to the left chart. Always change oil and oil filter as soon as possible after driving in a dust storm.

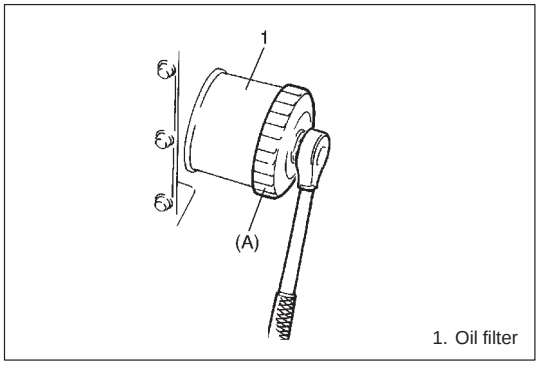


1. Oil pan
2. Oil drain plug

Before draining engine oil, check engine for oil leakage. If any evidence of leakage is found, make sure to correct defective part before performing the following work.

1) Drain engine oil by removing drain plug.
2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

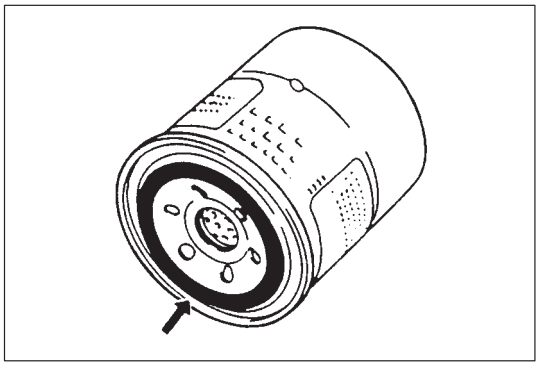
Tightening Torque
(a): 30 N·m (3.0 kg-m, 21.5 lb-ft)



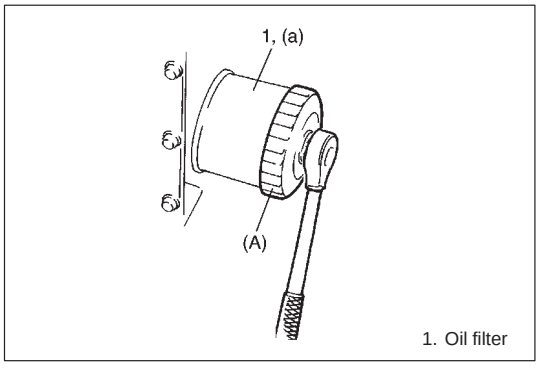
1. Oil filter

3) Loosen oil filter by using oil filter wrench (Special tool).

Special Tool
(A): 09915-46510



4) Apply engine oil to new oil filter O-ring.
5) Screw new filter on oil filter stand by hand until filter O-ring contacts with mounting surface.

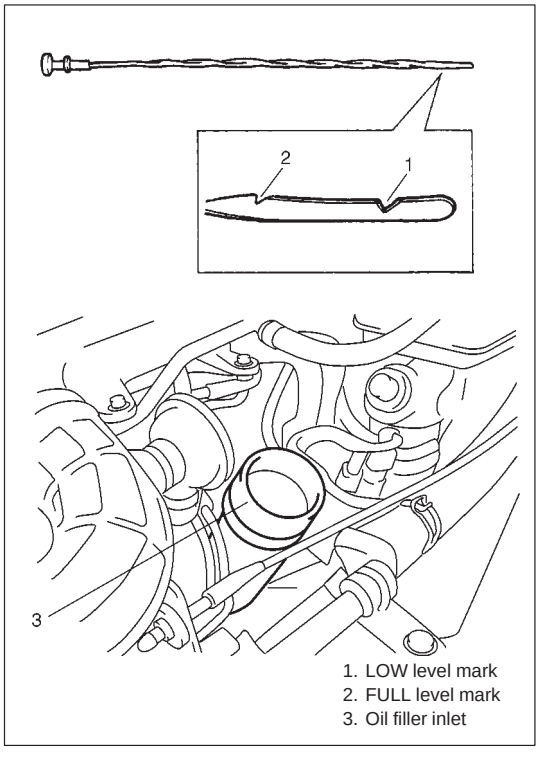


1. Oil filter

6) Tighten filter to specified torque.

Special Tool
(A): 09915-46510

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)



1. LOW level mark
2. FULL level mark
3. Oil filler inlet

7) Remove dipstick and oil filler cap. Replenish oil through oil filler inlet until oil level is brought to FULL level mark on dipstick. (Amount of oil: about 3.5 liters or 7.4/6.2 US/Imp pt.).

NOTE:
Note that amount of oil required when actually changing oil may somewhat differ from this data depending on various conditions (temperature, viscosity, etc.).

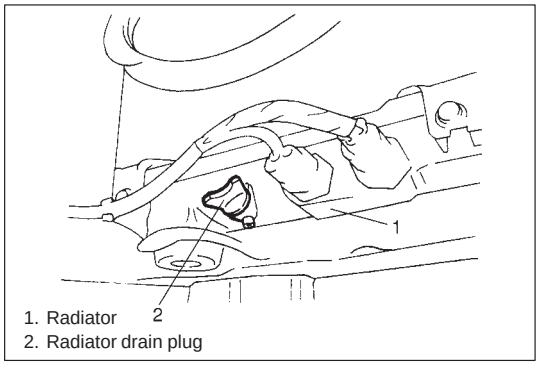
8) Install oil filler cap and dipstick. Start engine and run it for three minutes. Stop it and wait another 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.
9) Check oil filter and drain plug for oil leakage.

ITEM 1-4
Engine Coolant Change

WARNING:
To help avoid danger of being burned, do not remove degassing tank cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

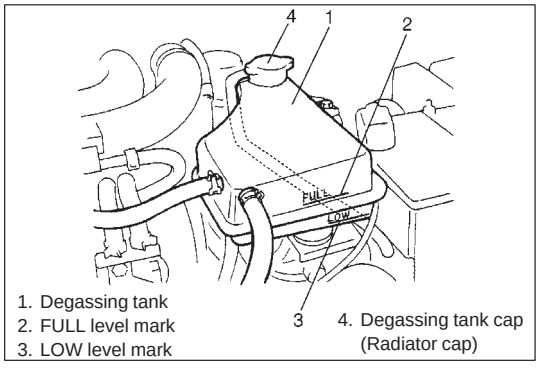
CAUTION:
When changing engine coolant, use mixture of 50% water and 50% ethylene-glycol base coolant (Anti-freeze/ Anti-corrosion coolant) for the market where ambient temperature falls lower than – 16°C (3°F) in winter and mixture of 70% water and 30% ethylene-glycol base coolant for the market where ambient temperature doesn't fall lower than –16°C (3°F).
Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene-glycol base coolant should be used for the purpose of corrosion protection and lubrication.

1) Remove degassing tank cap when engine is cool.



1. Radiator
2. Radiator drain plug

2) Loosen radiator drain plug to drain coolant.
3) Tighten drain plug securely.

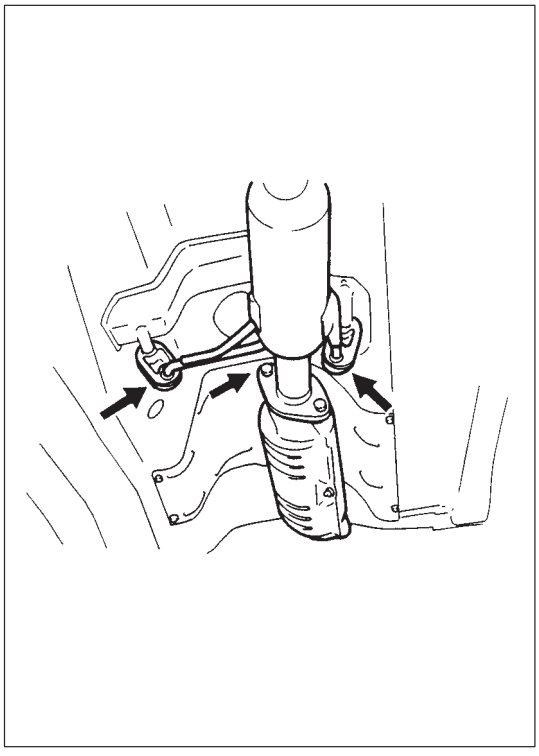


1. Degassing tank
2. FULL level mark
3. LOW level mark
4. Degassing tank cap (Radiator cap)

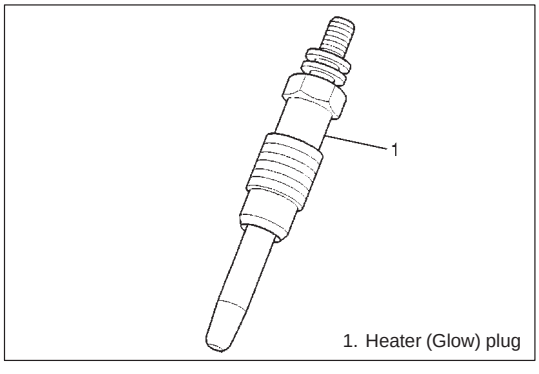
4) Fill cooling system with specified coolant through degassing tank filler inlet until coolant level reaches FULL level mark.
Run engine until radiator upper hose is hot and then for 2 minutes at about 2,000 r/min, while replenishing coolant. This drives out any air which may still be trapped within cooling system.
Add coolant as necessary until coolant level reaches FULL level mark. Reinstall degassing tank cap.
Refer to Section 6B of this manual for "Coolant Capacity".

ITEM 1-5
Exhaust System Inspection

WARNING:
To avoid danger of being burned, do not touch exhaust system when it is still hot.
Any service on exhaust system should be performed when it is cool.



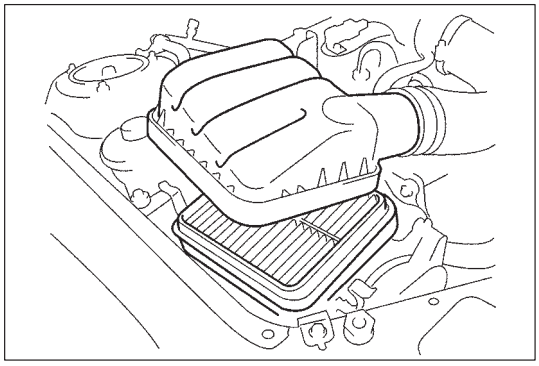
Check exhaust system as follows:
- ○ Check rubber mountings for damage and deterioration.
- ○ Check exhaust system for leakage, loose connections, dents, and damages.
  If bolts or nuts are loose, tighten them to specification.
  Refer to SECTION 6K for torque specification of bolts and nuts.
- ○ Check nearby body areas for damaged, missing or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into vehicle.
- ○ Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to floor carpet.
- ○ Any defects should be fixed at once.



1. Heater (Glow) plug

ITEM 1-6
Heater (Glow) Plugs Inspection

Check for external damage such as deformation, scratch, crack, etc.

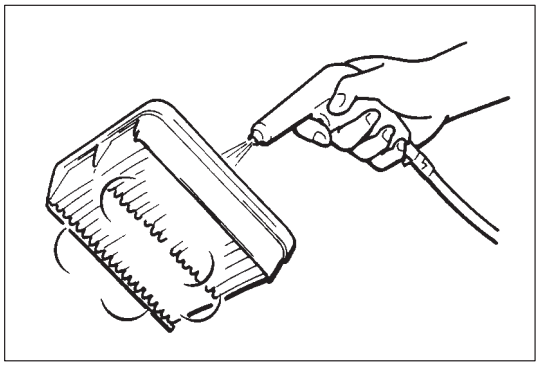


FUEL SYSTEM

ITEM 3-1

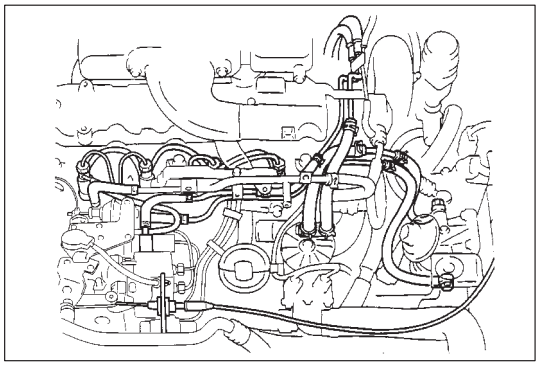
Air Cleaner Filter Replacement

1) Unclamp air cleaner case clamps.
2) Replace air cleaner filter with new one.
3) Clamp case securely.



Air Cleaner Filter Inspection

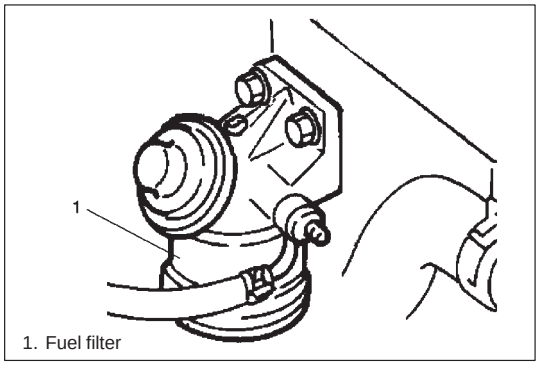
1) Visually check that air cleaner filter is not excessively dirty, damaged or oily.
2) Clean filter with compressed air from air outlet side of filter (i.e., the side facing up when installed).



ITEM 3-2

Fuel lines Inspection

Check fuel lines for loose connection, deterioration or damage which could cause leakage.
Make sure all clamps are secure.
Replace any damaged or deteriorated parts.
There should be no sign of fuel leakage or moisture at any fuel connection.



1. Fuel filter

ITEM 3-3

Fuel Filter Replacement

WARNING:
This work must be performed in a well ventilated area and away from any open flames (such as gas hot water heaters).

Replace fuel filter with new one referring to FUEL FILTER in Section 6E3.

Water Draining of Fuel Filter

Bleed fuel filter of water referring to FUEL FILTER in Section 6E3.

ITEM 3-4

Fuel Tank Inspection

Check fuel tank for corrosion, deterioration or damage which could cause leakage.

If a problem is found, repair or replace.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine oil	Minimum quality level required is ; ACEA B2-96, CCMC PD-2 or API CF (except CF-2) (Refer to engine oil viscosity chart in item 1-3)
Engine coolant	Ethylene-glycol base coolant (“Antifreeze/Anticorrosion coolant”)
Brake fluid	DOT 3
Manual transmission oil	See oil chart on Section 7A.
Power steering fluid	See material table on Section 3B1.
Door hinges	Engine oil
Engine hood latch	Engine oil
Key lock cylinder	Spray lubricant

SECTION 1B

AIR CONDITIONING (OPTIONAL)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

CAUTION:
The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).

NOTE:

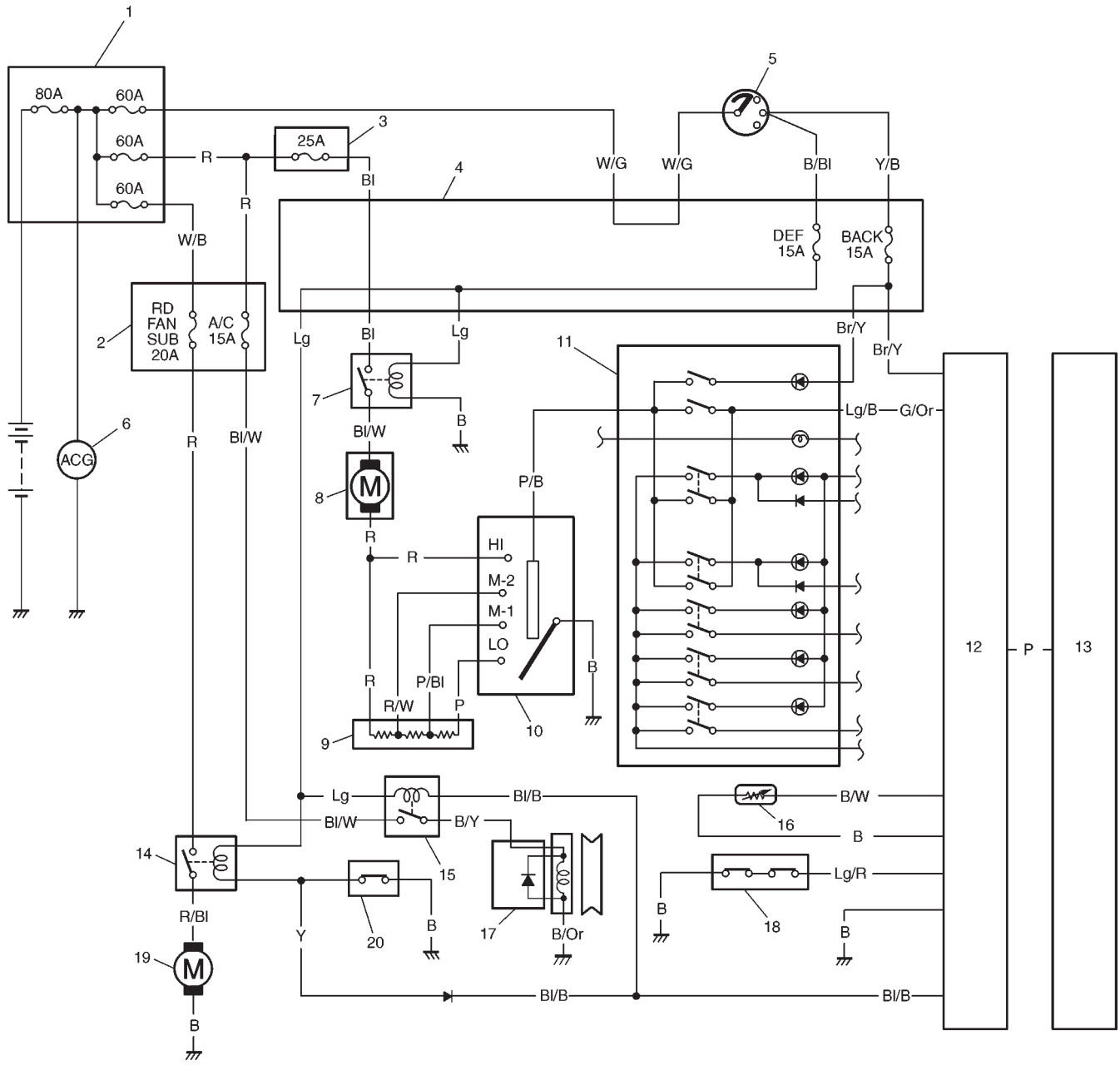
- **For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.**
- **For basic servicing method of the air conditioning system that is not described in this section, refer to AIR CONDITIONING BASIC MANUAL (Part number: 99520-02130).**

CONTENTS

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SPECIAL TOOLS 1B-16

GENERAL DESCRIPTION

WIRING CIRCUIT



1. Main fuse box
2. Fuse and relay box
3. Cassette fuse
4. Junction box (J/B)
5. Ignition switch
6. Generator
7. Blower fan motor relay
8. Blower fan motor
9. Blower fan motor resistor
10. Blower fan switch
11. Mode controller
12. A/C amplifier
13. ECM
14. Sub radiator fan motor relay
15. Compressor relay
16. A/C evaporator thermistor
17. Compressor
18. Dual pressure switch
19. Sub radiator fan motor
20. Radiator fan switch

FUNCTION OF EACH CONTROL COMPONENT

ECM

ECM output A/C control signal to A/C amplifier when ECM detect the following conditions.

○ Engine coolant temperature:

above 113·C (235·F) . . . . . OFF

(below 111·C (232·F) . . . . . ON)

○ Engine speed:

below 500 r/min. . . . . OFF

above 500 r/min. . . . . ON

DIAGNOSIS

GENERAL

Trouble	Possible Cause	Measure
Cool air does not come out (A/C system improper operative)	**A/C system inoperative**	
	○ No refrigerant	Recover, evacuation and charging.
	○ Fuse blown	Check “BACK”, “DEF”, “RD FAN SUB” and “A/C” fuses and check for short circuit.
	○ A/C switch faulty	Check A/C switch.
	○ Blower motor switch faulty	Check blower motor switch.
	○ A/C thermistor faulty	Check A/C thermistor.
	○ Dual pressure switch faulty	Check dual pressure switch.
	○ Wiring or grounding faulty	Repair as necessary.
	○ A/C controller and its circuit faulty	Check A/C controller and its circuit.
	○ A/C ON permission signal in ECM faulty	Check A/C ON permission signal.
	Compressor inoperative (dose not rotate)	
	○ Fuse blown	Check “A/C” and “DEF” fuses, and check for short circuit.
	○ Compressor relay faulty	Check compressor relay.
	○ Magnet clutch faulty	Check magnet clutch.
	○ Drive belt loose or broken	Tighten or replace drive belt.
	○ Compressor faulty	Check compressor.
	○ A/C ON permission signal in ECM faulty	Check A/C ON permission signal.
	○ A/C controller faulty	Check A/C controller.
	Sub radiator fan motor (condenser fan motor) inoperative	
	○ Fuse blown	Check “SUB RD FAN” and “DEF” fuses, and check for short circuit.
	○ Sub radiator fan motor relay faulty	Check sub radiator fan motor relay.
	○ Wiring or grounding faulty	Repair as necessary.
	○ Sub radiator fan motor faulty	Check sub radiator fan motor.
	Blower motor inoperative	
	○ Fuse blown	Check “DEF” fuse and cassette fuse, and check for short circuit.
	○ Blower fan motor relay faulty	Check blower fan motor relay.
	○ Blower fan motor resistor faulty	Check blower fan motor resistor.
	○ Blower fan motor switch faulty	Check blower fan motor switch.
	○ Wiring or grounding faulty	Repair as necessary.
	○ Blower fan motor faulty	Check blower fan motor.

Trouble	Possible Cause	Measure
Cool air does not come out or insufficient cooling (A/C system normal operative)	○ Insufficient or excessive charge of refrigerant	Check charge of refrigerant.
	○ Refrigerant leak in system	Check system for leaks.
	○ Condenser clogged	Check condenser.
	○ Evaporator clogged or frosted	Check evaporator
	○ A/C evaporator thermistor faulty	Check A/C evaporator thermistor.
	○ A/C controller faulty	Check A/C controller.
	○ Expansion valve faulty	Check expansion valve.
	○ Drive belt slipping	Check or replace drive belt.
	○ Magnetic clutch faulty	Check magnetic clutch.
	○ Compressor faulty	Check compressor.
	○ Air in A/C system	Replace receiver/dryer, and evacuation and charging.
	○ Air leaking from cooling unit or air duct	Repair as necessary.
	○ Heater and ventilation system faulty	Check air inlet box assembly (blower unit). Check heater control lever assembly. Check heater assembly.
	○ Blower motor faulty	Check blower motor.
	○ Excessive compressor oil existing in A/C system	Pull out compressor oil in A/C system, and replenish compressor oil, and replace compressor.
Cool air does not come out, only intermittently	○ Wiring connection faulty	Repair as necessary.
	○ Expansion valve faulty	Check expansion valve.
	○ Excessive moisture in A/C system	Replace receiver/dryer, and evacuation and charging.
	○ A/C controller faulty	Check A/C controller.
	○ Magnetic clutch faulty	Check magnetic clutch.
	○ Excessive charge of refrigerant	Check charge of refrigerant.
Cool air comes out only at high speeds	○ Condenser clogged	Check condenser.
	○ Insufficient charge of refrigerant	Check charge of refrigerant.
	○ Air in A/C system	Replace receiver/dryer, and evacuation and charging.
	○ Drive belt slipping	Check or replace drive belt.
	○ Compressor faulty	Check compressor.
Cool air does not come out, only at high speeds	○ Excessive charge of refrigerant	Check charge refrigerant.
	○ Evaporator frosted	Check evaporator and A/C evaporator thermistor.
Insufficient velocity of cooled air	○ Evaporator clogged or frosted	Check evaporator.
	○ Air leaking from cooling unit or air duct	Repair as necessary.
	○ Blower motor faulty	Check blower motor.
	○ Wiring or grounding faulty	Repair as necessary.

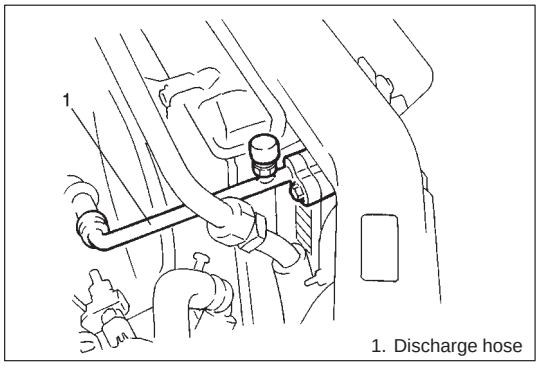
ON-VEHICLE SERVICE

REFRIGERATING SYSTEM

CONDENSER

REMOVAL

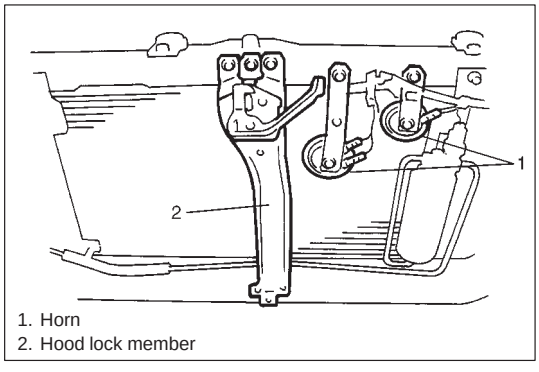
1) Disconnect negative (–) cable at battery.
2) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount added to the system.
3) Remove front bumper referring to “FRONT BUMPER” in Section 9 of the Service Manual as mentioned in FOREWORD of this manual.



1. Discharge hose

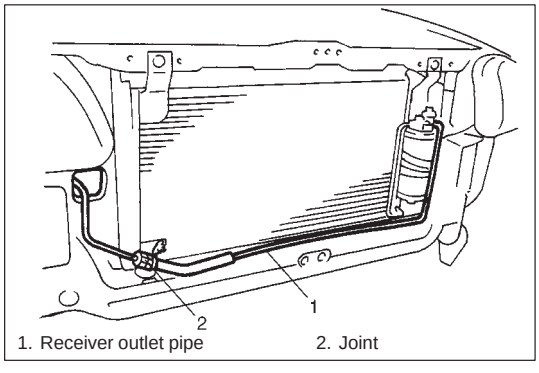
4) Disconnect compressor discharge hose from condenser inlet fittings.

   NOTE:
   As soon as above hose and pipe are disconnected, cap opened fittings so that moisture and dust do not enter into condenser.



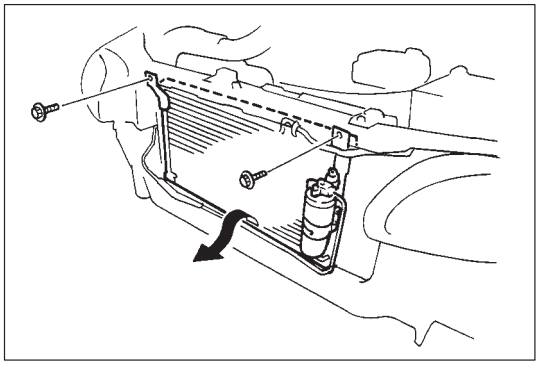
1. Horn
2. Hood lock member

5) Remove horn.
6) Remove hood latch and hood lock member.



1. Receiver outlet pipe 2. Joint

7) Disconnect coupler from dual pressure switch.
8) Remove receiver outlet pipe.



9) Remove condenser with receiver/dryer.

NOTE:
Be careful not to damage fins of condenser and radiator.

10) Remove receiver/dryer from condenser.

INSTALLATION

WARNING:
After installing hood latch, be sure to perform its adjustment according to procedure described in Service Manual. Failure to perform this adjustment may cause hood to be unlatched, resulting in an accident.

Reverse removal sequence to install condenser noting the following point.

- ○ When replacing condenser, add 20 – 30 cm^3 (20 – 30 cc) of compressor oil from compressor suction-side.
- ○ Evacuate and charge system according to previously described procedure.
- ○ Regulate hood latch referring to “HOOD” in Section 9 of the Service Manual mentioned in FOREWORD of this manual.

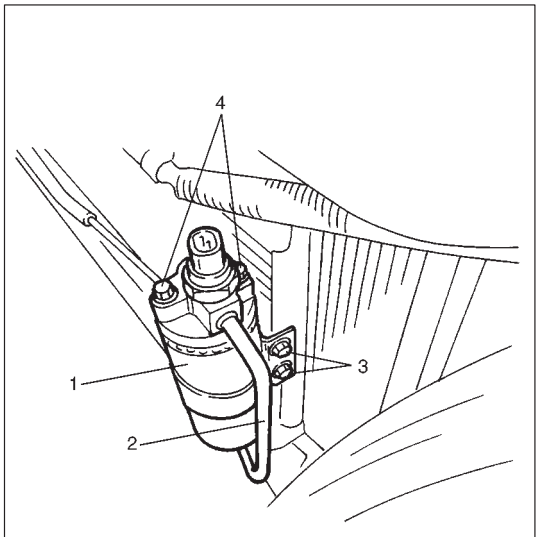
RECEIVER/DRYER

INSPECTION

Use a leak tester to check for gas leakage at sight glass and fittings.

REMOVAL

1) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount added to the system.
2) Remove front bumper referring to “FRONT BUMPER” in Section 9 of the Service Manual mentioned in FOREWORD of this manual.
3) Disconnect receiver outlet pipe.
4) Remove receiver/dryer from its holder.

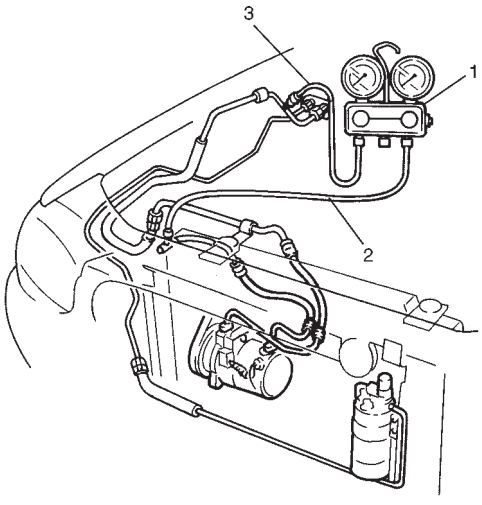


1. Receiver/dryer
2. Receiver outlet pipe
3. Receiver/dryer bracket bolt
4. Receiver outlet pipe bolt

INSTALLATION

Reverse removal sequence to install receiver/dryer noting the following points.

- ○ When replacing receiver/dryer, add 10 cm^3 (10 cc) of compressor oil from compressor suction-side.
- ○ Blind plugs of receiver/dryer should not be removed until just before receiver/dryer is installed.
- ○ Evacuate and charge system according to previously described procedure.



1. Manifold gauge set
2. High pressure side (Discharge side hose)
3. Low pressure side (Suction side hose)

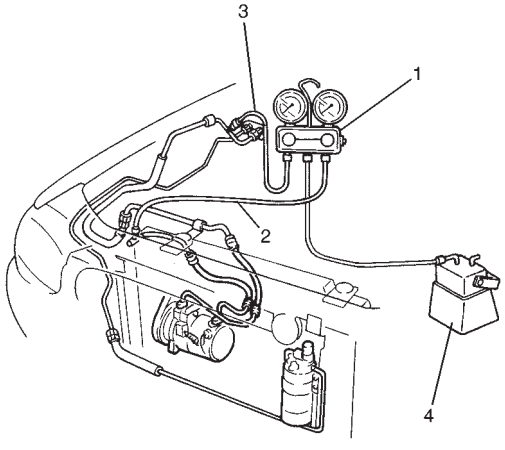
COMPRESSION SYSTEM

COMPRESSOR

INSPECTION

1) Install manifold gauge set, referring to “TROUBLESHOOTING PROCEDURE USING MANIFOLD GAUGE SET” in the same section of the Service Manual mentioned in FOREWORD of this manual.
2) Run engine at fast idle.
3) Check compressor for the following:
   - ○ High pressure gauge reading is not low and low pressure gauge reading is not higher than normal, referring to “CORRECTIVE MEASURES FOR MALFUNCTION SYMPTOMS” under “DIAGNOSIS” in the same section of the Service Manual as mentioned in FOREWORD of this manual.
   - ○ Metallic sound.
   - ○ Leakage from shaft seal.

   If any of the above checks indicates a defect, repair compressor.

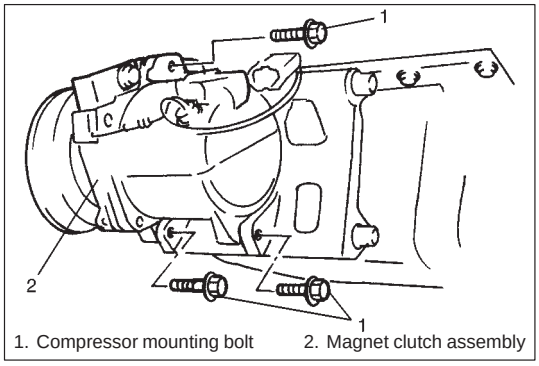


1. Manifold gauge set
2. High pressure side (Discharge side hose)
3. Low pressure side (Suction side hose)
4. Recovery and recycling equipment

REMOVAL

1) Run engine at idle with air conditioning on for 10 minutes.
2) Disconnect negative (–) cable at battery.
3) Recover refrigerant from refrigeration system using recovery and recycling equipment.
4) Remove drive belt. Refer to Section 6H “CHARGING SYSTEM” section in this manual for removal.
5) Disconnect magnet clutch lead wire from engine wire harness.
6) Disconnect suction and discharge flexible hoses from compressor.

NOTE:
Cap open fittings immediately to keep moisture out of system.

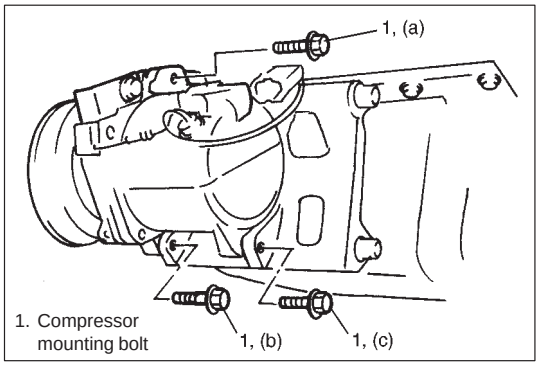


1. Compressor mounting bolt 2. Magnet clutch assembly

7) Loosen compressor mounting bolt, then remove compressor from its mounting bracket.

8) Drain compressor oil from compressor, and measure its amount.

NOTE:
When removing compressor, be careful not to damage fins of condenser.



1. Compressor mounting bolt

INSTALLATION

Reverse removal procedure noting the following point.

○ Tighten compressor mounting bolt as below order.

Compressor mounting bolt tightening order: (a) → (b) → (c)

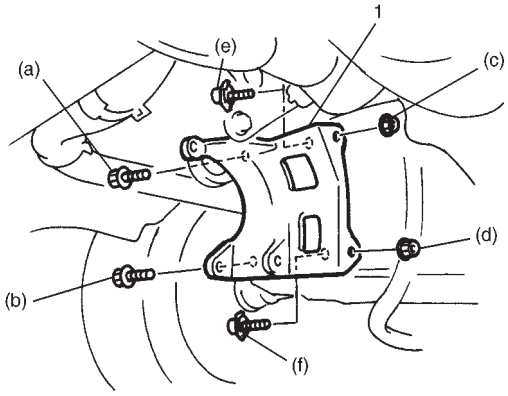
○ Tighten compressor mounting bolt as specified torque.

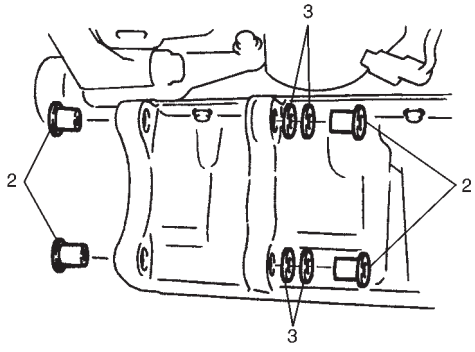
Tightening Torque
(a), (b) and (c): 26 N·m (2.6 kg-m, 19.0 lb-ft)

○ Pour new compressor oil with the same amount as that drained from compressor.

○ Evacuate and charge system according to previously described procedure.

NOTE:
Compressor supplied from factory is filled up with specified amount of compressor oil.
Compressor oil amount: 120 cm^3 (120 cc)





1. Compressor mounting bracket
2. Spacer
3. Washer

COMPRESSOR MOUNT

INSPECTION

1) Remove compressor. Refer to “COMPRESSOR” in this section.
2) Check mounting bolts and nuts for looseness.
3) Check mounting bracket for crack and deformation.
   If there is defect for its bracket, replace compressor mounting bracket.

REMOVAL

1) Remove compressor. Refer to “COMPRESSOR” in this section.
2) Loosen mounting bolts and nuts, and then remove compressor mounting bracket and its spacer.

INSTALLATION

Reverse removal procedure noting the following point.

○ Tighten compressor mounting bracket bolts and nuts as below order.

Compressor mounting bracket bolts and nuts tightening order: (a) → (b) → (c) → (d)

○ Tighten mounting bolts and nuts as specified torque.

Tightening Torque
(a), (b), (c) and (d): 50 N·m (5.0 kg-m, 36.0 lb-ft)

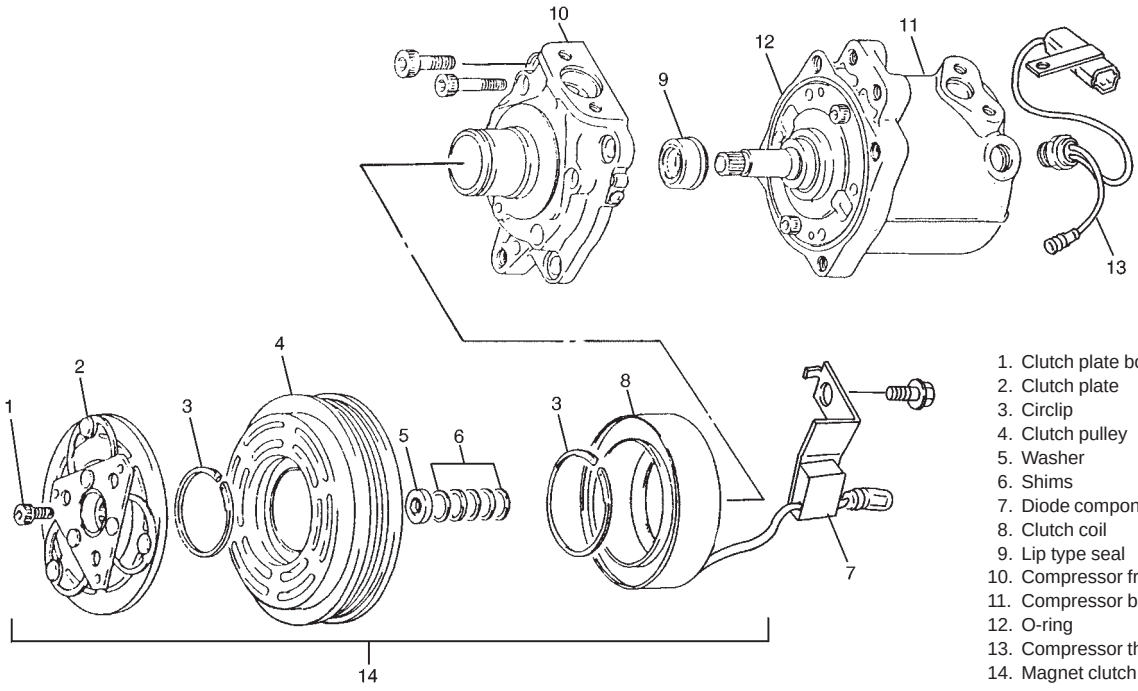
○ When flange bolt (e), (f) is attached, be careful to kinds of flange bolt.

Flange bolt (e): Wide angle flange bolt.
Flange bolt (f): Narrow angle flange bolt.

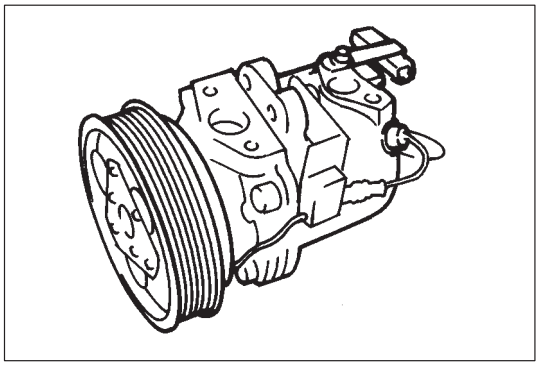
DRIVE BELT

Refer to “ACCESSORY DRIVE BELT” in Section 6H for detail.

MAGNET CLUTCH



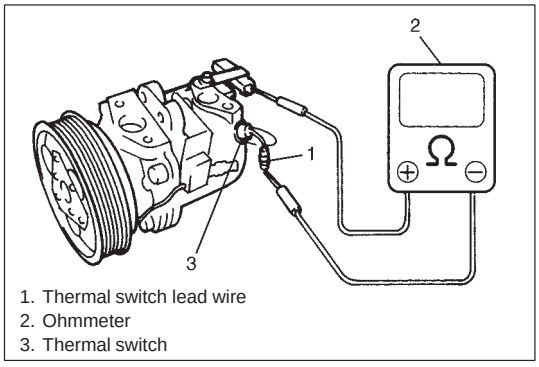
1. Clutch plate bolt
2. Clutch plate
3. Circlip
4. Clutch pulley
5. Washer
6. Shims
7. Diode component
8. Clutch coil
9. Lip type seal
10. Compressor front head
11. Compressor body assembly
12. O-ring
13. Compressor thermal switch
14. Magnet clutch assembly



INSPECTION

Clutch plate and pulley

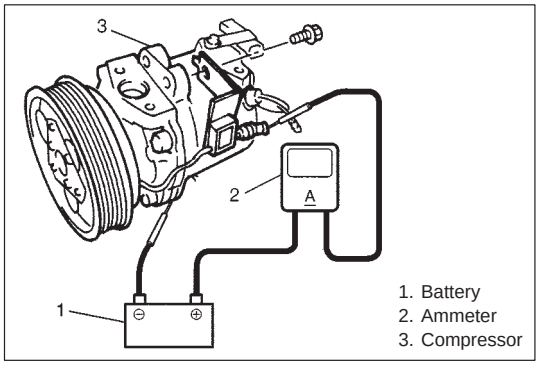
1) Check clutch plate and clutch pulley for wear and oil soaked conditions respectively.
2) Check clutch pulley bearing for noise, wear and grease leakage.
   If there is any defect for clutch plate and clutch pulley, replace magnet clutch component.



1. Thermal switch lead wire
2. Ohmmeter
3. Thermal switch

Thermal switch

1) Disconnect thermal switch lead wire from clutch coil lead wire.
2) Use an ohmmeter to check thermal switch for continuity.
   If it is no continuity, replace thermal switch.

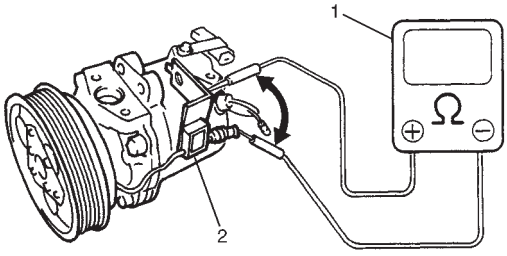


1. Battery
2. Ammeter
3. Compressor

Clutch coil

1) Connect battery and ammeter to compressor as shown.
2) Check that steadily locks between clutch plate and clutch pulley.
3) Check that ammeter indicates specified current.
   If check result is without specified current, replace magnet clutch assembly.

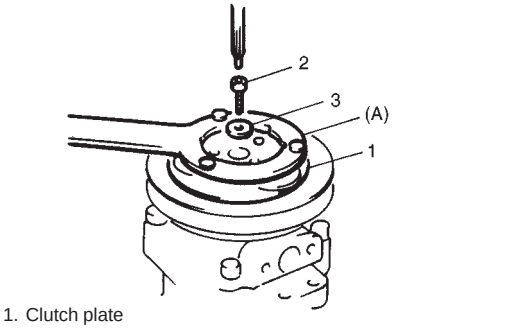
Specified current of magnet clutch: 4 A MAX at 12 V



1. Ohmmeter
2. Diode component

Diode component

Check both directions by reversing probes of ohmmeter and there should be only one-way continuity for diode component.
If check result is not satisfactory, replace magnet clutch component.



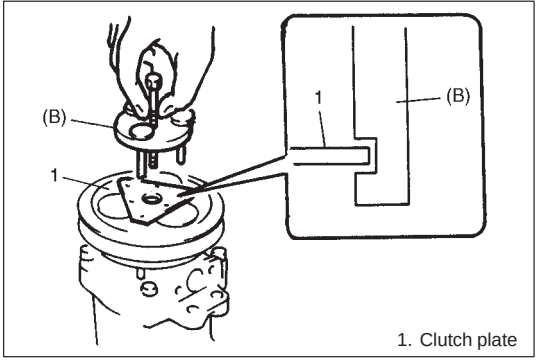
1. Clutch plate
2. Clutch plate bolt
3. Washer

REMOVAL

1) Remove compressor. Refer to "COMPRESSOR" in this section.
2) Fix clutch plate with special tool (A) and remove clutch plate bolt.

Special Tool
(A): 09991-06020

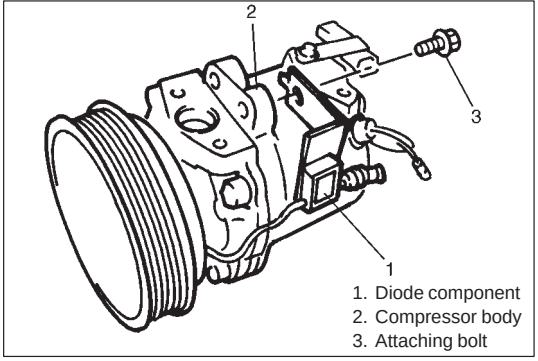
NOTE:
Do not reuse clutch plate bolt.



1. Clutch plate

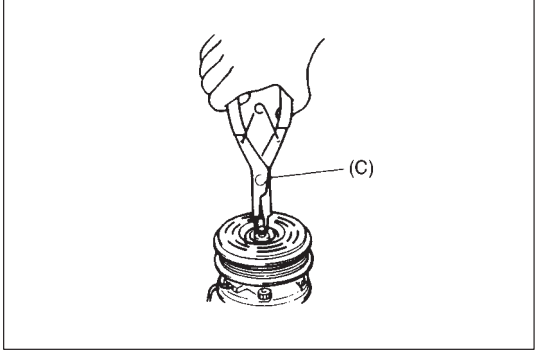
3) Using special tool (B), remove clutch plate.

Special Tool
(B): 09991-06030



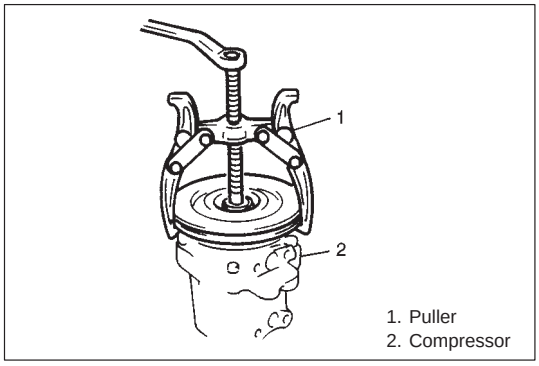
1. Diode component
2. Compressor body
3. Attaching bolt

4) Disconnect clutch coil lead wire from thermal switch.
5) Remove diode component from compressor body by loosening attaching bolt.



6) Remove shims from shaft.
7) Using special tool (C), remove circlip.

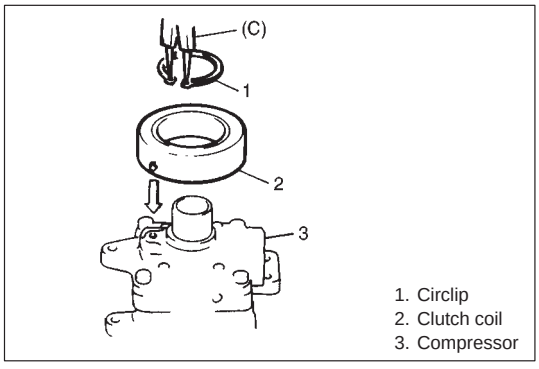
Special Tool
(C): 09900-06107



1. Puller
2. Compressor

8) Remove clutch pulley with puller.

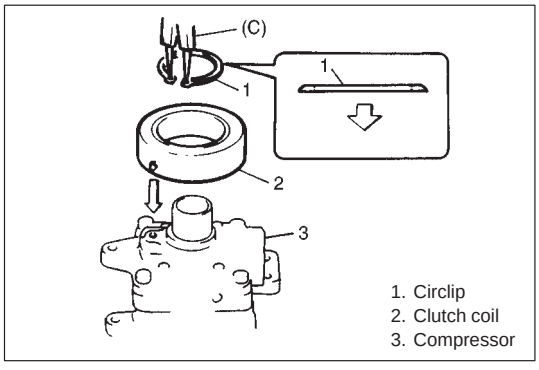
NOTE:
Be careful not to damage pulley when tapping clutch pulley.



1. Circlip
2. Clutch coil
3. Compressor

9) Remove circlip by using special tool (C).
10) Remove clutch coil from compressor.

Special Tool
(C): 09900-06107



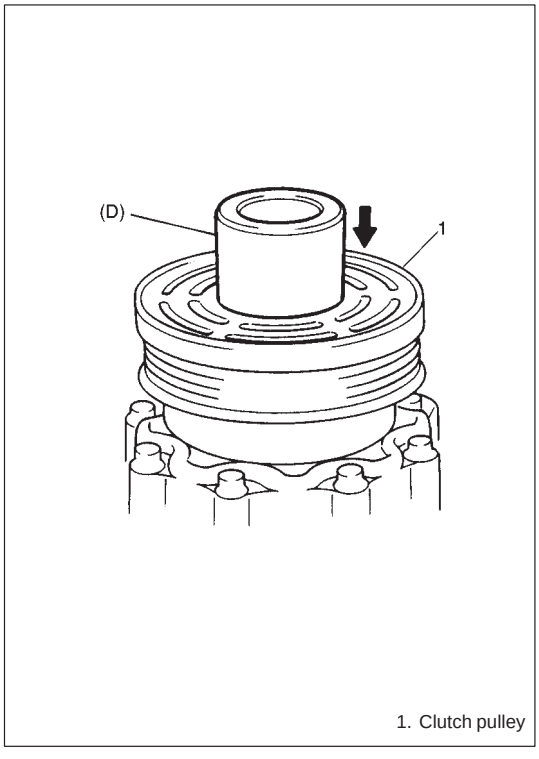
1. Circlip
2. Clutch coil
3. Compressor

INSTALLATION

1) Install clutch coil.
Protrusion on under side of clutch coil must match hole in compressor to prevent movement and correctly locate lead wire.
2) Using special tool (C), install circlip to compressor as shown.

Special Tool
(C): 09900-06107

3) Clamp covering portion of read wire.

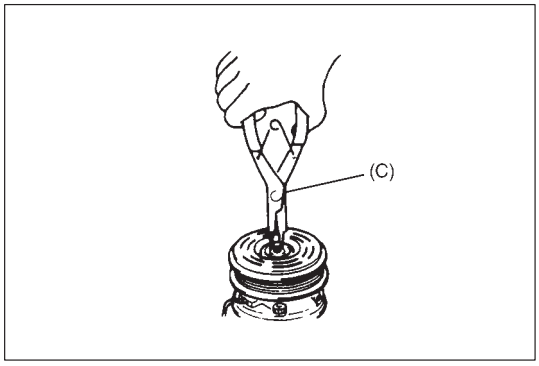


1. Clutch pulley

4) Install clutch pulley.
a) Set clutch pulley squarely over clutch pulley installation boss.
b) Place special tool (D) onto clutch bearing.
Ensure that edge rests only on inner race of bearing.

Special Tool
(D): 09991-06010

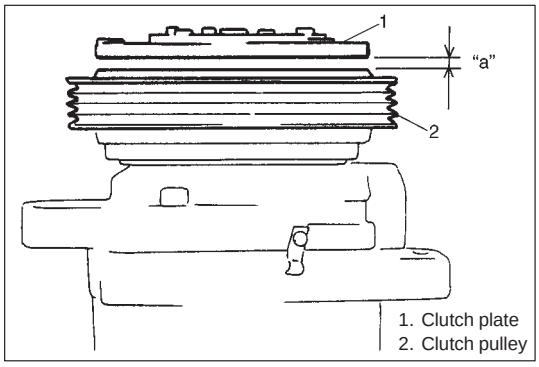
CAUTION:
Be careful not to scratch bearing seal.



5) Install circlip by using special tool (C).

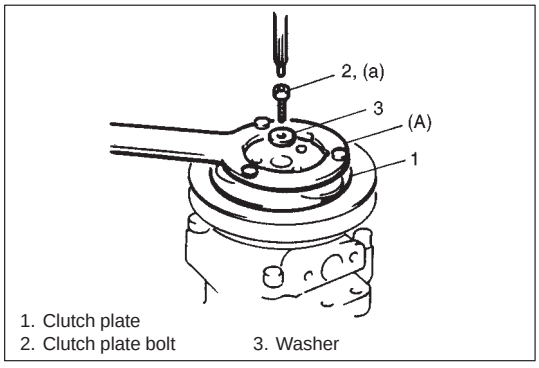
Special Tool
(C): 09900-06107

CAUTION:
Be careful not to scratch bearing seal.



6) Adjust clearance, between clutch plate and clutch pulley by putting shim(s) on compressor shaft.

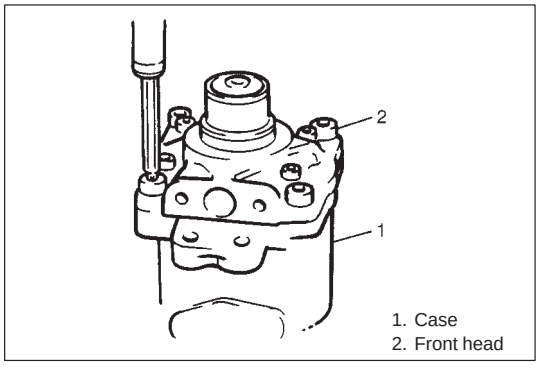
Standard clearance "a": 0.3 – 0.5 mm (0.012 – 0.020 in.)



7) Tighten new clutch plate bolt as specified below.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

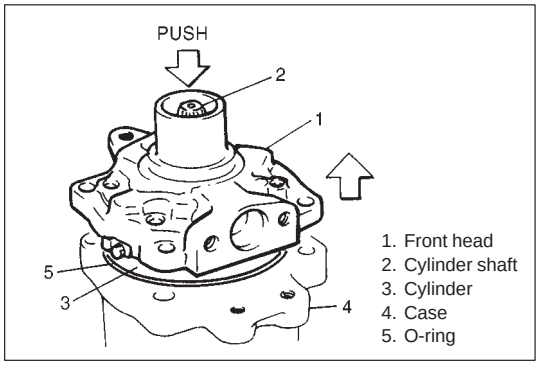
Special Tool
(A): 09991-06020



LIP TYPE SEAL

REMOVAL

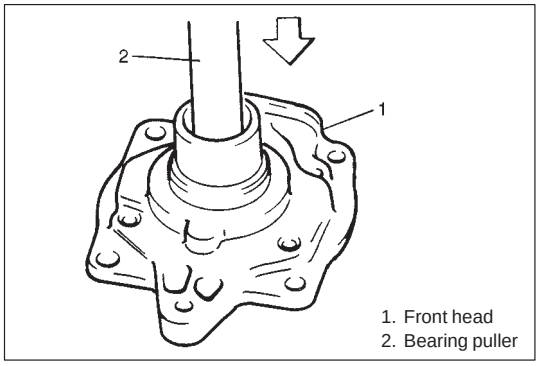
1) Remove magnet clutch referring to "MAGNET CLUTCH" in this section.
2) Remove front head mounting screws (8 pcs).



3) Remove front head by pushing cylinder shaft.

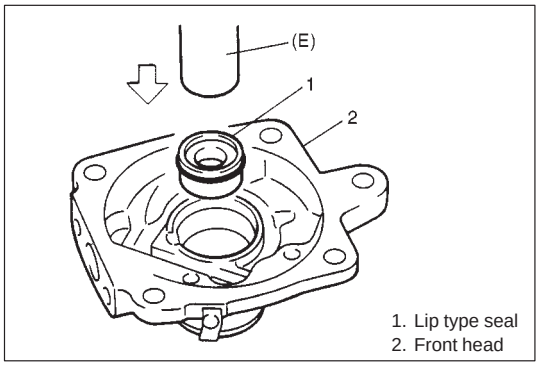
NOTE:
Be careful not to remove cylinder from case.

4) Remove O-ring.



1. Front head
2. Bearing puller

5) Remove lip type seal from front head.



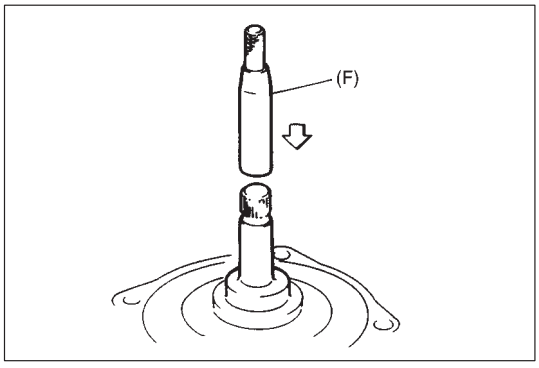
1. Lip type seal
2. Front head

INSTALLATION

1) Press-fit lip type seal into front head using special tool (E).

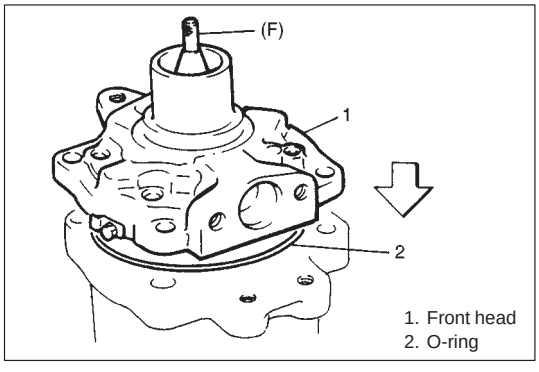
Special Tool
(E): 09991-06050

> **CAUTION:**
> **Do not reuse lip type seal once removed from compressor.**



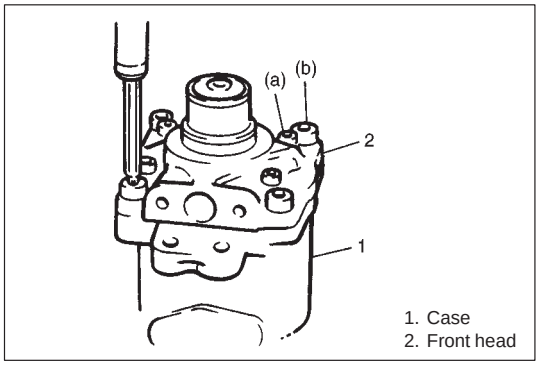
2) Coat special tool (F) surface with compressor oil and install it to the shaft.

Special Tool
(F): 09991-06040



1. Front head
2. O-ring

3) Install O-ring to case.
4) Apply compressor oil to lip type seal and O-ring.
5) Install front head assembly.



1. Case
2. Front head

6) Tighten front head bolt as specified torque.

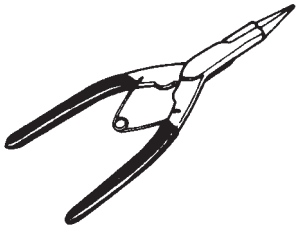
Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

NOTE:
- **Be sure to use new front head bolt and washer.**
- **Tighten bolt (a) first, and next (b).**

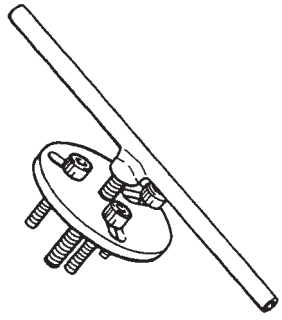
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Compressor oil	COMPRESSOR OIL (RS-20, 150 cc) 99000-99088-00D0	○ O-ring ○ Each component
Refrigerant	REFRIGERANT DRUM (200 g) 95794-50G00-0000	○ Refrigerant charge

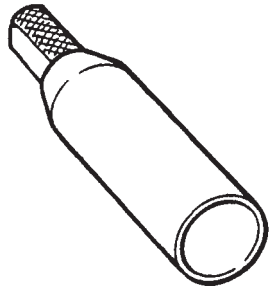
SPECIAL TOOLS



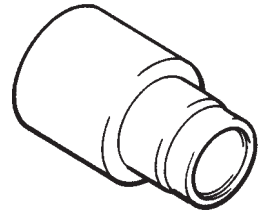
09900-06107
Snap ring pliers
(Opening type)



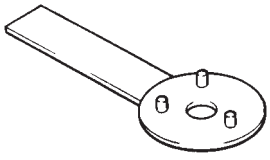
09991-06030
Armature plate remover



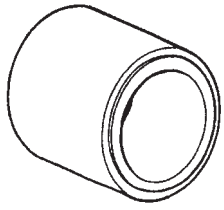
09991-06040
Lip type seal protector



09991-06050
Lip type seal installer



09991-06020
Armature plate spanner



09991-06010
Magnet clutch pulley installer

SECTION 3B1

POWER STEERING (P/S) SYSTEM

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "ON-VEHICLE SERVICE" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

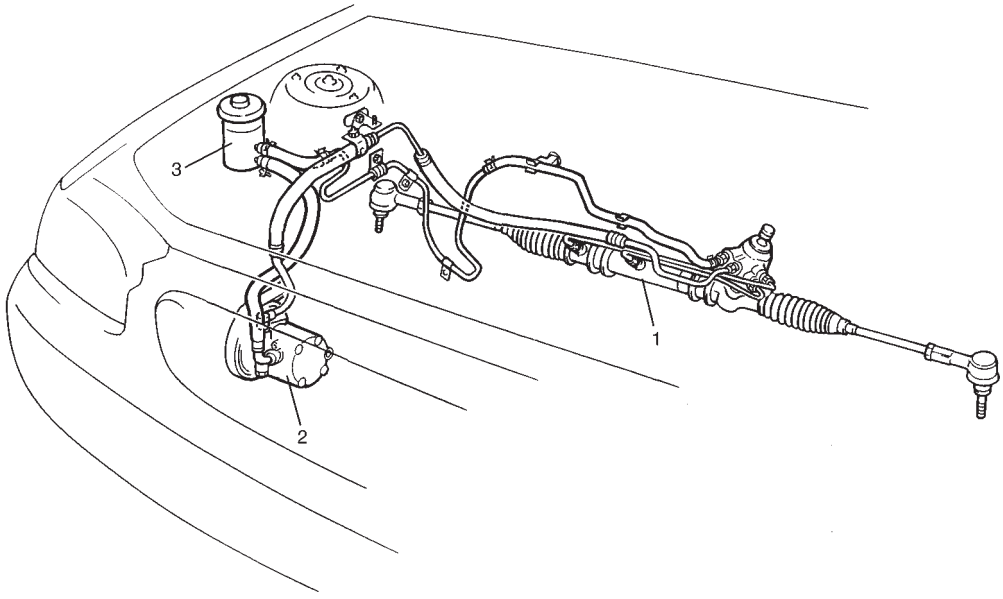
NOTE:
- **For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.**
- **Some parts in the Power Steering Gear Box cannot be disassembled or adjusted. For detailed information, refer to the description of POWER STEERING GEAR BOX COMPONENTS under REMOVE AND INSTALL POWER STEERING GEAR BOX, in same section of the service manual mentioned in FOREWORD of this manual.**
- **All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.**

CONTENTS

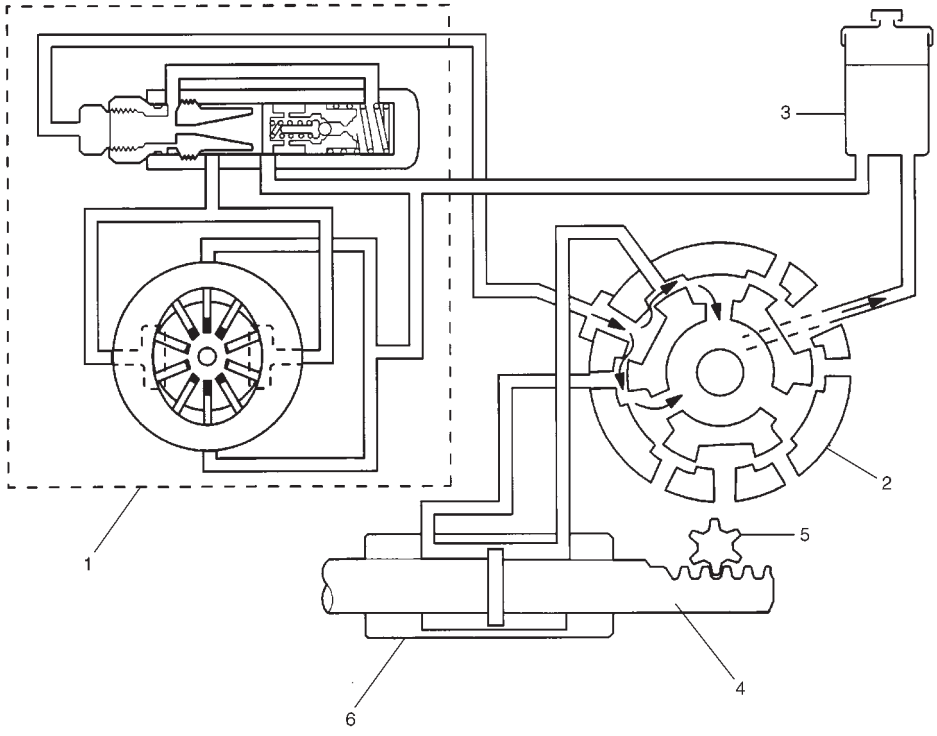
GENERAL DESCRIPTION 3B1-2
Power Steering (P/S) Pump 3B1-3
ON-VEHICLE SERVICE 3B1-4
Inspection 3B1-4
Removal and installation power steering gear box 3B1-7
Removal and installation power steering pump 3B1-8
TIGHTENING TORQUE SPECIFICATIONS 3B1-9
REQUIRED SERVICE MATERIAL 3B1-9
SPECIAL TOOLS 3B1-9

GENERAL DESCRIPTION

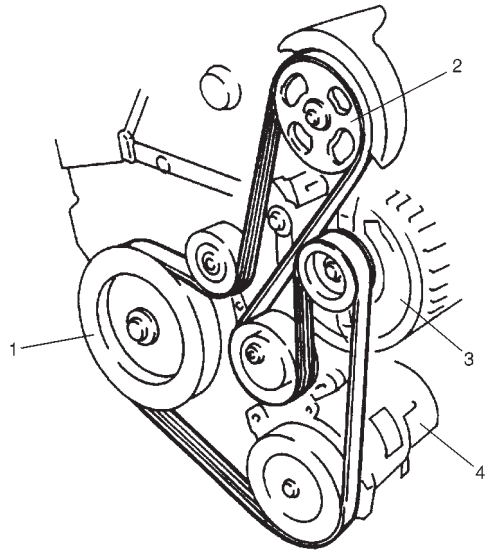
The power steering (P/S) system in this vehicle reduces the driver's effort needed in turning the steering wheel by utilizing the hydraulic pressure generated by the power steering (P/S) pump which is driven by the engine. The steering gear box consists of the rack and pinion gears and the control valve unit, hydraulic pressure cylinder unit.



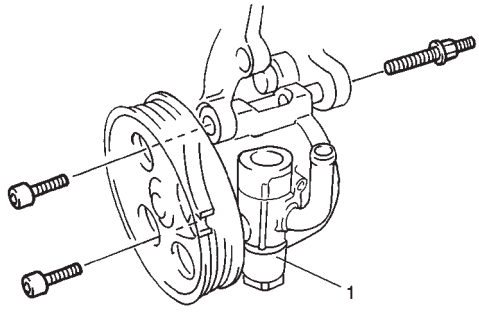
1. Power steering gear box
2. Power steering pump
3. P/S fluid reservoir



1. Pump
2. Valve section
3. Fluid reservoir
4. Rack
5. Pinion
6. Cylinder



1. Crankshaft pulley
2. P/S pump pulley
3. Generator
4. A/C compressor (if equipped)



1. P/S pump

POWER STEERING (P/S) PUMP

The power steering pump is a vane type and is driven by the V-ribbed belt from the crankshaft.

Model		Vane type
Hydraulic pressure control	Relieved pressure	8,400 kPa (84.0 kg/cm^2 or 1,194 psi)
	Control device	Flow control valve
		Relief valve
Fluid capacity of system		760 – 850 cm^3 (1.61/1.34 – 1.80/1.50 US/Imp. pt)

ON-VEHICLE SERVICE

INSPECTION

DRIVE BELT INSPECTION

Refer to SECTION 6H.

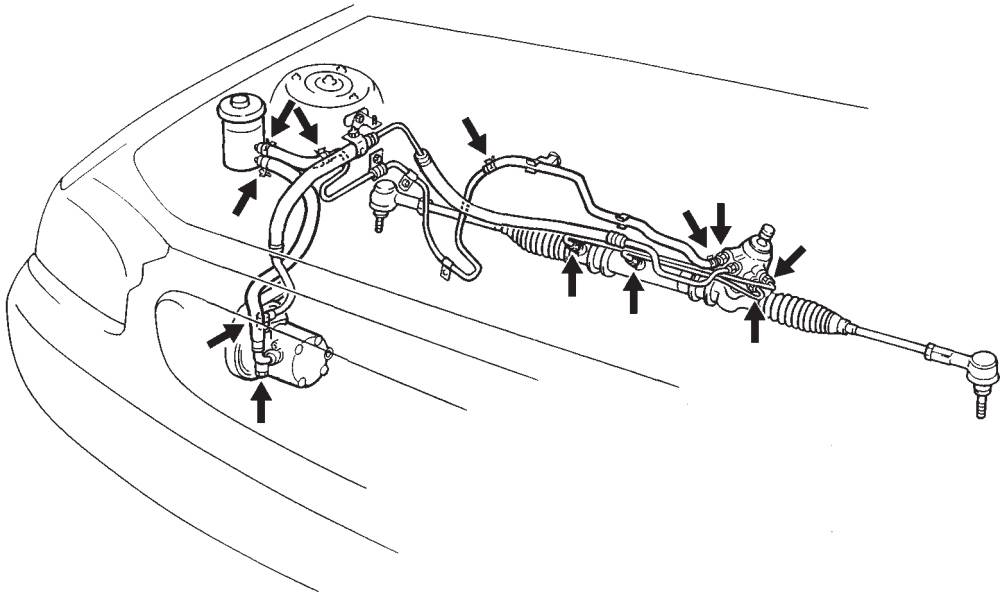
DRIVE BELT ADJUSTMENT

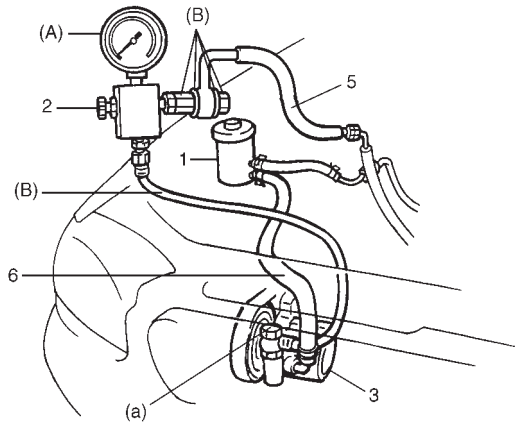
Refer to SECTION 6H.

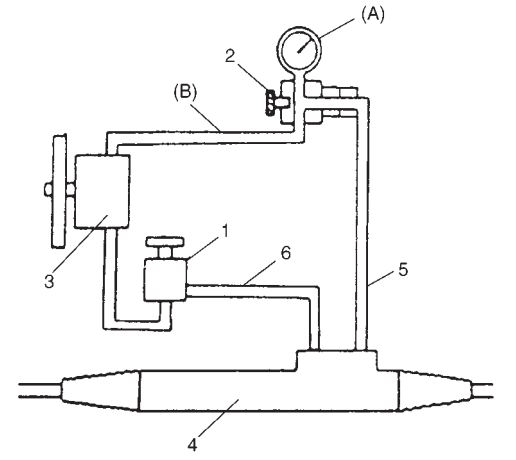
FLUID LEAKAGE

Start engine and turn steering wheel fully to the right and left so that maximum hydraulic pressure is provided. Then visually check gear box, P/S pump and fluid reservoir themselves and each joint of their connecting pipes for leakage.

CAUTION:
Never keep steering wheel turned fully for longer than 10 seconds.







1. P/S fluid reservoir
2. Gauge valve (fully open)
3. P/S pump
4. P/S gear box
5. High pressure side
6. Low pressure side

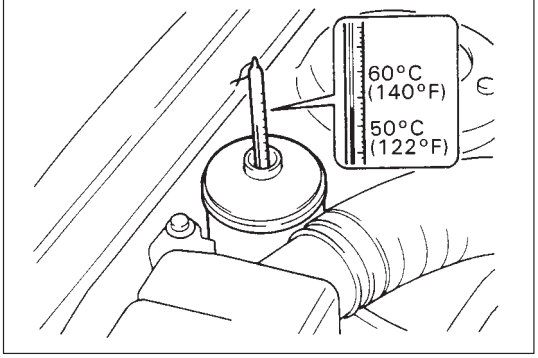
HYDRAULIC PRESSURE IN P/S CIRCUIT

1) After cleaning joint of high pressure hose and P/S pump thoroughly, disconnect hose from pump and install special tool (oil pressure gauge, attachment and hose).
   Tighten bolt and attachment to specified torque.

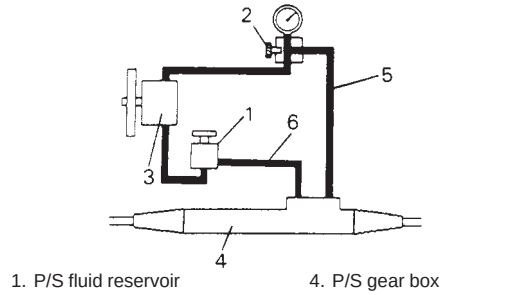
   Tightening torque
   (a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

   Special Tool
   (A): 09915-77410 (Oil pressure gauge)
   (B): 09915-77420 (Attachment & hose)

2) Check each connection for fluid leakage and bleed air.



3) With engine idling, warm up engine till temperature of fluid in reservoir rises to 50 – 60· C (122 – 140· F).

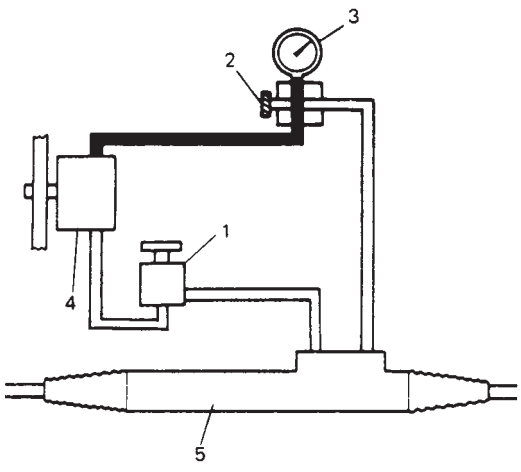


1. P/S fluid reservoir
2. Gauge valve (fully open)
3. P/S pump
4. P/S gear box
5. High pressure side
6. Low pressure side

4) Check back pressure by measuring hydraulic pressure with gauge valve fully open, engine idling and hands off steering wheel.

   Back pressure: Lower than 0 – 1500 kPa
   (0 – 15 kg/cm^2, 0 – 213 psi)

   When back pressure is higher than specified values, check control valve and piping for clogging.



1. P/S fluid reservoir
2. Gauge valve (fully close)
3. Oil pressure gauge
4. P/S pump
5. P/S gear box

5) Check relief pressure

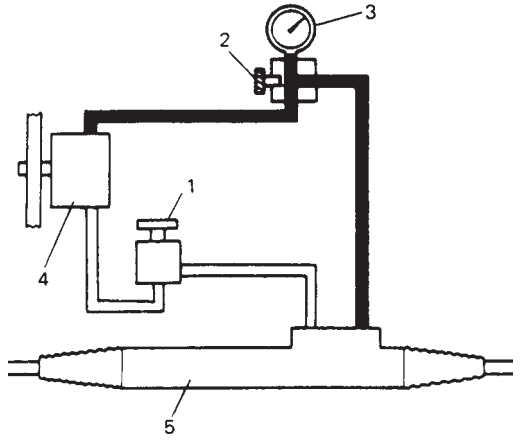
○ Increase engine speed to about 1,500 r/min (rpm). Close gauge valve gradually while watching pressure increase indicated by gauge and take reading of relief pressure (maximum hydraulic pressure).

Relief pressure: 8,200 – 8,900 kPa
(82 – 89 kg/cm^2, 1167 – 1265 psi)

○ When it is higher than specified values, possible cause is malfunction of relief valve.

○ When it is lower than specified values, possible cause is either failure of P/S pump or settling of relief valve spring.

CAUTION:
Be sure not to close gauge valve for longer than 10 seconds.



1. P/S fluid reservoir
2. Gauge valve (fully open)
3. Oil pressure gauge
4. P/S pump
5. P/S gear box

○ Next, open gauge valve fully and increase engine speed to about 1,500 r/min (rpm). Then turn steering wheel to the left or right fully and take reading of relief pressure.

Relief pressure: 8,200 – 8,900 kPa
(82 – 89 kg/cm^2, 1167 – 1265 psi)

○ When it is higher than specified values, possible cause is malfunction of relief valve.

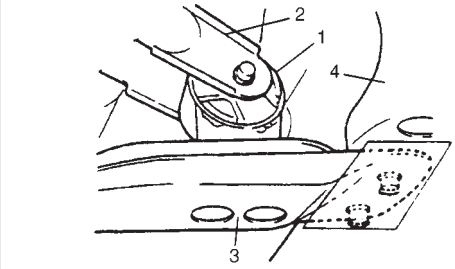
○ When it is lower than specified values, possible cause is failure in steering gear box. Replace gear box.

CAUTION:
Be sure not to hold steering wheel at fully turned position for longer than 10 seconds.

REMOVAL AND INSTALLATION POWER STEERING GEAR BOX

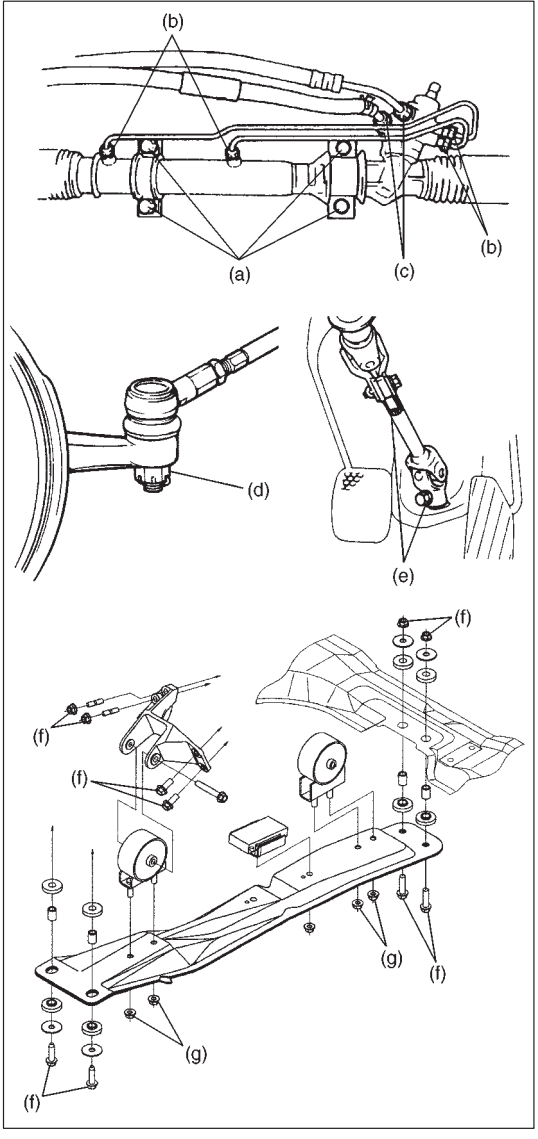
REMOVAL

1) Perform steps 1) to 6) written in REMOVAL, POWER STEERING GEAR BOX, SECTION 3B1 in service manual mentioned in FOREWORD of this manual.



1. Engine rear mounting
2. Mounting bracket
3. Mounting member
4. Suspension frame

2) Remove engine mounting member and then remove engine rear mounting bracket together with its mounting from engine.
3) Perform steps 9) to 11) written in REMOVAL, POWER STEERING GEAR BOX, SECTION 3B1 in service manual mentioned in FOREWORD of this manual.



INSTALLATION

Reverse removal procedure for installation of steering gear box noting the following points.

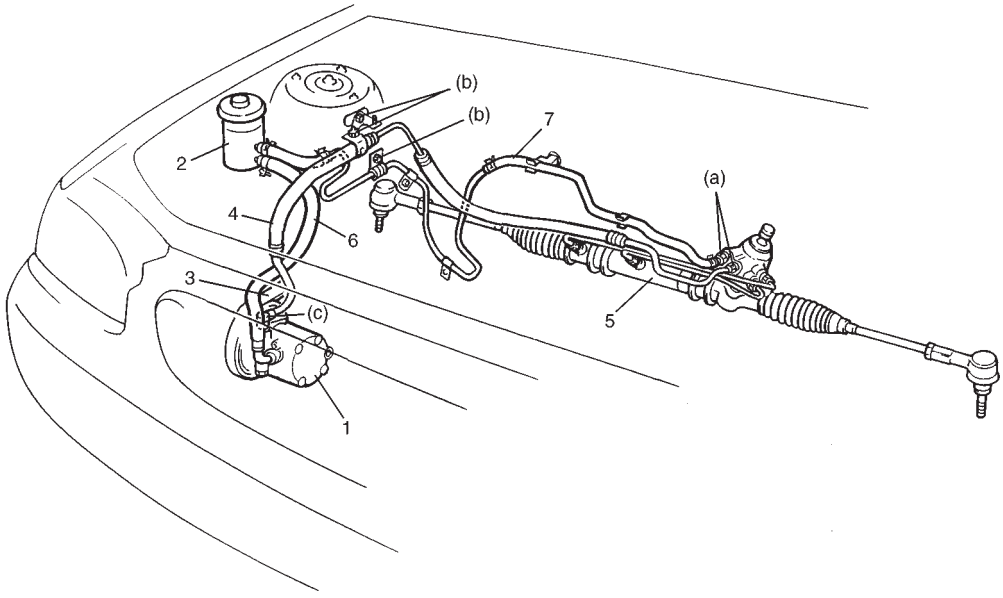
CAUTION:
Be sure to confirm that steering wheel and front tires (wheels) are in straight position when inserting steering lower joint into steering pinion shaft.

○ If a plug was put to disconnected pipe when removing steering gear box, remove that plug before reconnecting pipe.
○ Use specified torque as given below.

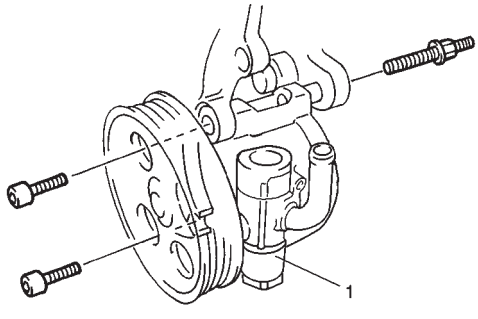
Tightening Torque
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(b): 20 N·m (2.0 kg-m, 14.5 lb-ft)
(c): 35 N·m (3.5 kg-m, 25.5 lb-ft)
(d): 35 – 55 N·m (3.5 – 5.5 kg-m, 25.5 – 39.5 lb-ft)
(e): 25 N·m (2.5 kg-m, 18.0 lb-ft)
(f): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(g): 45 N·m (4.5 kg-m, 32.5 lb-ft)

REMOVAL AND INSTALLATION POWER STEERING PUMP

Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)
(b): 6.5 N·m (0.65 kg-m, 5.0 lb-ft)
(c): 55 N·m (5.5 kg-m, 40.0 lb-ft)



1. Power steering pump assembly
2. Power steering fluid reservoir
3. Accessory drive belt
4. High pressure hose & pipe
5. Rack and pinion
6. Low pressure return hose (Tank side)
7. Low pressure return hose & pipe (Gear box side)



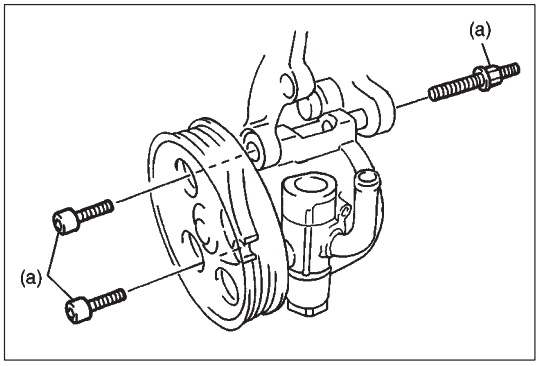
1. P/S pump

REMOVAL

NOTE:
Be sure to clean each joint of suction and discharge sides thoroughly before removal.

1) Remove drive belt, referring to SECTION 6H.
2) Disconnect high pressure hose and low pressure return hose from pump. As fluid flows out of disconnected joints, put a container under joints or a plug to hose.
3) Remove P/S pump from engine assembly.

NOTE:
Plug each port of removed pump to prevent dust or any other foreign matter from entering.



INSTALLATION
Reverse removal procedure.

Tightening Torque

(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

NOTE:
- ○ **Fill specified power steering fluid after installation and bleed air without failure.**
- ○ **Refer to structural diagram on previous page for tightening torque.**
- ○ **Check each connection for fluid leakage.**

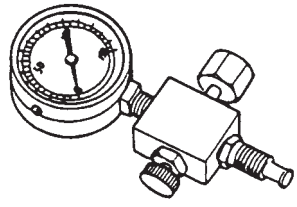
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening Torque		
	N·m	kg-m	lb-ft
High & low pressure pipe nut /bolt (pipe to gear box)	35	3.5	25.5
Pipe clamp bolt	6.5	0.65	5.0
High pressure pipe bolt (pipe to pump)	55	5.5	40.0
P/S pump mounting bolt	35	3.5	25.5

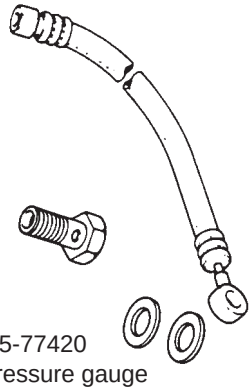
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Power steering fluid	An equivalent of DEXRON® -II, DEXRON® -IIE or DEXRON® -III	○ To fill power steering fluid reservoir ○ Parts lubrication when installing

SPECIAL TOOLS



09915-77410
Oil pressure gauge



09915-77420
Oil pressure gauge
attachment and hose set

SECTION 4

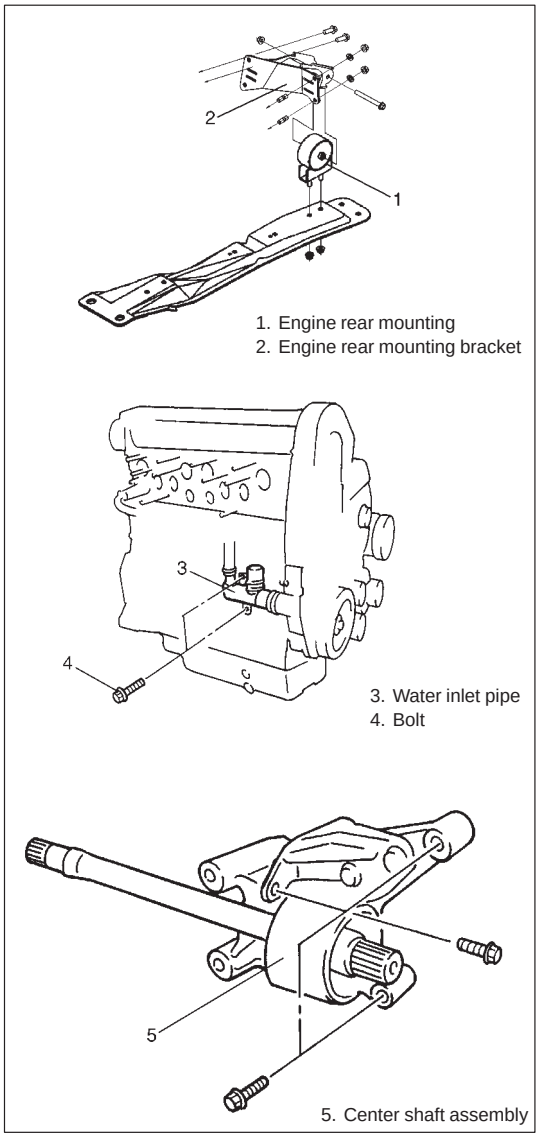
FRONT DRIVE SHAFT

NOTE:
For the descriptions (items) not found in this section of this manual, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

CONTENTS

ON-VEHICLE SERVICE
CENTER SHAFT
Removal/Installation 4-1

ON-VEHICLE SERVICE



CENTER SHAFT

REMOVAL

1) Hoist vehicle.
2) Drain engine coolant and transmission oil.
3) Remove right side drive shaft.
4) Remove engine rear mounting and its bracket.
5) Remove water inlet pipe bolts.
6) Remove center shaft.

INSTALLATION

1) Install center shaft.

CAUTION:
- **Protect differential side oil seal from any damage, preventing them from unnecessary contact while installing.**
- **Make sure that differential side joint is inserted fully and its snap ring is seated as it was.**

2) Install water inlet pipe with new O-ring.
3) Install engine rear mounting and its bracket.
4) Install right side drive shaft.
5) Fill transmission oil and engine coolant.
6) Lower vehicle.

SECTION 5

BRAKES

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

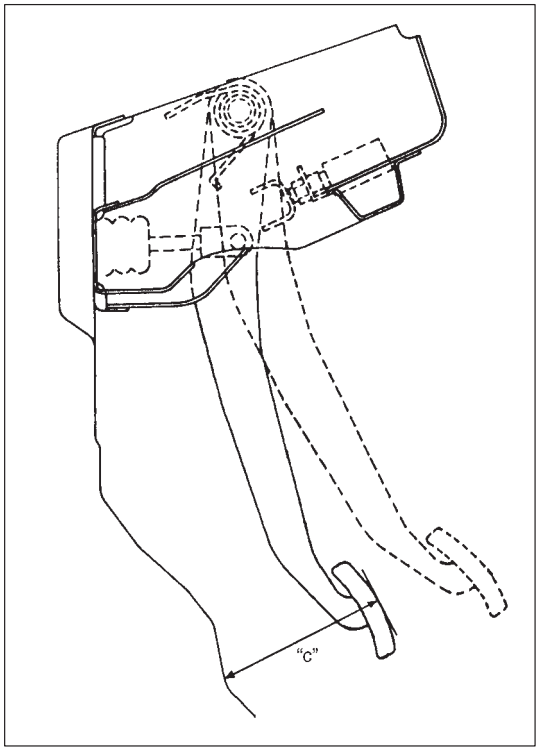
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "ON-VEHICLE SERVICE" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:

- **For the descriptions (items) not found in this section, refer to the same section of Service Manual mentioned in FOREWORD of this manual.**
- **All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.**

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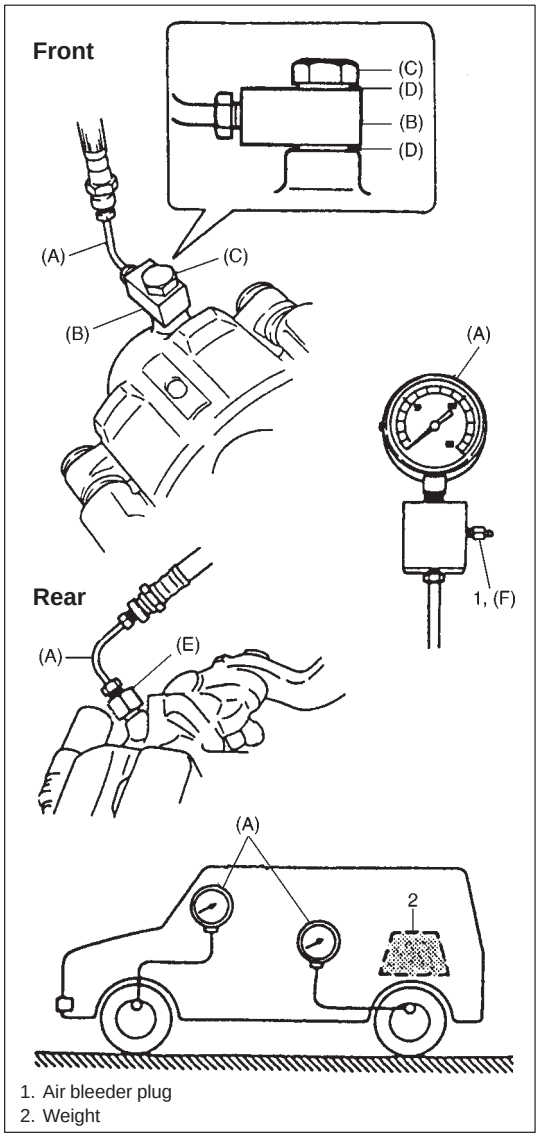
ON-VEHICLE SERVICE

EXCESSIVE PEDAL TRAVEL CHECK

1) Start engine.
2) Depress brake pedal a few times.
3) With brake pedal depressed with approximately 30 kg (66 lbs) load, measure brake pedal to wall clearance "c".

   Clearance "c": Over 70 mm (in.)

4) If clearance "c" is less than specification, the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines.
   Should clearance "c" remain less than specification even after replacement of brake shoes and bleeding of system, other possible but infrequent cause is malfunction of rear brake shoe adjusters or booster push rod length out of adjustment.



1. Air bleeder plug
2. Weight

FLUID PRESSURE TEST

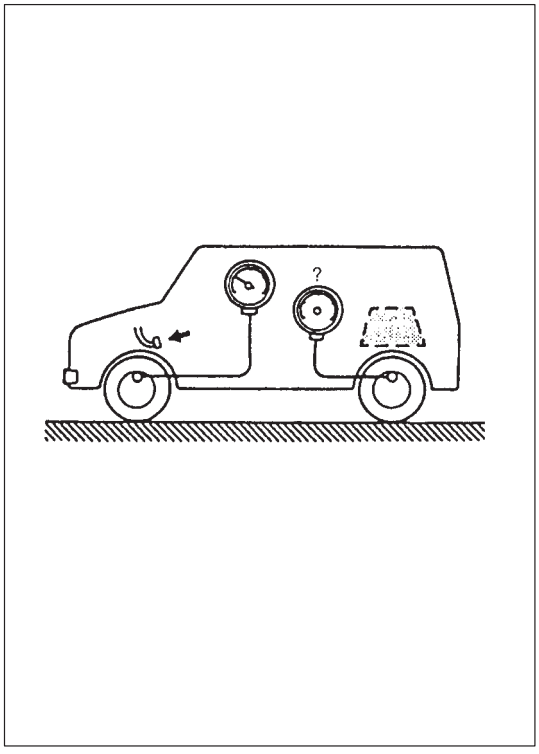
Test procedure for LSPV assembly is as follows.
Before testing, confirm the following.
○ Fuel tank is filled with fuel fully.
○ Vehicle is equipped with spare tire, tools, jack and jack handle.
1) Place vehicle on level floor and set 200 kg (442 lbs) weight slowly on axle housing center.
2) Install special tool to front and rear brake.

   NOTE:
   Pressure gauge should be connected to breather of front (left side brake) and rear (right side brake).
   After testing front left side and rear right side, test front right side and rear left side in the same way.

   Special Tool
   Front brake
   (A): 09956-02310
   (B): 09952-36320
   (C): 09360-10026 (Union bolt as spare part)
   (D): 09161-10009 (Washer as spare part)

   Rear brake
   (A): 09956-02310
   (E): 09952-36310
   (F): 55473-82030 (Air bleeder plug as a spare part)

   NOTE:
   Special tool (B) or (E) is used instead of thread diameter 10 mm attachment of special tool (A).
   So remove the attachment from (A) and install (B) or (E) as shown in figure.

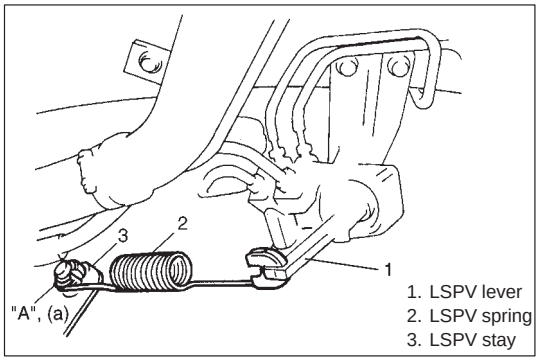


3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below.

Front brake	Rear brake	
5,000 kPa 50 kg/cm^2 711 psi	4 Door	3,900 – 4,300 kPa 39 – 43 kg/cm^2 555 – 611 psi
	WAGON	4,800 – 5,200 kPa 48 – 52 kg/cm^2 683 – 739 psi

As done above, apply 100 kg/cm^2 pressure to front brake and check that rear brake pressure then is within specification as given below.

Front brake	Rear brake	
10,000 kPa 100 kg/cm^2 1,422 psi	4 Door	5,400 – 5,800 kPa 54 – 58 kg/cm^2 768 – 825 psi
	WAGON	7,200 – 7,600 kPa 72 – 76 kg/cm^2 1024 – 1081 psi



4) If rear brake pressure is not within specification, adjust it by changing bolt “A” tightening position as follows.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

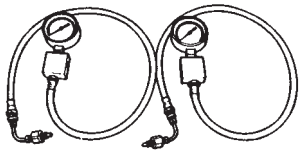
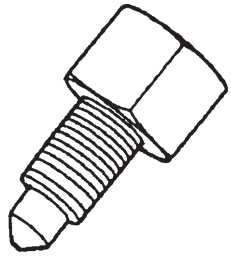
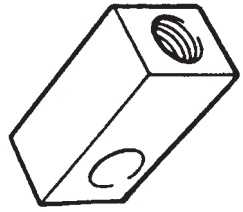
- ○ If rear brake pressure is higher than specification, move bolt “A” rearward and if it is lower, forward.
- ○ Repeat steps 3) and 4) until rear brake pressure is within specification.
- ○ After adjustment, be sure to torque nut to specification.

5) Upon completion of fluid pressure test, bleed brake system and perform brake test.

TIGHTENING TORQUE SPECIFICATIONS

FASTENING PARTS		TIGHTENING TORQUE		
		N·m	kg-m	lb-ft
Brake bleeder plug	(Front caliper)	10	1.0	7.5
	(Rear wheel cylinder and caliper)	8	0.8	6.0
LSPV bolt/LSPV bracket bolt		23	2.3	17.0
LSPV adjusting nut				

SPECIAL TOOLS

			
09950-78210 Flare nut wrench (10 mm)	09956-02310 Fluid pressure gauge	09952-36310 Fluid pressure gauge attachment (7 mm)	09952-36320 Fluid pressure gauge attachment

SECTION 6

ENGINE GENERAL INFORMATION AND DIAGNOSIS

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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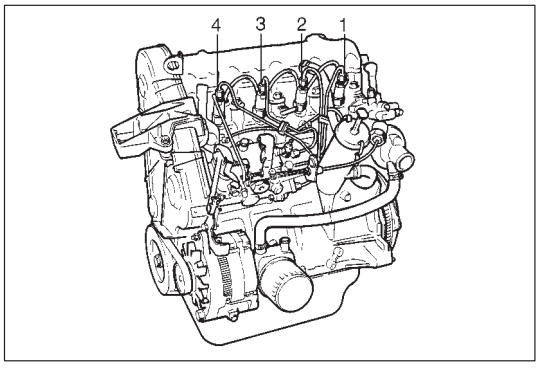
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GENERAL INFORMATION

STATEMENT ON CLEANLINESS AND CARE

An automobile engine is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the thousands of an millimeter (ten thousands of inch). Accordingly, when any internal engine parts are serviced, care and cleanliness are important. Throughout this section, it should be understood that proper cleaning and protection of machined surfaces and friction areas is part of the repair procedure. This is considered standard shop practice even if not specifically stated.

○ A liberal coating of engine oil should be applied to friction areas during assembly to protect and lubricate the surfaces on initial operation.
○ Whenever valve train components, pistons, piston rings, connecting rods, rod bearings, and crankshaft journal bearings are removed for service, they should be retained in order. At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.
○ Battery cables should be disconnected before any major work is performed on the engine. Failure to disconnect cables may result in damage to wire harness or other electrical parts.

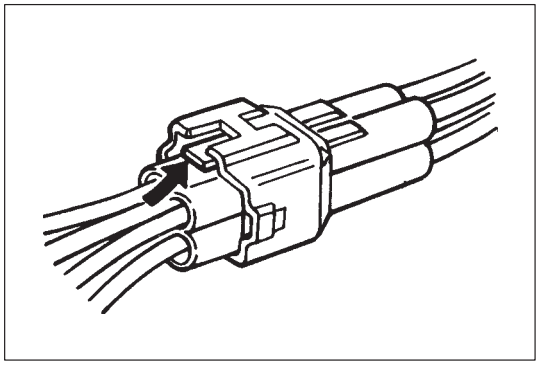


○ Throughout this manual, the four cylinders of the engine are identified by numbers No.1, No.2, No.3 and No.4 as counted from flywheel side to crankshaft pulley side.

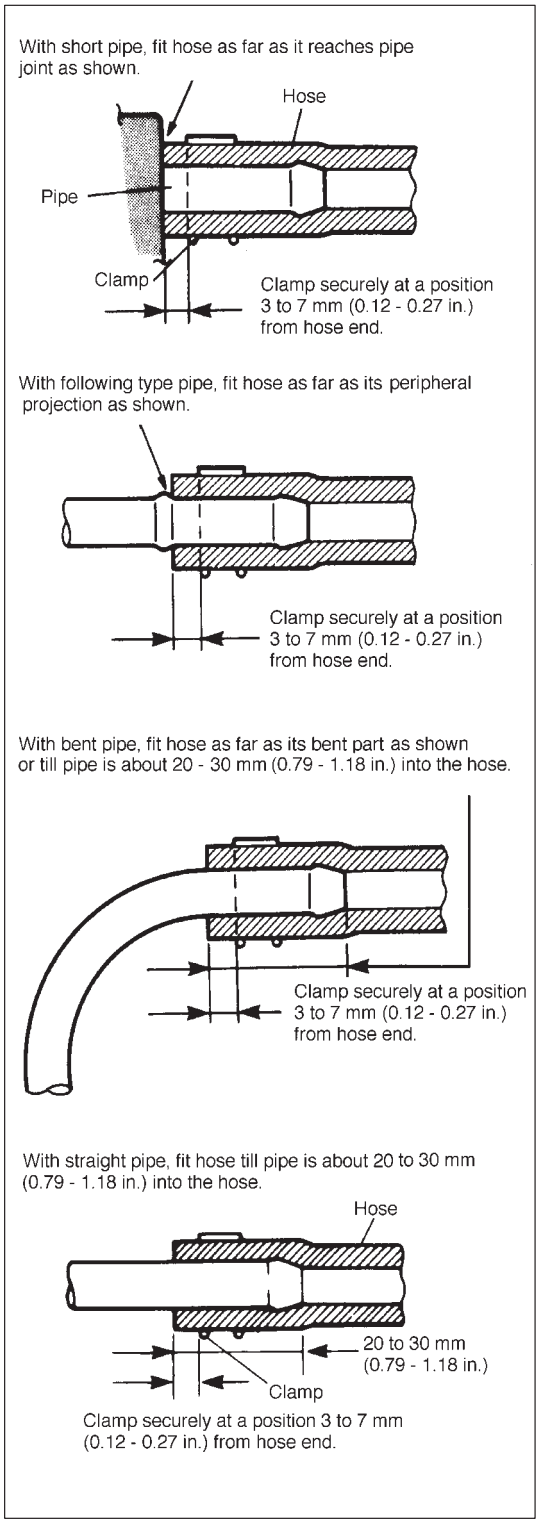
GENERAL INFORMATION ON ENGINE SERVICE

THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

○ When raising or supporting engine for any reason, do not use a jack under oil pan. Due to small clearance between oil pan and oil pump strainer, jacking against oil pan may cause it to be bent against strainer resulting in damaged oil pick-up unit.
○ It should be kept in mind, while working on engine, that 12-volt electrical system is capable of violent and damaging short circuits.
When performing any work where electrical terminals could possibly be grounded, ground cable of the battery should be disconnected at battery.
○ Any time the air cleaner, air intake hose, turbo charger or intake manifold is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow intake passage into cylinder and cause extensive damage when engine is started.



○ When disconnecting couplers, don't pull wire harness but make sure to hold coupler itself. With lock type coupler, be sure to unlock before disconnection. Attempt to disconnect coupler without unlocking may result in damage to coupler. When connecting lock type coupler, insert it till clicking sound is heard and connect it securely.



PRECAUTION ON FUEL SYSTEM SERVICE

○ Work must be done with no smoking, in a well-ventilated area and away from any open flames.

○ As fuel feed line (between fuel injection pump and fuel pipe) is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected.

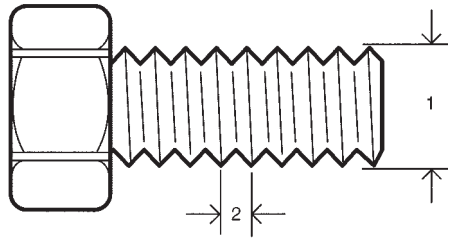
A small amount of fuel may be released after fuel line is disconnected.

In order to reduce the chance of personal injury, cover fitting to be disconnected with a shop cloth. Put that cloth in an approved container when disconnection is completed.

○ Fuel hose connection varies with each type of pipe. When reconnecting fuel hose, be sure to connect and clamp each hose correctly referring to figure "Hose Connection".

After connecting, make sure that it has no twist or kink.

○ When installing fuel filter union bolt or plug bolt on union bolt, always use new gasket and tighten it to specified torque.



1. Diameter
2. Pitch

METRIC INFORMATION

METRIC FASTENERS

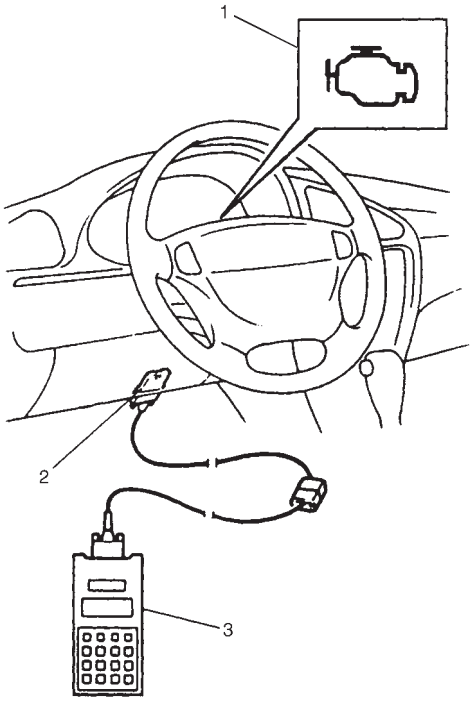
Most of the fasteners used for this vehicle are metric. When replacing any fasteners, it is most important that replacement fasteners be the correct diameter, thread pitch and strength.

CAUTION:
Note that both ISO and JIS type bolts and nuts are used for the engine assembly and related parts. Even when the diameter of the thread is the same, its pitch may vary between these two types. Installing a mismatched bolt or nut will cause damage to the thread. As the first step, make sure to tighten it by hand temporarily and if it feels tight, check the thread pitch for correct matching.

ENGINE DIAGNOSIS

GENERAL DESCRIPTION

This vehicle is equipped with an engine and emission control system which are under control of ECM.
The engine and emission control system in this vehicle are controlled by ECM. ECM has an On-Board Diagnostic system which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission. When diagnosing engine troubles, be sure to have full understanding of the outline of “On-Board Diagnostic System” and each item in “Precaution in Diagnosing Trouble” and execute diagnosis according to “ENGINE DIAGNOSTIC FLOW TABLE”.
There is a close relationship between the engine mechanical, engine cooling system, immobilizer system, exhaust system, etc. and the engine and emission control system in their structure and operation. In case of an engine trouble, even when the malfunction indicator lamp (MIL) doesn’t turn ON, it should be diagnosed according to this flow table.



1. Malfunction indicator lamp
2. Data link connector (DLC)
3. SUZUKI scan tool

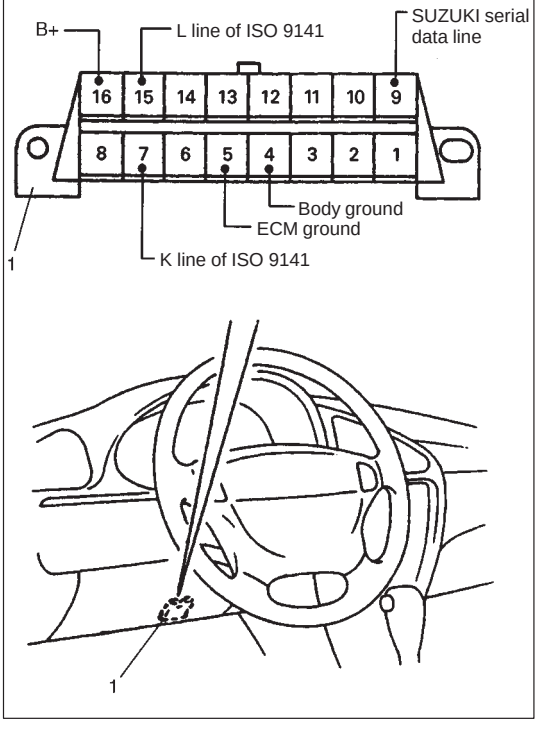
ON-BOARD DIAGNOSTIC SYSTEM

ECM diagnosis troubles which may occur in the area including the following parts when the ignition switch is ON and the engine is running, and indicates the result by turning on malfunction indicator lamp (1) for marked # following items.

- ○ Injection timing actuator #
- ○ Glow plug relay #
- ○ CKP sensor
- ○ ECT sensor
- ○ TP sensor
- ○ Barometric pressure sensor
- ○ Injector needle sensor
- ○ Power supply
- ○ EGR No.1 solenoid valve
- ○ EGR No.2 solenoid valve
- ○ MIL
- ○ CPU (Central Processing Unit) of ECM

ECM and malfunction indicator lamp (1) operate as follows.

- ○ Malfunction indicator lamp (1) lights for 2 to 3 seconds when the ignition switch is turned ON (but the engine at stop). This is only to check the malfunction indicator lamp (1) bulb and its circuit.
- ○ If the above areas of Engine and Emission Control system is free from any trouble, malfunction indicator lamp (1) turns OFF after 2 to 3 seconds from ignition switch turn ON.
- ○ When ECM detects a trouble which has occurred in the above areas with marked #, it makes malfunction indicator lamp (1) stay ON after 2 to 3 seconds from ignition switch turn ON including while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the trouble area in ECM back-up memory. (The memory is kept as it is even if the trouble was only temporary and disappeared immediately.)



Data Link Connector (DLC)

DLC (1) is in compliance with SAEJ1962 in its installation position, the shape of connector and pin assignment.

Serial data line (K line and L line of ISO 9141) is used for SUZUKI scan tool (Tech-1) to communicate with ECM, Air Bag SDM and ABS control module.

SUZUKI serial data line is used for SUZUKI scan tool to communicate with immobilizer control module.

PRECAUTION IN DIAGNOSING TROUBLE

○ Don't disconnect couplers from ECM, battery cable at battery, ECM ground wire harness from engine or main fuse before confirming diagnostic information (DTC, etc.) stored in ECM memory. Such disconnection will erase memorized information in ECM memory.

○ Diagnostic information stored in ECM memory can be cleared as well as checked by using SUZUKI scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.

○ Priorities for diagnosing troubles.

If multiple diagnostic trouble codes (DTCs) are stored.

Troubleshoot diagnostic trouble codes according to the following priorities.

1. DTC No.16/No.32/No.34 and DTC No.127
2. Diagnostic trouble codes (DTCs) other than DTC No.16/No.32/No.34 and DTC No.127

○ Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.

○ ECM Replacement

When substituting a known-good ECM, check for following conditions. Neglecting this check may cause damage to a known-good ECM.

– Resistance value of all relays, actuators is as specified respectively.

ENGINE DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) Check, Record and Clearance 1) Check for DTC referring to the next page. Is there any DTC(s)?	1) Print DTC or write them down and clear them by referring to “DTC Clearance” section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the next page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC 1) Recheck for DTC referring to “DTC Check” section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC 1) Recheck for DTC referring to “DTC Check” section. Is there any DTC(s)?		Go to Step 10.
8	Engine Basic Inspection, Diagnosis in Terms of Symptom and Engine Diagnosis Table 1) Check and repair according to “Engine Basic Check”, “Diagnosis in Terms of Symptom” and “Engine Diagnosis Table” section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Trouble shooting for DTC 1) Check and repair according to applicable DTC diag. flow table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

2. DIAGNOSTIC TROUBLE CODE (DTC) CHECK, RECORD AND CLEARANCE

First, check DTC, referring to “DTC check” section. If DTC is indicated, print it or write them down and then clear them by referring to “DTC clearance” section. DTC indicates malfunction that occurred in the system but does not indicate whether it exists now or it occurred in the past and the normal condition has been restored now. To check which case applies, check the symptom in question according to Step 4 and recheck DTC according to Step 5.

Attempt to diagnose a trouble based on DTC in this step only or failure to clear the DTC in this step will lead to incorrect diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting.

3. and 4. VISUAL INSPECTION

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine referring to “Visual Inspection” section.

5. TROUBLE SYMPTOM CONFIRMATION

Based on information obtained in Step 1 Customer complaint analysis and Step 2 DTC check, confirm trouble symptoms. Also, reconfirm DTC according to “DTC Confirmation Procedure” described in each DTC Diagnosis section.

6. and 7. RECHECKING AND RECORD OF DTC

Refer to “DTC check” section for checking procedure.

8. ENGINE BASIC INSPECTION, DIAGNOSIS IN TERMS OF SYMPTOM AND ENGINE DIAGNOSIS TABLE

Perform basic engine check according to the “Engine Basic Inspection Flow Table” first. When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to ENGINE DIAGNOSIS TABLE, DIAGNOSIS IN TERMS OF SYMPTOM and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or basic engine check) and repair or replace faulty parts, if any.

9. TROUBLESHOOTING FOR DTC (See each DTC Diag. Flow Table)

Based on the DTC indicated in Step 5 and referring to the applicable DTC diag. flow table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ECM or other part and repair or replace faulty parts.

10. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A and related circuit of DTC recorded in Step 2.

11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the engine is free from any abnormal conditions. If what has been repaired is related to the DTC, clear the DTC once, perform DTC confirmation procedure and confirm that no DTC is indicated.

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

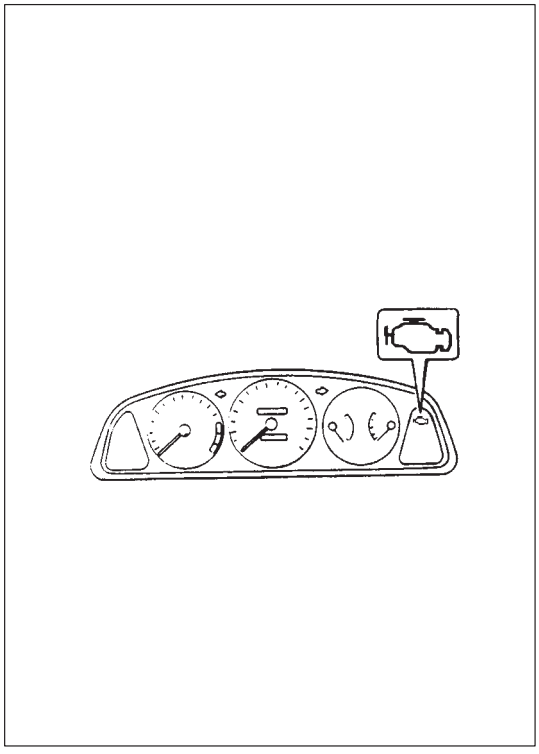
PROBLEM SYMPTOMS	
☐ **Difficult Starting** ☐ No cranking ☐ No initial combustion ☐ No combustion ☐ Poor starting at (☐cold ☐warm ☐always) ☐ Other_____	☐ **Poor Driveability** ☐ Hesitation on acceleration ☐ Back fire/☐After fire ☐ Lack of power ☐ Surging ☐ abnormal knocking ☐ Other_____
☐ **Poor Idling** ☐ Poor fast idle ☐ Abnormal idling speed (☐High ☐Low) (r/min.) ☐ Unstable ☐ Hunting (r/min. to r/min.) ☐ Other_____	☐ **Engine Stall when** ☐ Immediately after start ☐ Accel. pedal is depressed ☐ Accel. pedal is released ☐ Load is applied ☐ A/C ☐Electric load ☐P/S ☐ Other_____ ☐ Other_____
☐ OTHERS:	

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather Temperature Frequency Road	☐Fair ☐Cloudy ☐Rain ☐Snow ☐Always ☐Other_____ ☐Hot ☐Warm ☐Cool ☐Cold (°F/ °C) ☐Always ☐Always ☐Sometimes (times/ day, month) ☐Only once ☐Under certain condition ☐Urban ☐Suburb ☐Highway ☐Mountainous (☐Uphill ☐Downhill) ☐Tarmacadam ☐Gravel ☐Other_____
Vehicle Condition	
Engine condition	☐Cold ☐Warming up phase ☐Warmed up ☐Always ☐Other at starting ☐Immediately after start ☐Racing without load ☐Engine speed (r/min)
Vehicle condition	During driving: ☐Constant speed ☐Accelerating ☐Decelerating ☐Right hand corner ☐Left hand corner ☐When shifting (Lever position) ☐At stop ☐Vehicle speed when problem occurs (km/h, Mile/h) ☐Other_____

Malfunction indicator lamp condition	☐Always ON ☐Sometimes ON ☐Always OFF ☐Good condition	
Diagnostic trouble code	First check:	☐No code ☐Malfunction code ( )
	Second check:	☐No code ☐Malfunction code ( )

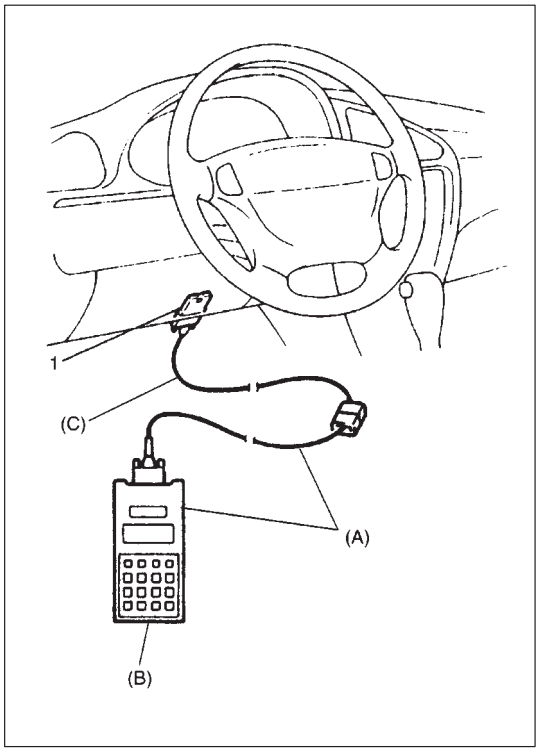
NOTE:

The above form is a standard sample. It should be modified according to conditions characteristic of each market.



MALFUNCTION INDICATOR LAMP (MIL) CHECK

1) Turn ON ignition switch (but the engine at stop) and check that MIL lights for 2 – 3 sec. and then goes out.
   If MIL does not light up (or MIL dims), go to "Diagnostic Flow Table A-1" for troubleshooting.
2) If MIL remains ON and no DTC is stored in ECM, go to "Diagnostic Flow Table A-2" for troubleshooting.



DIAGNOSTIC TROUBLE CODE (DTC) CHECK

1) Prepare SUZUKI scan tool (Tech-1).
2) With ignition switch OFF, connect it to data link connector (DLC) (1) located on underside of instrument panel at driver's seat side.

   Special Tool:
   (A): SUZUKI scan tool
   (B): Mass storage cartridge
   (C): 16/14 pin DLC cable

3) Turn ignition switch ON and confirm that MIL lights.
4) Read DTC according to instructions displayed on scan tool and print it or write it down.
   Refer to scan tool operator's manual for further details.
   If communication between scan tool and ECM is not possible, check if scan tool is communicable by connecting it to ECM in another vehicle. If communication is possible in this case, scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.
5) After completing the check, turn ignition switch off and disconnect scan tool from data link connector.

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

1) Connect SUZUKI scan tool (Tech-1) to data link connector in the same manner as when making this connection for DTC check.
2) Turn ignition switch ON.
3) Erase DTC according to instructions displayed on scan tool. Refer to scan tool operator's manual for further details.
4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting)	MIL
1	CKP sensor circuit malfunction	Implausible signal during engine running	No lights
3	Engine coolant temperature sensor circuit malfunction	Sensor circuit voltage low input Sensor circuit voltage high input	No lights
4	Throttle position sensor circuit malfunction	Sensor circuit voltage low input Sensor circuit voltage high input	No lights
13	Barometric pressure sensor malfunction	Sensor circuit in ECM voltage low Sensor circuit in ECM voltage high	No lights
14	Injector needle sensor circuit malfunction	Implausible signal during engine running Sensor circuit is open Sensor circuit is short to ground or battery voltage line	No lights
16	Injection timing actuator control malfunction	Implausible injection timing during engine running	Lights
17	Power supply circuit malfunction	Battery voltage is low Battery voltage is high	Lights (when undervoltage)
22	Glow plug relay diagnostic feedback malfunction	Low input when should be turn ON glow plug	Lights
23	Glow plug relay control circuit malfunction	Relay circuit is open Relay circuit is short to ground or battery voltage line	No lights
32	Glow plug relay diagnostic feedback malfunction	High input when should be turn OFF glow plug	Lights
33	EGR No.1 solenoid valve circuit malfunction	Solenoid valve circuit is open Solenoid valve circuit is short to ground or battery voltage line	No lights
34	Injection timing actuator circuit malfunction	Actuator circuit is open Actuator circuit is short to ground or battery voltage line	Lights
36	EGR No.2 solenoid valve circuit malfunction	Solenoid valve circuit is open Solenoid valve circuit is short to ground or battery voltage line	No lights
37	A/C cut off control circuit malfunction	Control circuit is open Control circuit is short to ground or battery voltage line	No lights
38	MIL circuit malfunction	MIL circuit is open MIL circuit is short to ground or battery voltage line	No lights
39	Glow plug indicator lamp malfunction	Lamp circuit is open Lamp circuit is short to ground or battery voltage line	No lights
127	Internal control module memory check sum error	Data write error (or check sum error) when written into ECM	Lights

VISUAL INSPECTION

Visually check following parts and systems.

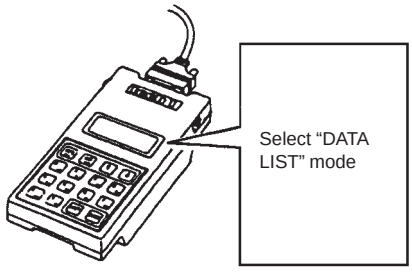
INSPECTION ITEM	REFERRING SECTION
○ Engine oil – – – – – level, leakage	Section 0B
○ Engine coolant – – – – – level, leakage	Section 0B
○ Fuel – – – – – level, leakage	Section 0B
○ Air cleaner element – – – – – dirt, clogging	Section 0B
○ Battery – – – – – fluid level, corrosion of terminal	
○ Water pump belt – – – – – tension, damage	Section 0B
○ Throttle cable – – – – – play, installation	Section 6E
○ Vacuum hoses – – – – – disconnection, looseness, deterioration, bend	
○ Connectors of electric wire harness – – – – – disconnection, friction	
○ Fuses – – – – – burning	Section 8
○ Parts – – – – – installation, bolt – – – – – looseness	
○ Parts – – – – – deformation	
○ Other parts that can be checked visually	
Also check following items at engine start, if possible	
○ Malfunction indicator lamp (Operation)	Section 6
○ Charge warning lamp (Operation)	Section 6H
○ Engine oil pressure warning lamp (Operation)	Section 8 (section 6A4 for pressure check)
○ Engine coolant temp. meter (Operation)	Section 8
○ Fuel level meter (Operation)	Section 8
○ Tachometer (Operation)	
○ Abnormal air being inhaled from air intake system	
○ Exhaust system – – – – – leakage of exhaust gas, noise	
○ Other parts that can be checked visually	

ENGINE BASIC INSPECTION

This check is very important for troubleshooting when ECM has detected no DTC and no abnormality has been found in visual inspection.
Follow the flow table carefully.

STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Check battery voltage. Is it 11 V or more?	Go to Step 3.	Charge or replace battery.
3	Is engine cranked?	Go to Step 4.	Go to “DIAGNOSIS” in Section 6G.
4	Does engine start?	Go to Step 5.	Go to Step 7.
5	Check idle speed as follows: 1) Warm up engine to normal operating temp. 2) Shift transmission to neutral position. 3) All of electrical loads are switched off. 4) Check engine idle speed with scan tool. See Fig. 1. Is it 845 – 895 r/min?	Go to Step 6.	Go to “IDLE SPEED INSPECTION AND ADJUSTMENT” in Section 6E3.
6	Check ignition pump static timing referring to “FUEL INJECTION PUMP STATIC TIMING ADJUSTMENT AND CHECKING” in Section 6E3. Is injection pump static timing correct?	Go to “DIAGNOSIS IN TERMS OF SYMPTOM”.	Adjust injection pump static timing referring to Section 6E3.
7	Check immobilizer DTC with scan tool referring to Section 8G. Is it indicated the trouble code?	Go to “DIAGNOSIS” in Section 8G.	Go to Step 8.
8	Perform air evacuation in the fuel circuit as follows: 1) Pump the priming pump on fuel filter over 30 times. 2) Carry out cranking the engine over 3 times for 5 seconds. Does engine start?	Go to “ENGINE DIAGNOSTIC FLOW TABLE”.	Go to “DIAGNOSIS IN TERMS OF SYMPTOM”.

Fig. 1 for Step 5



ENGINE DIAGNOSIS TABLE

Perform troubleshooting referring to following table when ECM has no DTC and no abnormality found in visual inspection and engine basic inspection previously.

Condition	Possible Cause	Referring Item
Hard Starting (Engine cranks OK)	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty ignitor	Fuel injector in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	Immobilizer control system out of order	Immobilizer control system in Section 8G
	Engine and emission control system out of order	
	○ Faulty CKP sensing rotor	CKP sensing rotor in Section 6E3
	○ Faulty CKP sensor, injector needle sensor, ECT sensor and TP sensor	CKP sensor, injector needle sensor, ECT sensor and TP sensor in Section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit.
	○ Faulty glow plug control relay	Glow plug control relay in Section 6E3
	Low compression	Compression check in section 6A4
	○ Improper valve lash	Valve clearance in section 6A4
	○ Improper valve timing	Valve timing in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Compression leak from valve seat	Valve seats in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Sticky valve stem	Valves in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Weak or damaged valve spring	Valve spring in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Compression leak at cylinder head gasket	Cylinder head in "OVERHAUL CHECKING TUNING MANUAL" listed in FOREWORD of this manual
	○ Sticking or damaged ring	Piston and Connecting Rod in section 6A4
	○ Worn piston, ring or cylinder	Piston and Connecting Rod in section 6A4

Condition	Possible Cause	Reference Item
Engine has no power	**Engine overheating**	Refer to “Overheating” of this table.
	Injection system out of order	
	○ Faulty fuel injection pump static timing	Static timing in “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	Engine and emission control system out of order	
	○ Faulty CKP sensing rotor	CKP sensing rotor in Section 6E3
	○ Faulty CKP sensor, injector needle sensor, ECT sensor and TP sensor	CKP sensor, injector needle sensor, ECT sensor and TP sensor in section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Malfunctioning EGR valve	EGR system inspection in section 6E3
	○ Maladjusted accelerator cable play	Adjustment injection pump in “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	Low compression	Previously outlined.
	Others	
	○ Dragging brakes	Diagnosis in Section 5.
	○ Slipping clutch	Diagnosis in Section 7C.

Condition	Possible Cause	Reference Item
Improper engine idling or engine fails to idle	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	Engine overheating	Refer to “Overheating” of this table.
	Engine and emission control system out of order	
	○ Faulty CKP sensing rotor	CKP sensing rotor in Section 6E3
	○ Faulty CKP sensor, injector needle sensor, ECT sensor and TP sensor	CKP sensor, injector needle sensor, ECT sensor and TP sensor in section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in Section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Malfunctioning EGR valve	EGR system inspection in section 6E3
	○ Maladjusted accelerator cable play	Adjustment injection pump in “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	Low compression	Previously outlined.

Condition	Possible Cause	Reference Item
Engine hesitates (Momentary lack of response as the accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make the vehicle move, as from a stop sign.)	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	Engine overheating	Refer to "Overheating" of this table.
	Engine and emission control system out of order	
	○ Faulty CKP sensing rotor	CKP sensing rotor in Section 6E3
	○ Faulty CKP sensor, injector needle sensor, ECT sensor and TP sensor	CKP sensor, injector needle sensor, ECT sensor and TP sensor in section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Malfunctioning EGR valve	EGR system inspection in section 6E3
	○ Maladjusted accelerator cable play	Adjustment injection pump in "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	Low compression	Previously outlined.
Surges (Engine power variation under steady throttle or cruise. Feels like the vehicle speeds up and down with no change in the accelerator pedal.)	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	Engine and emission control system out of order	
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in section 6E3
	○ Malfunctioning EGR valve	EGR system inspection in section 6E3

Condition	Possible Cause	Reference Item
Excessive detonation (The engine makes sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.)	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	Engine overheating	Refer to "Overheating" of this table.
	Engine and emission control system out of order	
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in Section 6E3
	○ Malfunctioning EGR valve	EGR system inspection in Section 6E3
	Others	
	○ Excessive combustion chamber deposits	Piston and cylinder head in Section 6A4
Overheating	○ Inoperative thermostat	Thermostat in Section 6B
	○ Faulty radiator fan motor or its circuit	Radiator fan control system in Section 6B
	○ Poor water pump performance	Water pump in Section 6B
	○ Clogged or leaky radiator	Radiator in Section 6B
	○ Improper engine oil grade	ITEM 1-3 Engine oil and oil filter change in Section 0B
	○ Clogged oil filter or oil strainer	Oil pressure check in Section 6A4
	○ Poor oil pump performance	Oil pressure check in Section 6A4
	○ Dragging brakes	Diagnosis in Section 5.
	○ Slipping clutch	Diagnosis in Section 7C.
	○ Blown cylinder head gasket	Valves and cylinder head in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual

Condition	Possible Cause	Reference Item
Poor fuel mileage	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and "ALL MODEL DIESEL DIAGNOSIS MANUAL" listed in FOREWORD of this manual
	Engine and emission control system out of order	
	○ Air cleaner element clogged	ITEM 3-1 Air cleaner element inspection in Section 0B
	○ Faulty ECT sensor and TP sensor	ECT sensor and TP sensor in Section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in Section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Malfunctioning EGR valve	EGR system inspection in Section 6E3
	Low compression	Previously outlined.
	Others	
	○ Dragging brakes	Diagnosis in Section 5.
	○ Slipping clutch	Diagnosis in Section 7C.
	○ Thermostat out of order	Thermostat in Section 6B.
	○ Improper tire pressure	Refer to Section 3F.

Condition	Possible Cause	Reference Item
Excessive engine oil consumption	**Oil entering combustion chamber**	
	○ Sticky piston ring	Valves and cylinder head in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Worn piston and cylinder	Valves and cylinder head in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Worn piston ring groove and ring	Valves and cylinder head in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Improper location of piston ring gap	Valves and cylinder head in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Worn or damaged valve stem seal	Valves and cylinder head in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Worn valve stem	Valves and cylinder head in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
Low oil pressure	○ Improper oil viscosity	ITEM 1-3 Engine oil and oil filter change in Section 0B
	○ Malfunctioning oil pressure switch	Oil pressure switch in Section 8
	○ Clogged oil strainer	Oil pan and oil pump strainer in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Functional deterioration of oil pump	Oil pump in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Worn oil pump relief valve	Oil pump in “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual
	○ Excessive clearance in various sliding parts	Refer to Section 6A4 and “OVERHAUL CHECKING TUNING MANUAL” listed below in FOREWORD of this manual

Condition	Possible Cause	Reference Item
Engine noise Note: Before checking the mechanical noise, make sure that: ○ Ignition timing is proper. ○ Specified fuel is used.	**Valve noise**	
	○ Improper valve lash	Valve clearance in Section 6A4
	○ Worn valve stem and guide	Valves and cylinder head in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Weak or broken valve spring	Valve spring in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Warped or bent valve	Valves and cylinder head in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Loose camshaft housing bolts	Camshaft in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	Piston, ring and cylinder noise	
	○ Worn piston, ring and cylinder bore	Valves and cylinder head in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	Connecting rod noise	
	○ Worn crankpin bearing	Crankpin and connecting rod in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Worn crankpin	Crankpin and connecting rod in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Loose connecting rod nuts	Connecting rod in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Low oil pressure	Previously outlined.
	Crankshaft noise	
	○ Low oil pressure	Previously outlined.
	○ Worn crankshaft journal bearing	Crank shaft and bearing in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Worn crankshaft journal	Crank shaft and bearing in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Loose lower crankcase (bearing cap) bolts	Crankshaft in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual
	○ Excessive crankshaft thrust play	Crankshaft in "OVERHAUL CHECKING TUNING MANUAL" listed below in FOREWORD of this manual

Condition	Possible Cause	Referring Item
Excessive hydrocarbon (HC) emission or excessive carbon monoxide (CO) emission	**Injection system out of order**	
	○ Faulty fuel injection pump static timing	Static timing in “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Clogged fuel filter or lines	Fuel filter in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Faulty fuel injection pump	Fuel injection pump in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	○ Faulty injector	Fuel injector in Section 6E3 and “ALL MODEL DIESEL DIAGNOSIS MANUAL” listed in FOREWORD of this manual
	Engine and Emission control system out of order	
	○ Air cleaner element clogged	ITEM 3-1 Air cleaner element inspection in Section 0B
	○ Faulty ECT sensor and TP sensor	ECT sensor and TP sensor in Section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in Section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Malfunctioning EGR valve	EGR system inspection in Section 6E3
	Low compression	Previously outlined.
Excessive nitrogen oxides (NOx) emission	**Engine and emission control system out of order**	
	○ Air cleaner element clogged	ITEM 3-1 Air cleaner element inspection in Section 0B
	○ Faulty ECT sensor and TP sensor	ECT sensor and TP sensor in Section 6E3
	○ Faulty fuel injection timing control actuator	Fuel injection timing control actuator in Section 6E3
	○ Faulty ECM	Inspection of ECM and its circuit
	○ Malfunctioning EGR valve	EGR system inspection in Section 6E3

SCAN TOOL DATA

As the data values given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.

Also, conditions in the below table that can be checked by the scan tool are those detected by ECM and output from ECM as commands and there may be cases where the engine or actuator is not operating (in the condition) as indicated by the scan tool.

NOTE:

○ **When checking the data with the engine running at idle or racing, be sure to shift M/T gear to the neutral gear position and pull the parking brake fully. Also, if nothing or "no load" is indicated, turn OFF A/C, all electric loads, P/S and all the other necessary switches.**

SCAN TOOL DATA	CONDITION	REFERENCE VALUES
CALC LOAD (CALCULATED ENGINE LOAD VALUE)	At specified idle speed with no load after warming up	4 – 5 mg/str
	At 2000 r/min with no load after warming up	6 – 7 mg/str
COOLANT TEMP. SENSOR VOLTAGE (ENGINE COOLANT TEMPERATURE SENSOR)	At specified idle speed after warming up	0.1 V (80 – 100°C, 176 – 212°F)
ENGINE SPEED	At idling with no load after warming up	Desired idle speed ± 50 r/min
INJECTION TIMING	At specified idle speed with no load after warming up	3 – 4 deg
	At 2000 r/min with no load after warming up	6 – 7 deg
THROTTLE POS SENSOR VOLTAGE (THROTTLE POSITION SENSOR)	Throttle valve fully closed	0.6 – 1.0 V
	Throttle valve fully open	2.4 – 2.8 V
BATTERY VOLTAGE	Ignition switch ON/engine stop	12 – 15 V
BAROMETRIC PRESSURE VOLTAGE	Ignition switch ON	Display the barometric pressure voltage
INJECTOR NEEDLE SENSOR VOLTAGE	At specified idle speed with no load after warming up	0.8 – 1.2 V

SCAN TOOL DATA DEFINITIONS

CALC LOAD (CALCULATED LOAD VALUE, mg/str)
Engine load value calculated from throttle position and engine speed. Load is referred to in terms of fuel quantity per stroke.

COOLANT TEMP. VOLTAGE (ENGINE COOLANT TEMPERATURE VOLTAGE, V)
It is detected by engine coolant temp. sensor.

ENGINE SPEED (rpm)
It is computed by reference pulses from crankshaft position sensor.

INJECTION TIMING (START OF INJECTION, °)
Start of injection control is performed by calculating an optimal desired start of injection and closing the loop on it. ECM controls the injection start timing.

THROTTLE POSITION SENSOR VOLTAGE (TP SENSOR VOLT, V)
The Throttle Position Sensor reading provides throttle valve opening information in the form of voltage. This information is used for correction, such as enrichment correction during acceleration.
The voltage reading should increase as the throttle is opened. 0 V indicates a broken or shorted sensor.

BATTERY VOLTAGE (V)
This parameter indicates battery positive voltage inputted from main relay to ECM.

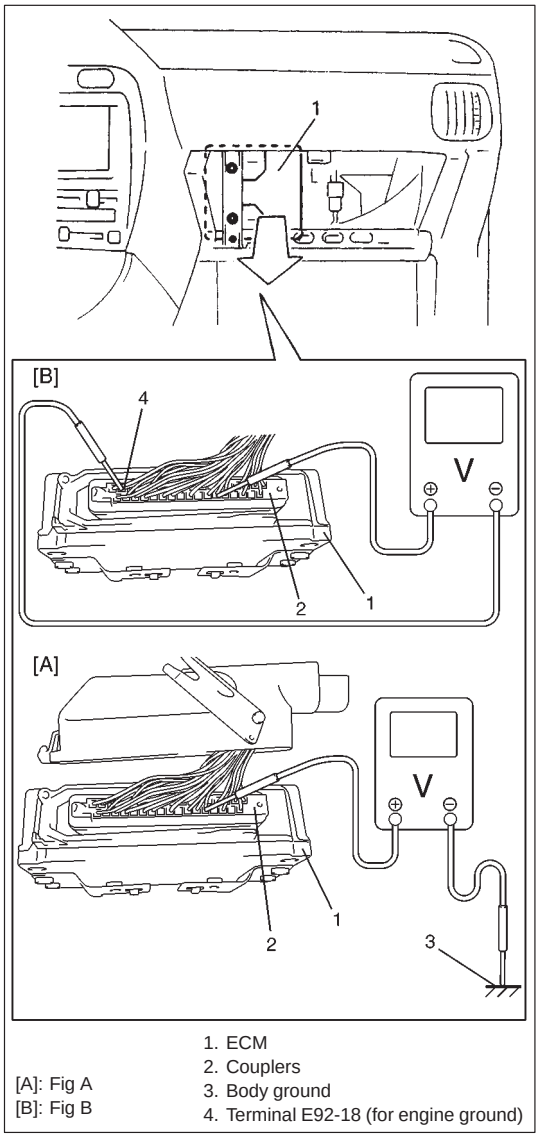
NEEDLE SENSOR VOLTAGE (V)
The ECM detects the start of needle movement by triggering on the rising edge of the needle movement sensor signal.

BAROMETRIC SENSOR VOLTAGE (V)
This parameter represents a measurement of barometric air pressure and is used for altitude correction of the fuel injection quantity.

INSPECTION OF ECM AND ITS CIRCUITS

ECM and its circuits can be checked at ECM wiring connectors by measuring voltage and resistance.

CAUTION:
ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with connector disconnected from it.



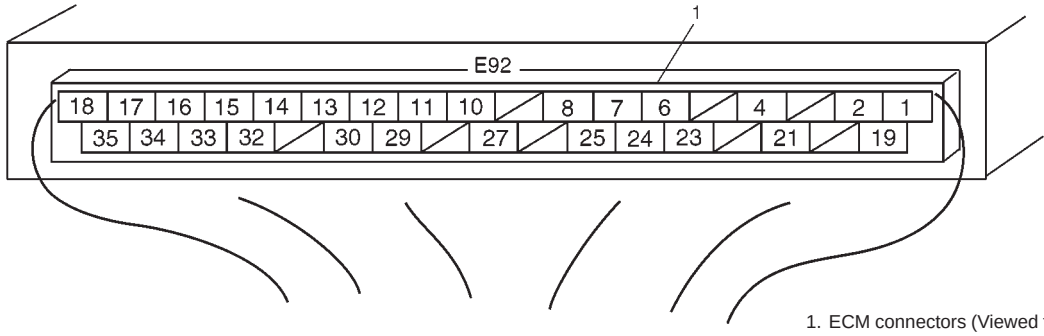
1. ECM
2. Couplers
3. Body ground
4. Terminal E92-18 (for engine ground)

[A]: Fig A
[B]: Fig B

VOLTAGE CHECK

1) Remove ECM from body referring to Section 6E.
2) Check voltage at each terminal of connectors connected.

NOTE:
As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.

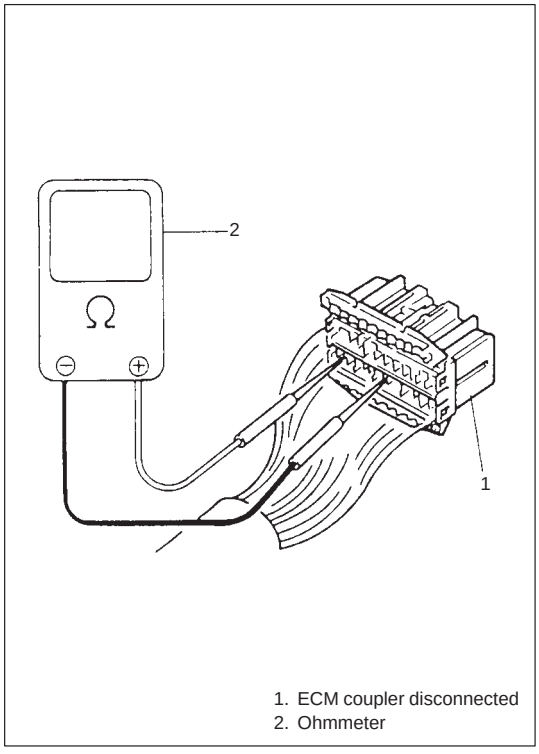


1. ECM connectors (Viewed from harness side)

ECM VOLTAGE VALUES TABLE

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
E92-01	Bl/R	TP sensor power supply output	Ground to engine (Fig B)	4 – 6 volts	Ignition switch ON position
E92-02	Bl/B	TP sensor input	Ground to engine (Fig B)	0.6 – 1.0 volts	Ignition switch ON position and throttle lever at idle position.
				2.4 – 2.8 volts	Ignition switch ON position and throttle lever at fully open position.
E92-04	Br	ECT sensor signal input	Ground to engine (Fig B)	0.25 – 0.28 volt	Ignition switch ON position at engine coolant temp. 60°C (140°F)
				0.1 – 0.12 volt	Ignition switch ON position at engine coolant temp. 90°C (194°F)
E92-06	Bl	Glow plug control relay feed back signal	Ground to engine (Fig B)	8 – 12 volts	While turn ON ignition switch for several seconds
				– 0.5 – 0.5 volt	Engine running
E92-07	B	Injector needle sensor positive input	Ground to engine (Fig B)	3 – 4.5 volts	Ignition switch ON position
E92-08	R	CKP sensor positive input	Ground to engine (Fig B)	2 – 3 volts	Ignition switch ON position
E92-10	P/G	Data link connector (K-line)	Ground to engine (Fig B)	2 – 3 volts	Ignition switch ON position
E92-11	Br	Engine speed signal output	Ground to engine (Fig B)	4 – 6 volts	Ignition switch ON position
E92-12	Bl	Glow plug indicator lamp output	Ground to engine (Fig B)	8 – 12 volts	While turn ON ignition switch for several seconds
				0 – 1 volt	Engine running
E92-13	P	A/C CUT signal output	Ground to engine (Fig B)	10 – 14 volts	Engine running
E92-14	Bl/W	EGR valve No.2 output	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON position
				0 – 1 volt	Engine running
E92-15	G/R	Injection timing control actuator output	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON position
E92-16	G/W	ECM power source	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON position
E92-17	B	ECM ground	Ground to engine (Fig A)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-18	B/Or	ECM ground	Ground to engine (Fig A)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-19	Bl/Or	TP sensor ground	Ground to engine (Fig B)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-21	Br/W	ECT sensor ground	Ground to engine (Fig B)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-23	B/Bl	Sealed wire ground	Ground to engine (Fig B)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-24	W	Injector needle sensor negative input	Ground to engine (Fig B)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-25	G	CKP sensor negative input	Ground to engine (Fig B)	2 – 3 volts	Ignition switch ON position

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
E92-27	Br/Y	Data link connector (L-line)	Ground to engine (Fig B)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-29	B/R	Glow plug control relay output	Ground to engine (Fig B)	0 – 1 volt	While turn ON ignition switch for several seconds
				10 – 14 volts	Engine running
E92-30	V	Malfunction indicator lamp output	Ground to engine (Fig B)	0 – 1 volt	While turn ON ignition switch for several seconds
				10 – 14 volts	Engine running
E92-32	R/Y	EGR valve No.1 output	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON position
				0 – 1 volt	Engine running
E92-33	G/Y	ECM power source	Ground to engine (Fig B)	10 – 14 volts	Ignition switch ON position
E92-34	B/Or	ECM ground	Ground to engine (Fig A)	– 0.5 – 0.5 volt	Ignition switch ON position
E92-35	B/Or	ECM ground	Ground to engine (Fig A)	– 0.5 – 0.5 volt	Ignition switch ON position



1. ECM coupler disconnected
2. Ohmmeter

RESISTANCE CHECK

1) Disconnect ECM couplers from ECM with ignition switch OFF.

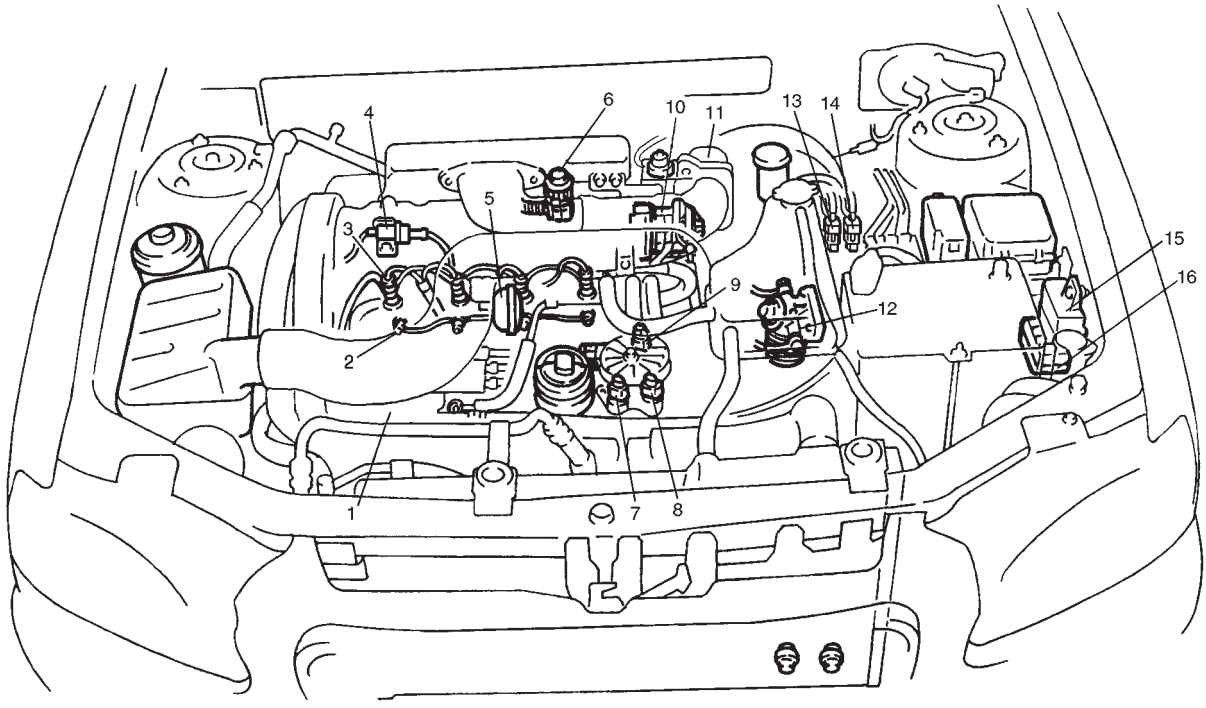
CAUTION:
Never touch terminals of ECM itself or connect voltmeter or ohmmeter.

2) Check resistance between each terminal of couplers disconnected.

CAUTION:
- **Be sure to connect ohmmeter probe from wire harness side of coupler.**
- **Be sure to turn OFF ignition switch for this check.**
- **Resistance in table below represents that when parts temperature is 20℃ (68℉).**

TERMINALS	CIRCUIT	STANDARD RESISTANCE
E92-7 to E92-24	Injector needle sensor	85 I – 130 I
E92-8 to E92-25	CKP sensor	330 I – 480 I
E92-4 to E92-24	ECT sensor	530 I – 590 I at 60°C, 140°F
		220 I – 240 I at 90°C, 194°F
E92-1 to E92-19	TP sensor	1.4 KI – 2.1 KI
E92-2 to E92-19		950 I – 1.5 KI
E92-12 to E92-18	Glow plug indicator	8 I – 14 I
E92-17 to E92-18	Ground	Continuity
E92-34 to E92-18	Ground	Continuity
E92-35 to E92-18	Ground	Continuity

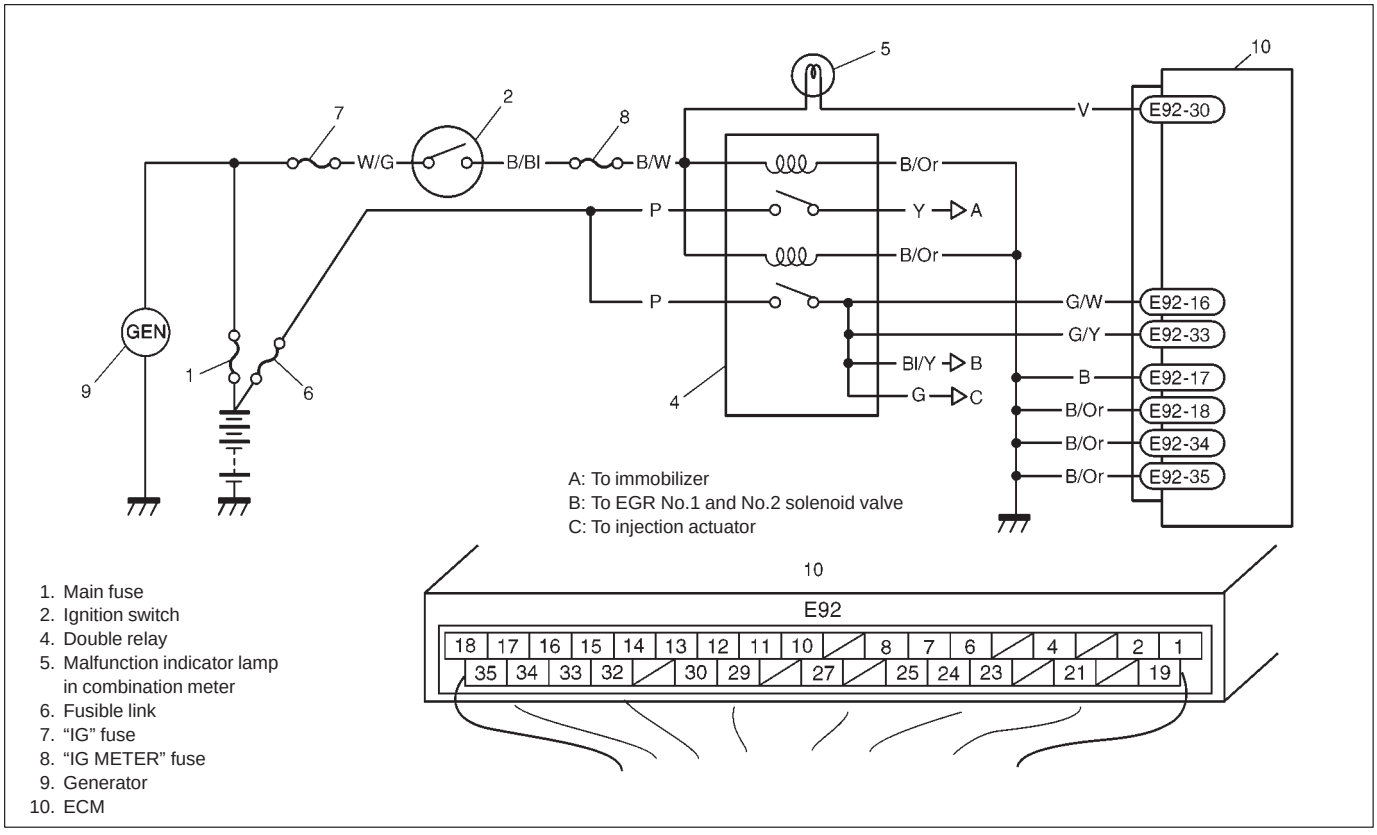
COMPONENT LOCATION



1. Fuel injection pump
2. Glow plug
3. Fuel injector
4. Injection needle sensor
5. Regulator
6. EGR No.1 valve
7. Coolant temp. gauge
8. Coolant temp. switch
9. ECT sensor
10. Vacuum pump
11. EGR No.2 valve
12. Fuel filter
13. EGR No.1 solenoid valve
14. EGR No.2 solenoid valve
15. Double relay
16. Glow plug control relay

TABLE A-1 MALFUNCTION INDICATOR LAMP CIRCUIT CHECK – LAMP DOES NOT COME "ON" AT IGNITION SWITCH ON (BUT ENGINE AT STOP)

CIRCUIT DESCRIPTION



When the ignition switch is turned ON, ECM causes the double relay to turn ON (close the contact point). Then, ECM being supplied with the main power, turns ON the malfunction indicator lamp (MIL). When the engine starts to run and no malfunction is detected in the system, MIL goes OFF but if a malfunction was or is detected, MIL remains ON even when the engine is running.

INSPECTION

STEP	ACTION	YES	NO
1	MIL Power Supply Check 1) Turn ignition switch ON. Do other indicator/warning lights in combination meter comes ON?	Go to Step 2.	"IG" fuse blown, main fuse blown, ignition switch malfunction, "B/W" circuit between "IG" fuse and combination meter or poor coupler connection at combination meter.
2	ECM Power and Ground Circuit Check Does engine start?	Go to Step 3.	Go to TABLE A-3 ECM POWER AND GROUND CIRCUIT CHECK. If these circuits are OK, go to DIAGNOSIS in SECTION 8G.
3	MIL Circuit Check 1) Turn ignition switch OFF and disconnect connectors from ECM. 2) Check for proper connection to ECM at terminal E92-30. 3) If OK, then using service wire, ground terminal E92-30 in connector disconnected. Does MIL turn on at ignition switch ON?	Substitute a known-good ECM and re-check.	Bulb burned out, "V" wire circuit open.

TABLE A-2 MALFUNCTION INDICATOR LAMP CIRCUIT CHECK – LAMP REMAINS "ON" WITH IGNITION SWITCH ON

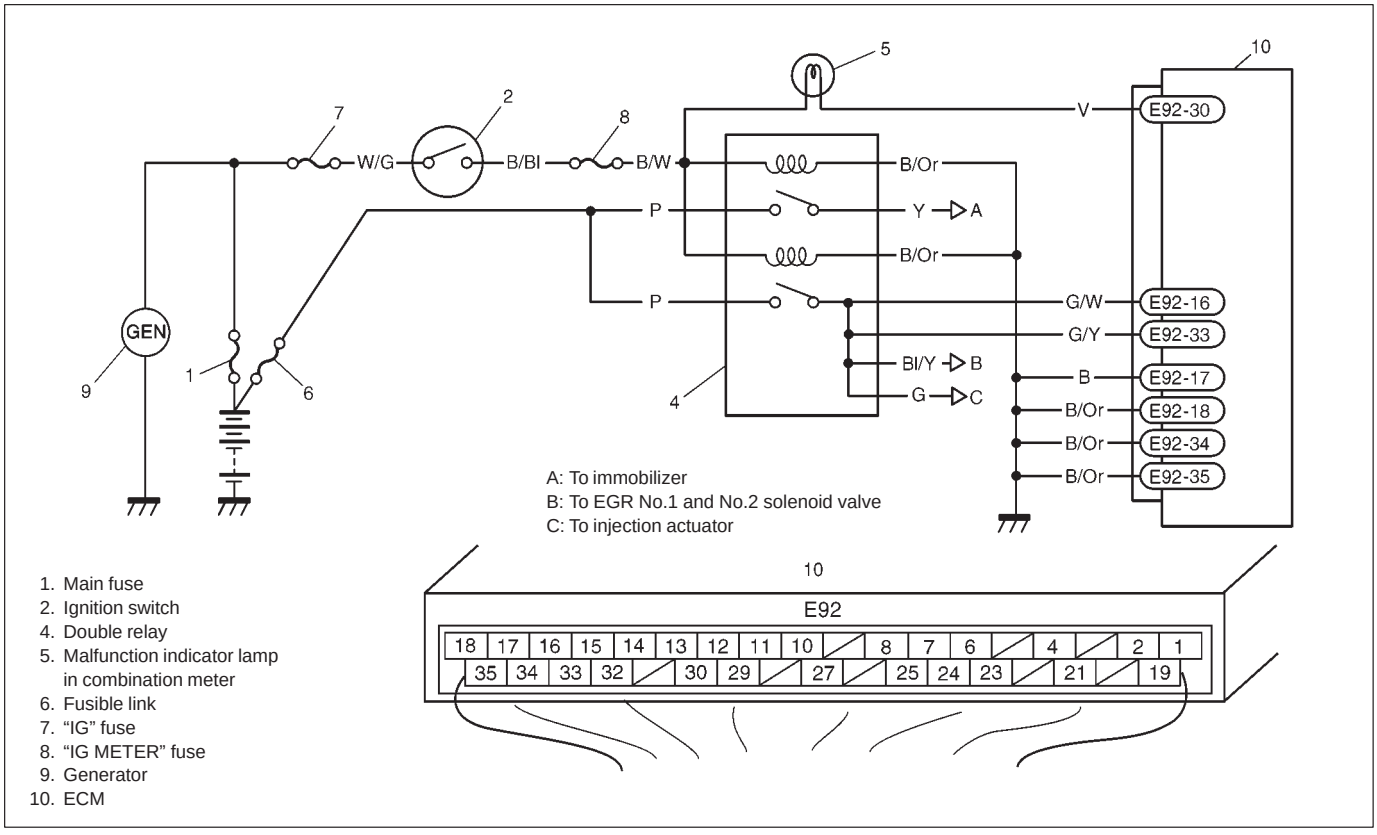
WIRING DIAGRAM/CIRCUIT DESCRIPTION – Refer to table A-1.

INSPECTION

STEP	ACTION	YES	NO
1	Diagnostic Trouble Code (DTC) check 1) Check DTC referring to DTC CHECK section. Is there any DTC(s)?	Go to Step 2 of ENGINE DIAG. FLOW TABLE.	Go to Step 2.
2	DTC check Start engine and recheck DTC while engine running. Is there any DTC(s)?		Go to Step 3.
3	MIL Circuit check 1) Turn OFF ignition switch. 2) Disconnect connectors from ECM. Does MIL turn ON at ignition switch ON?	"V" wire circuit shorted to ground.	Substitute a known-good ECM and recheck.

TABLE A-3 ECM POWER AND GROUND CIRCUIT CHECK – MIL DOESN'T LIGHT AT IGNITION SWITCH ON AND ENGINE DOESN'T START THOUGH IT IS CRANKED UP

CIRCUIT DESCRIPTION



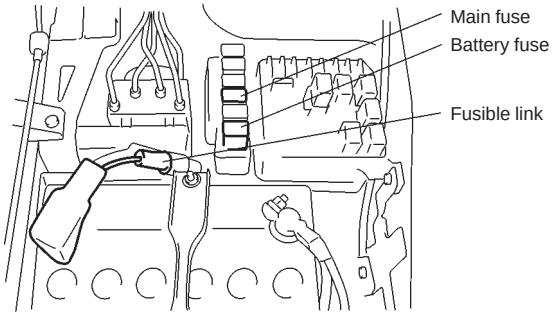
When the ignition switch tuned ON, the double relay turns ON (the contact point closes) and the main power is supplied to ECM.

INSPECTION

STEP	ACTION	YES	NO
1	Double Relay Operating Sound Check Is operating sound of double relay heard at ignition switch ON?	Go to Step 3.	Go to Step 2.
2	Double Relay Check Refer to DOUBLE RELAY in Section 6E3. Is double relay in good condition?	Go to Step 3.	Replace double relay.
3	Fuse Check Is "Fusible link" and "IG METER" fuse in good condition? See Fig. 1.	Go to Step 4.	Check for short in circuits connected to this fuse.
4	Double Relay Power Circuit Check 1) Turn ignition switch OFF, and disconnect coupler from double relay. 2) Turn ignition switch ON, measure voltage between "B/W" terminal in double relay coupler and body ground, and "P" terminal in double relay coupler and body ground. Is each terminal voltage 10 to 14 V?	Go to Step 5.	"B/W" or "P" circuit in glow plug relay coupler open or shorted to ground.

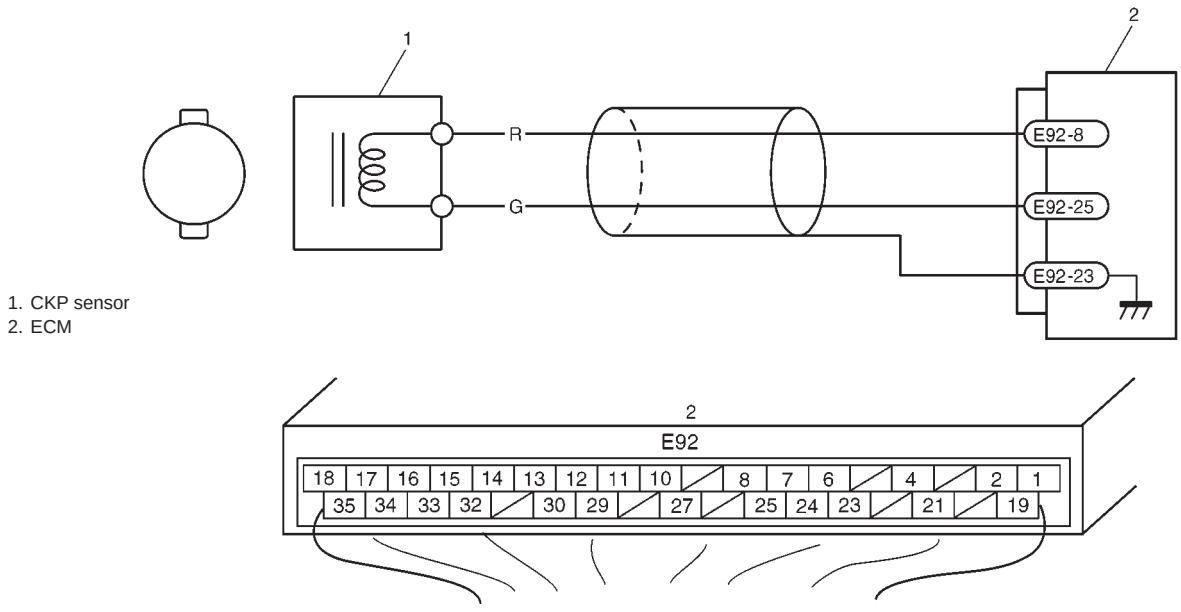
STEP	ACTION	YES	NO
5	Double Relay Ground Circuit Check 1) Turn ignition switch OFF. 2) Check continuity between "B/Or" terminal in double relay coupler and body ground. Is it continuity?	Go to Step 6.	"B/Or" circuit in glow plug relay coupler open.
6	1) Turn ignition switch ON. 2) Measure voltage between "G/Y", "G/W" terminals in double relay coupler with connect it coupler. Is it 10 to 14 V?	Go to Step 7.	Double relay malfunction.
7	ECM Power Circuit Check 1) Turn OFF ignition switch, disconnect connectors from ECM and install double relay. 2) Check for proper connection to ECM at terminals E92-16 and E92-33. 3) If OK, then measure voltage between terminal E92-16 and ground, E92-33 and ground with ignition switch ON. Is each voltage 10 – 14 V?	Substitute a known-good ECM and recheck.	"G/Y" or "G/W" circuit open.

Fig. 1 for Step 3



DTC No.1 CRANKSHAFT POSITION (CKP) SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



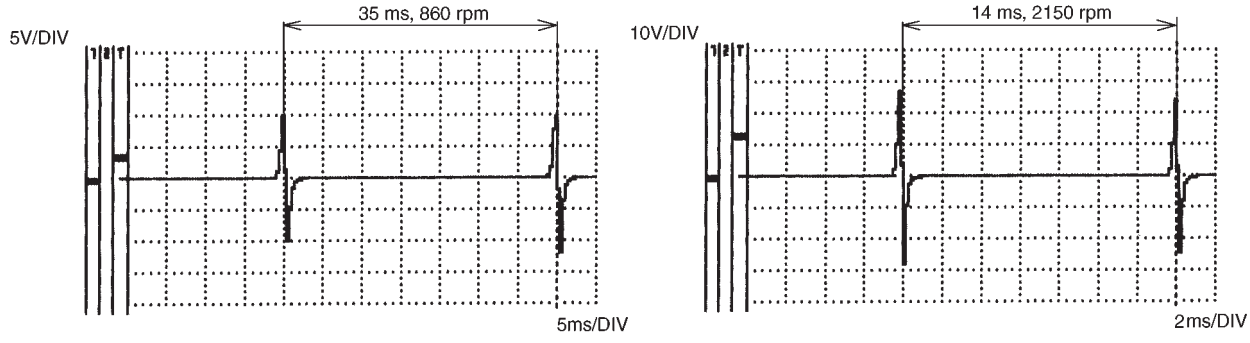
1. CKP sensor
2. ECM

DTC DETECTING CONDITION	POSSIBLE CAUSE
○ No CKP sensor signal for 2 seconds at engine cranking.	○CKP sensor circuit open or short. ○Signal teeth damaged. ○CKP sensor malfunction, foreign material being attached or improper installation. ○ECM malfunction.

Reference

Connect oscilloscope between terminals E92-8 and E92-25 of ECM connector connected to ECM and body ground, then check CKP sensor signal.

Oscilloscope Waveforms



Waveform at idle speed

Waveform at 2150 rpm

DTC CONFIRMATION PROCEDURE

1) Clear DTC and crank engine for 2 sec.
2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAGNOSIS FLOW TABLE”.
2	Check CKP sensor and connector for proper installation. Is CKP sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check CKP sensor resistance as follows. 1) Disconnect CKP sensor connector with ignition switch OFF. 2) Measure resistance between sensor terminals. Refer to CKP SENSOR in Section 6E3. Is measured resistance value as specified?	Go to Step 4.	Replace CKP sensor.
4	Check ECM terminals voltage as follows. 1) Turn ignition switch OFF. 2) Disconnect ECM connector. 3) Check for proper connection to ECM at each sensor terminals. 4) If check is OK, then turn ignition switch ON and measure voltage between sensor terminal E92-8, E92-25 of ECM and body ground. See Fig. 1. Is it 0 V?	Go to Step 5.	CKP sensor circuit shorted to power.
5	Check continuity of CKP sensor circuit as follows. 1) Turn ignition switch OFF. 2) Connect CKP sensor coupler. 3) Measure resistance between the following points. ○ Both ECM connector terminals of the CKP sensor circuit: continuity ○ Either terminal of CKP sensor coupler and body ground: no-continuity Are both check results satisfactory?	Go to Step 6.	Circuit open or shorted to ground.
6	Check CKP sensor damage as follows. 1) Remove CKP sensor. 2) Check sensor for damage or foreign material attached. Is it in good condition?	Go to Step 7.	Clean, repair or replace.
7	Check CKP sensor voltage waveform as follows. 1) Install CKP sensor. 2) Check for voltage waveform as shown in reference of previous page. Is specified voltage and waveform obtained?	Substitute a known-good ECM and recheck.	Go to Step 8.
8	Check sensor rotor with flywheel for the following. ○ Rotor teeth neither missing nor damaged. See Fig. 2. ○ No foreign material being attached. ○ Rotor being eccentric. Are they in good condition?	Replace CKP sensor.	Clean, repair or replace sensor rotor.

Fig. 1 for Step 4

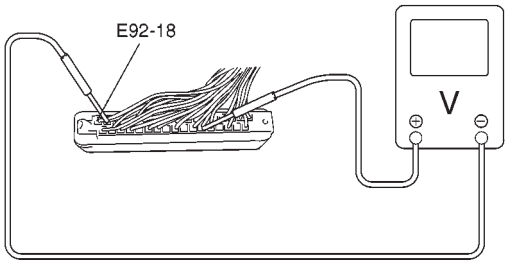
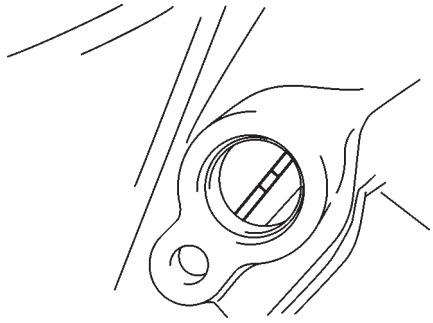
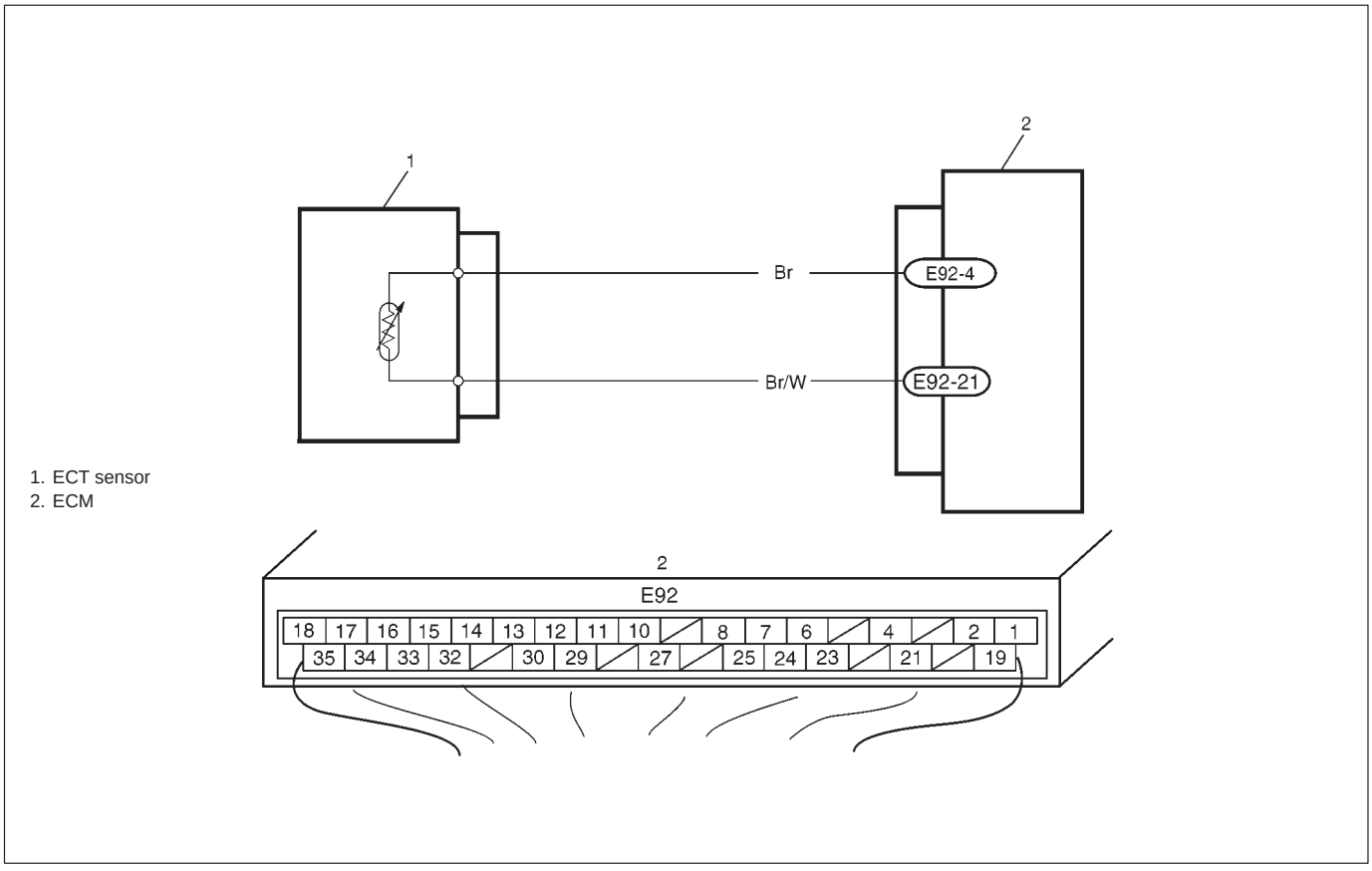


Fig. 2 for Step 8



DTC No.3 ENGINE COOLANT TEMPERATURE (ECT) CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
○Low engine coolant temperature (High voltage-High resistance) ○High engine coolant temperature (Low voltage-Low resistance)	○"Br" circuit open or shorted to power ○"Br/W" circuit open ○ECT sensor malfunction ○ECM malfunction

NOTE:

○ **Before inspecting, be sure to check that coolant temp. meter in combination meter indicates normal operating temperature (Engine is not overheating).**

DTC CONFIRMATION PROCEDURE

1) Clear DTC, start engine and keep it at idle for 1 min.
2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Check ECT Sensor and Its Circuit. 1) Connect scan tool with ignition switch OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. See Fig. 1. Is –40°C (–40°F) or 130°C (266°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0 A.
3	Check Wire Harness. 1) Disconnect ECT sensor connector. 2) Check engine coolant temp. displayed on scan tool. Is –40°C (–40°F) indicated?	Replace ECT sensor.	“Br” wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate –40°C (–40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness. 1) Disconnect ECT sensor connector with ignition switch OFF. 2) Check for proper connection to ECT sensor at “Br/W” and “Br” wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to “Br” wire terminal about 4 – 6 V? See Fig. 2.	Go to Step 4.	“Br” wire open or shorted to power, or poor E92-4 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect ECT sensor connector terminals. See Fig. 3. 2) Turn ignition switch ON and check engine coolant temp. displayed on scan tool. Is 130°C (266°F) indicated?	Replace ECT sensor.	“Br/W” wire open or poor E92-21 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. 1 for Step 2

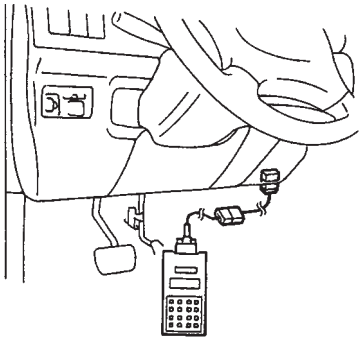


Fig. 2 for Step 5

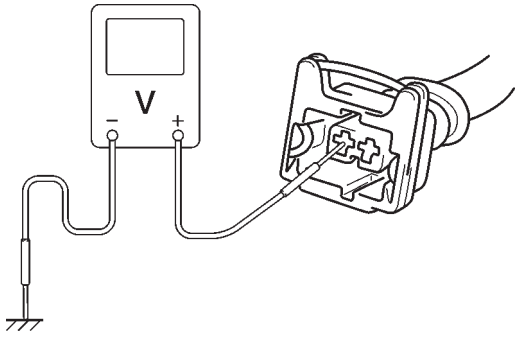
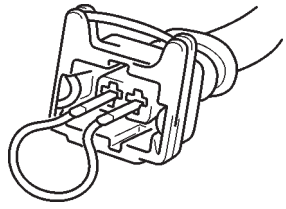
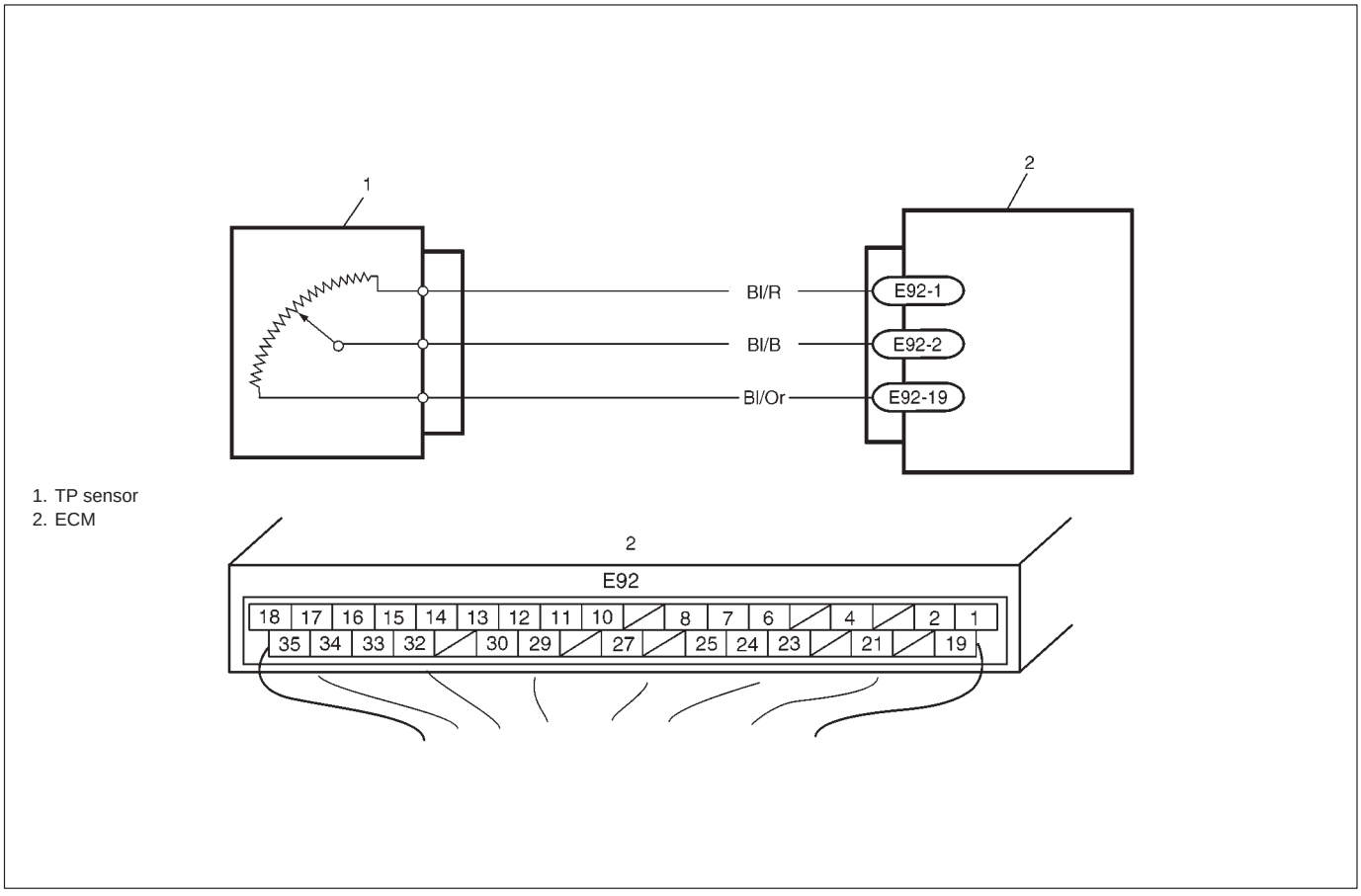


Fig. 3 for Step 6



DTC No.4 THROTTLE POSITION CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
○Signal voltage high ○Signal voltage low	○"Bl/Or" circuit open or shorted to power ○"Bl/B" circuit open or shorted to ground ○"Bl/R" circuit open or shorted to power or ground ○TP sensor malfunction ○ECM malfunction

DTC CONFIRMATION PROCEDURE

1) Clear DTC, start engine and keep it at idle for 1 min.
2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Check TP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF and then turn ignition switch ON. 2) Check throttle valve opening percentage displayed on scan tool. See Fig. 1. Is it displayed 0% or 100%?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0 A.
3	Check Wire Harness. 1) Disconnect connector from TP sensor with ignition switch OFF. 2) Check for proper connection to TP sensor at “Bl/R”, “Bl/B” and “Bl/Or” wire terminal. 3) If OK, then with ignition switch ON, check voltage at each of “Bl/R” and “Bl/B” wire terminals and body ground. See Fig. 2. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	“Bl/R” wire open, “Bl/R” wire shorted to ground circuit or power circuit or “Bl/Or” wire, “Bl/B” wire open or shorted to ground circuit or poor E92-1 or E92-2 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Check TP Sensor. Refer to TP SENSOR in Section 6E3. Is it in good condition?	“Bl/Or” wire open or poor E92-19 connection. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace TP sensor.

Fig. 1 for Step 2

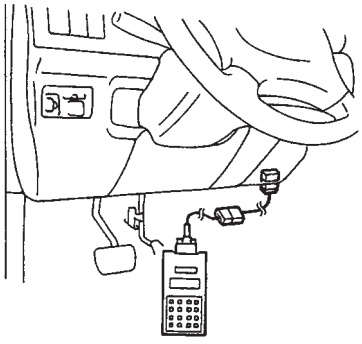
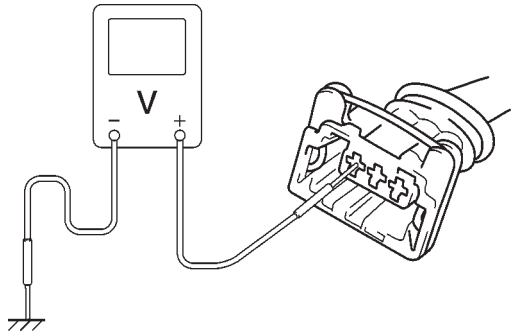


Fig. 2 for Step 3



DTC NO.13 BAROMETRIC PRESSURE SENSOR LOW/HIGH INPUT

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Barometric pressure sensor is installed in ECM.

DTC DETECTING CONDITION	POSSIBLE CAUSE
○Barometric pressure sensor voltage is too high or too low	○ECM (barometric pressure sensor) malfunction

DTC CONFIRMATION PROCEDURE

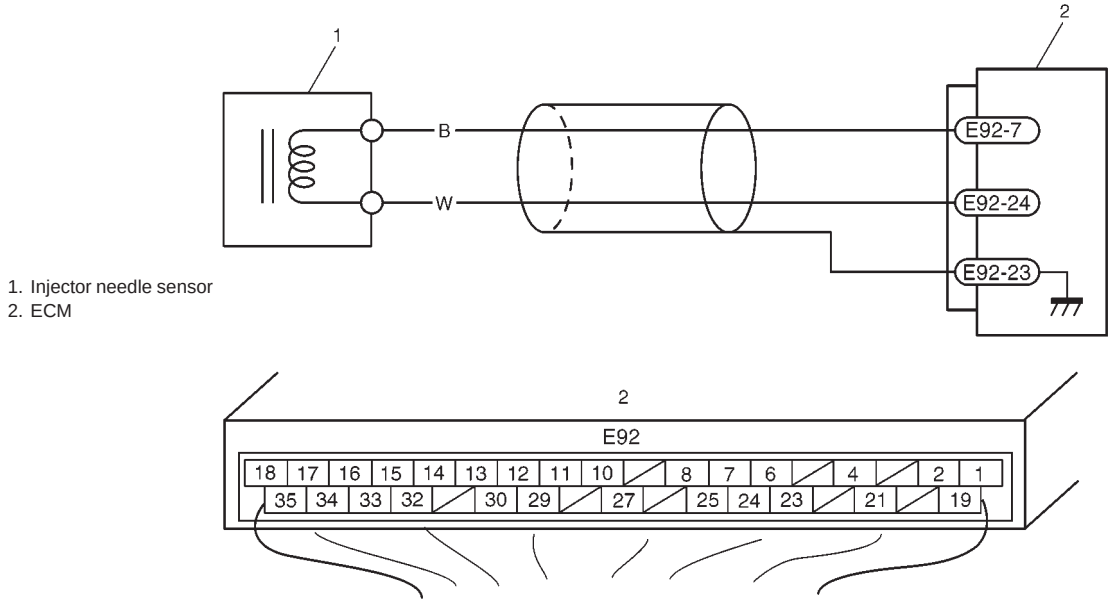
1) Turn ignition switch OFF.
2) Clear DTC with ignition switch ON.
3) Turn ignition switch ON for 2 sec., crank engine for 2 sec. and run it at idle for 1 min.
4) Check DTC in “DTC” mode.

INSPECTION

Substitute a known-good ECM and recheck.

DTC No.14 INJECTOR NEEDLE SENSOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION

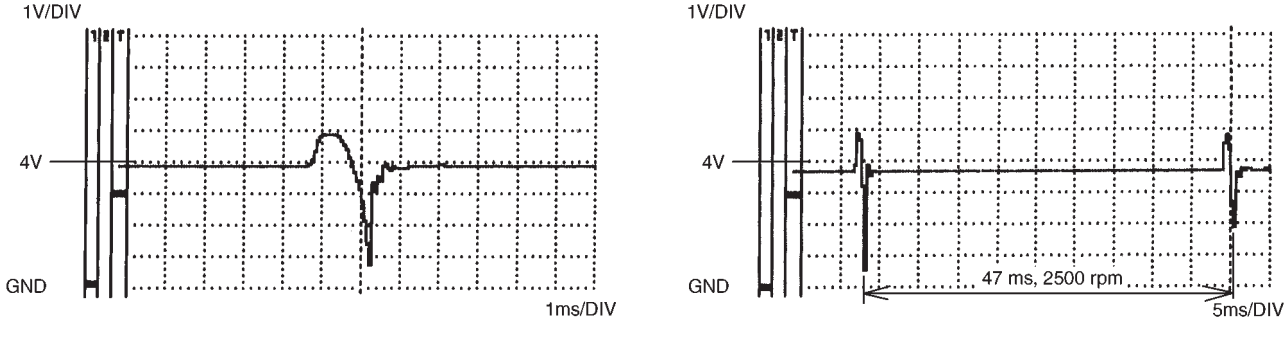


DTC DETECTING CONDITION	POSSIBLE CAUSE
○ No injector needle sensor signal for 2 seconds at engine cranking.	○Injector needle sensor circuit open or short. ○Injector damaged. ○Injector needle sensor malfunction. ○ECM malfunction.

Reference

Connect oscilloscope between terminals E92-7, E92-24 of ECM connector connected to ECM and check CKP sensor signal.

Oscilloscope Waveforms



Waveform at idle speed

Waveform at 2500 rpm

DTC CONFIRMATION PROCEDURE

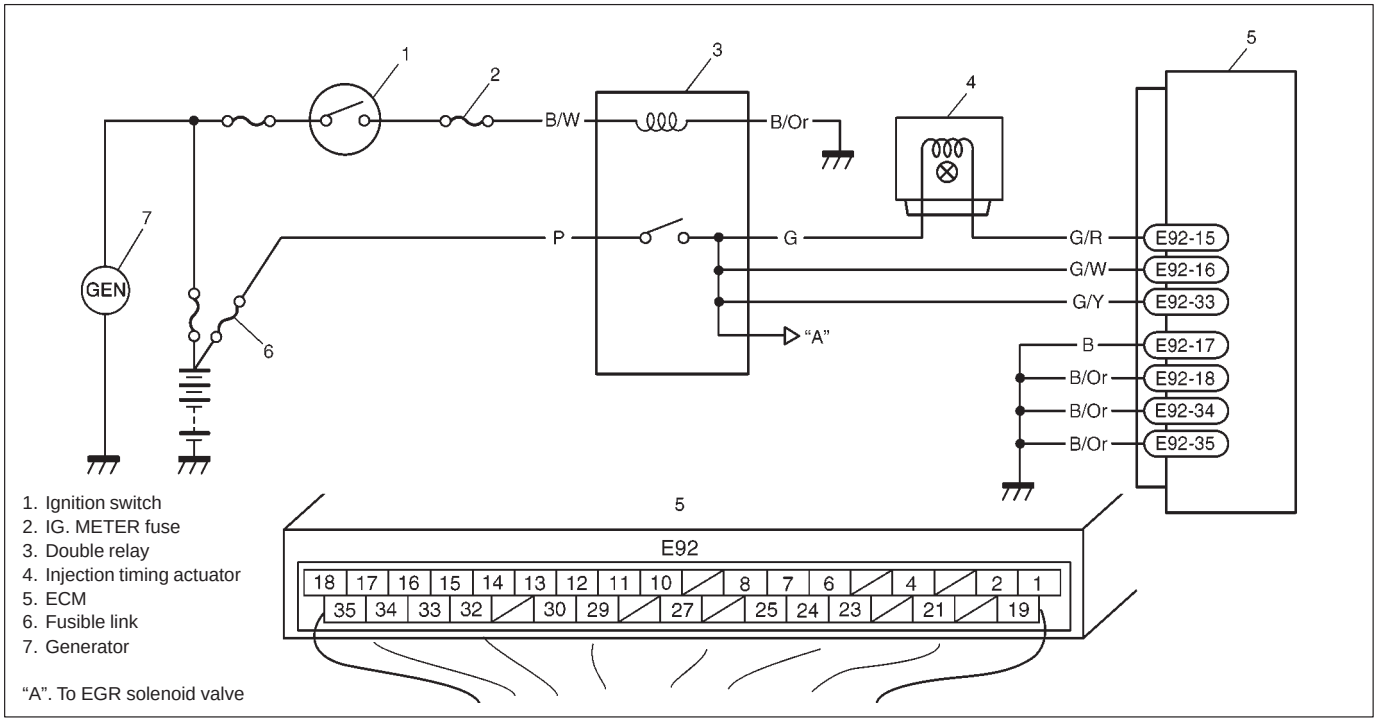
1) Clear DTC and crank engine for 2 sec.
2) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAGNOSIS FLOW TABLE”.
2	Check injector needle sensor and connector for proper installation. Is injector needle sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check injector needle sensor resistance as follows. 1) Disconnect injector needle sensor connector with ignition switch OFF. 2) Measure resistance between sensor terminals. Refer to INJECTOR NEEDLE SENSOR in Section 6E3. Is measured resistance value as specified?	Go to Step 4.	Replace injector needle sensor.
4	Check ECM terminal voltage as follows. 1) Turn ignition switch OFF. 2) Disconnect ECM connector. 3) Check for proper connection to ECM at each sensor terminals. 4) If check is OK, then turn ignition switch ON and measure voltage between sensor terminal of ECM and body ground. Is it 0 V?	Go to Step 5.	Injector needle sensor circuit shorted to power.
5	Check continuity of injector needle sensor circuit as follows. 1) Turn ignition switch OFF. 2) Connect injector needle sensor coupler. 3) Measure resistance between the following points. ○ Both ECM connector terminals of the injector needle sensor: continuity ○ Either terminal of injector needle sensor coupler and body ground: no-continuity Are both check results satisfactory?	Go to Step 6.	Circuit open or shorted to ground.
6	Check injector damage as follows. 1) Remove needle sensor with injector. 2) Check injector for damage, pollution and clogs. Refer to INJECTOR in Section 6A4. Is it in good condition?	Go to Step 7.	Clean, repair or replace.
7	Check voltage waveform for injector needle sensor as follows. 1) Install needle sensor with injector. 2) Check for voltage waveform as shown in reference of previous page. Is specified voltage and/or waveform obtained?	Substitute a known-good ECM and recheck.	Replace injector.

DTC No.16 INJECTION TIMING ACTUATOR CONTROL MALFUNCTION
DTC No.34 INJECTION TIMING ACTUATOR CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



1. Ignition switch
2. IG. METER fuse
3. Double relay
4. Injection timing actuator
5. ECM
6. Fusible link
7. Generator

"A". To EGR solenoid valve

ITEM	DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC No.16	Injection timing actuator improper operative	○Injection pump static timing is displacement ○Injection pump malfunction ○ECM malfunction
DTC No.34	Injection timing actuator circuit is opened or shorted	○"G" circuit open or short ○"G/R" circuit open or short ○Injection timing actuator malfunction

DTC CONFIRMATION PROCEDURE

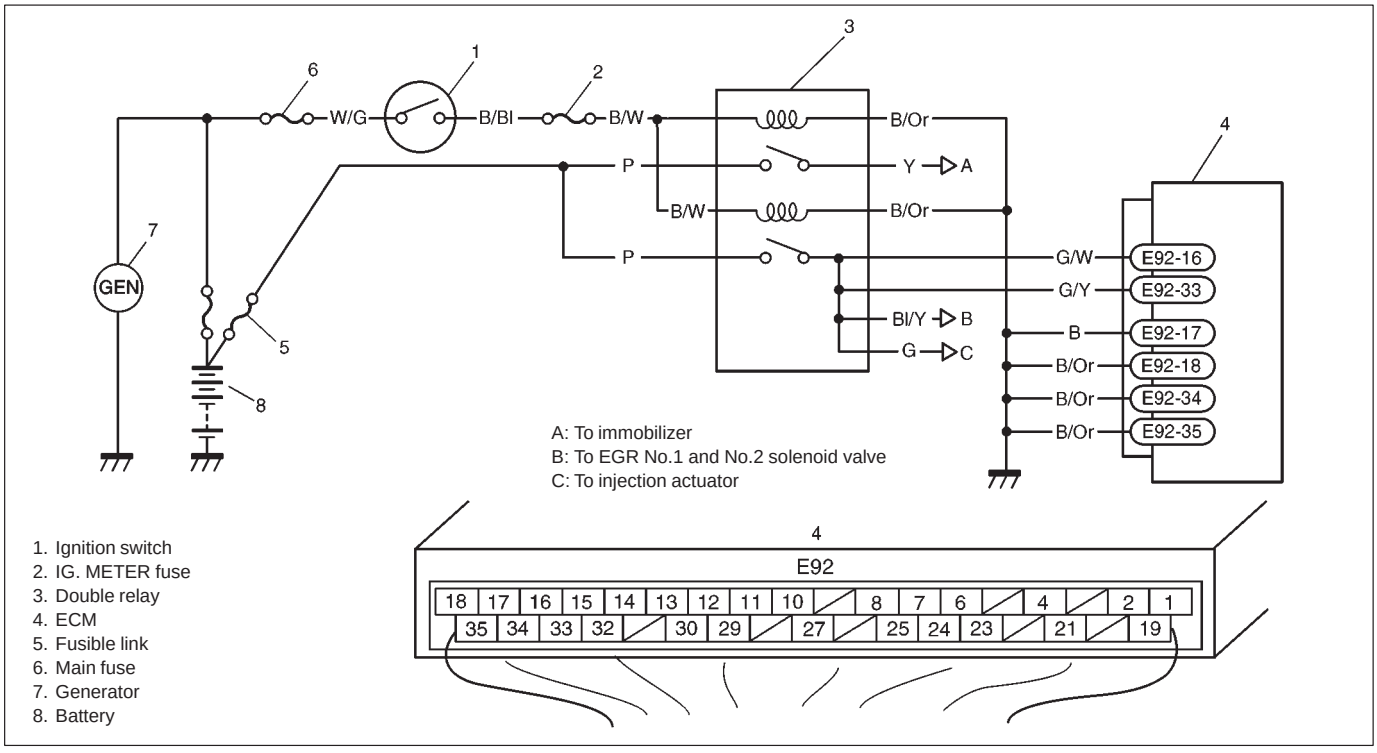
1) Clear DTC with ignition switch ON.
2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAGNOSIS FLOW TABLE”.
2	Check injection timing actuator connector for proper installation. Is injection timing actuator connector connected securely?	Go to Step 3.	Correct.
3	Check injection timing actuator operation as follows. 1) With ignition switch OFF, disconnect coupler from injection timing actuator. 2) Check injection riming actuator resistance. Refer to INJECTOR TIMING ACTUATOR in Section 6E3. Is it as specified?	Go to Step 4.	Remove the injection pump and have it checked by BOSCH dealer. (Refer to FUEL INJECTION PUMP in Section 6E3.)
4	Check ECM terminal voltage as follows. 1) Disconnect ECM coupler. 2) Connect injection timing actuator coupler. 3) Turn ignition switch ON. 4) Measure voltage between E92-15 terminal in ECM coupler and body ground. Is it over 10 V?	Go to Step 5.	“G” and “G/R” circuits open or shorted to ground.
5	Check injection timing actuator circuit voltage as follows. 1) Disconnect injection timing actuator coupler. 2) Turn ignition switch ON. 3) Measure voltage between E92-15 terminal in ECM coupler and body ground. Is it 0 V?	Go to Step 6.	“G/R” circuit shorted to power supply.
6	Check injection pump static timing. Refer to FUEL INJECTION PUMP in Section 6E3. Is it as specified?	Go to Step 7.	Adjust injection pump static timing. (Refer to FUEL INJECTION PUMP in Section 6E3.)
7	Substitute a known-good ECM and recheck. Is DTC detected?	Remove the injection pump and have it checked by BOSCH dealer. (Refer to FUEL INJECTION PUMP in Section 6E3.)	Faulty ECM.

DTC No.17 ECM POWER SUPPLY CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



1. Ignition switch
2. IG. METER fuse
3. Double relay
4. ECM
5. Fusible link
6. Main fuse
7. Generator
8. Battery

DTC DETECTING CONDITION	POSSIBLE CAUSE
○ ECM power supply circuit is 6 V or lower ○ ECM power supply circuit is 16 V or higher	○Poor charge battery. ○Fuse blown. ○"G/Y" and "G/W" circuit open or shorted to ground. ○"B/W" and "P" circuit open or shorted to ground. ○Double relay ground open or shorted to power supply. ○Generator malfunction. ○Double relay malfunction.

DTC CONFIRMATION PROCEDURE

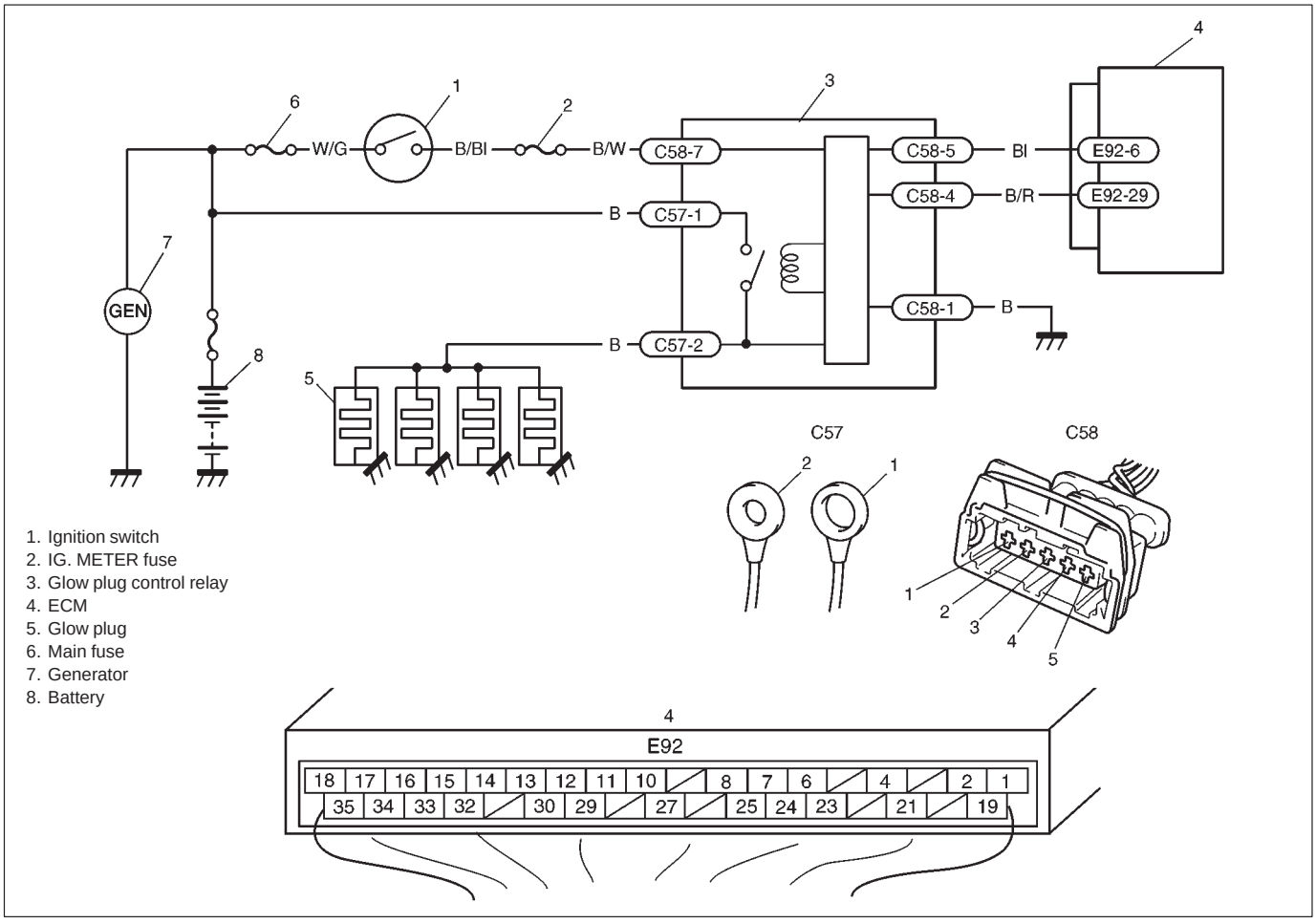
1) Clear "DTC".
2) Start engine and run it at 3000 r/min.
3) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAGNOSIS FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAGNOSIS FLOW TABLE".
2	Check battery voltage. Is it over 12 V?	Go to Step 3.	Battery poor charge or malfunction.
3	Check ECM power circuit. Go to TABLE A-2 ECM POWER AND GROUND CIRCUIT CHECK. Is check results OK?	Go to Step 4.	ECM power circuit malfunction.
4	Check generator voltage as follows. 1) Run engine at 3000 rpm. 2) Measure battery voltage. Is it 12 to 16 V?	Substitute a known-good ECM and recheck.	Generator malfunction.

DTC No.22 GLOW PLUG RELAY CONTROL MALFUNCTION (FEEDBACK LOW VOLTAGE)
DTC No.23 GLOW PLUG RELAY CONTROL CIRCUIT MALFUNCTION
DTC No.32 GLOW PLUG RELAY CONTROL MALFUNCTION (FEEDBACK HIGH VOLTAGE)

CIRCUIT DESCRIPTION



ITEM	DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC No.22	Glow plug relay control malfunction. (Glow plug relay feedback voltage is low when E92-29 terminal on ECM output voltage is low.)	○"Bl" circuit short to ground. ○Glow plug relay malfunction. ○Glow plug relay C57-1, C58-3 terminal circuit open or short to ground. ○Glow plug relay C57-2 terminal circuit short to ground.
DTC No.23	Glow plug relay control circuit open or short	○"B/R" circuit open or short to ground.
DTC No.32	Glow plug relay control malfunction. (Glow plug relay feedback voltage is high when E92-29 terminal on ECM output voltage is high.)	○"Bl" circuit short to power supply. ○Glow plug relay malfunction. ○Glow plug relay C57-2 terminal circuit short to power supply.

DTC CONFIRMATION PROCEDURE

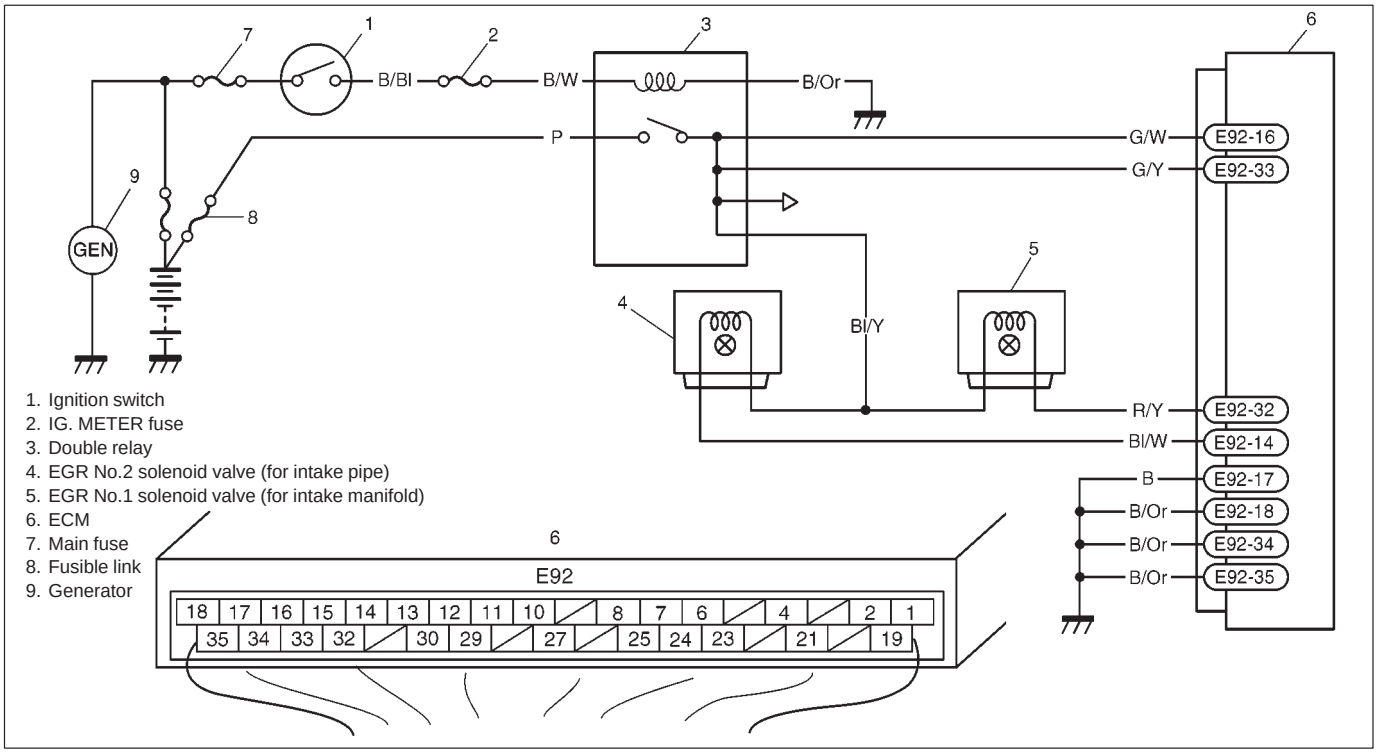
1) Clear DTC, start engine and keep it at idle for 1 min.
2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAGNOSIS FLOW TABLE”.
2	Check glow plug relay and connector for proper installation. Is glow plug relay installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check glow plug relay operation as follows. 1) Disconnect negative cable terminal at battery. 2) Disconnect coupler and terminals from glow plug relay and remove it. 3) Check glow plug relay. Refer to GLOW PLUG RELAY in Section 6E3. Is check results as specified?	Go to Step 4.	Glow plug relay malfunction.
4	Check glow plug relay power supply circuit as follows. 1) Insulate C57-1 and C57-2 terminals in glow plug harness. 2) Connect negative cable to battery terminal. 3) Turn ignition switch ON. 4) Measure voltage between C57-1 terminal in glow plug harness terminal and ground, C57-2 terminal in glow plug harness terminal and ground. Is voltage at each terminal over 10 V?	Go to Step 5.	C57-1 and C57-2 circuits open or shorted to ground.
5	Check glow plug relay circuit continuity as follows. 1) Turn ignition switch OFF. 2) Check continuity between C58-1 terminal in glow plug relay coupler and body ground. Is it continuity?	Go to Step 6.	C58-1 circuit open.
6	Check glow plug relay circuit insulation as follows. 1) Disconnect coupler from ECM. 2) Check continuity between C57-2 terminal in glow plug harness and body ground. Is it continuity?	Go to Step 7.	C57-2 circuit open or glow plug malfunction.
7	Check terminal E92-29 circuit voltage as follows. 1) Connect coupler and terminal to glow plug relay. 2) Disconnect coupler from ECM. 3) Turn ignition switch ON. 4) Measure voltage between E92-29 terminal in ECM coupler and body ground. Is voltage over 10 V?	Go to Step 8.	E92-29 circuit open or shorted to ground.
8	Check terminal E92-29 circuit voltage as follows. 1) Disconnect coupler from glow plug relay. 2) Measure voltage between E92-29 terminal in ECM coupler and body ground with ignition switch ON. Is it 0 V?	Go to Step 9.	E92-29 circuit shorted to power supply.
9	Check terminal E92-6 circuit voltage as follows. 1) Connect shorting harness between E92-29 terminal in ECM coupler and body ground. 2) Measure voltage between E92-6 terminal in ECM coupler and body ground with ignition switch ON. Is it over 6 V?	Go to Step 10.	E92-6 circuit open or shorted to ground.
10	1) Disconnect shorting harness in Step 7. 2) Measure voltage E92-6 terminal in ECM coupler and body ground with ignition switch ON. Is it over 0 V?	Substitute a known-good ECM and recheck.	E92-6 circuit shorted to power supply.

DTC NO.33 EGR NO.1 CONTROL VALVE CIRCUIT MALFUNCTION
DTC NO.36 EGR NO.2 CONTROL VALVE CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
EGR No.1 or No.2 solenoid valve circuit is opened or shorted.	○"R/Y", "Bl/W" circuit open or short ○"Bl/Y" circuit open or short ○EGR solenoid valve malfunction

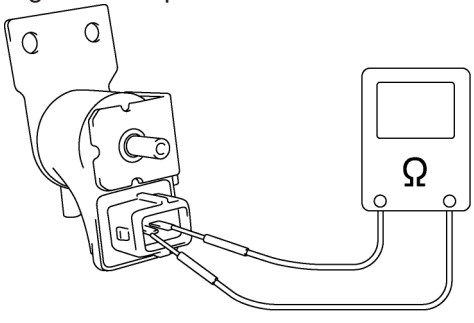
DTC CONFIRMATION PROCEDURE

1) Clear DTC with ignition switch ON.
2) Select "DTC" mode on scan tool and check DTC.

INSPECTION

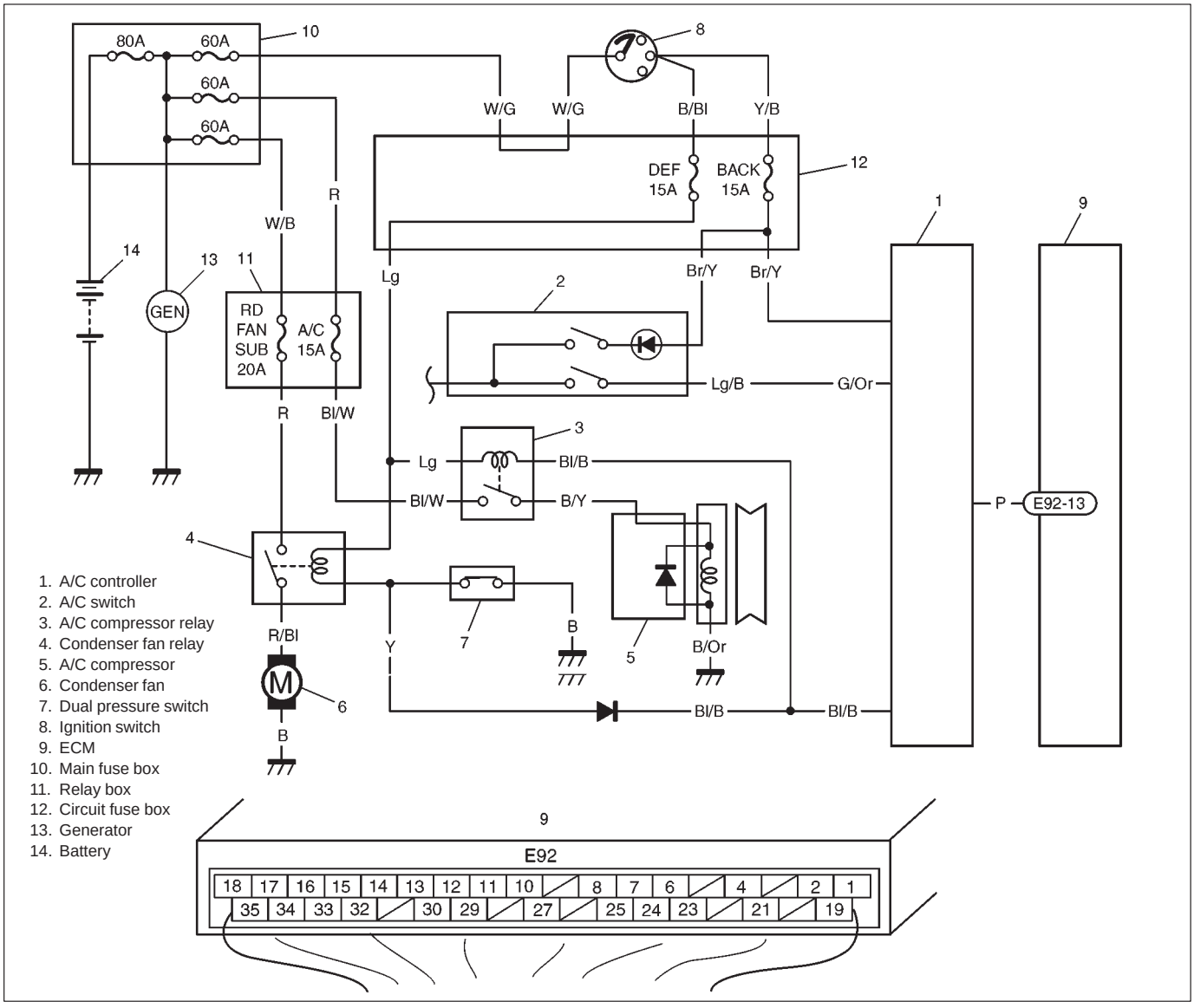
STEP	ACTION	YES	NO
1	Check EGR No.1, No.2 solenoid valve for resistance. 1) With ignition switch OFF, disconnect coupler from canister purge valve. 2) Check resistance of EGR No.1, No.2 solenoid valve. Resistance between two terminals. See Fig.1. : 23 – 40 Ω at 20℃ (68℉) Resistance between terminal and body : 1MΩ or higher Is it as specified?	"R/Y", "Bl/Y" circuit open or short.	Replace EGR No.1 or No.2 solenoid valve.

Fig. 1 for Step 1



DTC NO.37 A/C CUT OFF CONTROL CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
○ Low voltage at terminal E92-13 when ECM doesn't output A/C ON signal to A/C amplifier or when engine coolant temp. is not 110°C (230°F) or more.	○"P" circuit open or short ○Each engine emission control sensor faulty ○ECM malfunction

DTC CONFIRMATION PROCEDURE

1) Clear DTC with ignition switch ON.
2) Select "DTC" mode on scan tool and check DTC.

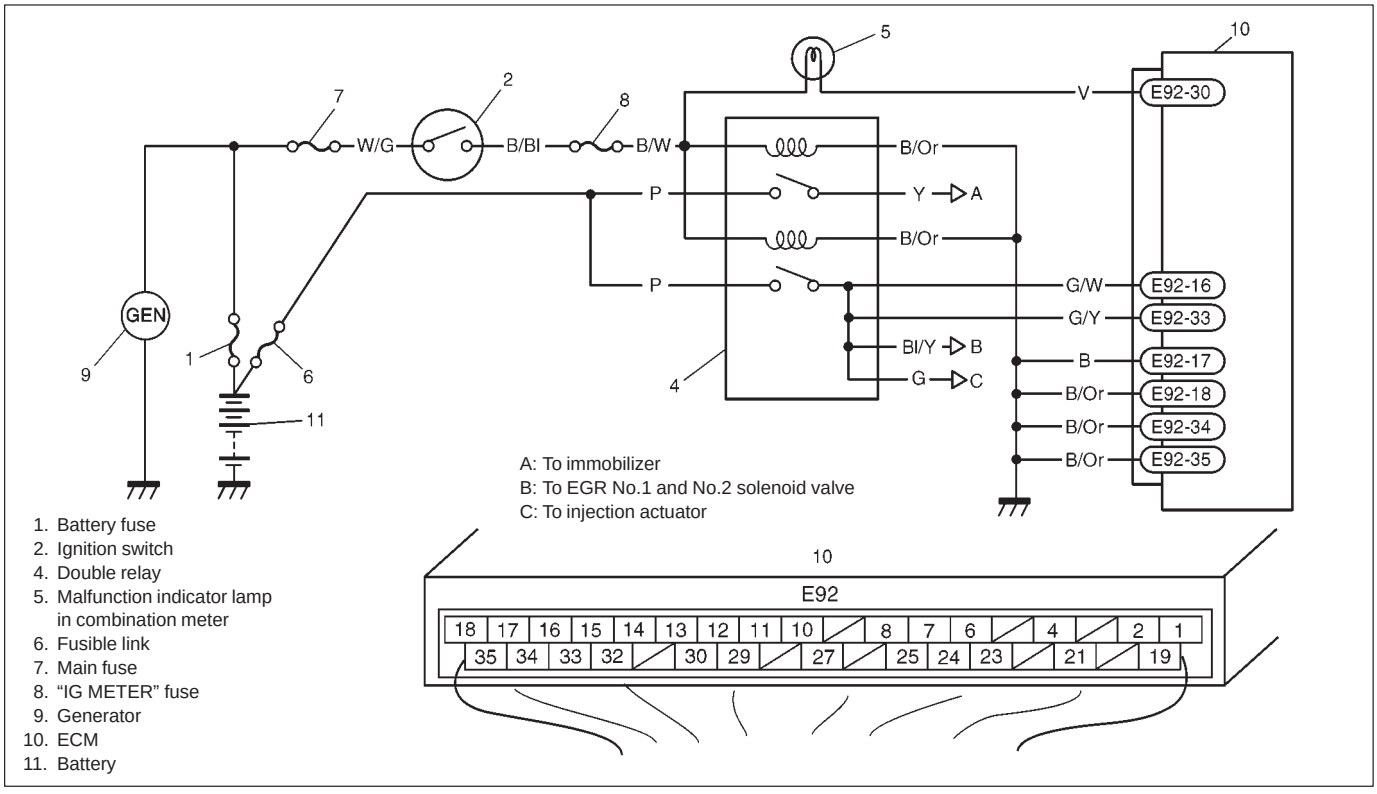
DTC NO.37

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAGNOSIS FLOW TABLE”.
2	Check A/C Cut Signal Circuit. 1) Check voltage at terminal E92-13 A/C cut signal specification: While engine running: 0 – 1.5 V Ignition switch turn ON or while cranking engine: 10 – 14 V Are check results as specified?	Substitute a known-good ECM and recheck.	“P” circuit open or short.

DTC NO.38 MALFUNCTION INDICATOR LAMP (MIL) CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
○ MIL open circuit.	○E92-30 circuit opened.
○ MIL short circuit.	○E92-30 shorted to ground or power supply.

DTC CONFIRMATION PROCEDURE

1) Clear DTC.
2) Start engine and run it at idle speed.
3) Select "DTC" mode on scan tool and check DTC.

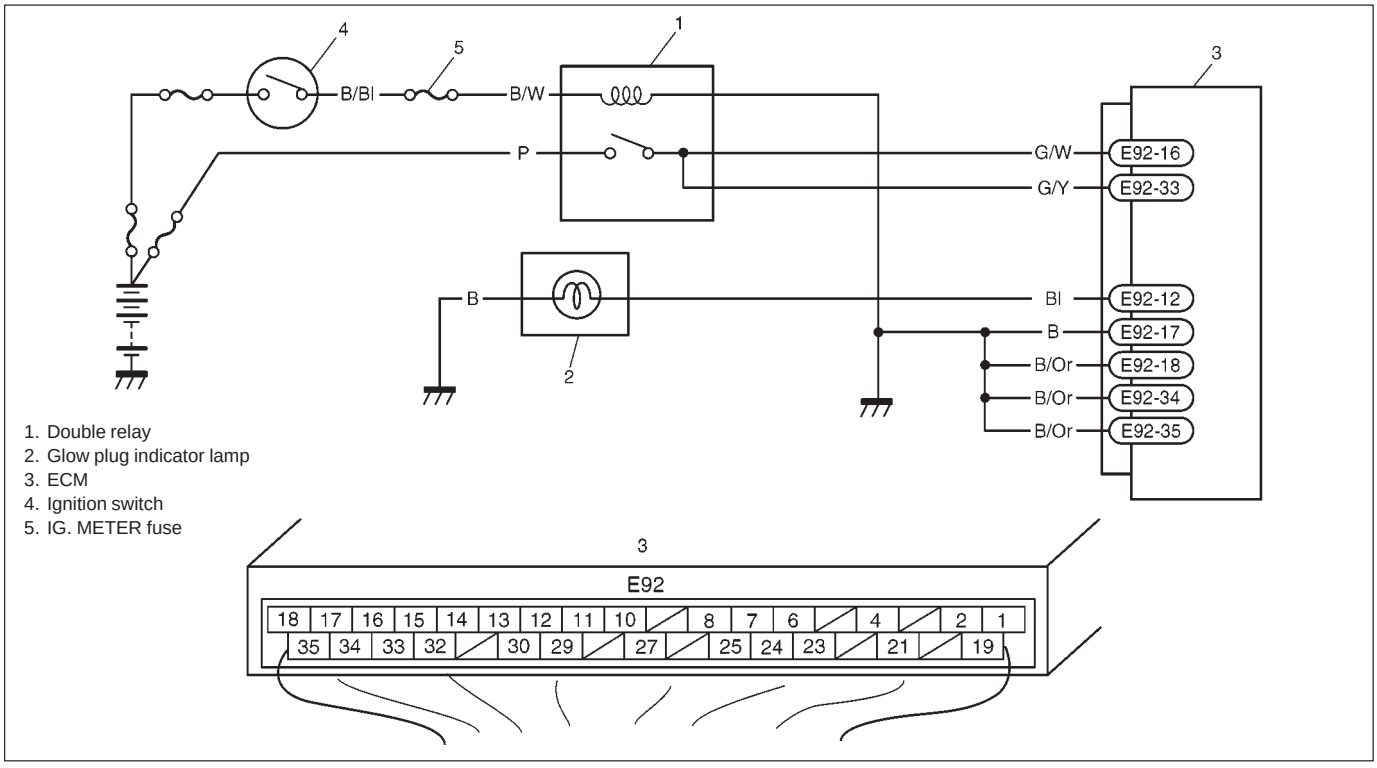
INSPECTION

STEP	ACTION	YES	NO
1	Was "ENGINE DIAGNOSIS FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAGNOSIS FLOW TABLE".
2	Check ECM and connector for proper installation. Is ECM installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check terminal E92-30 voltage as follows. 1) Turn ignition switch OFF, disconnect coupler from ECM. 2) Measure voltage between E92-30 terminal in ECM coupler and body ground with ignition switch ON. Is it 12 to 16 V?	Go to Step 6.	Go to Step 4.

STEP	ACTION	YES	NO
4	MIL bulb check 1) Remove combination meter. 2) Remove MIL bulb, and then check that there is no burned out for bulb. Is it OK?	Go to Step 5.	Glow plug indicator lamp burned out.
5	Check MIL power supply as follows. 1) Measure voltage between “B/W” terminal in combination meter coupler and body ground with ignition switch ON. Is it 12 to16 V?	E92-30 circuit opened or shorted to ground.	“B/W” circuit in combination meter circuit opened or shorted to ground.
6	Check terminal E92-30 voltage as follows. 1) Turn ignition switch OFF, disconnect coupler from combination meter. 2) Measure voltage between E92-30 terminal in ECM coupler and body ground with ignition switch ON. Is it 0 V?	Go to Step 7.	E92-30 circuit shorted to power supply line.
7	Check terminal E92-30 circuit as follows. 1) Check for continuity between E92-30 terminal in ECM coupler and body ground. Is continuity indicated?	E92-30 circuit shorted to ground.	Substitute a known-good ECM and recheck.

DTC No.39 GLOW PLUG INDICATOR LAMP CIRCUIT MALFUNCTION

CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
○ Glow plug indicator lamp open circuit.	○E92-12 circuit open.
○ Glow plug indicator lamp short circuit.	○E92-12 shorted to ground or power supply.

DTC CONFIRMATION PROCEDURE

1) Clear DTC.
2) Start engine and run it at idle speed.
3) Select “DTC” mode on scan tool and check DTC.

INSPECTION

STEP	ACTION	YES	NO
1	Was “ENGINE DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAGNOSIS FLOW TABLE”.
2	Check ECM and connector for proper installation. Is ECM installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check terminal E92-12 voltage as follows. 1) Turn ignition switch OFF, disconnect coupler from ECM. 2) Measure voltage between E92-12 terminal in ECM coupler and body ground with ignition switch ON. Is it 0 V?	Go to Step 4.	E92-12 circuit shorted to power supply.
4	Check glow plug indicator as follows. 1) Remove combination meter. 2) Remove glow plug indicator bulb, and then check that there is no burned out for bulb. Is it OK?	Go to Step 5.	Glow plug indicator lamp burned out.

STEP	ACTION	YES	NO
5	Check terminal E92-12 no-continuity as follows. 1) Check for no-continuity between E92-12 terminal in ECM coupler and body ground with disconnected bulb from ECM. Is no-continuity indicated?	Go to Step 6.	E92-12 circuit shorted to ground.
6	Check terminal E92-12 circuit as follows. 1) Install glow plug indicator bulb. 2) Check for continuity between E92-12 terminal in ECM coupler and body ground. Is continuity indicated?	Substitute a known-good ECM and recheck.	E92-12 circuit opened.

DTC NO.127 INTERNAL CONTROL MODULE MEMORY CHECK SUM ERROR

DTC DETECTING CONDITION	POSSIBLE CAUSE
Data write error (or check sum error) when written into ECM	ECM

DTC CONFIRMATION PROCEDURE

1) Turn ignition switch OFF.
2) Clear DTC with ignition switch ON and then turn ignition switch OFF.
3) Start engine and run it at idle if possible.
4) Check DTC in “DTC” mode.

INSPECTION

Substitute a known-good ECM and recheck.

DIAGNOSIS IN TERMS OF SYMPTOM

Retrieve Table

Item	Corresponding procedure
The engine will not start with no emission of smoke (engine warm and cold)	Procedure 1
The engine will not start with emission of black smoke (engine warm and cold)	Procedure 2
The engine will not start with emission of clear smoke (engine cold)	Procedure 3
The engine is difficult to start when cold (with emission of black smoke)	Procedure 4
The engine starts then stops	Procedure 5
Unstable idling	Procedure 6
Vibration at idle	Procedure 7
Unwanted acceleration	Procedure 8
The engine stalls/on overrun (slow return to idle)	Procedure 9
Engine miss-fire; irregular operation	Procedure 10
The engine starts with difficulty (engine hot)	Procedure 11
Vehicle lacks of power (with or without emission of smoke)	Procedure 12
Excessive diesel consumption	Procedure 13
Engine knocking	Procedure 14
Hesitation at steady speed	Procedure 15
Hesitation on re-acceleration	Procedure 16
With emission of black smoke (at idle) after starting	Procedure 17
Emission of blue smoke (at idle; on overrun; at low load)	Procedure 18
With emission of black smoke (at load)	Procedure 19
No re-accelaration/no liveliness (with or without emission of smoke)	Procedure 20
The vehicle moves off with difficulty (with or without emission of smoke)	Procedure 21

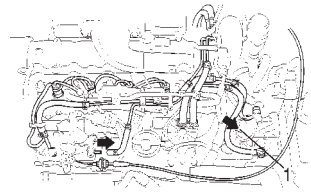
PROCEDURE 001

The engine will not start with no emission of smoke – engine warm and cold

Perform “Immobilizing actuator (shut off valve) check”.
(Refer to “Shut off valve check” in section 8G of this manual.)

Is operation of Immobilizing actuator (shut off valve) in good condition?
- No → Repair or replace any defective parts referring to section 8G of this manual.
- Yes ↓

1) Disconnect fuel feed hose from fuel injection pump.
2) Operator priming pump on fuel filter.



1. Priming pump

Does fuel come out from disconnected hose?
- No → Repair or replace any defective parts.
- Yes ↓

Check high pressure pipes between fuel injection pump and injectors for leakage, clog and bent. Are they in good condition?
- No → Repair or replace any defective parts.
- Yes ↓

Are injectors correct and in good condition? (Refer to “Injector inspection” in section 6E3.)
- No → Repair or replace any defective parts.
- Yes ↓

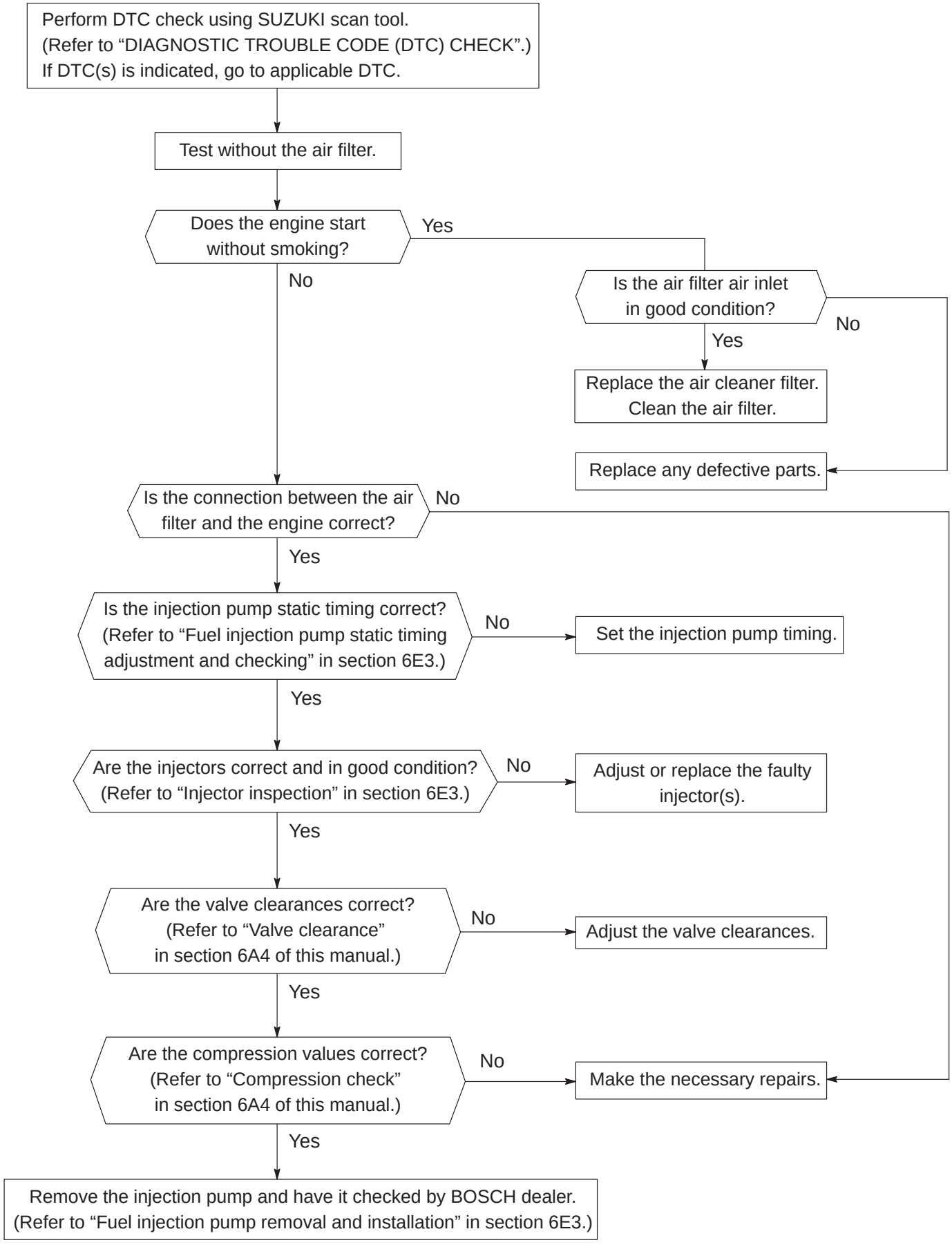
Check fuel injection pump drive system – timing belt, gear pulleys.

Are they in good condition?
- No → Repair or replace any defective parts.
- Yes ↓

Remove the injection pump and have it checked by BOSCH dealer. (Refer to “Fuel injection pump removal and installation” in section 6E3.)

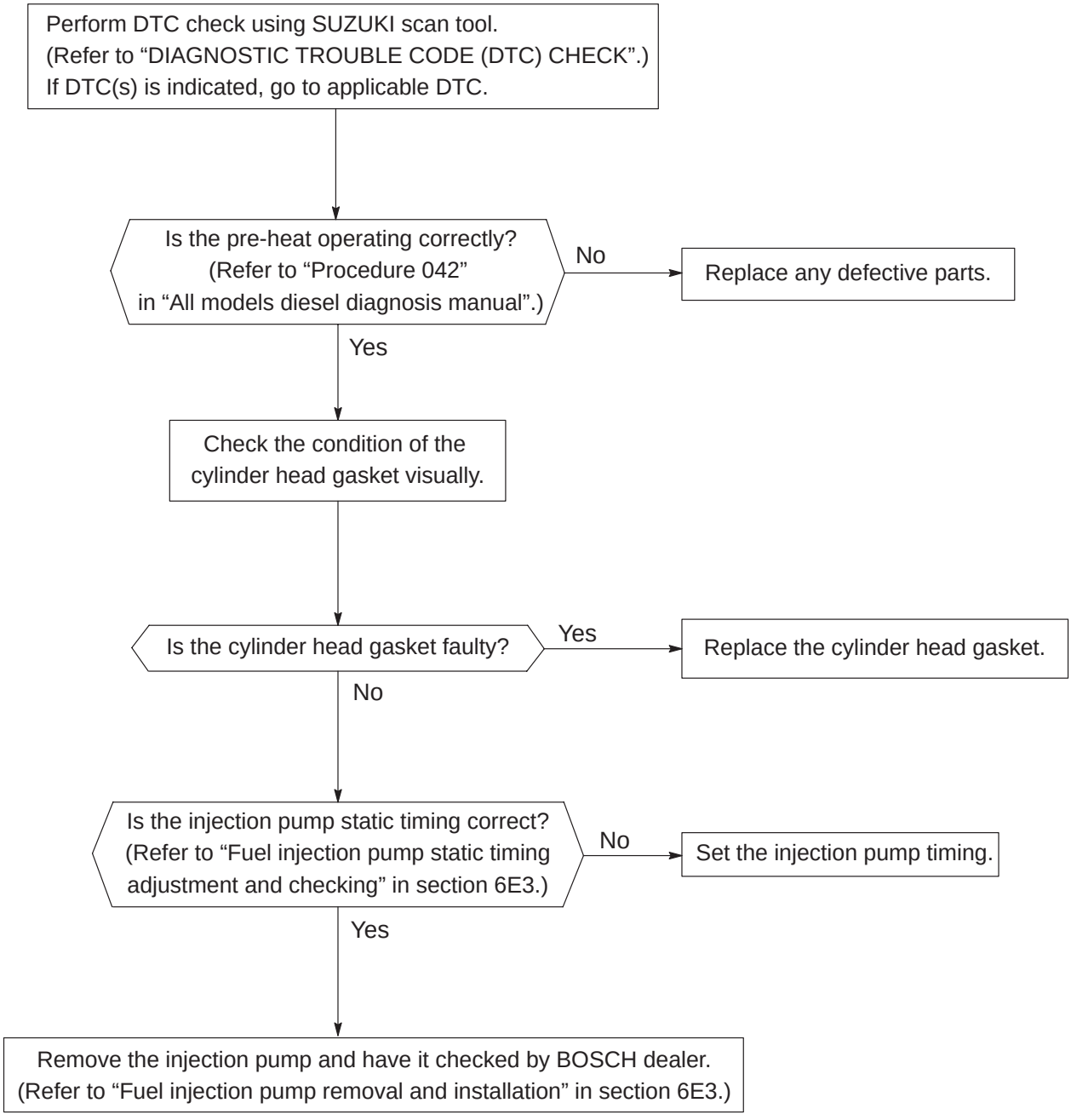
PROCEDURE 002

The engine will not start with emission of black smoke – engine warm or cold.



PROCEDURE 003

The engine will not start with emission of clear smoke – engine cold



PROCEDURE 004

The engine is difficult to start when cold – with emission of black smoke

Perform DTC check using SUZUKI scan tool.
(Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CHECK".)
If DTC(s) is indicated, go to applicable DTC.

↓

Is the pre-heat operating correctly?
(Refer to "Procedure 042"
in "All models diesel diagnosis manual".)

No → Replace any defective parts.

↓ Yes

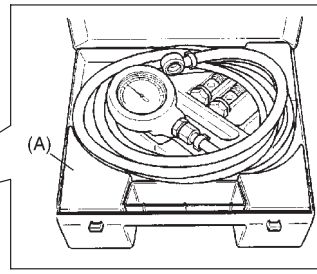
Is fast idle control thermostat adjusted
and working correctly?
(Refer to "Injection pump settings:
BOSCH equipment (Non-industrial setting)"
in "Overhaul checking tuning manual".)

No → Adjust or replace any defective parts.

↓ Yes

Is the diesel supply system correct?
(Refer to "Procedure 026"
in "All models diesel diagnosis manual".)

No →



Special tool
(A): 09912-56510/
OUT0000077
(Pressure gauge)

↓ Yes

Is the injection pump static timing correct?
(Refer to "Fuel injection pump static timing
adjustment and checking" in section 6E3.)

No → Set the injection pump timing.

↓ Yes

Is the exhaust gas recirculation
(EGR) working correctly?
(Refer to "Procedure 044"
in "All models diesel diagnosis manual".)

No →

↓ Yes

Are the injectors correct and in good condition?
(Refer to "Injector inspection" in section 6E3.)

No → Adjust or replace the faulty injectors.

↓ Yes

Are the valve clearances correct?
(Refer to "Valve clearance"
in section 6A4 of this manual.)

No →

↓ Yes

Are the compression values correct?
(Refer to "Compression check"
in section 6A4 of this manual.)

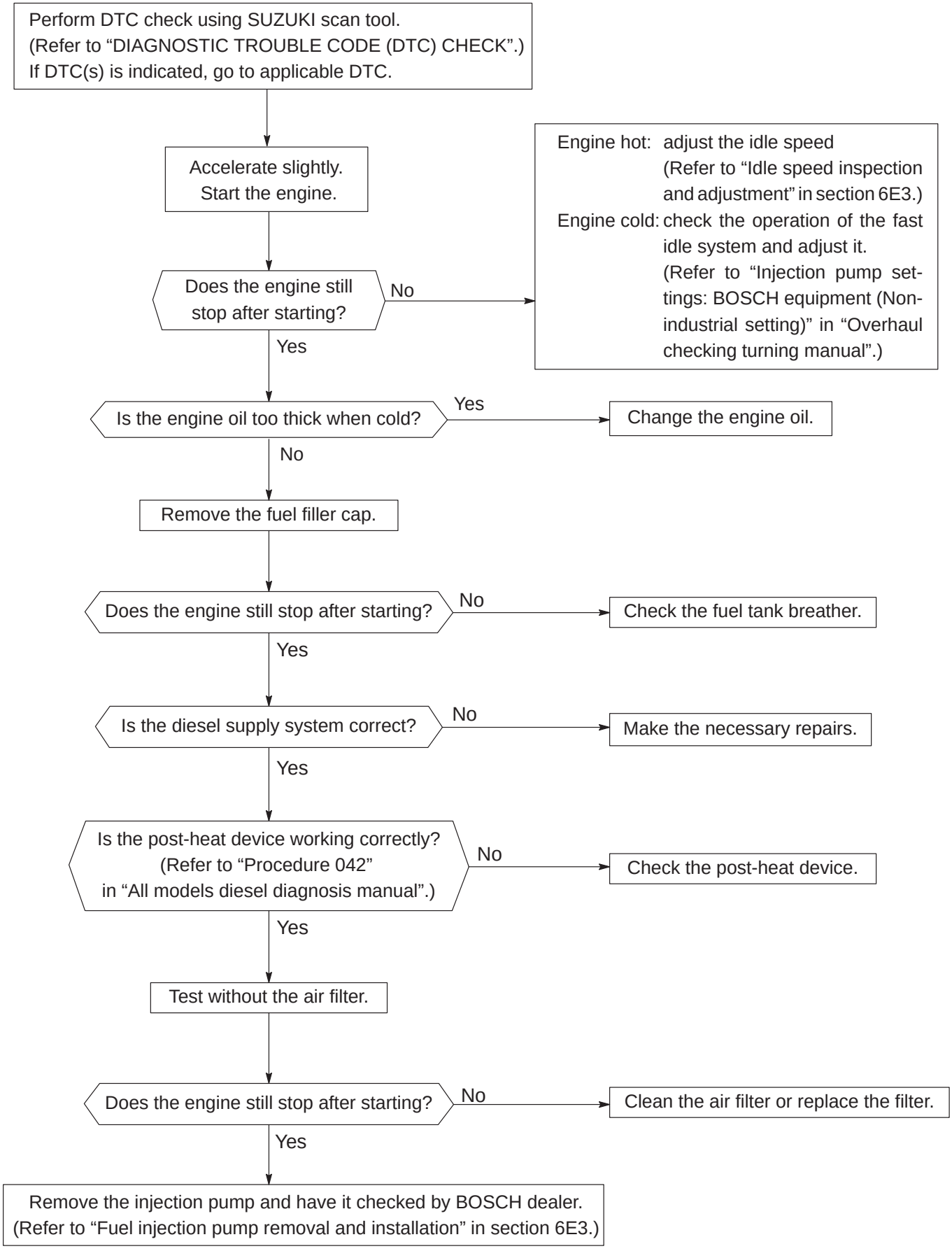
No → Make the necessary repairs.

↓ Yes

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to "Fuel injection pump removal and installation" in section 6E3.)

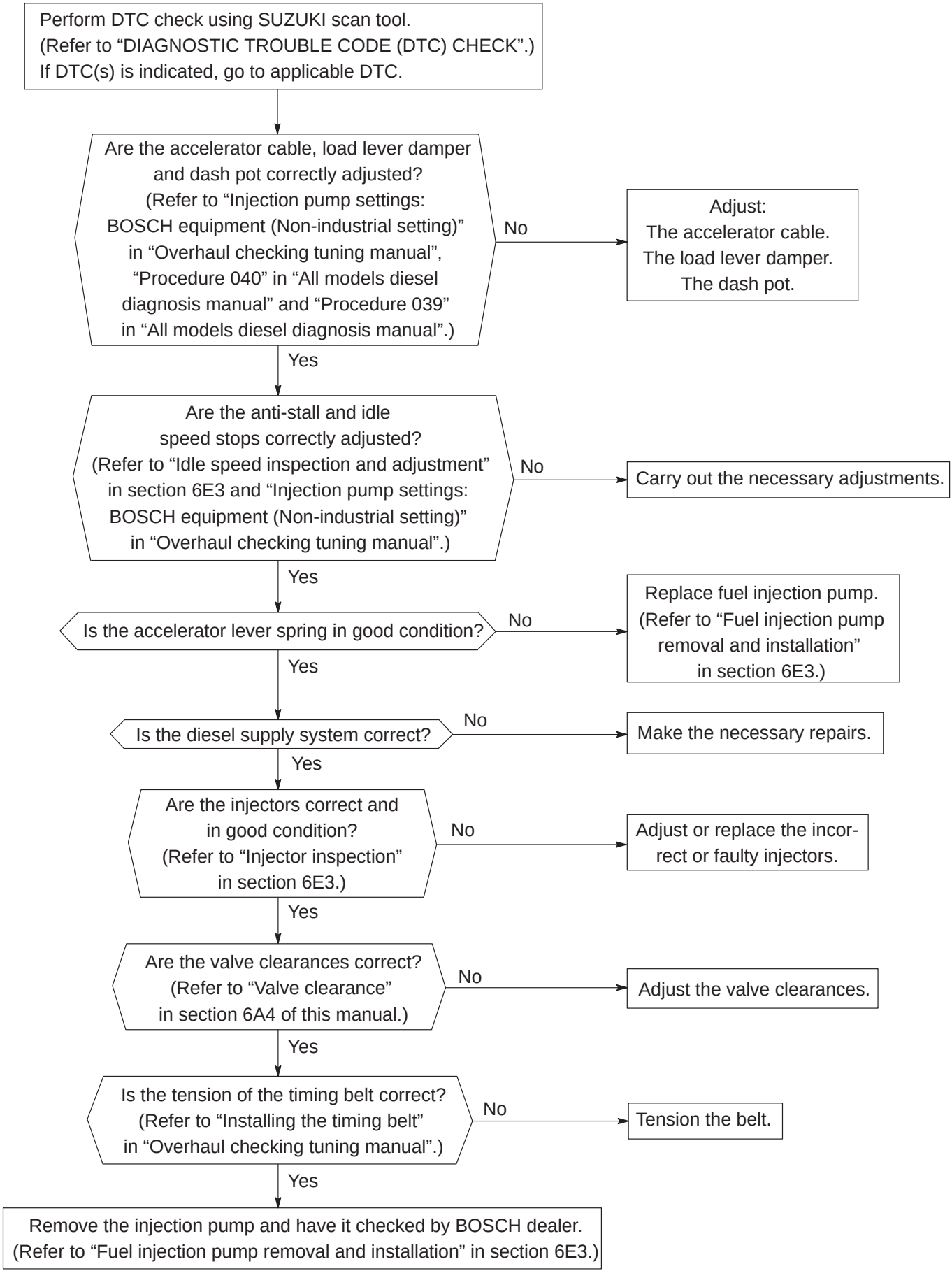
PROCEDURE 005

The engine starts then stops



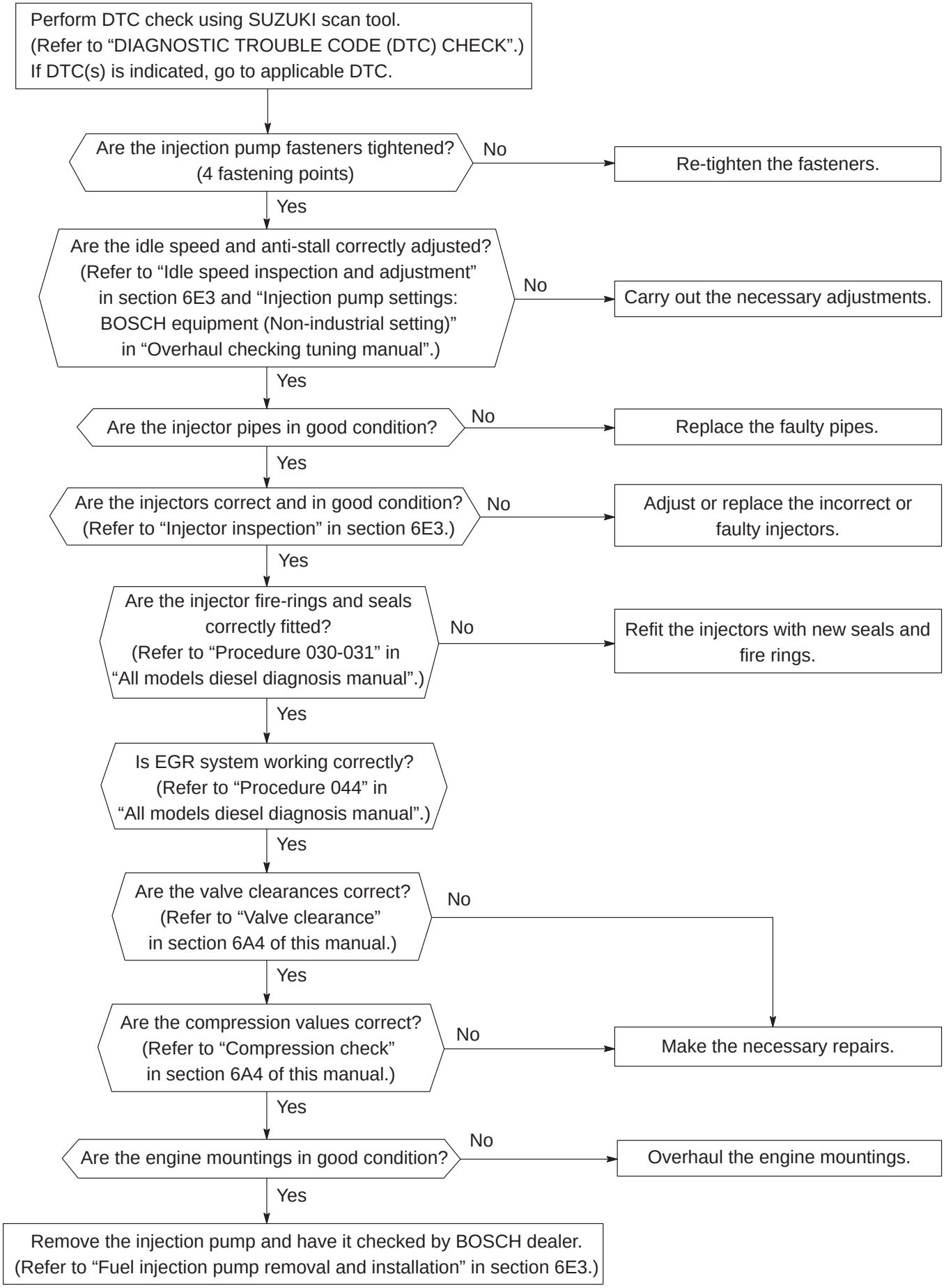
PROCEDURE 006

Unstable idling



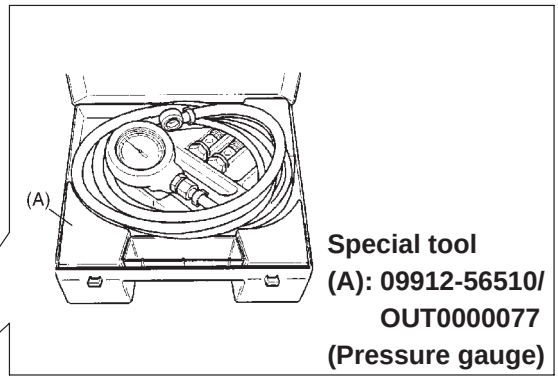
PROCEDURE 007

Vibration at idle



PROCEDURE 008

Unwanted acceleration



Is the diesel supply system correct?
(Refer to “Procedure 026”
in “All models diesel diagnosis manual”.)

No → Make the necessary repairs.

Yes

Is the engine oil level above maximum?

Yes → Top up the oil level.

No

Is the engine emitting blue smoke and
is the turbo/manifold inlet duct abnormally oily?

No → Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

Yes

Disconnect the oil vapour recirculation system.
Does the engine accelerate on its own?

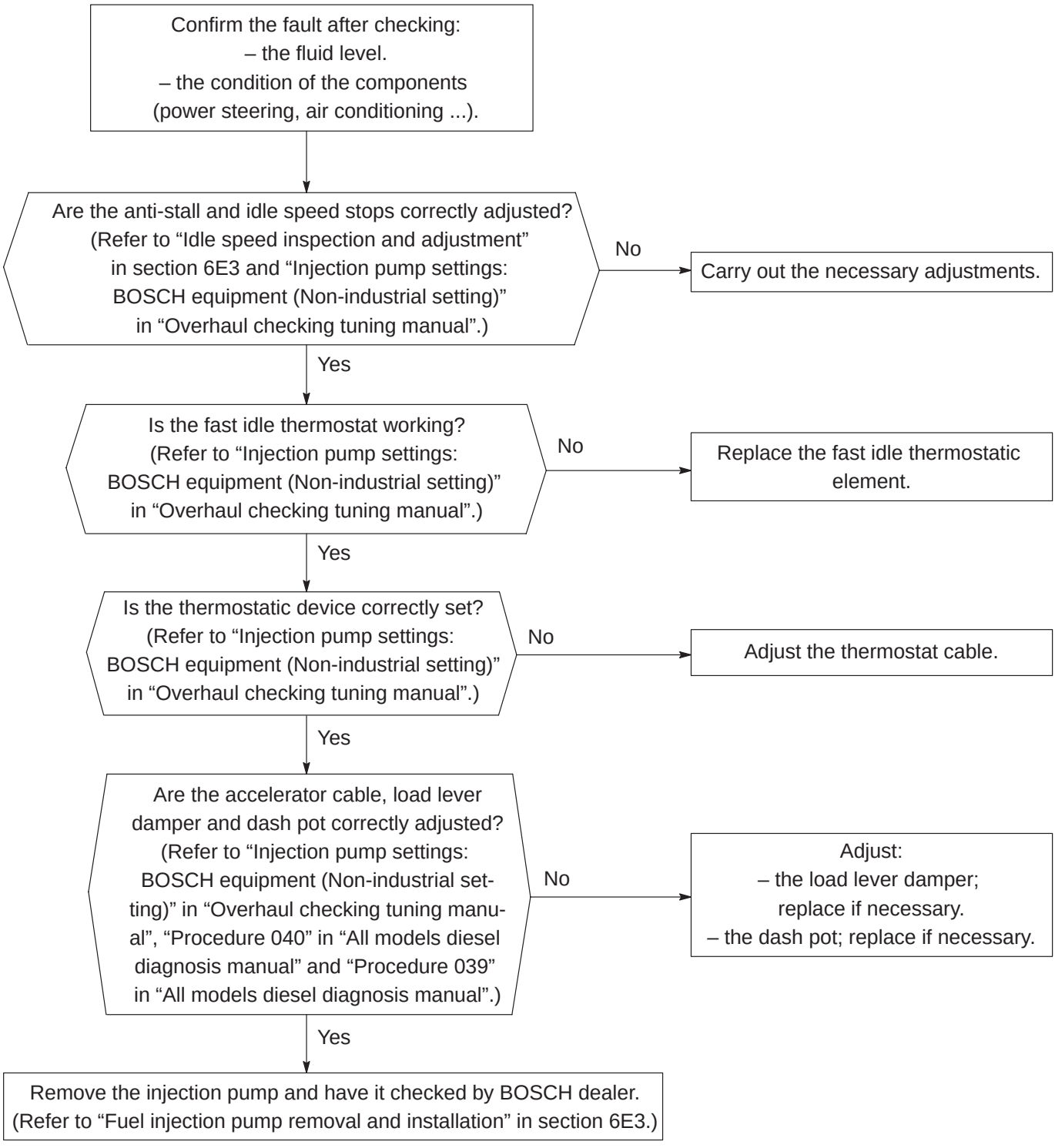
No → Check the general condition of the engine:
– compression
– recirculation of oil vapours

Yes

Oil leak at the turbocharger bearings.
Replace the turbo.

PROCEDURE 009

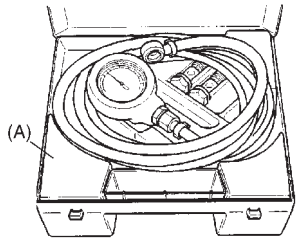
The engine stalls (on overrun) – slow return to idle



PROCEDURE 010

Engine mis-fires; irregular operation

Perform DTC check using SUZUKI scan tool.
(Refer to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK”.)
If DTC(s) is indicated, go to applicable DTC.



Special tool
(A): 09912-56510/ OUT0000077 (Pressure gauge)

Is the diesel supply system correct?
(Refer to “Procedure 026” in “All models diesel diagnosis manual”.)
No
Yes

Is the idling speed correct?
(Refer to “Idle speed inspection and adjustment” in section 6E3.)
No → Adjust the idling speed.
Yes

Are the injection pipes leaking?
Yes → Replace or re-tighten the faulty pipe(s).
No

Is the exhaust gas recirculation (EGR) working correctly?
(Refer to “Procedure 044” in “All models diesel diagnosis manual”.)
No
Yes

Is the injection pump static timing correct?
(Refer to “Fuel injection pump static timing adjustment and checking” in section 6E3.)
No → Set the injection pump timing.
Yes

Are the valve clearances correct?
(Refer to “Valve clearance” in section 6A4 of this manual.)
No → Adjust the valve clearances.
Yes

Are the compression values correct?
(Refer to “Compression check” in section 6A4 of this manual.)
No → Make the necessary repairs.
Yes

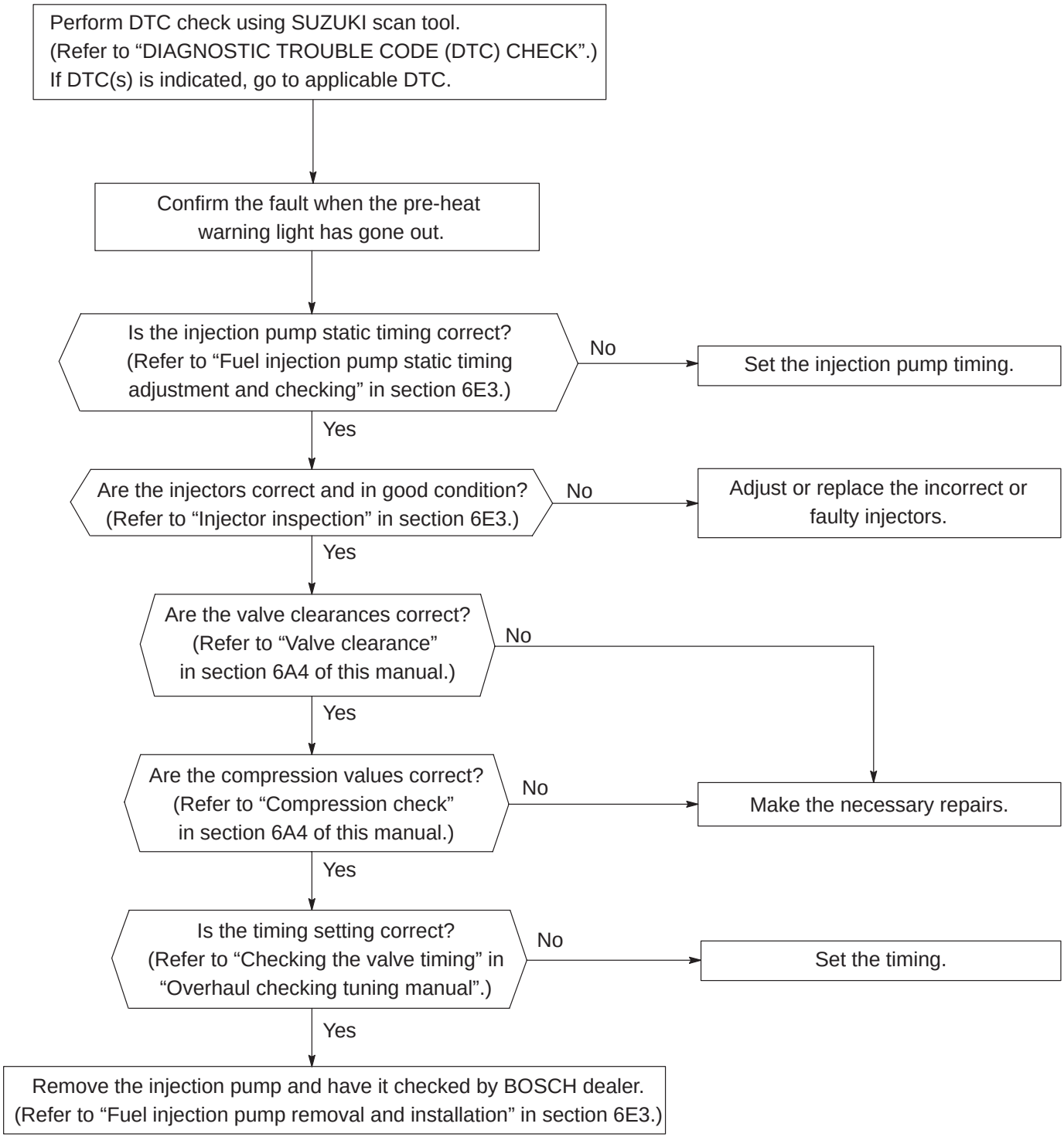
Are the injectors correct and in good condition?
(Refer to “Injector inspection” in section 6E3.)
No → Adjust or replace the incorrect or faulty injectors.
Yes

Are the injector seals and fire-rings correctly fitted?
(Refer to “Procedure 030, 031” in “All models diesel diagnosis manual”.)
No → Refit the injectors with new seals and fire-rings.
Yes

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

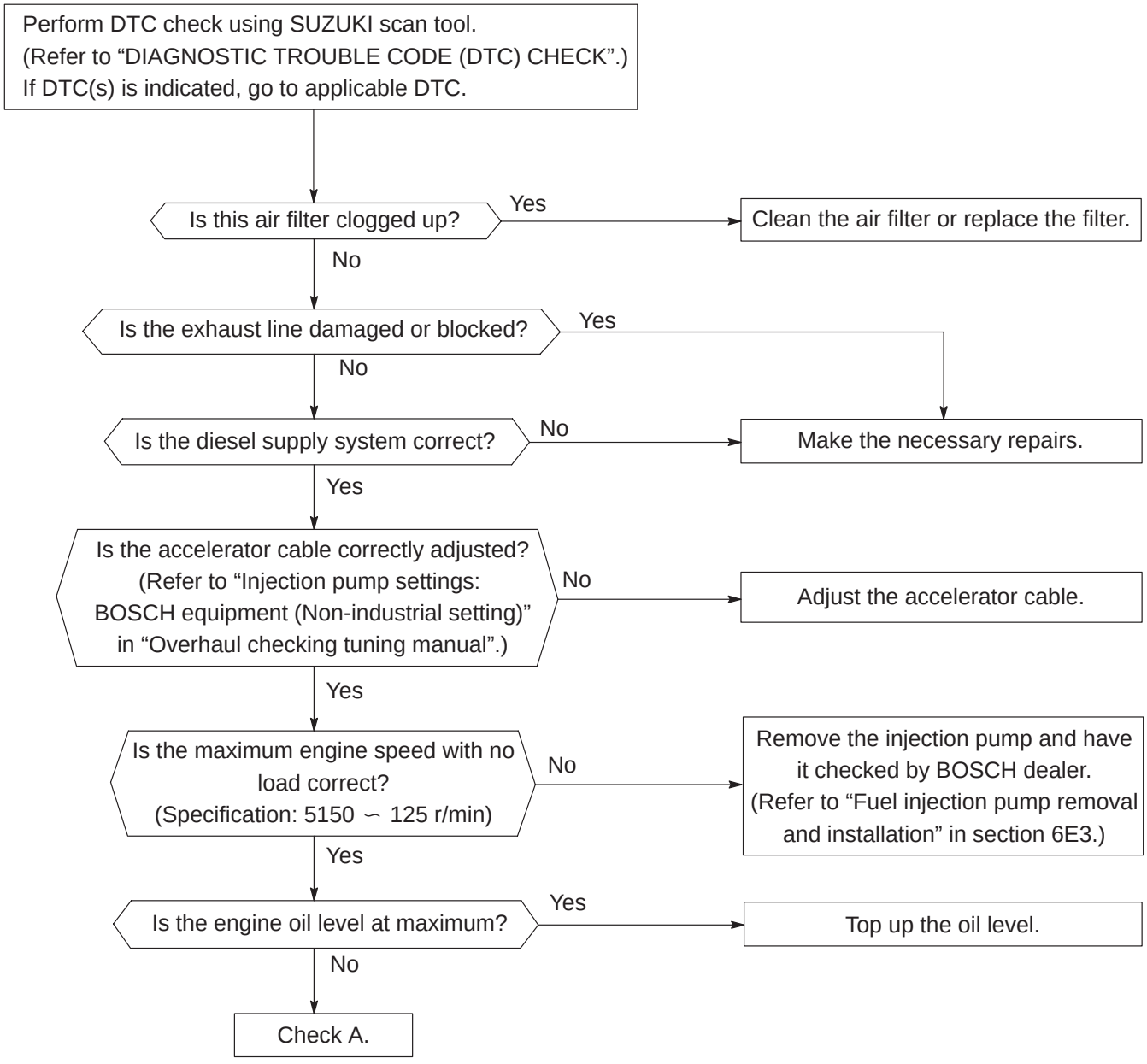
PROCEDURE 011

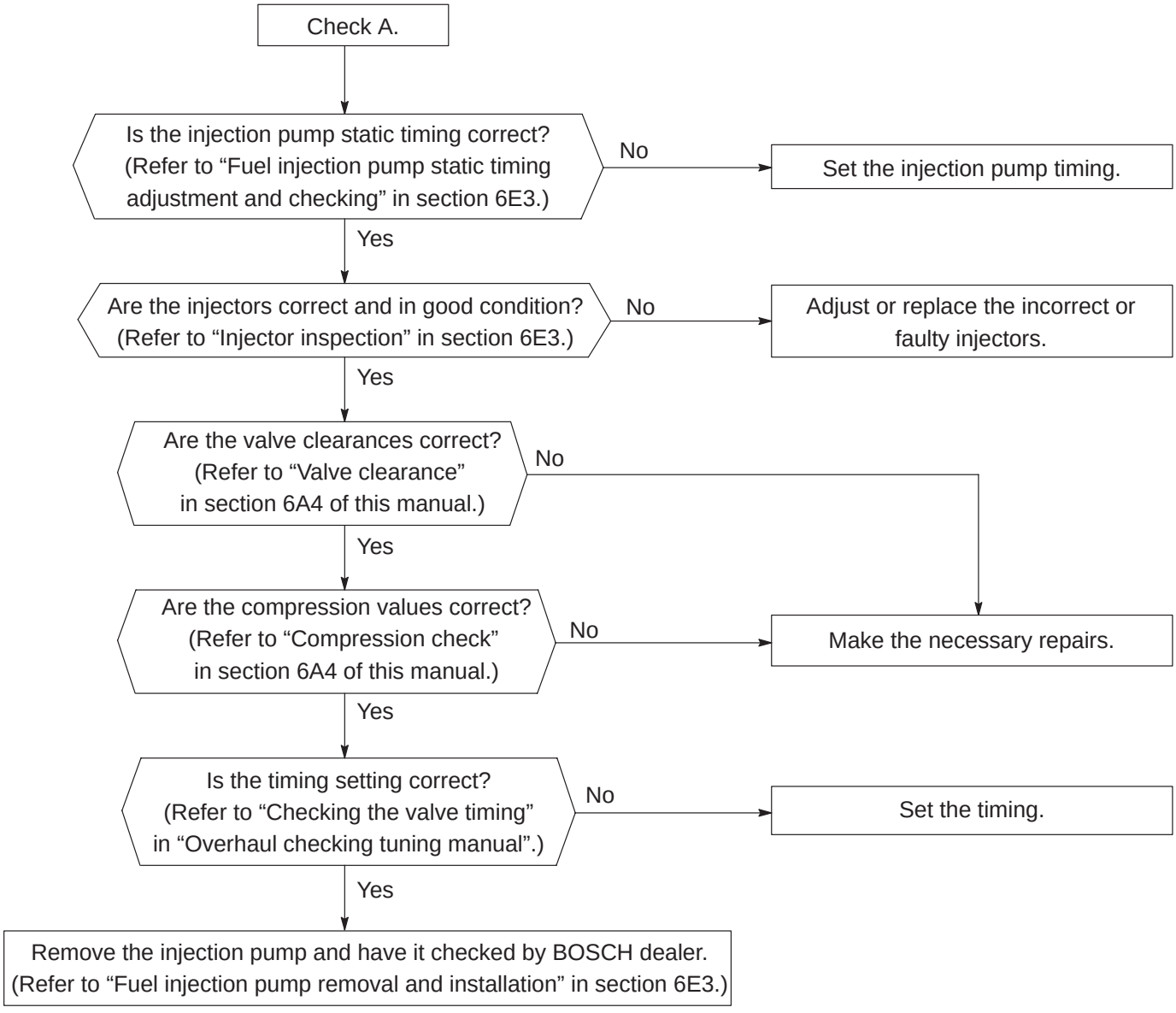
The engine starts with difficulty (engine hot)



PROCEDURE 012

Vehicle lacks of power (with or without emission of smoke)




Check A.
Is the injection pump static timing correct? (Refer to “Fuel injection pump static timing adjustment and checking” in section 6E3.)
No
Set the injection pump timing.
Yes
Are the injectors correct and in good condition? (Refer to “Injector inspection” in section 6E3.)
No
Adjust or replace the incorrect or faulty injectors.
Yes
Are the valve clearances correct? (Refer to “Valve clearance” in section 6A4 of this manual.)
No
Yes
Are the compression values correct? (Refer to “Compression check” in section 6A4 of this manual.)
No
Make the necessary repairs.
Yes
Is the timing setting correct? (Refer to “Checking the valve timing” in “Overhaul checking tuning manual”.)
No
Set the timing.
Yes
Remove the injection pump and have it checked by BOSCH dealer. (Refer to “Fuel injection pump removal and installation” in section 6E3.)

PROCEDURE 013

Excessive diesel consumption

Perform DTC check using SUZUKI scan tool.
(Refer to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK”.)
If DTC(s) is indicated, go to applicable DTC.

↓

Confirm the fault after checking:
– the condition and conformity of the vehicle (external accessories)
– the pressure and conformity of the tyres
– the condition of the brakes
– the fuel system
– the inlet system
– the injection pump

↓

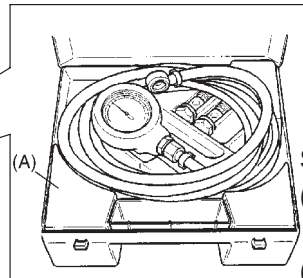
Is one or more injector return pipe(s) disconnected? — Yes → The return circuit is blocked. Make the necessary repairs. Reposition the return pipes.

No ↓

Is the air filter clogged up? — Yes → Clean the air filter or replace the filter.

No ↓

Is the diesel supply system correct? (Refer to “Procedure 026” in “All models diesel diagnosis manual”.) — No → Make the necessary repairs.



Special tool
(A): 09912-56510/ OUT0000077 (Pressure gauge)

Yes ↓

Is the timing setting correct? (Refer to “Checking the valve timing” in “Over3haul checking tuning manual”.) — No → Set the timing.

Yes ↓

Is the injection pump static timing correct? (Refer to “Fuel injection pump static timing adjustment and checking” in section 6E3.) → Set the injection pump timing.

Yes ↓

Are the injectors correct and in good conditions? (Refer to “Injector inspection” in section 6E3.) — No → Adjust or replace the incorrect or faulty injectors.

Yes ↓

Are the valve clearances correct? (Refer to “Valve clearance” in section 6A4 of this manual.) — No →

Yes ↓

Are the compression values correct? (Refer to “Compression check” in section6A4 of this manual.) — No →

Yes ↓

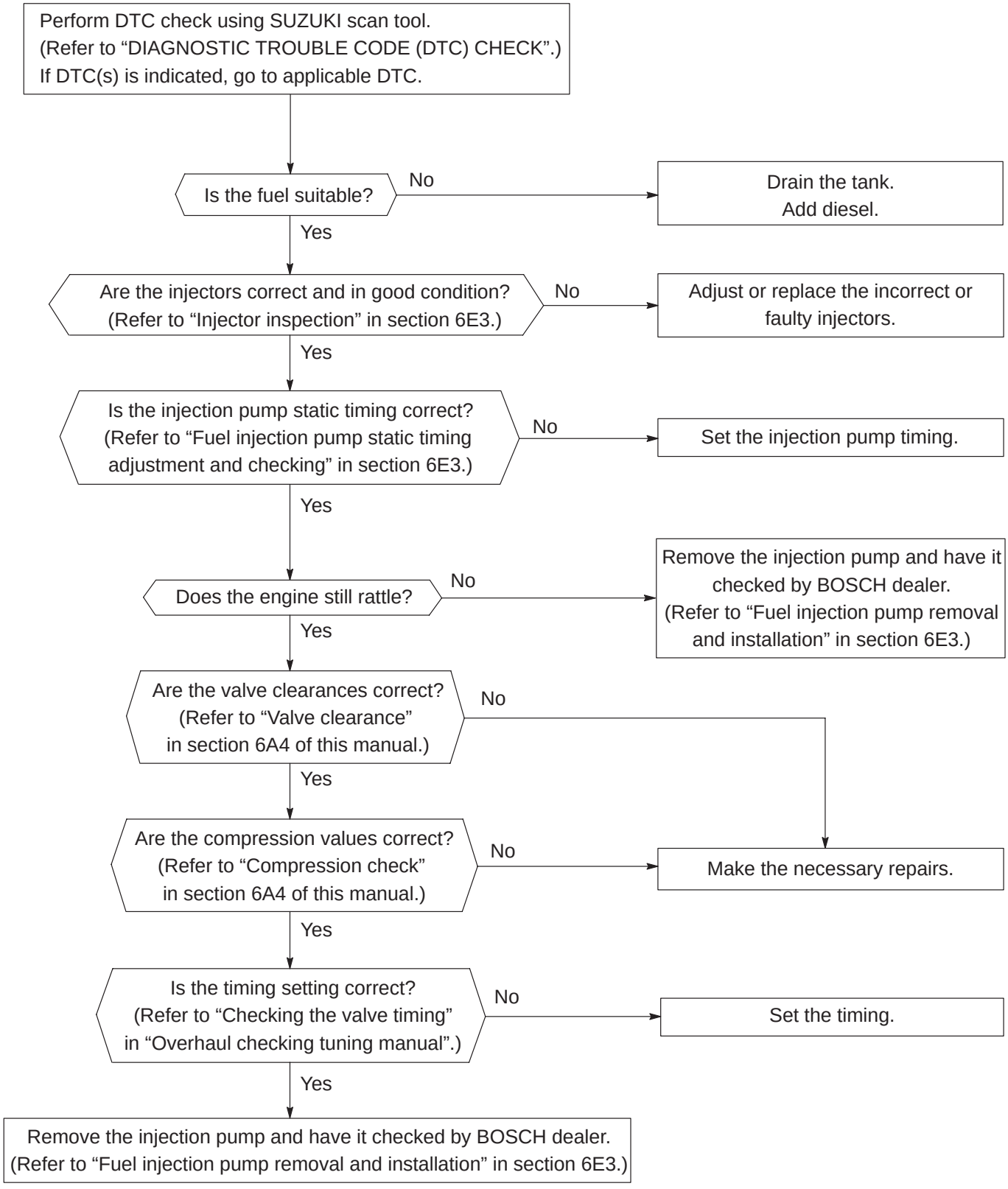
Is the exhaust gas recirculation (EGR) working correctly? (Refer to “Procedure 044” in “All models diesel diagnosis manual”.) — No → Make the necessary repairs.

Yes ↓

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

PROCEDURE 014

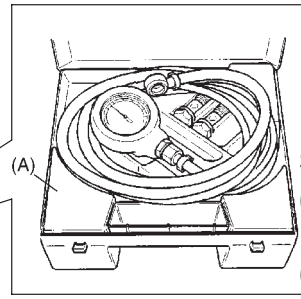
Engine knocking



PROCEDURE 015

Hesitation at steady speed

Perform DTC check using SUZUKI scan tool.
(Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CHECK".)
If DTC(s) is indicated, go to applicable DTC.



Special tool
(A): 09912-56510/
OUT0000077
(Pressure gauge)

Is the diesel supply system correct?
(Refer to "Procedure 026"
in "All models diesel diagnosis manual".)
No → Make the necessary repairs.

Yes

Are the injection pump fasteners tightened?
(4 fastening points)
No → Re-tighten the fasteners.

Yes

Is the accelerator cable adjusted correctly?
(Refer to "Injection pump settings:
BOSCH equipment (Non-industrial setting)"
in "Overhaul checking tuning manual".)
No → Adjust accelerator cable.

Yes

Is there play in the drive shafts?
Yes → Replace any defective parts.

No

Is the exhaust gas recirculation (EGR)
working correctly?
(Refer to "Procedure 044"
in "All models diesel diagnosis manual".)
No → Make the necessary repairs.

Yes

Are the injectors correct and in good condition?
(Refer to "Injector inspection" in section 6E3.)
No → Adjust or replace the incorrect or faulty injectors.

Yes

Is the injection pump static timing correct?
(Refer to "Fuel injection pump static timing
adjustment and checking" in section 6E3.)
No → Set the injection pump timing.

Yes

Are the valve clearances correct?
(Refer to "Valve clearance"
in section 6A4 of this manual.)
No → Make the necessary repairs.

Yes

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to "Fuel injection pump removal and installation" in section 6E3.)

PROCEDURE 016

Hesitation on re-acceleration

Perform DTC check using SUZUKI scan tool.
(Refer to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK”.)
If DTC(s) is indicated, go to applicable DTC.

↓

Are the idle speed and anti-stall correctly adjusted?
(Refer to “Idle speed inspection and adjustment” in section 6E3 and “Injection pump settings: BOSCH equipment (Non-industrial setting)” in “Overhaul checking tuning manual”.)

No → Carry out the necessary adjustments.

Yes ↓

Are the injection pump fasteners tightened?
(4 fastening points)

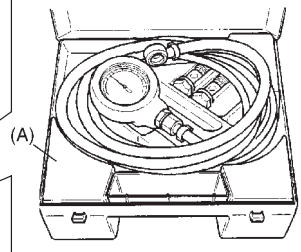
No → Re-tighten the fasteners.

Yes ↓

Is the accelerator cable adjusted correctly?
(Refer to “Injection pump settings: BOSCH equipment (Non-industrial setting)” in “Overhaul checking tuning manual”.)

No → Adjust the accelerator cable.

Yes ↓



Special tool
(A): 09912-56510/ OUT0000077 (Pressure gauge)

Is air present in the diesel system?
(Refer to “Procedure 026” in “All models diesel diagnosis manual”.)

Yes → Eliminate the air leak.

No ↓

Is the damper in good condition?
Is the damping correctly adjusted?
(Refer to “Procedure 039” in “All models diesel diagnosis manual”.)

No → Replace the damper and adjust it correctly.

Yes ↓

Is the engine mounting in good condition?

No → Replace any defective parts.

Yes ↓

Are the injectors correct and in good condition?
(Refer to “Injector inspection” in section 6E3.)

No → Adjust or replace the faulty injectors.

Yes ↓

Is the injection pump static timing correct?
(Refer to “Fuel injection pump static timing adjustment and checking” in section 6E3.)

No → Set the injection pump timing.

Yes ↓

Is the exhaust gas recirculation (EGR) working correctly?
(Refer to “Procedure 044” in “All models diesel diagnosis manual”.)

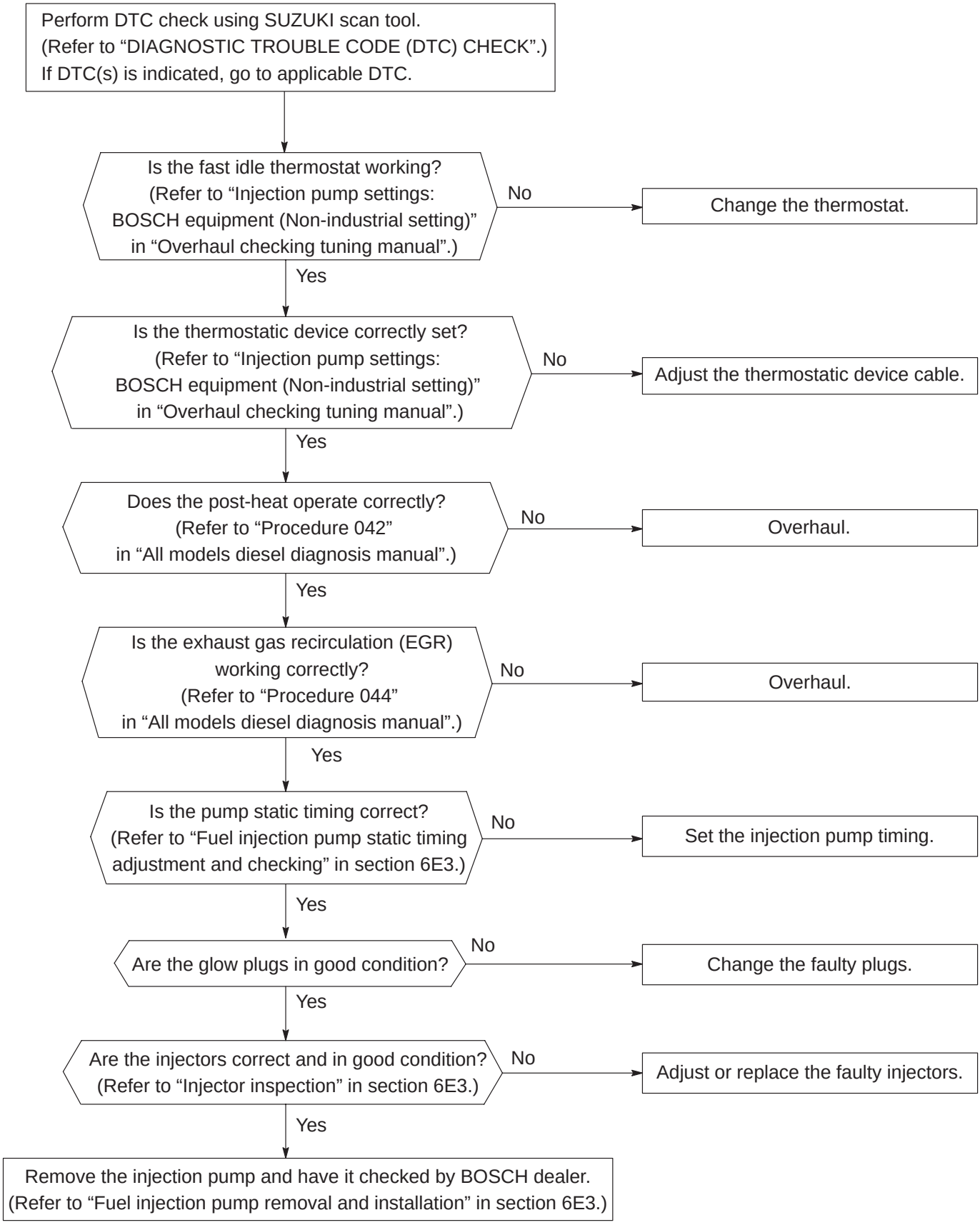
No → Make the necessary repairs.

Yes ↓

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

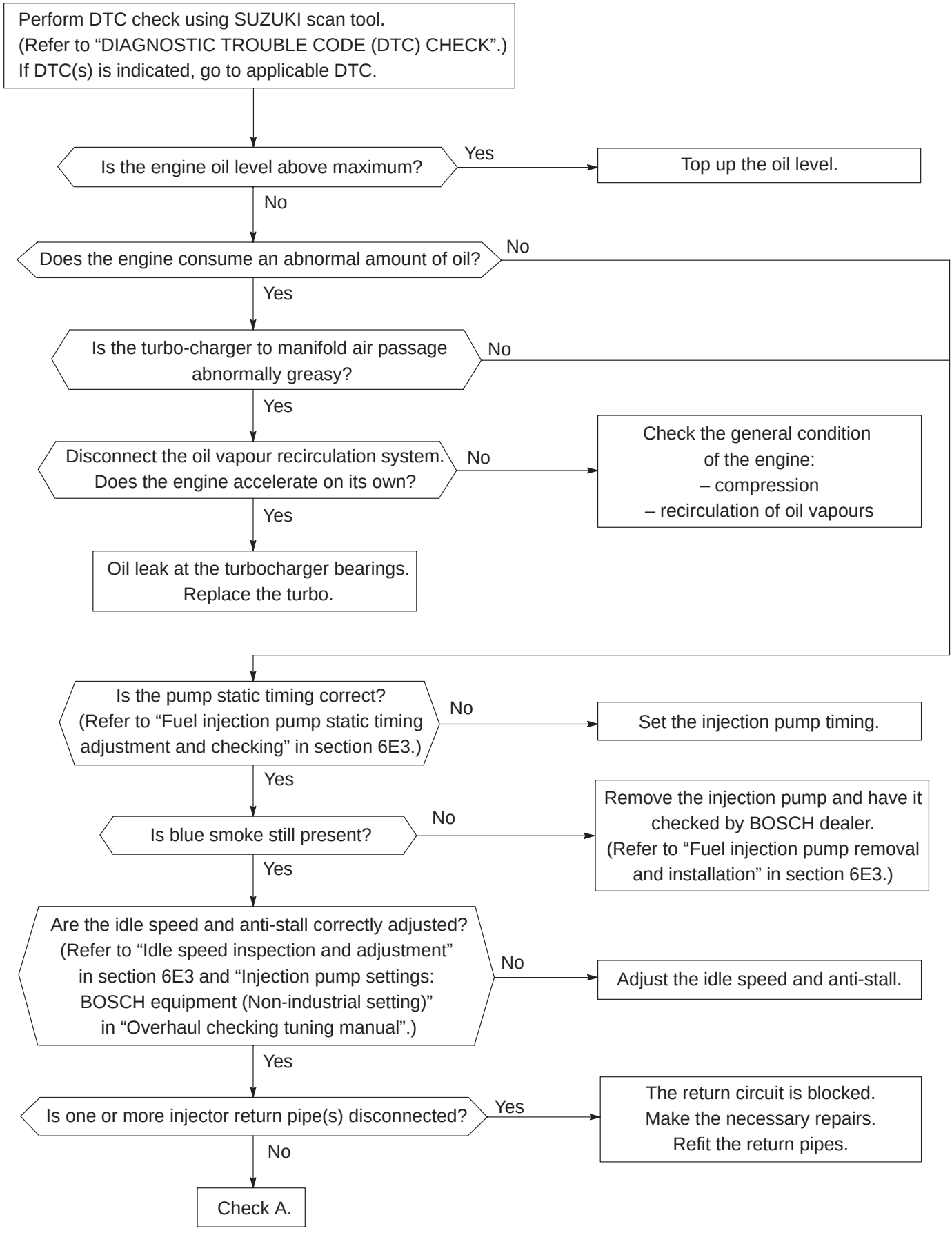
PROCEDURE 017

With emission of black smoke (at idle) after starting

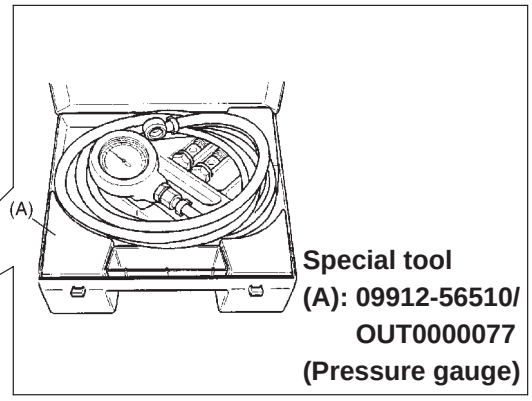


PROCEDURE 018

Emission of blue smoke (at idle; on overrun; at low load)



Check A.



Special tool
(A): 09912-56510/
OUT0000077
(Pressure gauge)

Is the diesel supply system correct?
(Refer to “Procedure 026”
in “All models diesel diagnosis manual”.)

No → Make the necessary repairs.

Yes

Are the valve clearances correct?
(Refer to “Valve clearance”
in section 6A4 of this manual.)

No → Make the necessary repairs.

Yes

Are the injectors correct and in good condition?
(Refer to “Injector inspection” in section 6E3.)

No → Adjust or replace the faulty injectors.

Yes

Are the fire-rings and seals correctly fitted?
(Refer to “Procedure 030-031”
in “All models diesel diagnosis manual”.)

No → Refit the injectors with new heat seals and fire rings.

Yes

Is the timing setting correct?
(Refer to “Checking the valve timing”
in “Overhaul checking tuning manual”.)

No → Set the injection pump timing.

Yes

Are the compression values correct?
(Refer to “Compression check”
in section 6A4 of this manual.)

No → Make the necessary repairs.

Yes

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

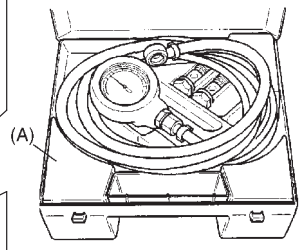
PROCEDURE 019

With emission of black smoke (at load)

Perform DTC check using SUZUKI scan tool.
(Refer to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK”.)
If DTC(s) is indicated, go to applicable DTC.

Is the air filter clogged up?
Yes → Clean the air filter or replace the filter.
No

Is the diesel supply system correct?
(Refer to “Procedure 026”
in “All models diesel diagnosis manual”.)
No



Special tool
(A): 09912-56510/
OUT0000077
(Pressure gauge)

Yes

Is the exhaust gas recirculation (EGR) working correctly?
(Refer to “Procedure 044”
in “All models diesel diagnosis manual”.)
No → Make the necessary repairs.

Yes

Is the injection pump static timing correct?
(Refer to “Fuel injection pump static timing
adjustment and checking” in section 6E3.)
No → Set the injection pump timing.

Yes

Are the injectors correct and in good condition?
(Refer to “Injector inspection” in section 6E3.)
No → Adjust or replace the faulty injectors.

Yes

Are the valve clearances correct?
(Refer to “Valve clearance”
in section 6A4 of this manual.)
No

Yes

Are the compression values correct?
(Refer to “Compression check”
in section 6A4 of this manual.)
No → Make the necessary repairs.

Yes

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

PROCEDURE 020

No re-acceleration/no liveliness (with or without emission of smoke)

Perform DTC check using SUZUKI scan tool.
(Refer to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK”.)
If DTC(s) is indicated, go to applicable DTC.

↓

Ensure theat the pump and the injectors are correct.

↓

Is the diesel supply system correct?
(Refer to “Procedure 026”
in “All models diesel diagnosis manual”.)

No → Make the necessary repairs.

Yes ↓

Is the accelerator cable adjusted correctly?
(Refer to “Injection pump settings:
BOSCH equipment (Non-industrial setting)”
in “Overhaul checking tuning manual”.)

No → Adjust the accelerator cable.

Yes ↓

Is the pump static timing correct?
(Refer to “Fuel injection pump static timing
adjustment and checking” in section 6E3.)

No → Set the injection pump timing.

Yes ↓

Is the injector calibration pressure correct?
(Refer to “Injector inspection” in section 6E3.)

No → Adjust or replace the faulty injectors
(see the precautions to be taken).

Yes ↓

Are the valve clearances correct?
(Refer to “Valve clearance”
in section 6A4 of this manual.)

No → Make the necessary repairs.

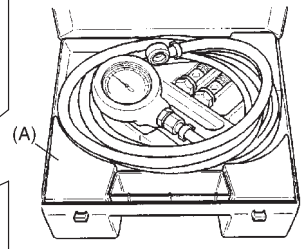
Yes ↓

Are the compression values correct?
(Refer to “Compression check”
in section 6A4 of this manual.)

No → Make the necessary repairs.

Yes ↓

Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)



Special tool
(A): 09912-56510/
OUT0000077
(Pressure gauge)

NOTE: If the fault persists after checking the pump, check the conformity of the thickness of the cylinder head gasket.

PROCEDURE 021

The vehicle moves off with difficulty (with or without emission of smoke)

Perform DTC check using SUZUKI scan tool.
(Refer to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK”.)
If DTC(s) is indicated, go to applicable DTC.

↓

Confirm the fault after checking the condition of the brakes.

↓

Are the idle speed and anti-stall correctly adjusted?
(Refer to “Idle speed inspection and adjustment” in section 6E3 and “Injection pump settings: BOSCH equipment (Non-industrial setting)” in “Overhaul checking tuning manual”.)

No → Carry out the necessary adjustments.

Yes ↓

Is the vehicle fitted with accessories?
(power steering, car-phone...)

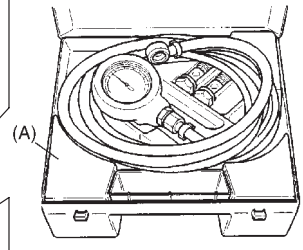
No → ↓

Yes ↓

Switch off these functions.
Is the fault still present?

No → Adjust the idle to maximum.

Yes ↓



Special tool
(A): 09912-56510/ OUT0000077 (Pressure gauge)

Is the diesel supply system correct?
(Refer to “Procedure 026” in “All models diesel diagnosis manual”.)

No → Make the necessary repairs.

Yes ↓

Is the injection pump static timing correct?
(Refer to “Fuel injection pump static timing adjustment and checking” in section 6E3.)

No → Set the injection pump timing.

Yes ↓

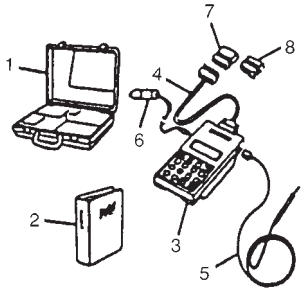
Are the injectors correct and in good condition?
(Refer to “Injector inspection” in section 6E3.)

No → Adjust or replace the faulty injectors.

Yes ↓

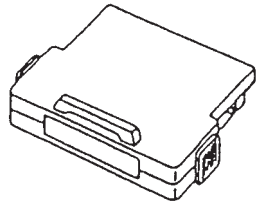
Remove the injection pump and have it checked by BOSCH dealer.
(Refer to “Fuel injection pump removal and installation” in section 6E3.)

SPECIAL TOOLS

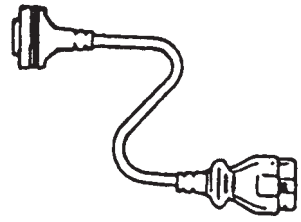


1. Storage case
2. Operator's manual
3. Scan tool
4. DLC cable (14/26 pin, 09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor

09931-76011
SUZUKI scan tool (Tech 1 A) kit



Mass storage cartridge



09931-76030
16/14 pin DLC cable

SECTION 6A4

ENGINE MECHANICAL (XUD9BSD ENGINE)

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

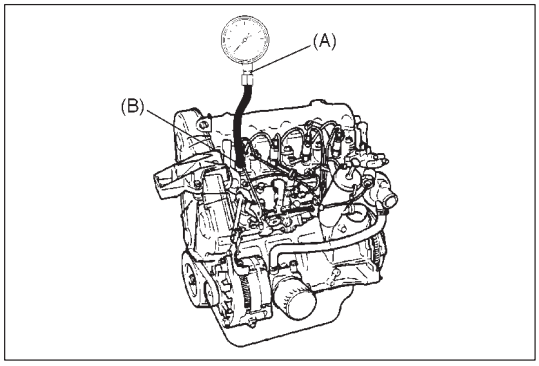
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
Please refer to description of XUD9 SD/BSD engine in "OVERHAUL CHECKING TUNING MANUAL" listed as one of related manuals in FOREWORD as well. In principle, on-vehicle repair and maintenance, disassembly and assembly are described in this section while disassembly and assembly of the parts removed from the vehicle are described in "OVERHAUL CHECKING TUNING MANUAL".

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Oil Pressure Check 6A4- 2
Valve Clearance 6A4- 2
Turbocharger Pressure Check 6A4- 2
Air Cleaner Element 6A4- 3
Oil Filter 6A4- 4
Oil Pressure Switch 6A4- 4
Oil Cooler 6A4- 5
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Turbocharger 6A4- 6
Intake Manifold, Exhaust Manifold and EGR Valve 6A4- 7
Cylinder Head 6A4- 8
Injector Shield 6A4-10
Swirl Chamber 6A4-10
Plug Ball 6A4-11
Piston and Connecting Rod 6A4-12
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NOTE:
For what each abbreviation stands for (i.e., full term), refer to SECTION 0A.

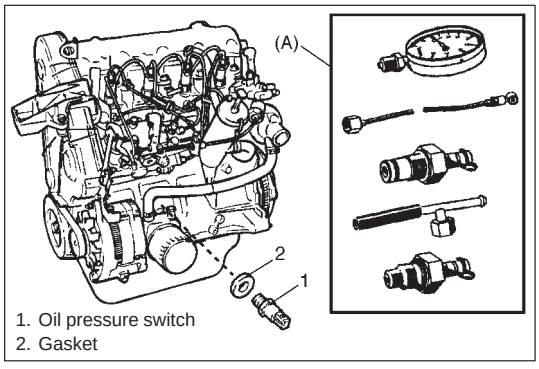


ON-VEHICLE SERVICE

COMPRESSION CHECK

Check compression pressure referring to “Procedure 024” in “All models diesel diagnosis manual”.

Special tool
(A): 09912-57820
(B): 09912-57830



1. Oil pressure switch
2. Gasket

OIL PRESSURE CHECK

Check engine oil pressure. Refer to “Checking oil pressure” in “Overhaul checking turning manual”.

Special tool
(A): 09915-76530/OUT0000057

When installing oil pressure switch, use a new gasket.

VALVE CLEARANCE

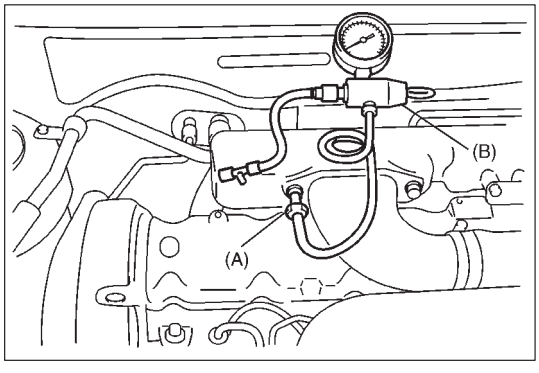
Check or adjust valve clearance. Refer to “Adjusting valve clearance” in “Overhaul checking tuning manual”.

Valve clearance specification (when cold)

INTAKE	**0.15 ∽ 0.04 mm**
EXHAUST	**0.30 ∽ 0.04 mm**

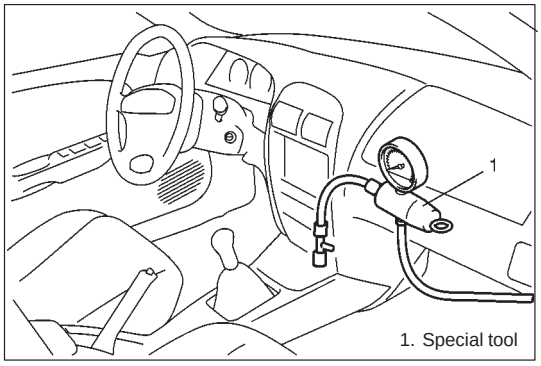
TURBOCHARGER PRESSURE CHECK

WARNING:
- **When carrying out road tests, select a safe place where no man or no running vehicle is seen so as to prevent any accident.**
- **Road test, should be carried out with 2 persons, a driver and tester, on a level road.**



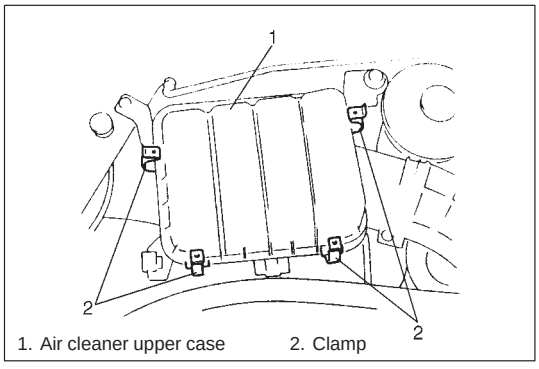
1) Replace right side bolt of air inlet pipe to special tool (A).
2) Connect special tool (B) of which port (1) is plugged with bending hose as shown.

   Special tool
   (A): 09915-78220
   (B): 09918-18111
3) Open valve in special tool (B) by turning counterclockwise it.
4) Start engine and warm it up to normal operating temperature.
5) Drive with 3rd gear at idle speed.



1. Special tool

6) Depress the accelerator pedal fully.
7) During the acceleration, measure turbocharger pressure when the engine speed reaches 2000 – 3000 RPM.
   Turbocharger pressure should be 20 to 55 kPa.
   If turbocharger pressure is not within specified value, check air intake system and exhaust system for leakage and clog.
   If there is no leakage and clog, replace turbocharger.



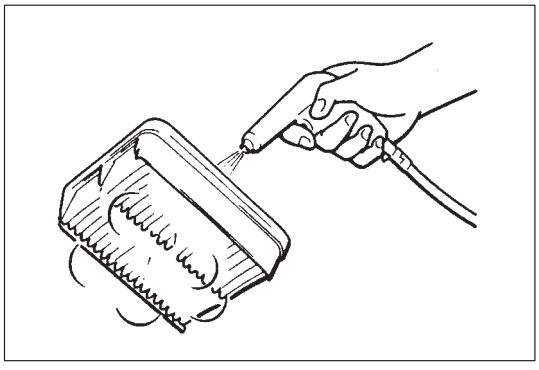
1. Air cleaner upper case 2. Clamp

AIR CLEANER ELEMENT

This air cleaner element is of dry type. Clean it according to the following procedure.

REMOVAL

1) Remove air cleaner upper case from lower case after unhooking clamps from upper case.
2) Remove air cleaner element.

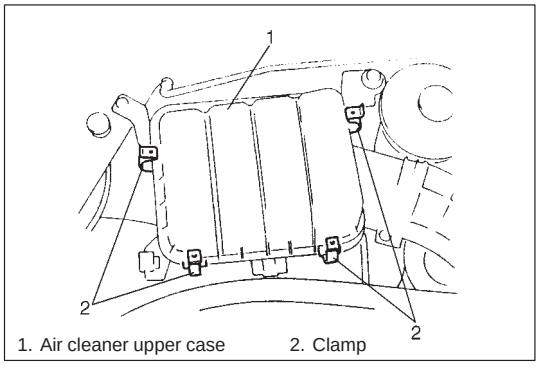


INSPECTION

Inspect air cleaner filter. Clean or replace if necessary.

CLEANING

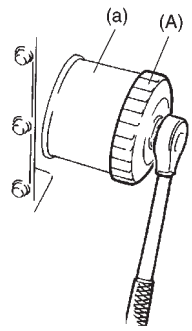
Clean element with compressed air from inside of element.



1. Air cleaner upper case 2. Clamp

INSTALLATION

1) Install air cleaner element to its lower case.
2) Install air cleaner upper case.
   Hook clamps securely.



OIL FILTER

REMOVAL

1) Remove oil filter using special tool (oil filter wrench).

Special tool
(A): 09915-46510

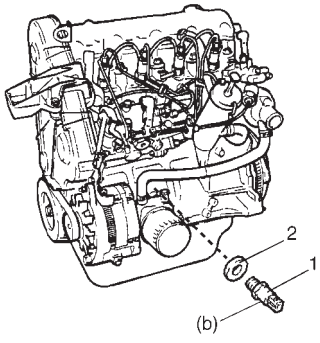
INSTALLATION

1) Apply engine oil to new oil filter O-ring.
2) Install oil filter and tighten it to specified torque by using special tool (A).

Special tool
(A): 09915-46510

Tightening torque
(a): 14 N·m (1.4 kg-m)

3) Check engine oil level referring to section 0B.
4) Start engine and check oil filter for oil leakage.



1. Oil pressure switch
2. Gasket

OIL PRESSURE SWITCH

REMOVAL

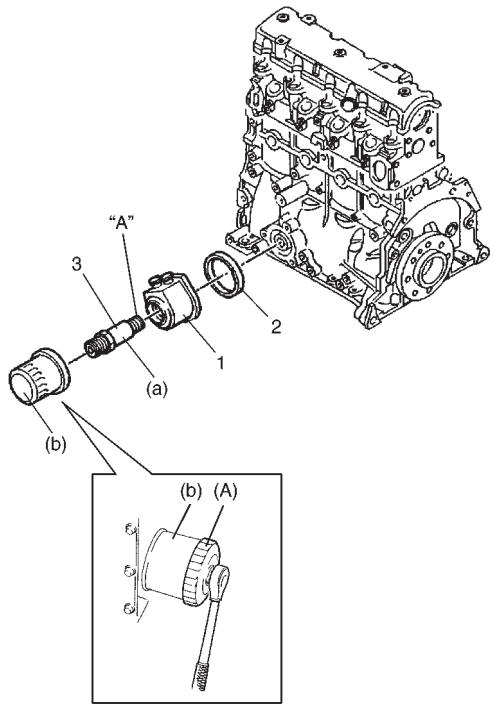
1) Disconnect oil pressure switch connector.
2) Remove oil pressure switch.

INSTALLATION

1) Install oil pressure switch with new gasket.
2) Tighten oil pressure switch.

Tightening torque
(b): 30 N·m (3.0 kg-m)

3) Connect connector.
4) Start engine and check for oil leakage.



1. Oil cooler
2. Gasket
3. Oil filter stand

OIL COOLER

REMOVAL

1) Drain engine coolant.
2) Remove oil filter.
3) Disconnect hoses and remove oil cooler.

INSTALLATION

1) Install oil cooler with new gasket.
2) Tighten cooler stud stand to specified torque.

   Tightening torque:
   (a): 57.5 N·m (5.8 kg-m)

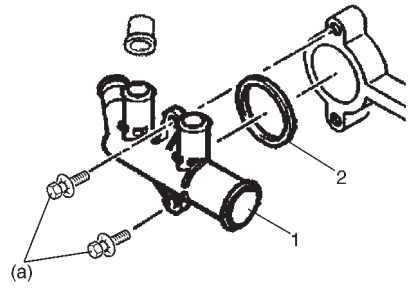
   Sealant:
   "A" : LOCTITE 572

3) Connect hoses and tighten oil filter to specified torque by using special tool (A).

   Special tool
   (A): 09915-46510

   Tightening torque:
   (b): 14 N·m (1.4 kg-m)

4) Fill engine coolant.
5) Check engine oil level. Refer to section 0B.
6) Check for oil leakage.



1. Water inlet pipe
2. O-ring

WATER INLET BOX

REMOVAL

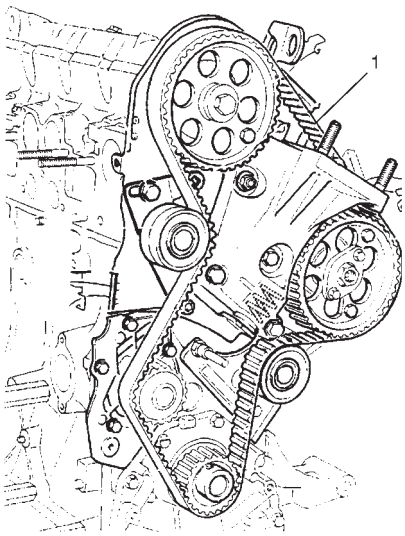
1) Drain engine coolant.
2) Disconnect hoses and remove water inlet pipe.

INSTALLATION

1) Install water inlet pipe with new O-ring.
2) Tighten water inlet pipe bolts.

   Tightening torque:
   (a): 20 N·m (2.0 kg-m)

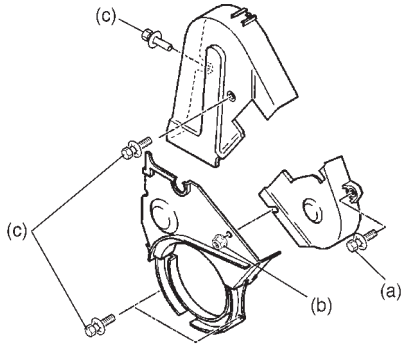
3) Fill engine coolant.



TIMING BELT

REMOVAL

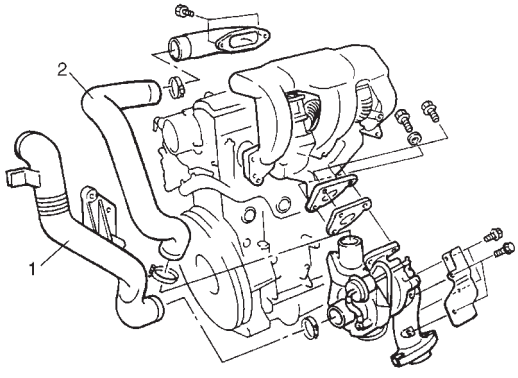
1) Drain engine coolant.
2) Remove the following parts.
   - ○ Front-right wheel.
   - ○ Engine under cover right side.
   - ○ Radiator outlet pipe.
   - ○ Accessory drive belt.
   - ○ Air cleaner suction pipe No.1 and air cleaner case.
   - ○ Power steering pump with hoses connected.
3) Support engine.
4) Remove engine mounting right side.
5) Remove timing belt cover.
6) Remove timing belt (1). Refer to “Dismantling the engine” in “Overhaul checking tuning manual”.



INSTALLATION

1) Reverse removal procedure for installation.
   Refer to “INSTALLING THE TIMING BELT” in “Overhaul checking tuning manual”.
2) Tighten bolts and nuts to specified torque.

Tightening torque:
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)
(b): 5 N·m (0.5 kg-m, 4.0 lb-ft)
(c): 15 N·m (1.5 kg-m, 11.0 lb-ft)



1. Air intake pipe
2. Air outlet hose

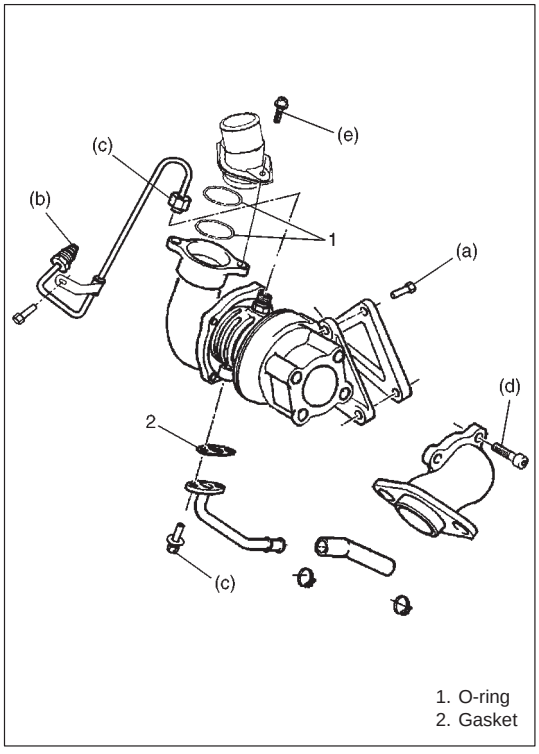
TURBOCHARGER

REMOVAL

1) Drain transmission oil and engine coolant.
2) Remove the following items.

NOTE:
The inlet and outlet orifices of the turbocharger must be blanked off.

   - ○ Air intake pipe.
   - ○ Air outlet hose from turbocharger.
   - ○ Exhaust pipe No.1.
   - ○ Center shaft. Refer to section 4 of this manual.
   - ○ Oil feed pipe and oil return hose from engine.
3) Remove turbocharger from exhaust manifold.



1. O-ring
2. Gasket

INSTALLATION

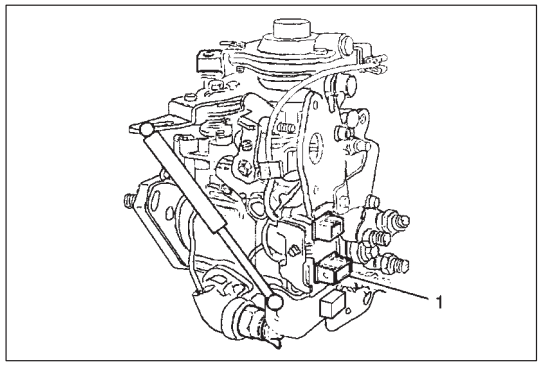
1) Make sure that there are no foreign material in air intake circuit and exhaust manifold.
2) Reverse removal procedure.

   NOTE:
   Use new gasket.

3) Tighten bolts and nuts to specified torque.

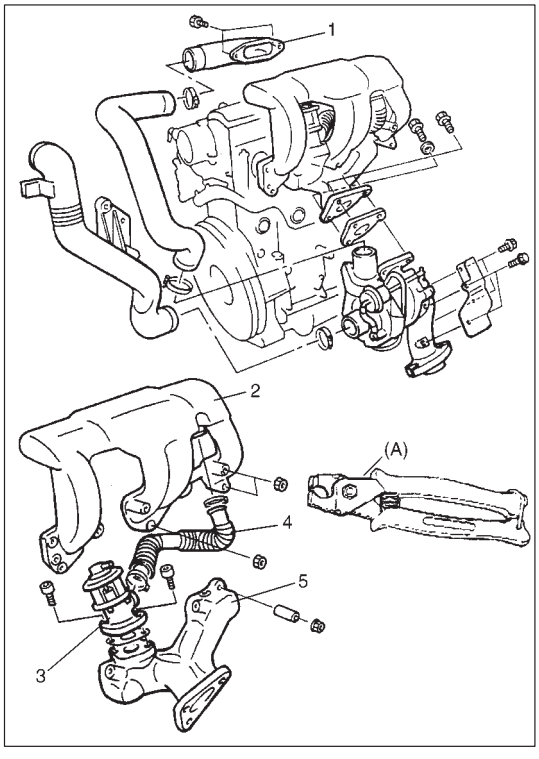
   Tightening torque:
   (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)
   (b): 30 N·m (3.0 kg-m, 22.0 lb-ft)
   (c): 20 N·m (2.0 kg-m, 14.5 lb-ft)
   (d): 22 N·m (2.2 kg-m, 16.0 lb-ft)
   (e): 11 N·m (1.1 kg-m, 8.0 lb-ft)

4) Before starting engine, perform “PRECAUTIONS TO BE TAKEN BEFORE STARTING THE ENGINE” as explained below.



PRECAUTIONS TO BE TAKEN BEFORE STARTING THE ENGINE

1) Disconnect connector of immobilizer actuator (1).
2) Crank engine until the oil pressure light is turned off.
3) Reconnect connector of immobilizer actuator (1).
4) Start engine and let it run at idle speed for approximately 30 seconds.
5) Check there are no leaks on any of the hose connections.



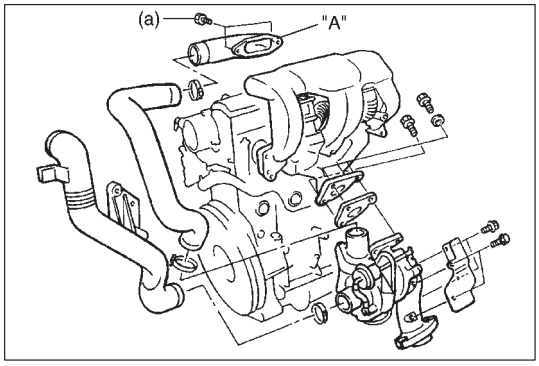
INTAKE MANIFOLD, EXHAUST MANIFOLD AND EGR VALVE

REMOVAL AND DISASSEMBLING

1) Remove the following parts.
   ○ Turbocharger
   ○ Air inlet pipe (1) from intake manifold (2)
2) Remove intake manifold (2), exhaust manifold (5) and EGR valve (3) assembly from cylinder head. (They are connected by EGR pipe (4).)
3) Remove EGR pipe (4) using special tool then intake manifold (2) can be separated from exhaust manifold (5).

   Special tool:
   (A): 09919-46510/OUT0000110

4) Remove EGR valve from exhaust manifold.



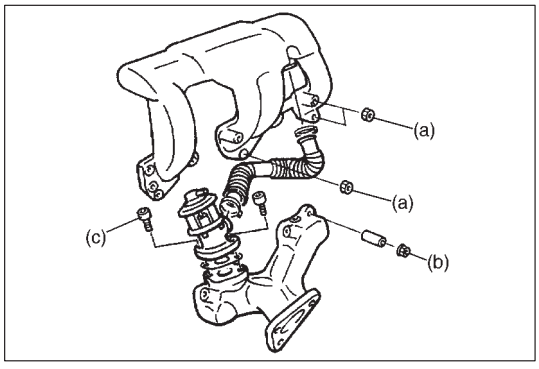
INSTALLATION

1) Reverse removal procedure when installation.

NOTE:
Use new gasket.

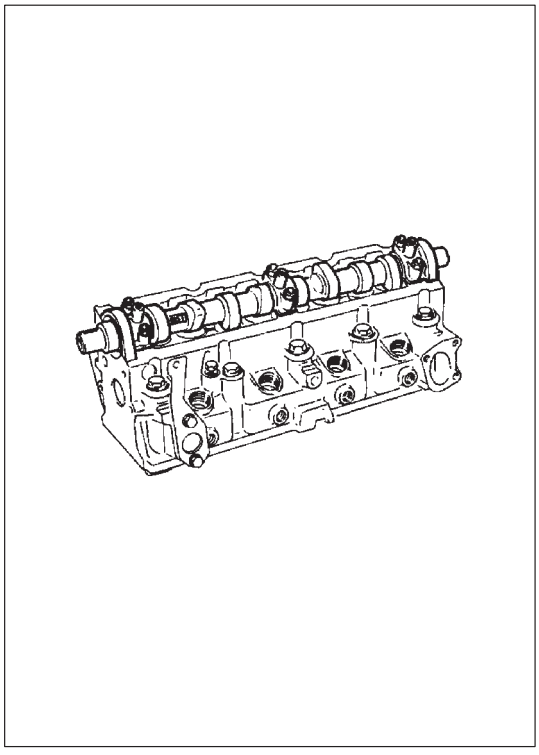
Apply sealant between air inlet pipe and intake manifold.
"A" Sealant: LOCTITE 518

Tightening torque:
(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)



2) Tighten bolts and nuts to specified torque.

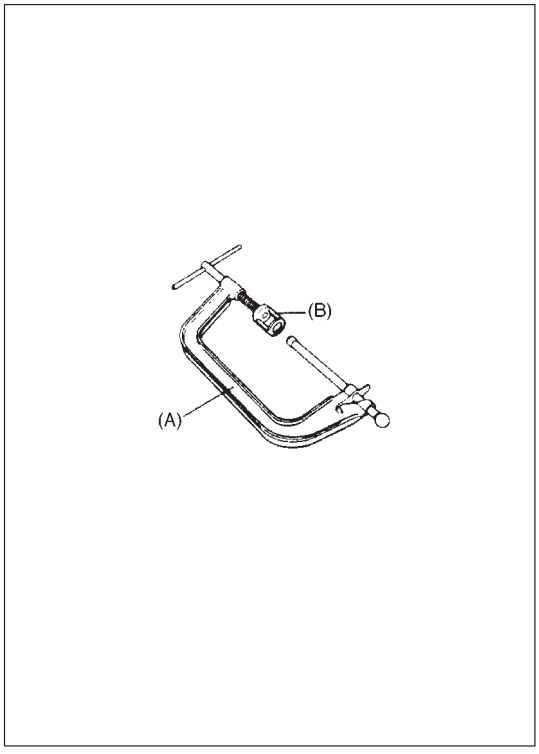
Tightening torque:
(a): 20 N·m (2.0kg-m, 14.5 lb-ft)
(b): 30 N·m (3.0 kg-m, 22.0 lb-ft)
(c): 15 N·m (1.5 kg-m, 11.0 lb-ft)



CYLINDER HEAD

REMOVAL

1) Remove intake manifold, exhaust manifold and EGR valve assembly.
2) Remove cylinder head. Refer to the following items in "Overhaul checking tuning manual".
   "Stripping the engine"
   "Dismantling the engine"
   "Removing cylinder head"
   (Specified tool; 0.0149 is not needed)
   "Tightening the cylinder head"



DISASSEMBLING, INSPECTION AND REASSEMBLING

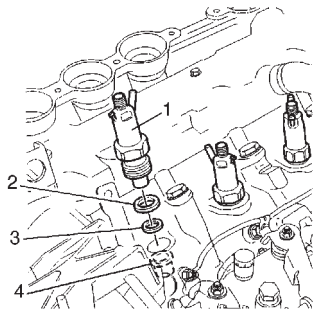
1) Disassemble, inspect and reassembling cylinder head. Refer to the following items in “Overhaul checking tuning manual”. Use special tool when removing and installing valve.

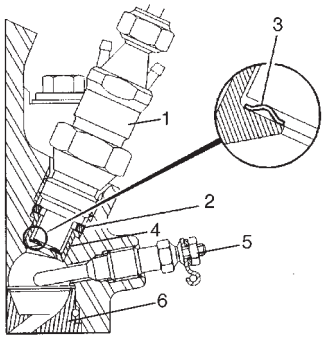
   Special tool:
   (A): 09916-14510
   (B): 09916-14910

   “Cylinder head”
   “Valves”
   “Valve springs”
   “Valve guides”
   “Valve seats”
   “Swirl chambers”
   “Reconditioning the cylinder head”

INSTALLATION

1) Install cylinder head. Refer to the following items in “Overhaul checking tuning manual”.
   “Cylinder head gasket identification”
   “Selecting the cylinder head gasket”
   “Installing the cylinder head”
   “Identification of various builds for cylinder head bolts”
   “Reuse of the cylinder head bolts, type III”
   “Tightening the cylinder head”
   “Installing the camshaft”





1. Fuel injector
2. Copper washer
3. Flame ring
4. Injector shield
5. Glow plug
6. Swirl chamber

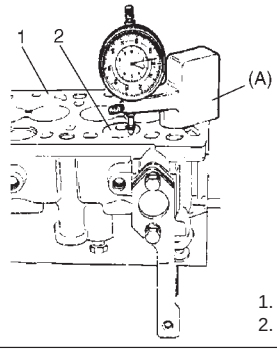
INJECTOR SHIELD

REMOVAL

1) Remove injector and then remove injector shield with finger. If injector shield can not be removed, tap injector shield out using suitable brass drift from swirl chamber side as follows.
   i) Remove fuel injectors and glow plugs.
   ii) Remove cylinder head.
   iii) Remove swirl chamber.
   iv) Use a suitable brass drift, tap injector shield out.

INSTALLATION

1) Position old copper washer on its outer diameter and tap it into cylinder head using a suitable drift against copper washer.
2) Final positioning of injector shield can be left until it is pushed into place when fitting injector.



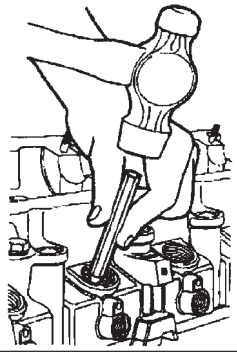
1. Cylinder head
2. Swirl chamber

SWIRL CHAMBER

INSPECTION

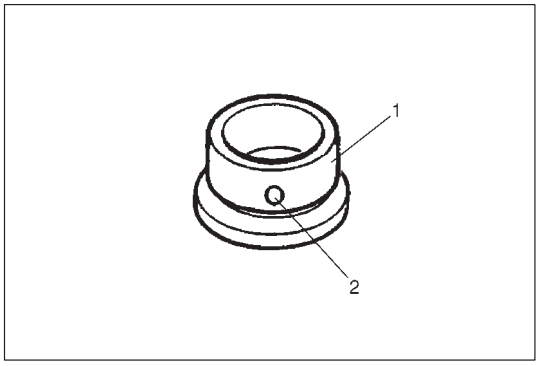
1) Remove injectors and glow plugs.
2) Remove cylinder head.
3) Check protrusion of swirl chamber. Refer to “Reconditioning the cylinder head” and “Swirl chambers” in “Overhaul checking tuning manual”.

   Special tool:
   (A): 09910-26510/OUT 0000005



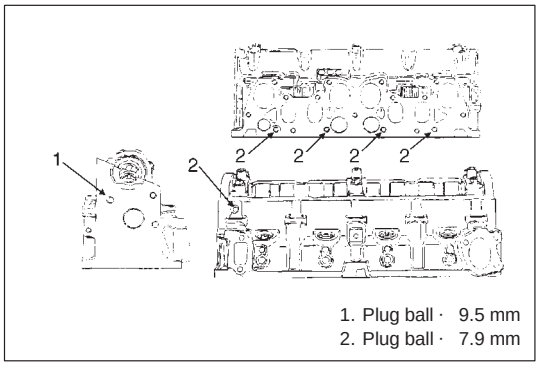
REMOVAL

1) Identify each swirl chamber with its original location.
2) Use a suitable brass drift, tap the swirl chamber out.



INSTALLATION

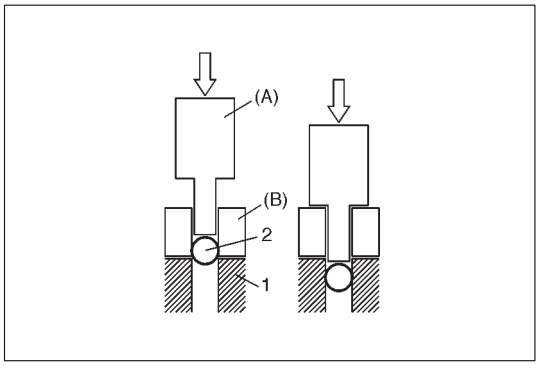
1) Install swirl chambers (1), so that swirl chamber protrusion (2) engages cylinder head recess.
2) Reverse removal procedure.



1. Plug ball · 9.5 mm
2. Plug ball · 7.9 mm

PLUG BALL

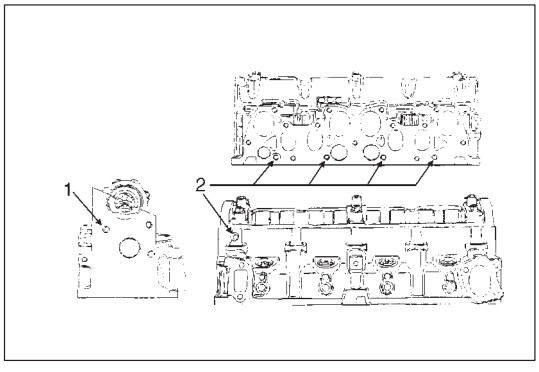
There are 6 plug balls in cylinder head.
Their locations are indicated in left figure.



INSTALLATION

1) Apply “LOCTITE 243” on the plug ball.
2) Push the plug ball (2) into the cylinder head (1) with special tools (A) and (B) until tool (A) bottoms out.

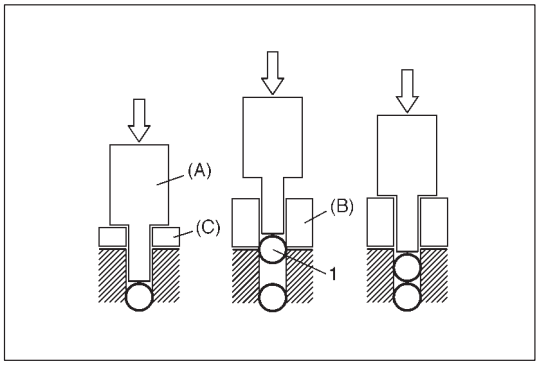
Special tool
(A) and (B): 09918-96510/OUT0000136



SECOND PLUG BALL

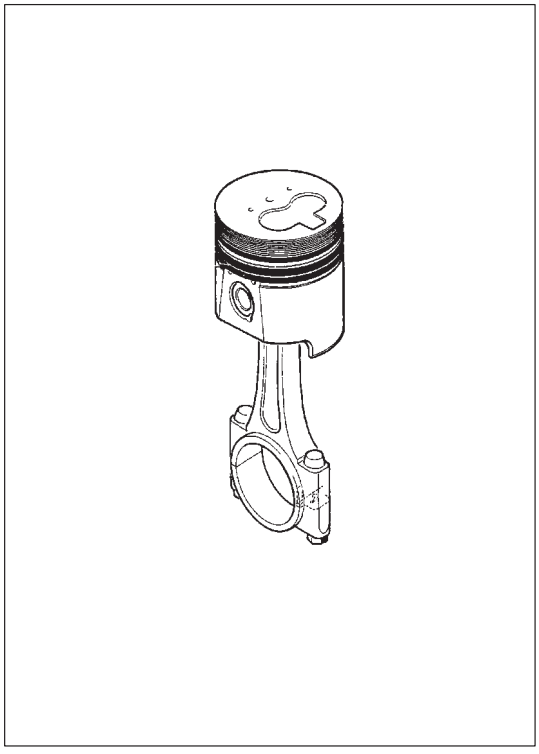
If oil leaks from plug ball · 9.5 mm (1), insert a second plug ball over original ball.

If oil leaks form plug balls · 7.9 mm (2), replace cylinder head with new one because no second ball is not available.



INSTALLATION

1) Push plug ball into cylinder head with special tools (A) and (C) until tool (A) bottoms out.
2) Apply “LOCTITE 243” on the second plug ball (1).
3) Push the second plug ball into the cylinder head with special tool (A) and (B) until (A) bottoms out.



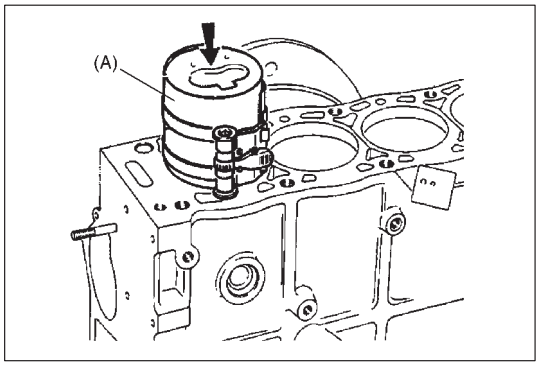
PISTON AND CONNECTING ROD

REMOVAL

1) Remove piston and connecting rod. Refer to “Removing the crankshaft and piston assembly” in “Overhaul checking tuning manual”.

INSPECTION

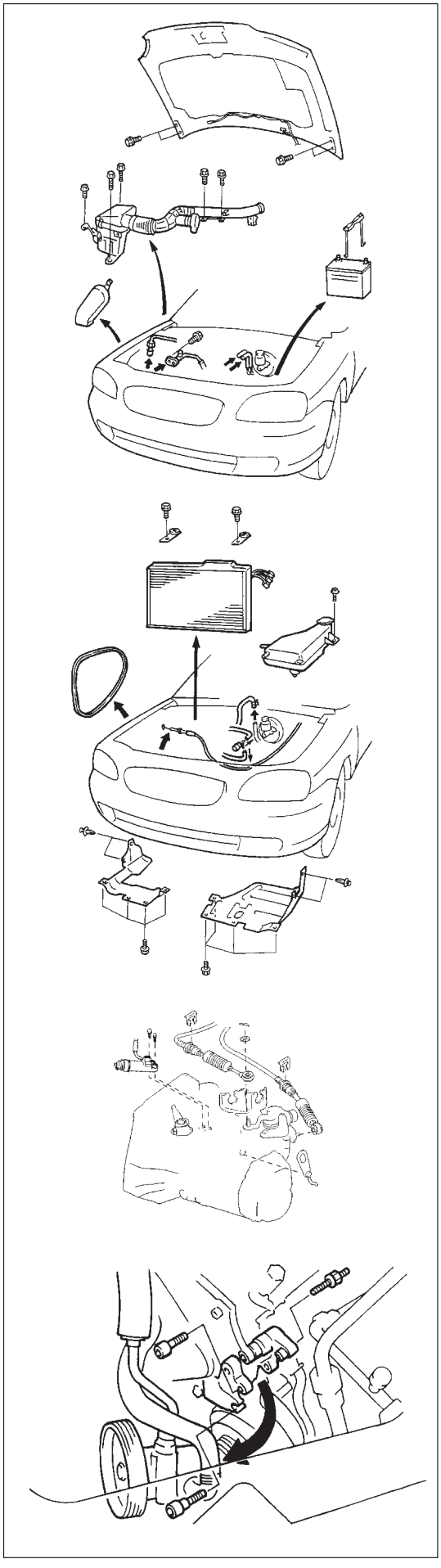
1) Inspect piston and connecting rod. Refer to the following items in “Overhaul checking tuning manual”.
   “Cylinder/piston matching”
   “Crankshaft”
   “Crankshaft pins and journals”



INSTALLATION

1) Install piston and connecting rod. Refer to the following items in “Overhaul checking tuning manual”.
   “Fitting pistons and connecting rods”
   “Installing pistons and connecting rods”

Special tool:
(A): 09916-77310

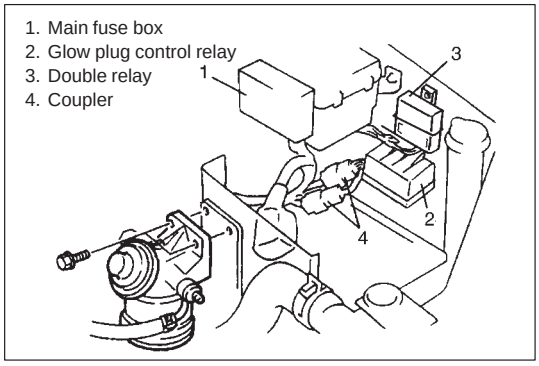


UNIT REPAIR OVERHAUL

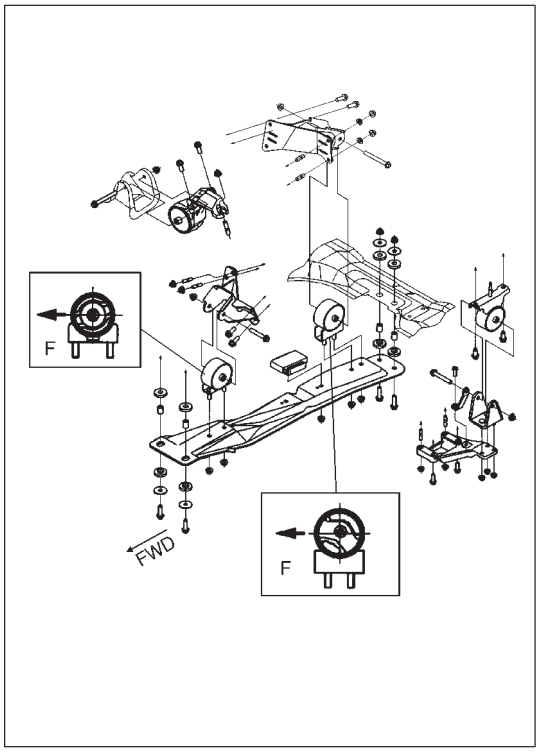
ENGINE ASSEMBLY

REMOVAL

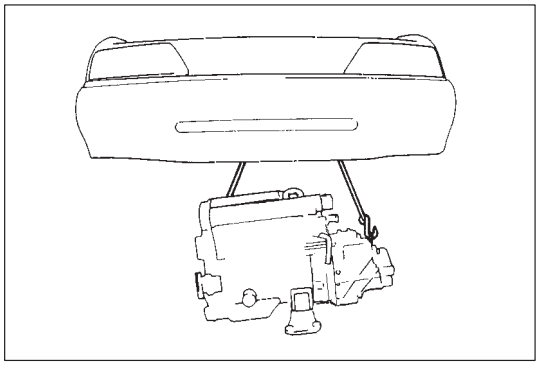
1) Drain transmission oil and engine coolant.
2) Remove the following parts.
   - ○ Fuel filler cap
   - ○ Battery
   - ○ Engine hood after disconnecting windshield washer hose
   - ○ Air cleaner outlet hose No. 1
   - ○ Air cleaner suction pipe No. 1
   - ○ Air cleaner case assembly
   - ○ Air cleaner outlet pipe
   - ○ Engine coolant degassing tank and its bracket
   - ○ Engine under covers
   - ○ Radiator
   - ○ Throttle cable
   - ○ Shift cables from transmission
   - ○ Clutch cylinder from transmission with hose still attached
   - ○ Air conditioner compressor pipes referring to section 1B
   - ○ Accessory drive belt
   - ○ Power steering pump from its bracket with hoses still attached
   - ○ Drive shafts
   - ○ Exhaust pipe No. 1
   - ○ Engine ground cable from transmission
3) Disconnect the following parts.
   - ○ Vacuum hoses from EGR solenoid valve No.1, No.2 and brake booster
   - ○ Fuel feed hose and return hose
   - ○ Heater inlet hose and outlet hose
   - ○ Water inlet hose



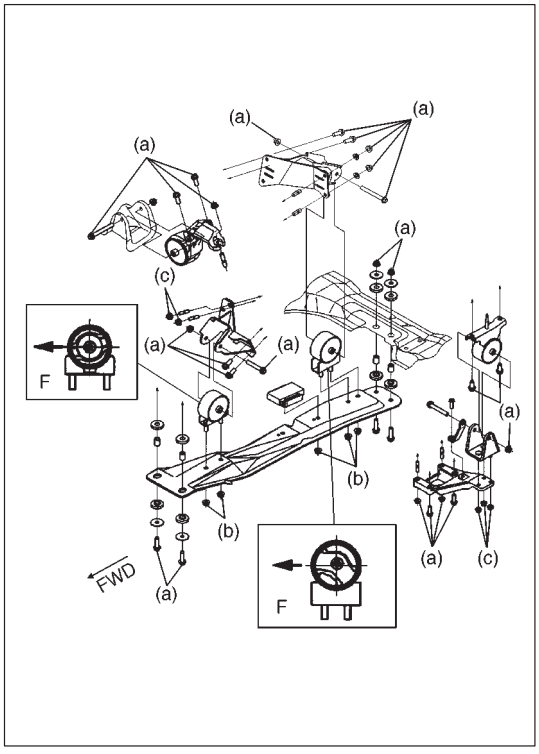
4) Remove double relay, glow-plug control relay and main fuse box.
5) Disconnect 2 couplers from main harness.
6) Remove fuel filter assembly from bracket with hoses still connected. Lower engine assembly with harness.



7) Install lifting device.
8) Remove rear mounting.
9) Remove 2 bolts that fix mounting member and suspension frame.
10) Remove bolt from engine front torque bush.
11) Remove 2 bolts that fix mounting member and front member. Then remove mounting member.
12) Remove left mounting from body. (2 bolts)
13) Remove engine right mounting from engine right bracket. (2 bolts and 1 nut)
14) Remove engine right mounting from body. (1 bolt)
15) Before removing engine with transmission, ensure that all hoses, electric wires and cables are disconnected from engine and transmission.



16) Lower engine with transmission from body.



INSTALLATION

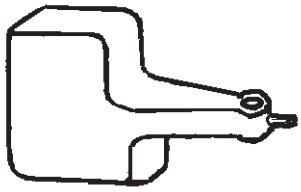
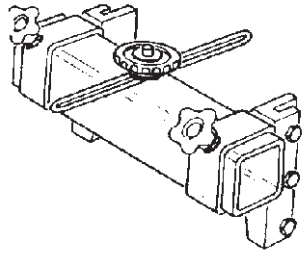
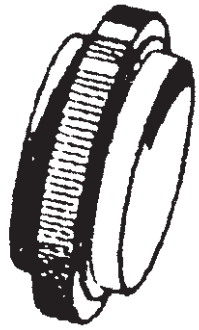
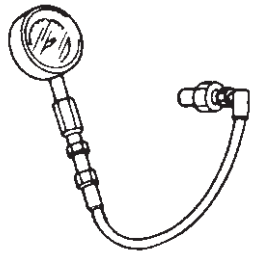
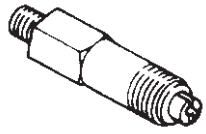
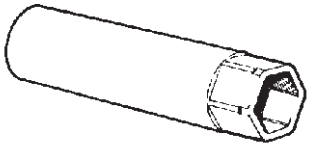
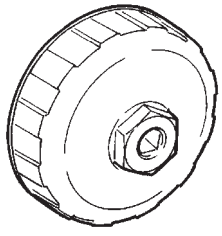
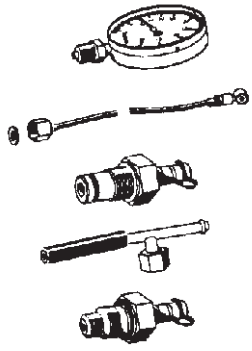
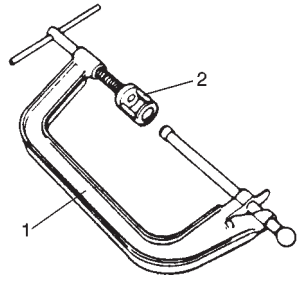
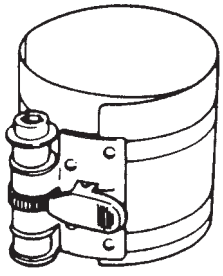
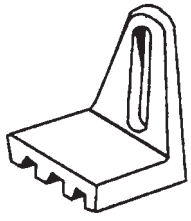
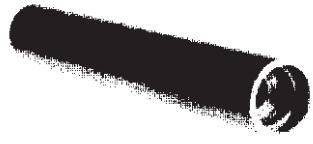
For installation, reverse the removal procedure. However, pay attention to the following points.

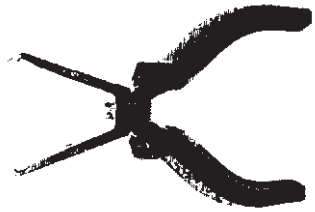
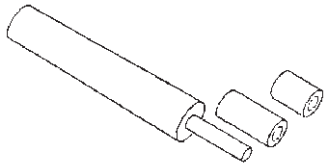
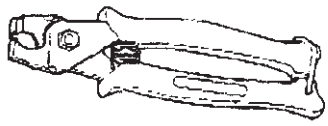
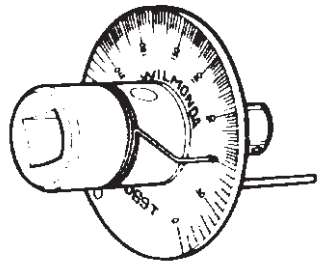
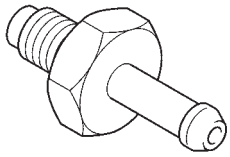
- ○ Be sure to clamp hoses securely.
- ○ For adjustment of throttle cable, refer to “Injection pump setting: BOSCH equipment” in “Overhaul checking tuning manual”.
- ○ Connect engine ground cable properly and securely.
- ○ Tighten bolts and nuts shown in the figure.

Tightening torque:
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(b): 45 N·m (4.5 kg-m, 32.5 lb-ft)
(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)

- ○ For installing engine hood, refer to “Hood” in Section 9. And perform “hood latch operation check” as indicated below.
  Pull primary hood latch release handle inside vehicle. Secondary latch should keep hood from operating all the wary when primary latch is released. Make sure engine hood closes firmly.
- ○ Check that there is no leakage of intake air, exhaust gas, engine coolant and oil.

SPECIAL TOOL

 09910-26510 (OUT0000005) Dial gauge support	 09910-26520 (OUT0000015) TDC rod positioner	 09911–16510 (OUT0000002) Rear oil seal installer	 09911-16520 (OUT0000011) Rear main seal installer
 09911–16530 (OUT0000013) Front seal installer	 09918-18111 Air pressure regulator	 09912-57820 Compression gauge	 09912-57830 Compression gauge attachment
 09915-26510 (OUT0000001) Injector socket	 09915-46510 Oil filter wrench	 09915-76530 (OUT0000057) Oil pressure gauge kit	 1. 09916-14510 Valve lifter 2. 09916-14910 Valve lifter attachment
 09916-77310 Piston ring compressor	 09916-96510 (OUT0000049) Flywheel lock	 09917-66510 (OUT0000014) Camshaft oil seal installer	 09917-96510 (OUT0000019) Stem seal installer

 09917-96520 (OUT0000021) Stem seal remover	 09918-96510 (OUT0000136) Plug ball installer kit	 09919-46510 (OUT0000110) Clamp pliers	 09919-56510 (OUT0000062) Tightening angle gauge
 09915-78220 Pressure gage attachment			

TIGHTENING TORQUE SPECIFICATIONS

FASTENING PARTS	TIGHTENING TORQUE		
	N·m	kg-m	lb-ft
Cylinder block oil gallery plug (oil filter side)	20.0	2.0	14.7
Cylinder block oil gallery plug (flywheel side)	38.0	3.8	28.0
Cylinder block plug plate bolt (flywheel side)	8.5	0.9	6.3
Cylinder block water drain plug (intake manifold side)	38.0	3.8	28.0
Cylinder block oil gallery plug bolt (intake manifold side)	25.0	2.5	18.4
Crankshaft housing bolt	70.0	7.1	51.6
Cylinder head cover bolt	8.0	0.8	5.9
Camshaft housing bolt	16.0	1.6	11.8
Cylinder head bolt	See “Tightening the cylinder head, TYPE III” in “Overhaul checking tuning manual”.		
Cylinder head coolant outlet plate bolt	11.0	1.1	8.1
Timing belt cover bolt	10.0	1.0	7.5
	15.0	1.5	11.0
Timing belt cover nut	5.0	0.5	4.0
Turbocharger oil feed pipe flare nut	20.0	2.0	14.5
Turbocharger oil feed pipe union nut	30.0	3.0	22.0
Turbocharger exhaust inlet flange bolt	50.0	5.0	36.5
Turbocharger exhaust outlet flange bolt	22.0	2.2	16.0
Turbocharger oil return pipe	20.0	2.0	14.5
Turbocharger air outlet pipe bolt	11.0	1.1	8.0
Flywheel bolt	50.0	5.1	36.9
Damper pulley bolt	See “Installing the damper pulley” in “Overhaul checking tuning manual”		
Crankshaft oil seal carrier (damper pulley side) bolt	15.0	1.5	11.1
Connecting rod	See “Installing pistons and connecting rods” in “Overhaul checking tuning manual”.		
Camshaft pulley bolt	40.0	4.1	29.5
Timing belt tensioner bolt	18.0	1.8	13.3
Timing belt idler bolt	17.5	1.8	12.9
Oil pump bolt	20.0	2.0	14.7
Oil pump plug bolt	10.0	1.0	7.4
Oil strainer bolt	9.0	0.9	6.6
Oil pressure switch	30.0	3.1	22.1
Oil cooler	57.5	5.9	42.4
Oil filter	14.0	1.4	10.3
Oil pan bolt	18.0	1.8	13.3
Oil drain plug bolt	34.0	3.4	25.1
Oil jet bolt	10.0	1.0	7.4
Water pump bolt	15.0	1.5	11.1

FASTENING PARTS	TIGHTENING TORQUE		
	N·m	kg-m	lb-ft
Water inlet pipe bolt	20.0	2.0	14.7
Water bypass pipe bolt	17.5	1.8	12.9
Thermostat case bolt	8.0	0.8	5.9
Water outlet box bolt	16.0	1.6	11.8
Thermo switch (on water outlet box)	17.5	1.8	12.9
Thermo sensor (on water outlet box)	17.5	1.8	12.9
Fuel heater case bolt	15.0	1.5	11.1
Intake manifold bolt	15.0	1.5	11.1
Intake manifold nut	20.0	2.0	14.5
Air inlet pipe bolt	9.0	0.9	6.6
Fuel injection pump bracket bolt	20.0	2.0	14.7
Fuel injection pump bolt and nut	20.0	2.0	14.8
Fuel injection pump pulley nut	50.0	5.1	36.9
Fuel injector pipe nut	25.0	2.5	18.4
Fuel injector assembly	130.0	13.3	95.9
Fuel injector	95.0	9.5	70.1
Fast idle thermo device	27.0	2.7	19.9
Fuel feed pipe bolt (on fuel injection pump)	25.0	2.5	18.4
Fuel return pipe bolt (on fuel injection pump)	25.0	2.5	18.4
Fuel feed pipe bolt breeding screw (on fuel injection pump)	4.5	0.5	3.3
Fast idle control cable fix bolt	4.0	0.4	3.0
Fast idle control cable adjusting nut	6.0	0.6	4.4
EGR valve bolt	15.0	1.5	11.0
Exhaust manifold nut	30.0	3.0	22.0
Exhaust pipe No.1 bolt	19.0	1.9	14.0
Lifting bracket bolt No.4 cylinder side (diameter: 7 mm)	10.0	1.0	7.4
Lifting bracket bolt No.4 cylinder side (diameter: 8 mm)	20.0	2.0	14.8
Engine bracket (timing belt side)	20.0	2.0	14.7
Lifting bracket bolt (No.1 cylinder side)	17.0	1.7	12.5
Glow plug	22.0	2.2	16.2
Glow plug wiring nut	4.0	0.4	2.9
Vacuum pump bolt and nut	25.0	2.5	18.4
Accessory drive belt tensioner spring bolt	21.0	2.1	15.5
Accessory bracket bolt	20.0	2.0	14.7
Accessory drive belt idler bolt	22.0	2.2	16.2
Fuel filter outlet pipe bolt	39.5	4.0	29.1
Fuel filter inlet pipe bolt	39.5	4.0	29.1
Fuel filter inlet pipe bolt breeding screw	5.0	0.5	3.7
Fuel filter element bolt	9.0	0.9	6.6
Fuel filter water bleeding screw	3.5	0.4	2.6
Engine right mounting bolt and nut	55.0	5.5	40.0

FASTENING PARTS	TIGHTENING TORQUE		
	N·m	kg-m	lb-ft
Engine left mounting bolt	55.0	5.5	40.0
Engine left mounting bracket bolt and nut	55.0	5.5	40.0
Engine left mounting bracket No.1 & No.2 nut	25.0	2.5	18.0
Engine front mounting nut	45.0	4.5	32.5
Engine rear mounting nut	45.0	4.5	32.5
Engine rear mounting bracket bolt and nut	55.0	5.5	40.0
Engine front bush bracket bolt	55.0	5.5	40.0
Engine front bush bracket nut	25.0	2.5	18.0
Mounting member bolt and nut	55.0	5.5	40.0
Dynamic damper nut	55.0	5.5	40.0

SECTION 6B

ENGINE COOLING

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
For the description (items) not found in this section of this manual, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

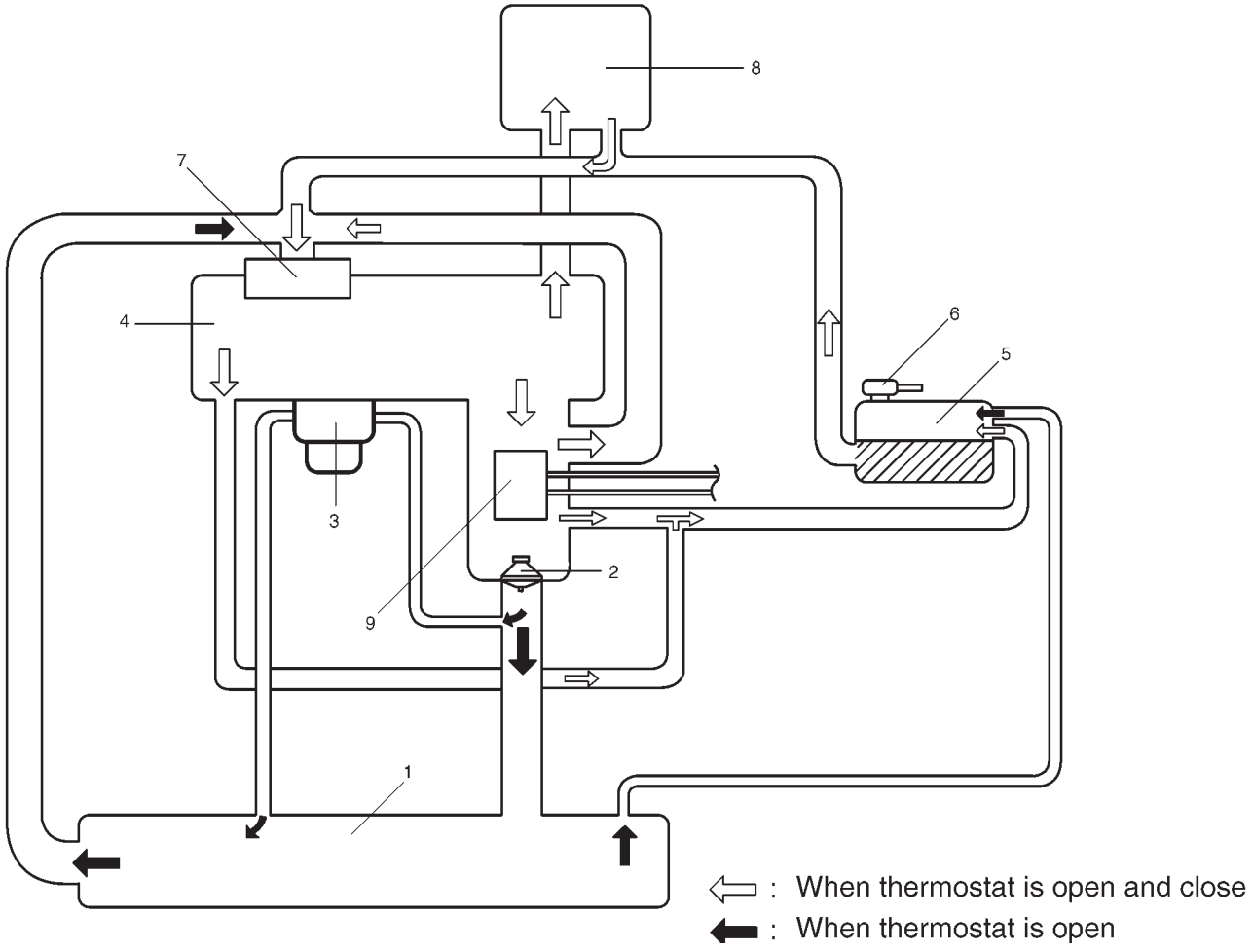
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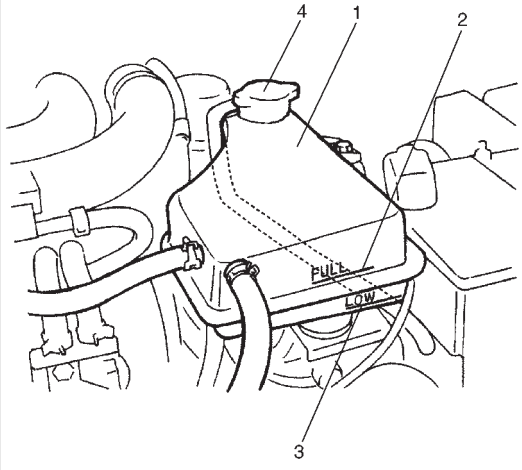
GENERAL DESCRIPTION

The cooling system consists of the degassing tank cap, radiator, degassing tank, hoses, water pump, cooling fan, thermostat. The radiator is of tube-and-fin type.

COOLING SYSTEM CIRCULATION



1. Radiator
2. Thermostat
3. Engine oil cooler
4. Engine
5. Degassing tank
6. Degassing tank cap (Radiator cap)
7. Water pump
8. Heater
9. Fuel heater



1. Degassing tank
2. FULL level mark
3. LOW level mark
4. Degassing tank cap (Radiator cap)

COOLANT DEGASSING TANK

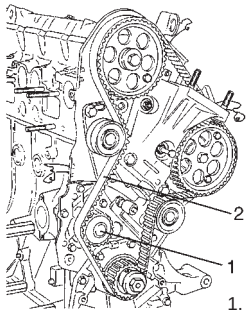
The degassing tank consists of a “see-through” plastic tank, a hose and a radiator cap.

During operation, the coolant circulates inside of the degassing tank constantly. As the coolant warms up and expands, the coolant level in the degassing tank rises. On the other hand, it lowers as the coolant cools down and contracts. When the pressure applied to the inside of the degassing tank constantly exceeds the specified value, the pressure is relieved through the degassing tank cap (radiator cap).

Thus, the radiator is kept filled with coolant to the desired level at all times, resulting in increased cooling efficiency.

Coolant level should be between “FULL” and “LOW” marks on the degassing tank.

Coolant should be added only to the degassing tank as necessary.

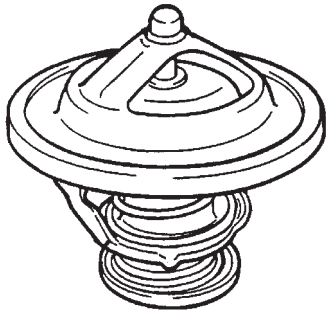


1. Water pump
2. Camshaft timing belt

WATER PUMP

The water pump is driven by camshaft timing belt.

The water pump can not be disassembled.



THERMOSTAT

A wax pellet type thermostat is used in the coolant outlet passage to control the flow of engine coolant, to provide fast engine warm up and to regulate coolant temperatures.

A wax pellet element is hermetically contained in a metal case, and expands when heated and contracts when cooled.

When the pellet is heated and expands, the metal case pushed down the valve to open it.

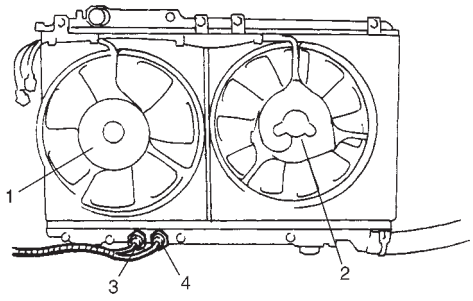
As the pellet is cooled, the contraction allows the spring to close the valve.

Thus, the valve remains closed while the coolant is cold, preventing circulation of coolant through the radiator.

At this point, coolant is allowed to circulate only throughout the engine to warm it quickly and evenly.

As the engine warms, the pellet expands and the thermostat valve opens, permitting coolant to flow through the radiator.

Thermostat functional spec. ⌣ 1.5· C (2.7· F)	
Temp. at which valve begins to open	83· C (181· F)



1. Main cooling fan motor
2. Sub cooling fan motor
3. Main thermo switch
4. Sub thermo switch

COOLING FAN

The cooling fan is driven by electric motor, and the motor is activated by two thermo switches (main and sub).

	Main thermo switch	Sub thermo switch
Temp. at switch "ON"	88·C (190·F)	93·C (199·F)
Temp. at switch "OFF"	82·C (180·F)	87·C (189·F)

WARNING:
Keep hands, tools, and clothing away from engine cooling fan to help prevent personal injury. This fan is electric and can come on whether or not the engine is running. The fan can start automatically in response to the thermo switch with the ignition switch in the "ON" position.

ANTI-FREEZE PROPORTIONING CHART			
Freezing temperature	·C	–16	–36
	·F	3	–33
Antifreeze/ Anticorrosion coolant concentration	%	30	50
Ratio of compound to cooling water	ltr.	2.4/5.6	4.0/4.0
	US pt.	5.1/11.8	8.5/8.5
	Imp. pt.	4.2/9.9	7.1/7.1

COOLANT CAPACITY	
Engine, radiator, heater and degassing tank etc.	8.0 liters (16.9/14.1 US/Imp.p.)

COOLANT

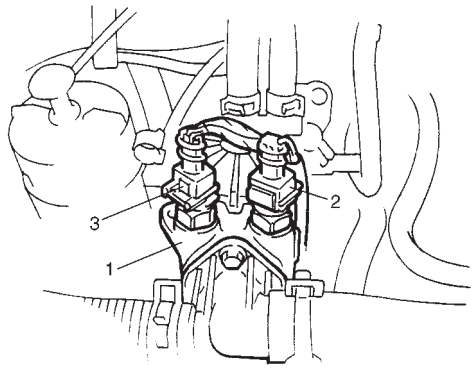
The cooling system has been filled at the factory with a quality coolant that is a 50/50 mixture of water and ethylene glycol antifreeze.

This 50/50 mixture coolant solution provides freezing protection to –36·C (–33·F).

- ○ Maintain cooling system freeze protection at –36·C (–33·F) to ensure protection against corrosion and loss of coolant from boiling.
  This should be done even if freezing temperatures are not expected.
- ○ Add ethylene glycol base coolant when coolant has to be added because of coolant loss or to provide added protection against freezing at temperature lower than –36·C (–33·F).

NOTE:

- ○ **Alcohol or methanol base coolant or plain water alone should not be used in cooling system at any time as damage to cooling system could occur.**
- ○ **Even in a market where no freezing temperature is anticipated, mixture 70% water and 30% ethylene glycol antifreeze (Antifreeze/Anticorrosion coolant) should be used for the purpose of corrosion protection and lubrication.**
- ○ **"Hard water", if used, will foul up the cooling circuit by scale formation. Tap water available from city water supply is the best available water, in a practical sense, for the cooling system. Distilled water is ideal but is a luxury in most cases.**



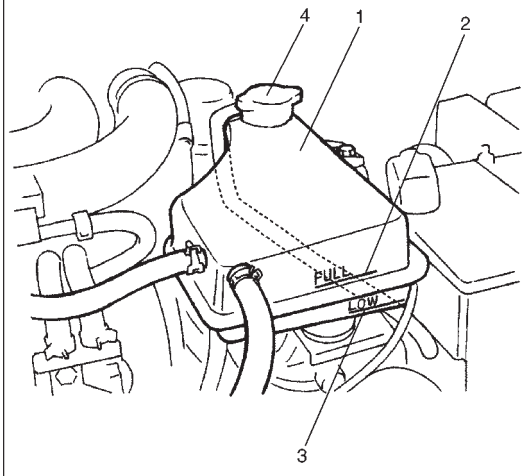
1. Thermostat case
2. Coolant temp. switch
3. Coolant temp. gauge

COOLANT (WATER) TEMP. GAUGE AND SWITCH

Coolant (water) temp. gauge and switch are installed to thermostat case. This gauge activates a temp. meter gauge in the instrument cluster and the switch activates a warning lamp in the instrument cluster.

DIAGNOSIS

Condition	Possible cause	Correction
Engine overheats	○ Not enough coolant	Check coolant level and add as necessary.
	○ Faulty thermostat	Replace.
	○ Faulty water pump	Replace.
	○ Dirty or bent radiator fins	Clean or remedy.
	○ Coolant leakage on cooling system	Repair.
	○ Defective cooling fan motor	Check and replace as necessary.
	○ Faulty thermo switch or its circuit	Repair or replace
	○ Plugged radiator	Check and replace radiator as necessary.
	○ Faulty degassing tank cap	Replace.
	○ Dragging brakes	Adjust brake.
	○ Slipping clutch	Adjust or replace.



1. Degassing tank
2. Full level mark
3. LOW level mark
4. Degassing tank cap (Radiator cap)

MAINTENANCE

COOLANT LEVEL

To check level, lift hood and look at “see-through” degassing tank. It is not necessary to remove radiator cap to check coolant level.

WARNING:
To help avoid danger of being burned:
○ Do not remove degassing tank cap while coolant is “boiling”, and engine and radiator are still hot.
Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon.

When engine is cool, check coolant level in degassing tank.
A normal coolant level should be between “FULL” and “LOW” marks on degassing tank.

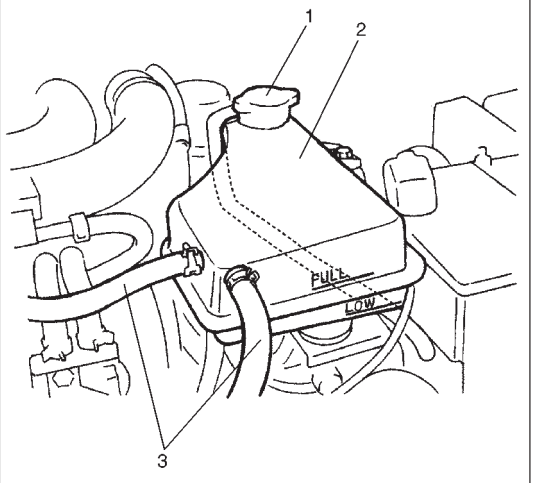
If coolant level is below “LOW” mark, remove reservoir tank cap and add proper coolant to tank to bring coolant level up to “FULL” mark. Then, reinstall cap and align match marks on tank and cap.

NOTE:
If proper quality antifreeze is used, there is no need to add extra inhibitors or additives that claim to improve system. They may be harmful to proper operation of system, and are unnecessary expense.

COOLING SYSTEM SERVICE

WARNING:
To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot.
Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

Cooling system should be serviced as follows.
1) Check cooling system for leakage or damage.
2) Wash radiator cap and filled neck with clean water by removing radiator cap when engine is cold.
3) Check coolant for proper level and freeze protection.



1. Degassing tank cap (Radiator cap)
2. Degassing tank
3. Inlet hoses

4) Using a pressure tester, check system and degassing tank cap for proper pressure holding capacity 110 kpa (1.1 kg/cm^2, 15.6 psi). If replacement of cap is required, use proper cap specified torque for this car.

   NOTE:
   After installing degassing tank cap to degassing tank, make sure that it is closed certainty as shown in figure. If not, turn cap more as shown figure.

5) Tighten hose clamps and inspect all hoses. Replace hoses whenever cracked, swollen or otherwise deteriorated.
6) Clean frontal area of radiator core.

COOLING SYSTEM FLUSH AND REFILL

1) Remove degassing tank cap (radiator cap) when engine is cool: Turn cap counterclockwise slowly until it reaches a “stop”. (Do not press down while turning it.)
   Wait until pressure is relieved (indicated by a hissing sound) then press down on cap and continue to turn it counterclockwise.

   WARNING:
   To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

2) With degassing tank cap (radiator cap) removed, run engine until upper radiator hose is hot (this shows that thermostat is open and coolant is flowing through system).
3) Stop engine and drain coolant.
4) Close drain plug. Add water until system is filled and run engine until upper radiator hose is hot again.
5) Repeat steps 3) and 4) several times until drained liquid is nearly colorless.
6) Drain system and then close radiator drain plug tightly.
7) Pour coolant (50/50 mixture of good quality ethylene glycol antifreeze and water) up to “FULL” level mark of degassing tank.
8) Fill degassing tank up to “FULL” level mark on degassing tank. Reinstall degassing tank cap aligning match marks on degassing tank and cap.
9) Start engine and run it at idle speed and under 2,000 r/min. until radiator inlet (upper) hose is hot.

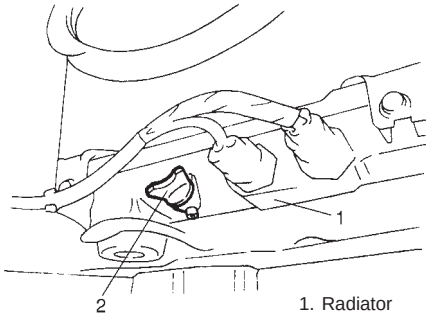
10) Run engine at 2,000 r/min. for 2 minutes to purge air in cooling system, with degassing tank cap removed.
11) Stop engine.
12) Replenish coolant up to “FULL” level mark of degassing tank and reinstall degassing tank cap.

WATER PUMP BELT TENSION

Refer to OVERHAUL CHECKING TUNING MANUAL.

ON-VEHICLE SERVICE

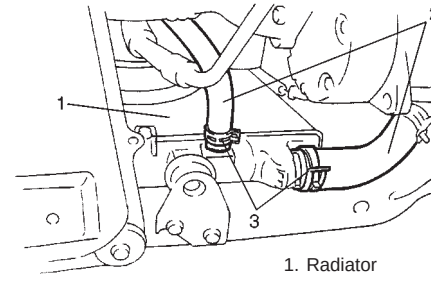
WARNING:
○ Check to make sure that engine coolant temperature is cold before removing any part of cooling system.
○ Also be sure to disconnect negative cord from battery terminal before removing any part.



1. Radiator
2. Radiator drain plug

COOLING SYSTEM DRAINING

1) Remove degassing tank cap.
2) Loosen drain plug on radiator to drain coolant.
3) After draining coolant, be sure to tighten drain plug securely.
4) Fill cooling system. (Refer to Item COOLANT of MAINTENANCE.)



1. Radiator
2. Radiator outlet hoses
3. Clamp

COOLING WATER PIPES OR HOSES

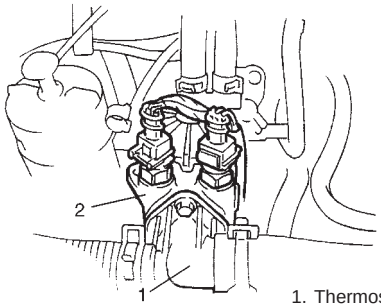
REMOVAL

1) Drain cooling system.
2) To remove these pipes or hoses, loosen clamp on each hose and pull hose end off.

INSTALLATION

Install removed parts in reverse order of removal procedure, noting the following.

○ Tighten each clamp securely.
○ Refill cooling system with proper coolant,referring to description on COOLANT of MAINTENANCE.

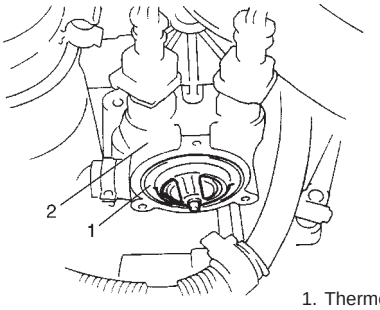


1. Thermostat cap
2. Thermostat case

THERMOSTAT

REMOVAL

1) Disconnect negative cable at battery.
2) Drain cooling system and tighten drain plug.
3) Disconnect thermostat cap from thermostat case.

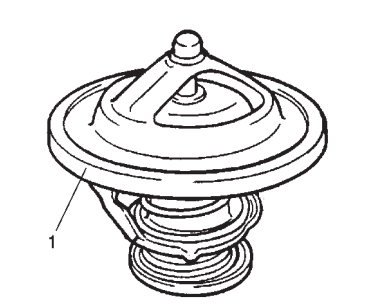


1. Thermostat
2. Thermostat case

4) Remove thermostat.

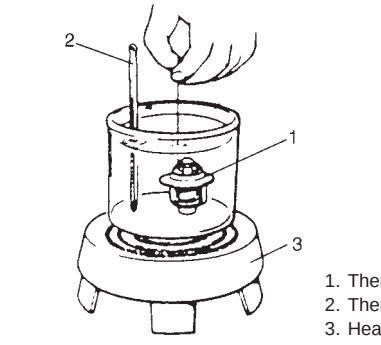
INSPECTION

1) Check to make sure that valve seat is free from foreign matters which would prevent valve from seating tight.
2) Check thermostat seal for breakage, deterioration or any other damage.



1. Thermostat seal

3) Check thermostatic movement of wax pellet as follows:
   a) Immerse thermostat in water, and heat water gradually.
   b) Check that valve starts to open at specific temperature.
   c) If valve starts to open at a temperature substantially below or above specific temperature, thermostat unit should be replaced with a new one. Such a unit, if reused, will bring about overcooling or overheating tendency.



1. Thermostat
2. Thermometer
3. Heater

INSTALLATION

Reverse removal procedures.

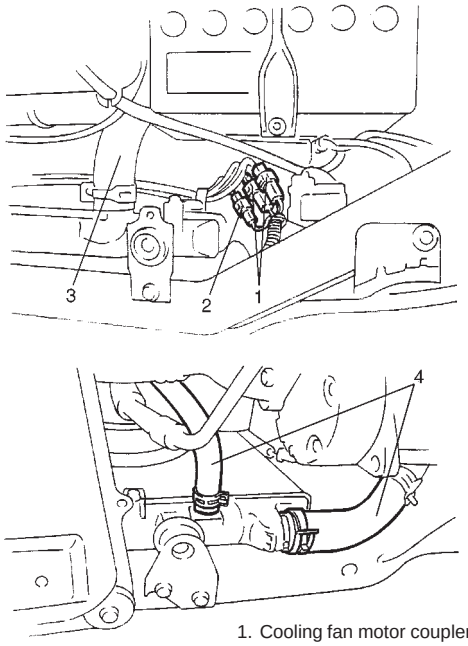
WATER PUMP BELT

Refer to “GENERATOR” under “ON-VEHICLE SERVICE” in Section 6H.

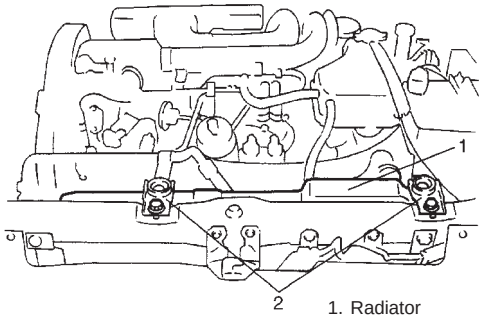
RADIATOR

REMOVAL

1) Disconnect negative cable at battery.
2) Drain cooling system by loosening drain plug of radiator.
3) Disconnect couplers of cooling fan motor and thermo switches.
4) Disconnect radiator inlet and outlet hoses and degassing tank hose from radiator.



1. Cooling fan motor coupler
2. Thermo switch coupler
3. Radiator inlet hose
4. Radiator outlet hoses



1. Radiator
2. Radiator bracket

5) Remove radiator brackets and radiator.

INSPECTION

Check radiator for leakage or damage. Straighten bent fins, if any.

CLEANING

Clean frontal area of radiator cores.

INSTALLATION

Reverse removal procedures.

NOTE:

- ○ **Refill cooling system with proper coolant referring to COOLANT item of MAINTENANCE.**
- ○ **After installation, check each joint for leakage.**

WATER PUMP

Refer to “DISMANTLING THE ENGINE” and “INSTALLING THE TIMING BELT” of “OVER HAUL CHECKING TUNING MANUAL”.

REQUIRED SERVICE MATERIALS

MATERIALS	USE
Ethylene glycol base coolant (Anti-freeze/Anti-corrosion coolant)	Additive to engine cooling system for improving cooling efficiency and for protection against rusting.

SECTION 6E3

ENGINE AND EMISSION CONTROL SYSTEM (XUD9BSD ENGINE)

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

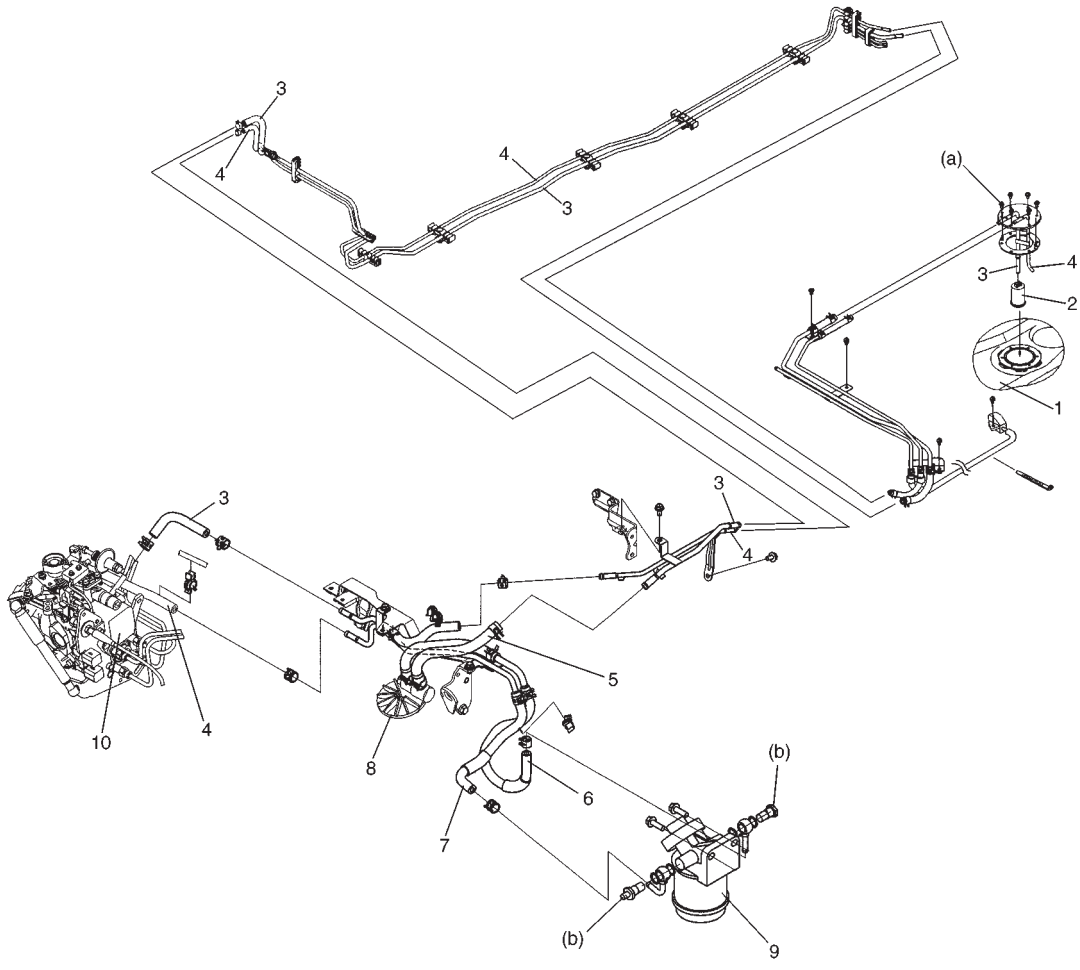
NOTE:
Please refer to description of XUD9 SD/BSD engine in "OVERHAUL CHECKING TUNING MANUAL" and "ALL MODELS DIESEL DIAGNOSIS MANUAL" listed as related manuals in FOREWORD as well. This section describes DIAGNOSIS, removal, installation and inspection of parts and gives an instruction to refer to "OVERHAUL CHECKING TUNING MANUAL" or "ALL MODELS DIESEL DIAGNOSIS MANUAL" as necessary.

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GENERAL DESCRIPTION

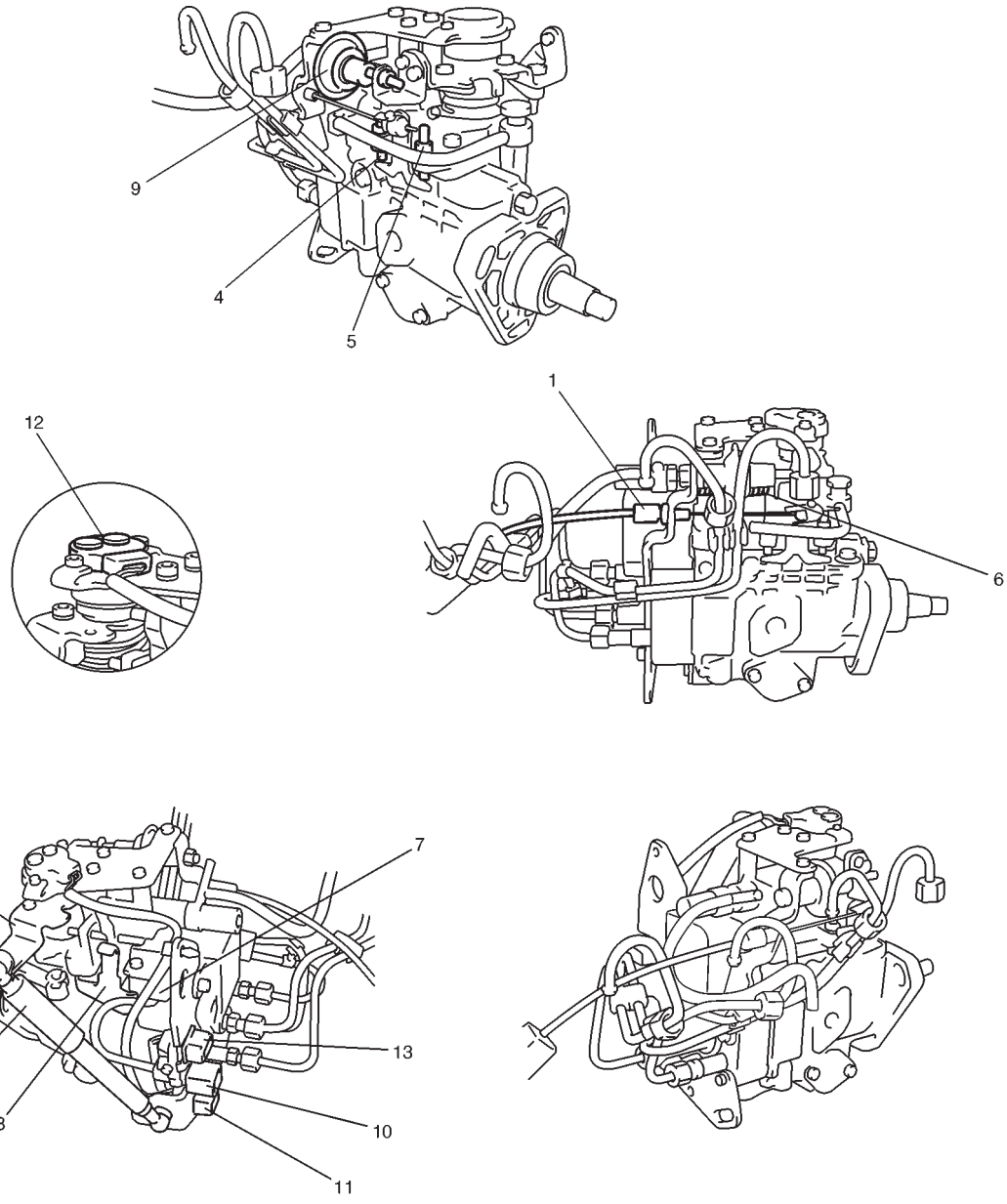
FUEL DELIVERY SYSTEM



1. Fuel tank
2. Fuel net filter
3. Fuel feed line
4. Fuel return line
5. Fuel hose (to fuel heater)
6. Fuel hose (to fuel filter)
7. Fuel hose (to fuel injection pump)
8. Fuel heater
9. Fuel filter
10. Fuel injection pump

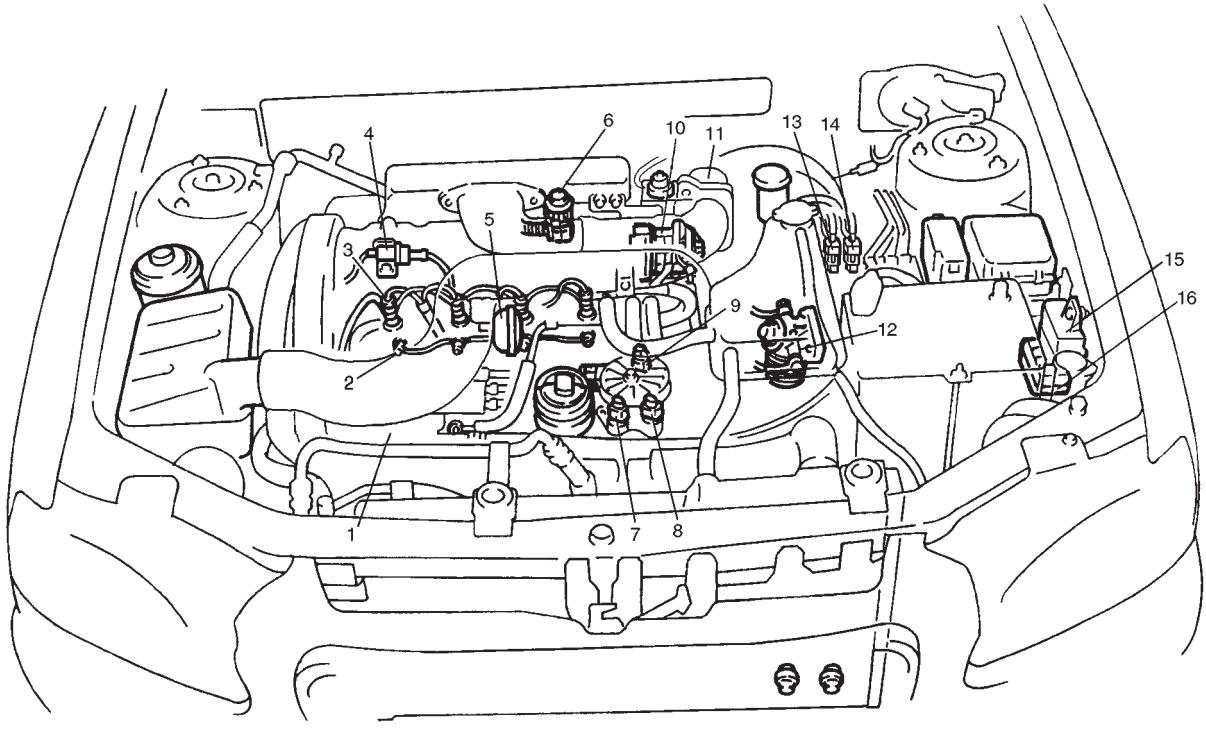
Tightening torque
(a) : 1.6 N·m (0.2 kg-m)
(b) : 40.0 N·m (4.0 kg-m)

FUEL INJECTION PUMP



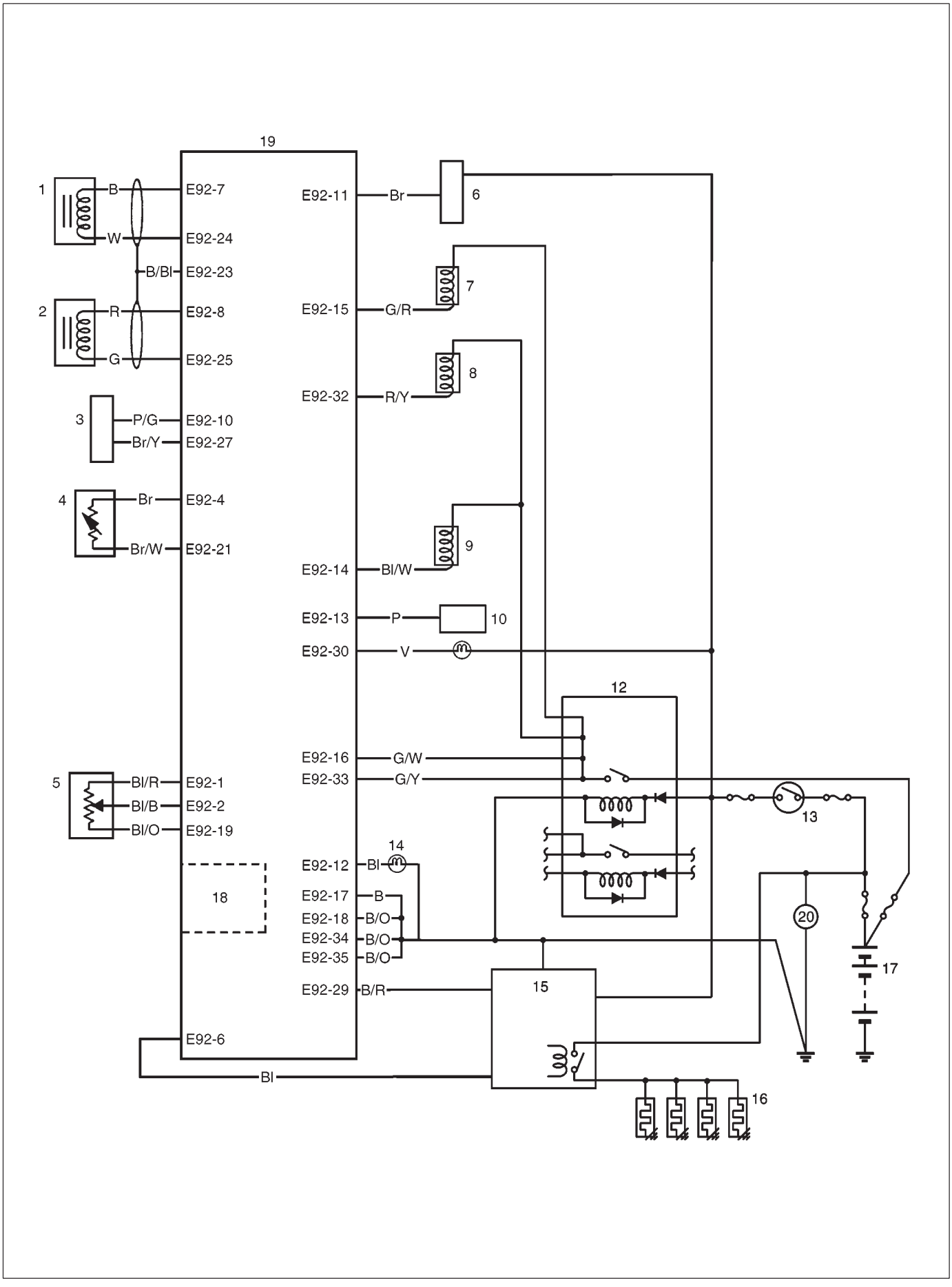
1. First idle thermostatic component
2. Load lever
3. Manual engine stop lever
4. Idle adjustment screw
5. Fast idle adjustment screw
6. Residual flow adjustment screw
7. Stop solenoid valve
8. Load lever damper
9. Dash pot
10. Immobilizing actuator
11. Throttle position sensor
12. Load lever position copy potentiometer
13. Injection timing control actuator

ELECTRIC CONTROL SYSTEM

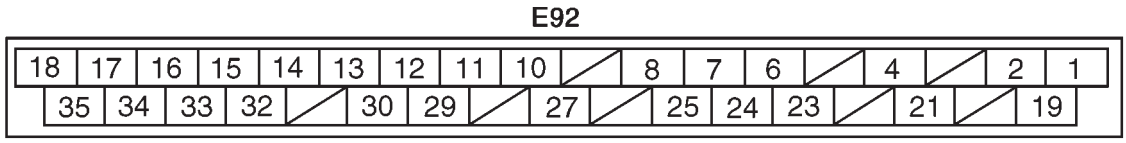


1. Fuel injection pump
2. Glow plug
3. Fuel injector
4. Injector needle sensor
5. Regulator
6. EGR No.1 valve
7. Coolant temp. gauge
8. Coolant temp. switch
9. ECT sensor
10. Vacuum pump
11. EGR No.2 valve
12. Fuel filter
13. EGR No.1 solenoid valve
14. EGR No.2 solenoid valve
15. Double relay
16. Glow plug control relay

SYSTEM DIAGRAM



TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



TERMINAL		CIRCUIT
E92	1	Power supply for sensor
	2	Throttle position sensor (+)
	3	–
	4	Coolant temp. sensor (+)
	5	–
	6	Glow plug signal
	7	Injector needle sensor (+)
	8	Crankshaft position (CKP) sensor (+)
	9	–
	10	Data link connector
	11	Tachometer signal
	12	Glow plug lamp
	13	A/C controller (if equipped)
	14	EGR No.1 solenoid valve signal
	15	Injection timing control actuator signal
	16	Power source (from battery)
	17	Ground
	18	Ground

TERMINAL		CIRCUIT
E92	19	Throttle position sensor (–)
	20	–
	21	Coolant temp. sensor (–)
	22	–
	23	Ground for sensor shield wire
	24	Injector needle sensor (–)
	25	Crankshaft position (CKP) sensor (–)
	26	–
	27	Data link connector
	28	–
	29	Glow plug control relay
	30	Warning lamp
	31	–
	32	EGR No.2 solenoid valve signal
	33	Power source (from battery)
	34	Ground
	35	Ground

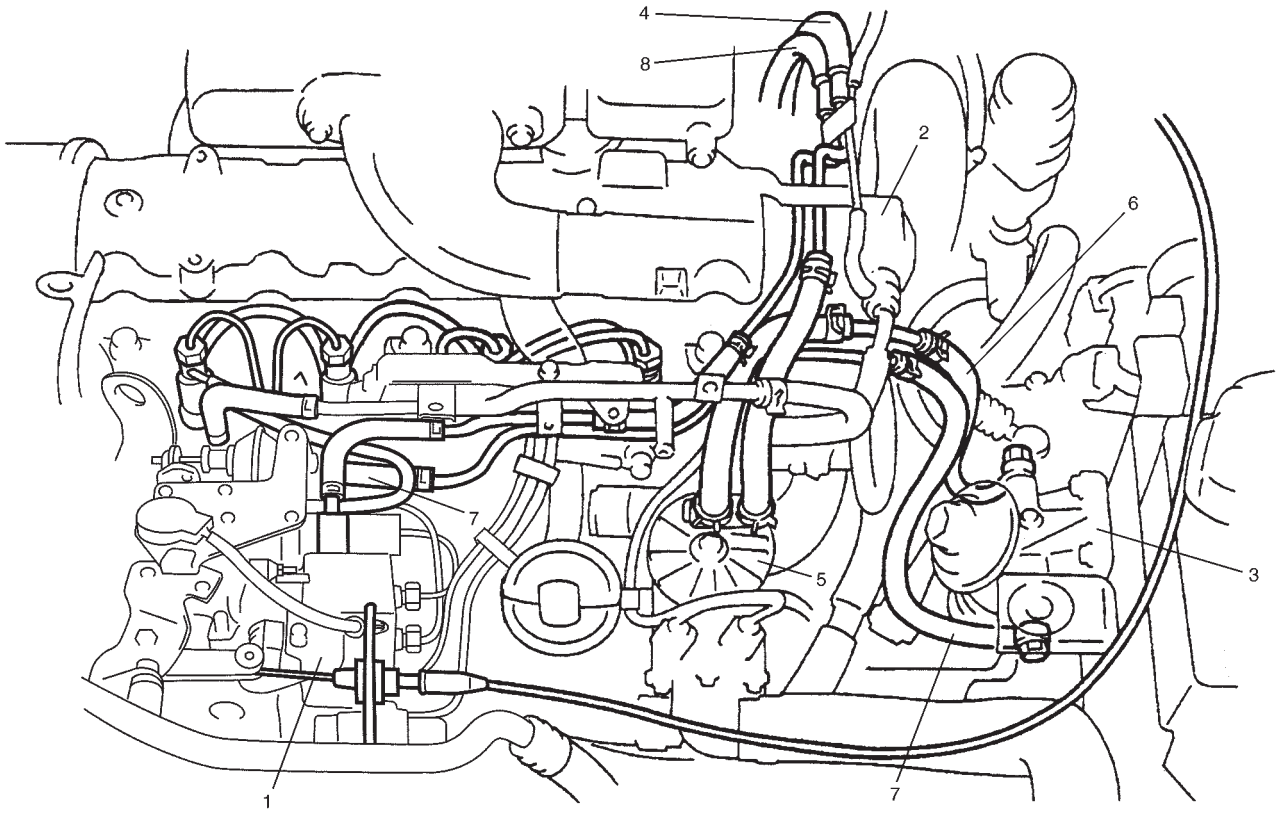
1. Injector needle sensor
2. Crankshaft position (CKP) sensor
3. DLC
4. Coolant temp. sensor
5. Throttle position sensor
6. Tachometer
7. Injection timing control actuator
8. EGR No.2 solenoid valve
9. EGR No.1 solenoid valve
10. A/C controller
11. Warning lamp
12. Double relay
13. Ignition switch
14. Glow plug indicator lamp
15. Glow plug control relay
16. Glow plug
17. Battery
18. Barometric pressure sensor
19. ECM
20. Generator

Wire color

B : Black
B/Bl : Black/Blue
B/O : Black/Orange
B/R : Black/Red
Bl : Blue
Bl/B : Blue/Black
Bl/O : Blue/Orange
Bl/R : Blue/Red
Bl/W : Blue/White
Br : Brown
Br/W : Brown/White
Br/Y : Brown/Yellow
G : Green
G/R : Green/Red
G/W : Green/White
G/Y : Green/Yellow
P : Pink
P/G : Pink/Green
R :Red
R/Y : Red/Yellow
V : Violet
W : White

ON-VEHICLE SERVICE

HOSE AND PIPES



1. Fuel injection pump
2. Vacuum pump
3. Fuel filter
4. Fuel feed hose (fuel tank – fuel heater)
5. Fuel heater
6. Fuel feed hose (fuel heater – fuel filter)
7. Fuel feed hose (fuel filter – injection pump)
8. Fuel return hose

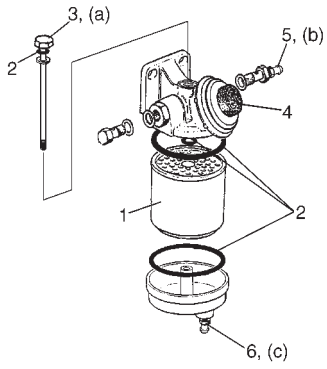
GENERAL

When hoses are disconnected and system components are removed for service, reinstall components properly, and route and connect hoses correctly after service. Refer to above figure for proper routing of hoses.

IDLE SPEED INSPECTION AND ADJUSTMENT

For adjustment of idle speed, refer to “Injection pump setting: BOSCH equipment” in “Overhaul checking tuning manual” for procedure. And the table below for specific idle speed value.

Idle speed [RPM]	Vehicle
870 ∽ 25	Not equipped with A/C
	Equipped with A/C



1. Fuel filter
2. O-ring
3. Fuel filter bolt
4. Priming pump
5. Fuel filter bleeding screw
6. Water bleeding screw

FUEL FILTER

REPLACEMENT

WARNING:
This work must be performed in a well ventilated area and away from any open flames.

1) Remove fuel filter bolt.
2) Replace fuel filter (1) and O-rings.
3) Tighten fuel filter bolt.

   Tightening torque
   (a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

4) Loose fuel filter bleeding screw.
5) Bleed fuel filter by working priming pump until there is no more air in the circuit.
6) Tighten fuel filter bleeding screw.

   Tightening torque
   (b): 5 N·m (0.5 kg-m, 4.0 lb-ft)

7) Check for fuel leakage.

WATER DRAINING

1) Loose water bleeding screw.
2) When water stops, tighten water bleeding screw to specified torque.

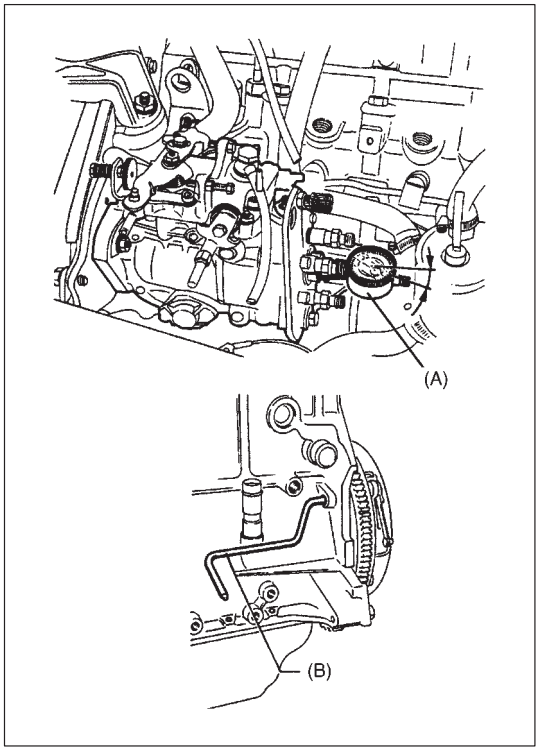
   Tightening torque
   (c): 3.5 N·m (0.4 kg-m, 2.5 lb-ft)

3) Check for fuel leakage.

FUEL INJECTION PUMP

NOTE:
Overhaul of injection pump requires use of special tools and testers, and therefore, pump is sealed to prevents unauthorized service.

Remove injection pump from engine referring to “Dismantling the engine” in “Overhaul checking tuning manual”.

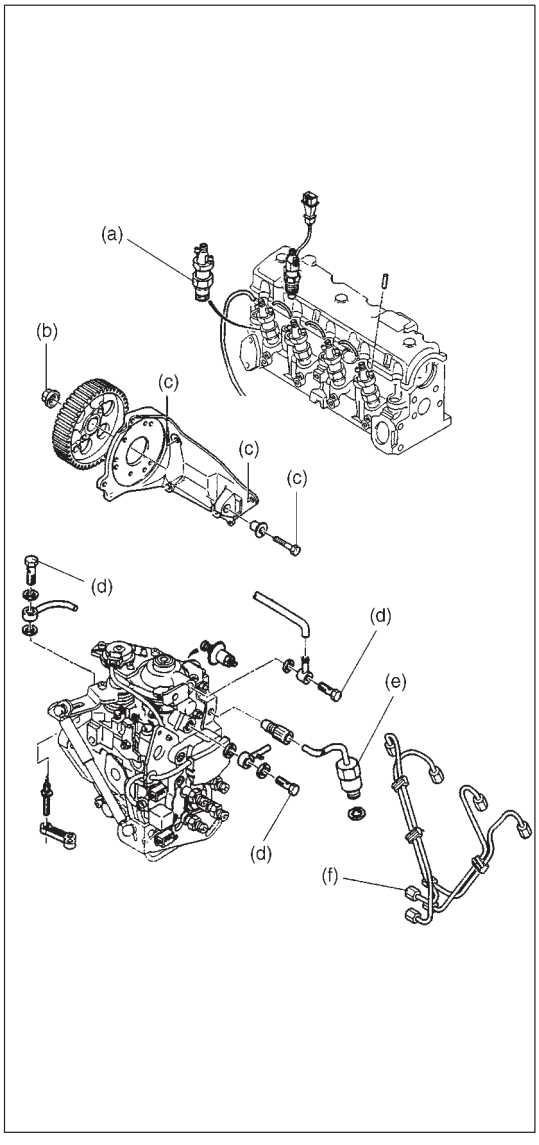


FUEL INJECTION PUMP STATIC TIMING ADJUSTMENT AND CHECKING

Adjust and check fuel injection static timing. Refer to the following items in "Overhaul checking tuning manual".

"Timing the injection pump (method 2: Timing at TDC, preparing the injection BOSCH pump)"
"Injection pump settings: BOSCH equipment"
"Checking the injection pump timing (method 2: BOSCH pump)"

Special tool
(A): 09900-20606
(B): 09910-26520 / OUT0000015



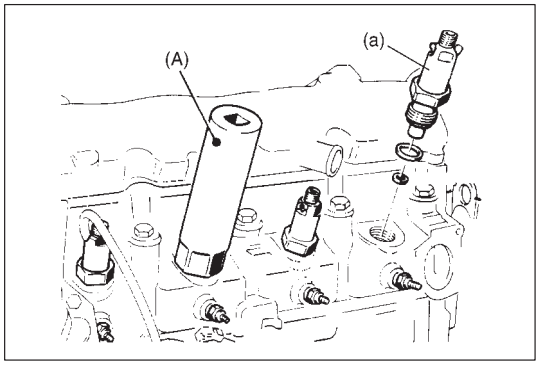
REMOVAL AND INSTALLATION

1) Refer to the following items in "Overhaul checking tuning manual".
   "Dismantling the engine"
   "Installing the timing belt"

   Tightening torque
   (a): 90 N·m (9.0 kg-m, 65.0 lb-ft)
   (b): 50 N·m (5.0 kg-m, 36.5 lb-ft)
   (c): 20 N·m (2.0 kg-m, 14.5 lb-ft)
   (d): 25 N·m (2.5 kg-m, 18.0 lb-ft)
   (e): 30 N·m (3.0 kg-m, 22.0 lb-ft)
   (f): 25 N·m (2.5 kg-m, 18.0 lb-ft)

   "A" Sealant: Rhone Poulenc CAF 33 black
2) Perform "Fuel injection pump static timing adjustment and checking" in this section.

CAUTION:
After replacing fuel pump assembly, be sure to register each fuel pump/immobilizer control module code in immobilizer control module and fuel pump by performing procedure described in "Procedure After Fuel Pump Assembly Replacement" (in section 8G of this manual). Otherwise immobilizer control system can not operate.



FUEL INJECTOR

REMOVAL AND INSTALLATION

Remove and install injector. Refer to the following items in “Overhaul checking tuning manual”.

“Removing the injectors”

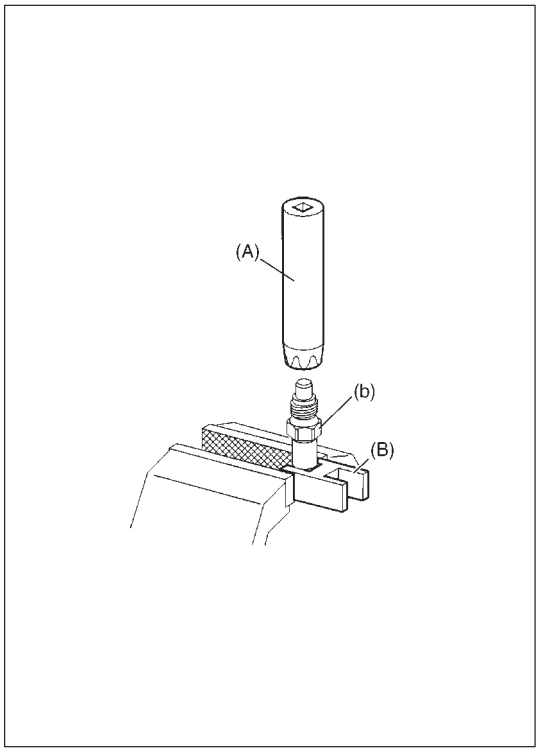
“Reinstalling the injectors”

Special tool

(A): 09915-26510 / OUT0000001

Tightening torque

(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



DISASSEMBLY AND REASSEMBLY

Disassemble and reassemble injector. Refer to the following items in “Overhaul checking tuning manual”.

“Injector overhaul”

“Reassembling the injectors”

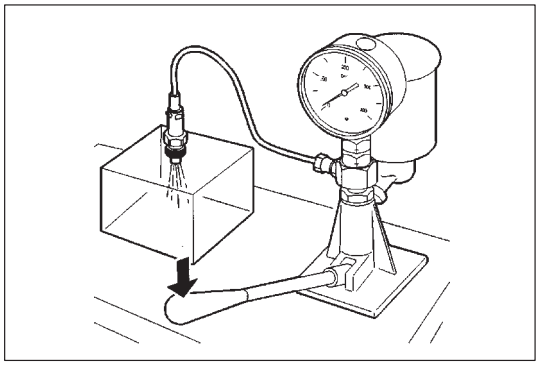
Special tool

(A): 09915-26510 / OUT0000001

(B): 09913-16520 / OUT0000073

Tightening torque

(b): 75 N·m (7.5 kg-m, 54.5 lb-ft)



INSPECTION AND ADJUSTMENT

Inspect and adjust injector. Refer to the following items in “Overhaul checking tuning manual”.

“Checking and setting injector timing”

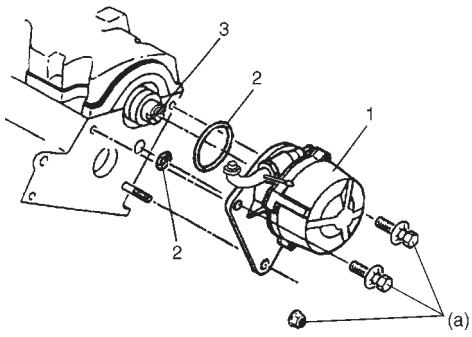
“Checking injector seals”

“Checking injector pressure setting”

“Adjusting injector pressure”

Injector opening pressure

13000 ⌣ 50 kPa (130 ⌣ 5 kg/cm^2)



1. Vacuum pump
2. O-ring
3. Camshaft

VACUUM PUMP

REMOVAL

1) Disconnect hoses attached vacuum pump.
2) Remove vacuum pump from cylinder head.

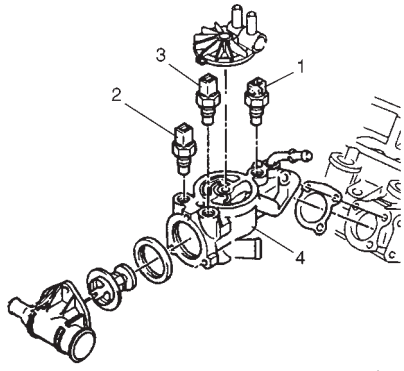
INSTALLATION

1) Fit the dogs of vacuum pump coupling into the slot of camshaft.

   NOTE:
   Use new O-rings.

2) Install vacuum pump and tighten bolts and nut to specified torque.

   Tightening torque
   (a): 25 N·m (2.5 kg-m, 18.0 lb-ft)



1. ECT gauge (for combination meter)
2. ECT switch (for combination meter)
3. Water outlet box

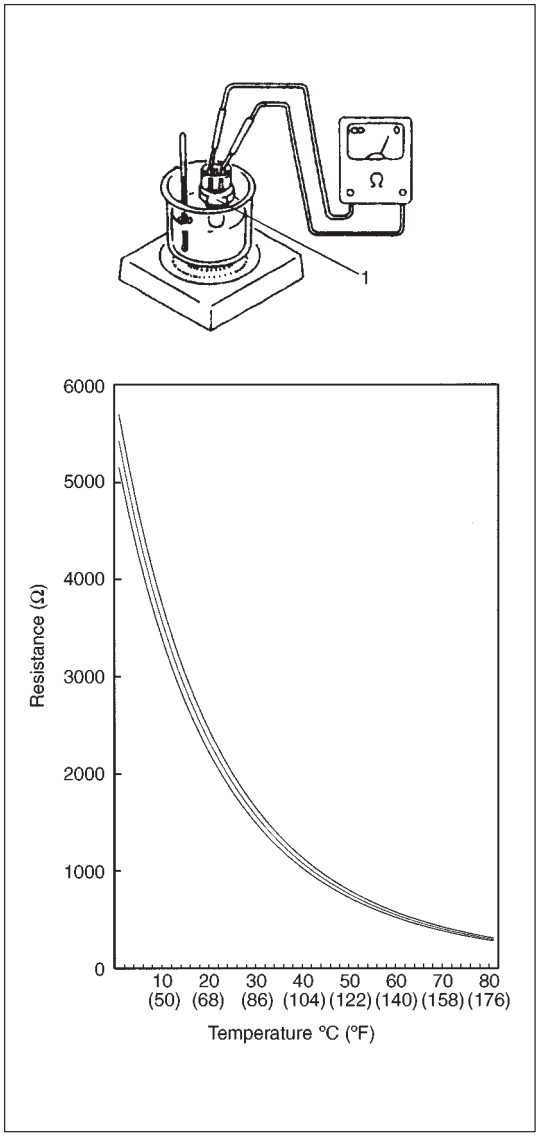
ENGINE COOLANT TEMPERATURE SENSOR (ECT SENSOR)

REMOVAL

1) Disconnect battery negative cable at battery.
2) Drain coolant referring to Section 6B.

> **WARNING:**
> **To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.**

3) Disconnect connector from ECT sensor.
4) Remove ECT sensor (1) from water outlet box.

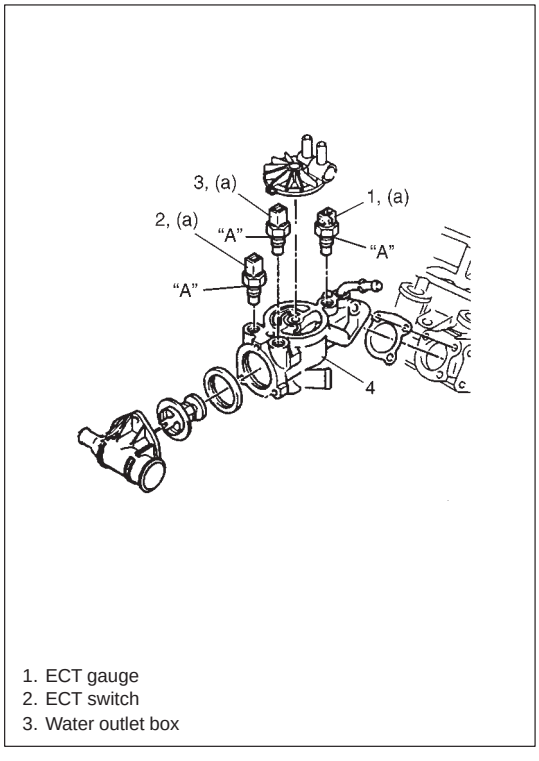


INSPECTION

Immerse temperature sensing part of ECT sensor (1) in water (or ice) and measure resistance between terminal while heating water gradually.

If measured resistance doesn't show such characteristic as shown below, replace ECT sensor (1).

Temperature (·C (·F))	Resistance (I)
20 (68)	2426 – 2592
40 (104)	1103 – 1211
80 (176)	271 – 347



1. ECT gauge
2. ECT switch
3. Water outlet box

INSTALLATION

Reverse removal procedure noting the following:

○ Clean mating surfaces of ECT sensor (1) and water outlet box.

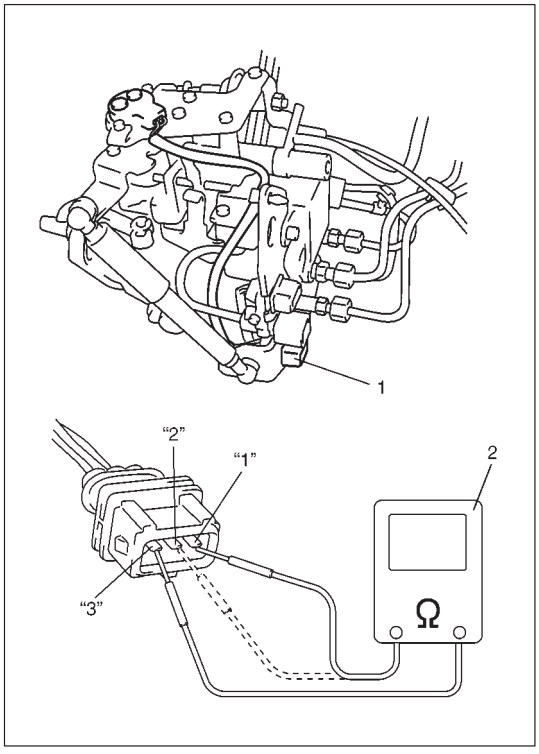
○ Tighten ECT sensor (1) that is applied with sealant "A" to specified torque.

Sealant "A":
LOCTITE 572

Tightening Torque
(a): 18 N·m (1.8 kg-m, 13.0 lb-ft)

○ Connect connector to ECT sensor (1) securely.

○ Refill coolant referring to Section 6B.



THROTTLE POSITION SENSOR (TP SENSOR)

INSPECTION

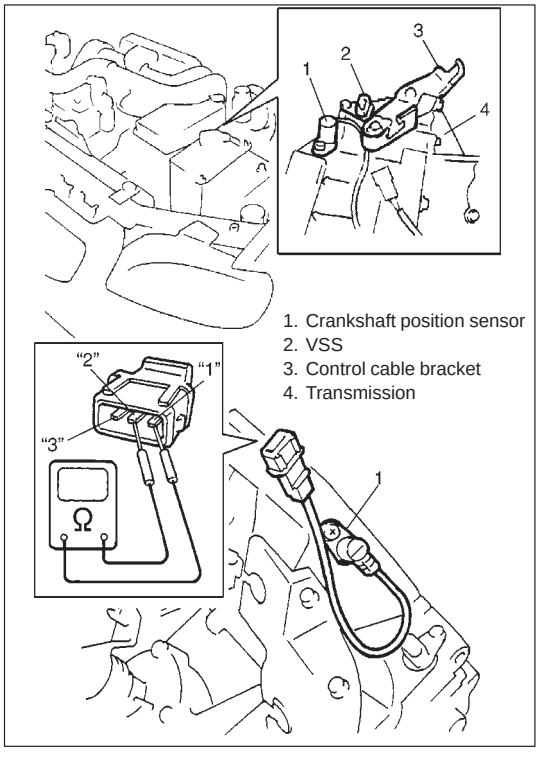
1) Disconnect negative cable at battery and disconnect throttle position sensor (1) connector.
2) Using an ohmmeter (2), check potentiometer resistance between terminals under each condition given in table below.
   If check result is not satisfactory, replace injection pump assembly.

TP sensor potentiometer resistance

TERMINALS	RESISTANCE
Between "1" and "3" terminals	1700 I⌣ 100 Ω
Between "2" and "3" terminals	1200 ⌣ 60 Ω – 1800 ⌣ 90 Ω varying according to throttle valve opening

NOTE:
There should be more than 600 Ω resistance difference between when throttle valve is at idle position and when it is fully open.

3) Connect throttle position sensor (1) connector.
4) Connect negative cable to battery.



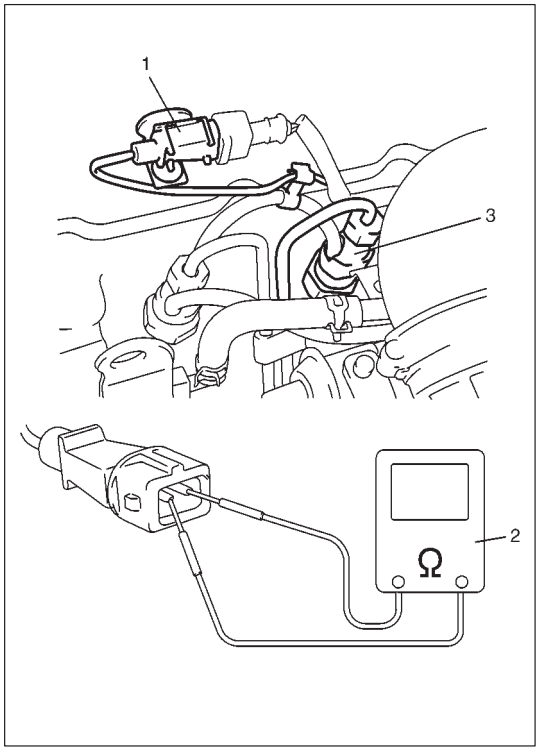
CRANKSHAFT POSITION SENSOR

INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect engine position sensor coupler.
3) Using an ohmmeter, check sensor coil resistance between terminal "1" and terminal "2".
   If check result is not satisfactory, replace crankshaft position sensor.

   Engine position sensor coil resistance: 315 – 405 Ω

4) Connect crankshaft position sensor coupler.
5) Connect negative cable to battery.

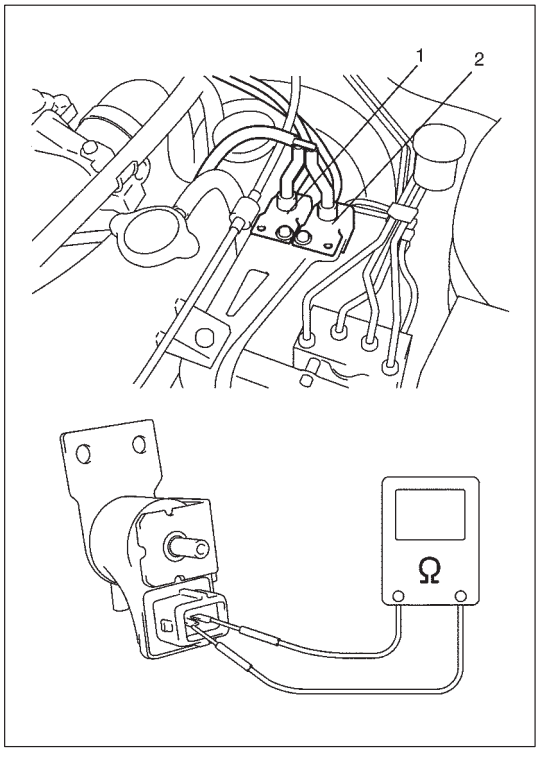


INJECTOR NEEDLE SENSOR

INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect injector needle sensor (1) at coupler.
3) Using an ohmmeter (2), check sensor coil resistance between terminals.
   If check result is not satisfactory, replace injector (3) with needle sensor.

   Injector needle sensor coil resistance: 66 – 153 Ω
4) Connect injector needle sensor coupler.
5) Connect negative cable to battery.

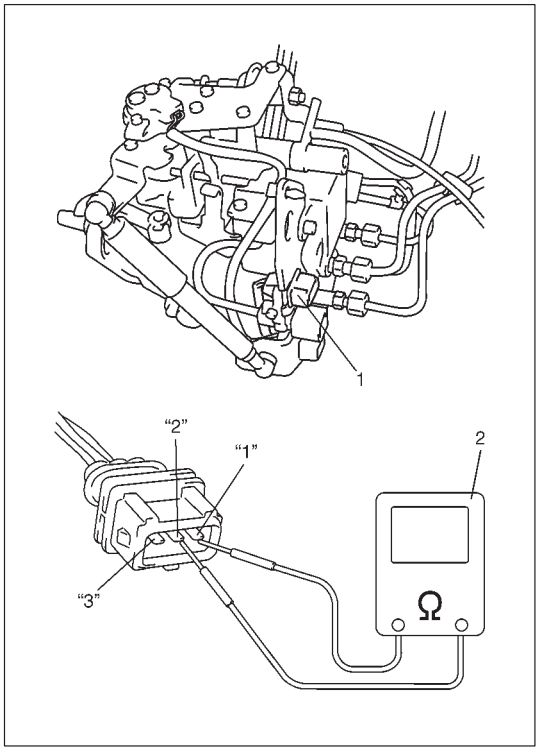


EGR NO.1 AND NO.2 SOLENOID VALVE

INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect EGR No.1 (1), or No.2 (2) solenoid valve coupler.
3) Remove EGR No.1 (1) or No.2 (2) solenoid valve.
4) Using an ohmmeter, check solenoid valve coil resistance between terminals.
   If check result is not satisfactory, replace EGR solenoid valve.

   EGR solenoid valve coil resistance: 23 – 40 Ω
5) Install EGR solenoid valve.
6) Connect EGR solenoid valve connector.
7) Connect negative cable to battery.

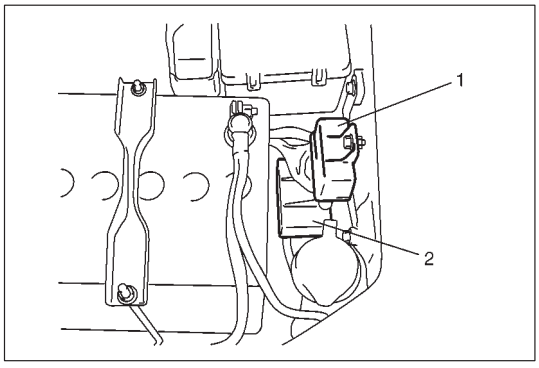


INJECTION TIMING CONTROL ACTUATOR

INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect injection timing control actuator (1) at connector.
3) Using an ohmmeter (2), check injection timing control actuator coil resistance between terminals.
   If check result is not satisfactory, replace injection pump assembly.

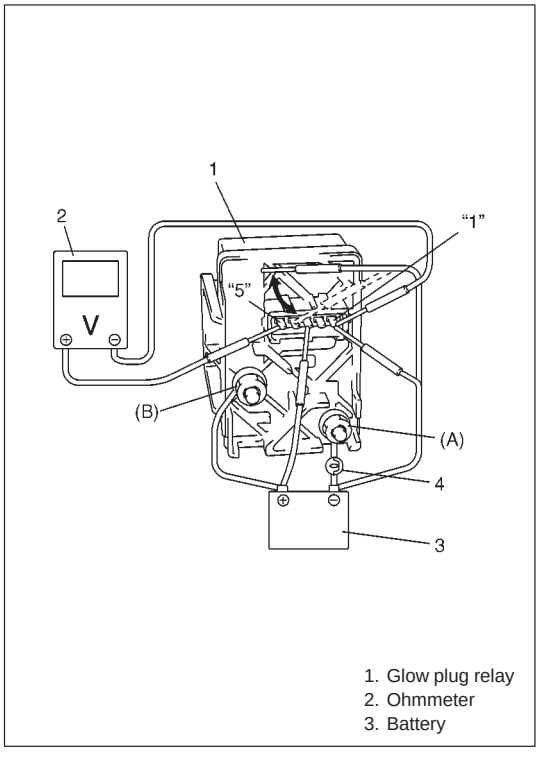
   Injection timing control actuator coil resistance: 10 – 23 Ι
4) Connect injection timing control actuator connector.
5) Connect negative control at battery.



GLOW PLUG RELAY

INSPECTION

1) Disconnect negative cable at battery.
2) Remove double relay (1).
3) Remove glow plug relay (2).

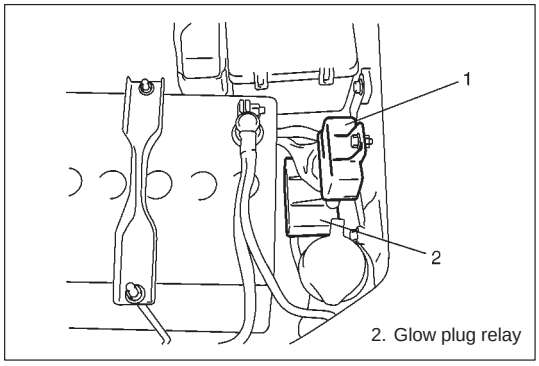


1. Glow plug relay
2. Ohmmeter
3. Battery

4) Connect test bulb (4) between terminal (A) and negative battery terminal as shown.
5) Connect negative battery terminal to terminal “1” and positive battery terminal to terminal “3” of relay.
6) Check voltage between terminal “1” and terminal “5” of relay and check bulb lights.

   If measured voltage is less than 3 V and bulb doesn’t light up, relay is in good condition. If not replace relay.
7) Connect negative battery to terminal“4” of relay.
8) Check voltage between terminal “1” and terminal “5” of relay and check bulb lights.

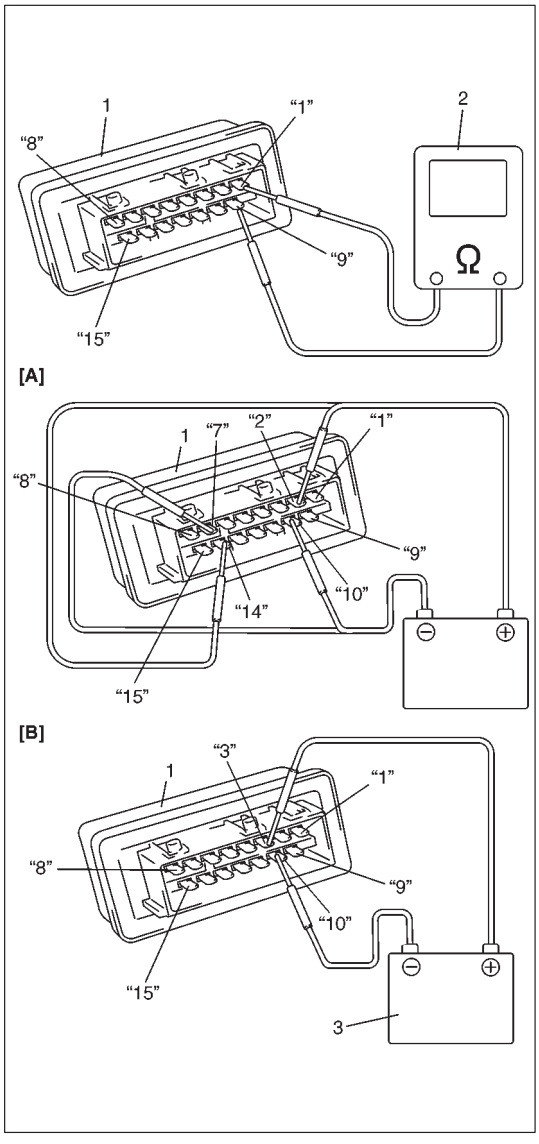
   If measured voltage is more than 3 V and bulb lights up, relay is in good condition. If not, replace relay.



2. Glow plug relay

DOUBLE RELAY

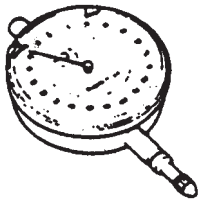
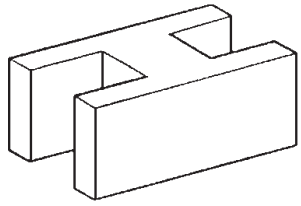
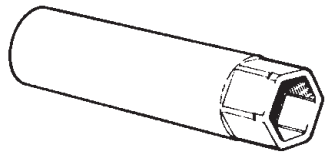
1) Disconnect negative cable at battery.
2) Remove double relay (1).



3) Using an ohmmeter, check continuity between each terminals under each condition given in table below.
   If check result is not satisfactory, replace main relay.

Condition	Terminals													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Not connect battery terminal to terminal “2” and “14”, and “7” and “10”	○			○	○	○		○	○		○		○		○
Connect positive battery terminal to terminal “2” and “14”, and negative battery terminal to terminal “7” and “10” (fig.[A])	○			○	○	○		○	○	○	○		○		○
Connect positive battery terminal to terminal “3” and negative battery terminal to terminal “10” (fig.[B])	○								○		○				

SPECIAL TOOLS

			
09900-20606 Dial gauge	09910-26520 (OUT0000015) TDC rod positioner	09913-16520 (OUT0000073) Injector flange	09915-26510 (OUT0000001) Injector socket

TIGHTENING TORQUE SPECIFICATIONS

FASTENING PARTS	TIGHTENING TORQUE		
	N·m	kg-m	lb-ft
Coolant temp. switch (on water outlet box)	18.0	1.8	13.0
Fuel injection pump nut, bolt	20.0	2.0	14.5
Fuel injection pump pulley nut	50.0	5.0	36.5
Fuel injector pipe nut	25.0	2.5	18.0
Fuel injector assembly	75.0	7.5	54.5
Fuel injector	90.0	9.0	65.0
Fast idle thermo device	30.0	3.0	22.0
Fuel feed pipe bolt (on fuel injection pump)	25.0	2.5	18.0
Fuel return pipe bolt (on fuel injection pump)	25.0	2.5	18.0
Fuel feed pipe bolt bleeding screw (on fuel injection pump)	4.5	0.5	3.5
Fast idle control cable fix bolt	4.0	0.4	3.0
Fast idle control cable adjusting nut	6.0	0.6	4.5
Glow plug	22.0	2.2	16.0
Glow plug wiring nut	4.0	0.4	3.0
Vacuum pump bolt and nut	25.0	2.5	18.0
Fuel filter outlet pipe bolt	40.0	4.0	29.0
Fuel filter inlet pipe bolt	40.0	4.0	29.0
Fuel filter inlet pipe bolt bleeding screw	5.0	0.5	4.0
Fuel filter element bolt	9.0	0.9	6.5
Fuel filter water bleeding screw	3.5	0.4	2.5

SECTION 6G4

CRANKING SYSTEM
(1.7kW Reduction Type)

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
For descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

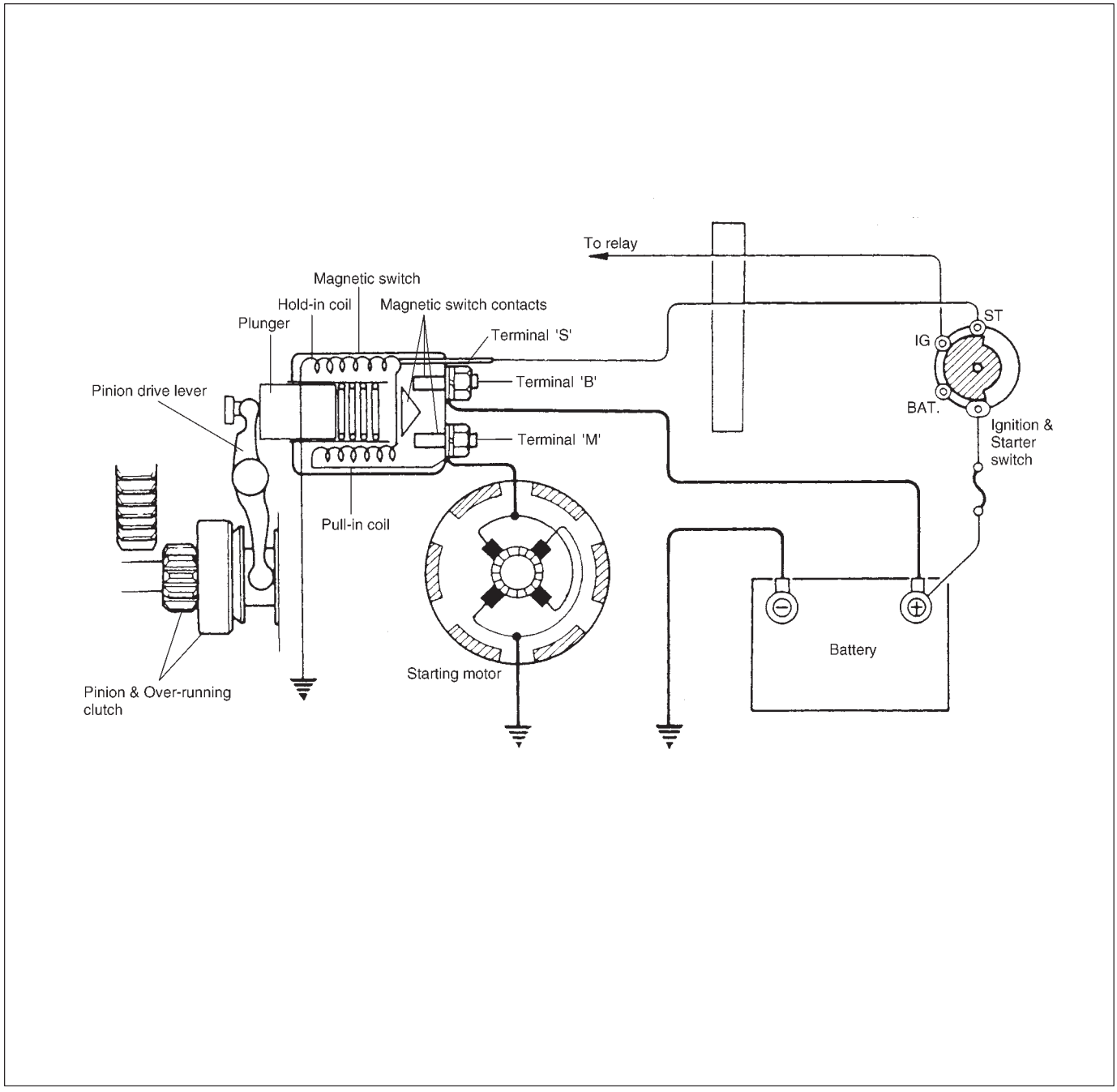
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GENERAL DESCRIPTION

STARTING MOTOR CIRCUIT

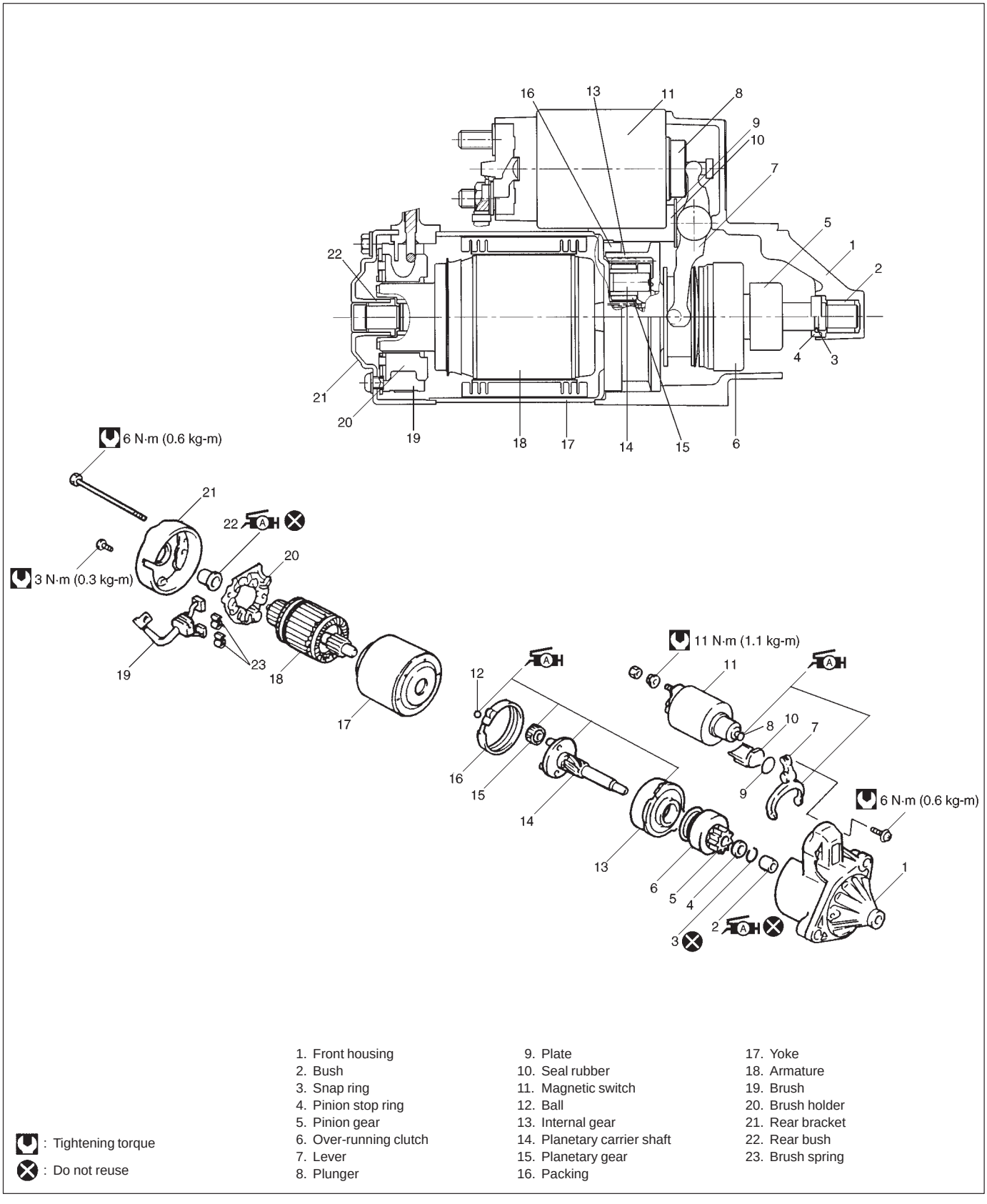
○ The magnetic switch coils are magnetized when the ignition switch is closed.
○ The resulting plunger and pinion drive lever movement causes the pinion to engage the engine flywheel gear and the magnetic switch main contacts to close, and cranking takes place.
○ When the engine starts, the pinion over-running clutch protects the armature from excessive speed until the switch is opened, at which time the return spring causes the pinion to disengage.



STARTING MOTOR

The starting motor consists of parts shown below and has permanent magnets mounted in starting motor yoke (frame).

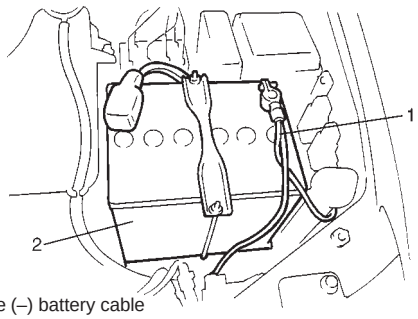
The magnetic switch assembly and parts in the starting motor are enclosed in the housings so that they will be protected against possible dirt and water splash.



: Tightening torque

: Do not reuse

1. Front housing
2. Bush
3. Snap ring
4. Pinion stop ring
5. Pinion gear
6. Over-running clutch
7. Lever
8. Plunger
9. Plate
10. Seal rubber
11. Magnetic switch
12. Ball
13. Internal gear
14. Planetary carrier shaft
15. Planetary gear
16. Packing
17. Yoke
18. Armature
19. Brush
20. Brush holder
21. Rear bracket
22. Rear bush
23. Brush spring

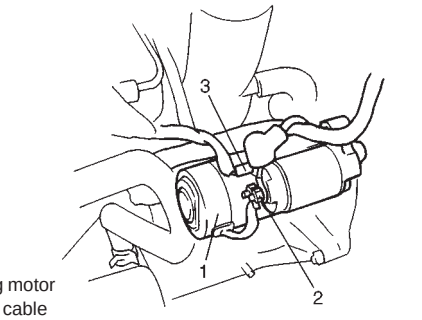


1. Negative (–) battery cable
2. Battery

UNIT REPAIR OVERHAUL

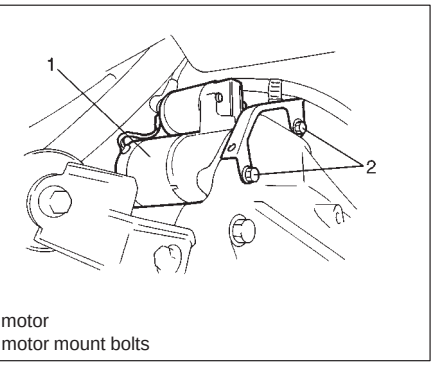
DISMOUNTING

1) Disconnect negative (–) battery cable at battery.



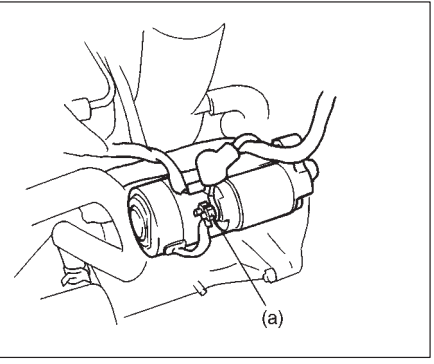
1. Starting motor
2. Battery cable
3. Magnetic switch lead wire connector

2) Disconnect magnetic switch lead wire and battery cable from starting motor terminals.
3) Remove left side engine under cover.



1. Starting motor
2. Starting motor mount bolts

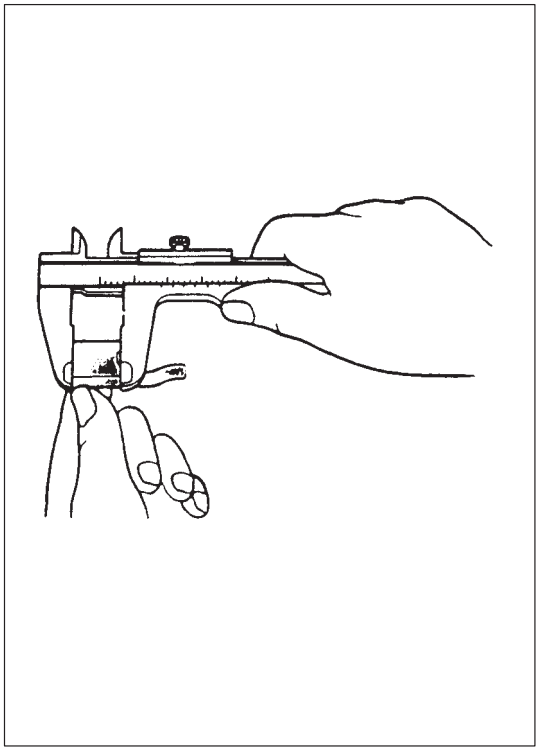
4) Remove 2 starting motor mount bolts.
5) Dismount starting motor.



REMOUNTING

Reverse the dismounting procedure.

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



INSPECTION

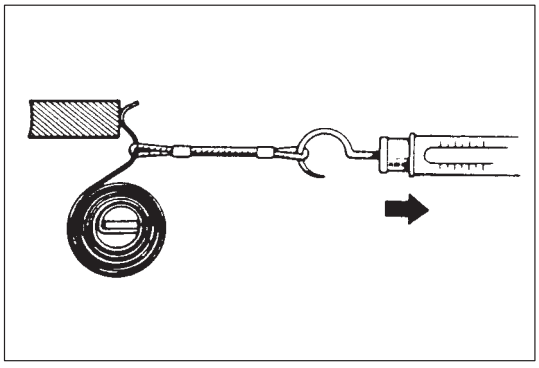
BRUSH

○ Check brushes for wear.
Measure length of brushes and if below limit, replace brush assembly.

Brush length

	Length
Standard	17.5 mm (0.69 in.)
Limit	12 mm (0.47 in.)

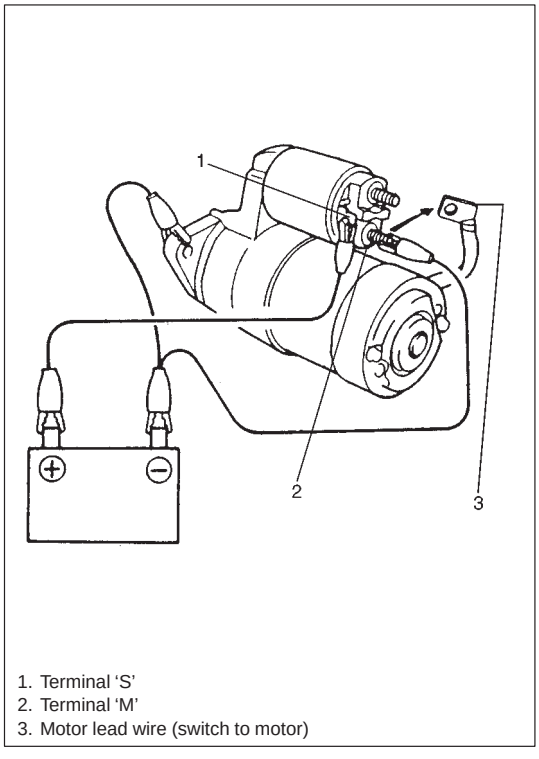
○ Check for smooth movement with the brushes installed to each brush holder.



SPRING

Inspect brush springs for wear, damage or other abnormal conditions. Replace brush assembly if necessary.

Brush spring tension
Standard : 23.4 – 31.6 N (2.34 – 3.16 kg, 5.15 – 7.0 lb)
Limit : 10.0 N (1.0 kg, 2.2 lb)



1. Terminal 'S'
2. Terminal 'M'
3. Motor lead wire (switch to motor)

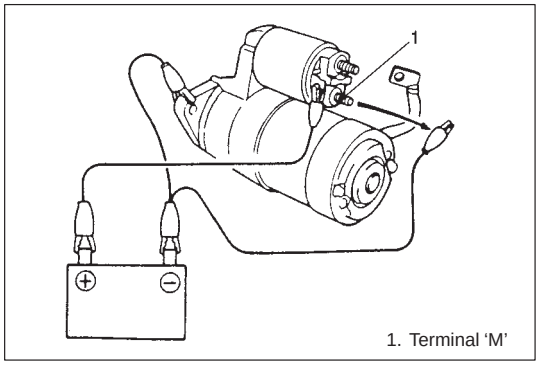
PERFORMANCE TEST

CAUTION:
Each test must be performed within 3 – 5 seconds to avoid coil from burning.

1) Pull-In Test

NOTE:
Before testing, disconnect motor lead wire from terminal 'M'.

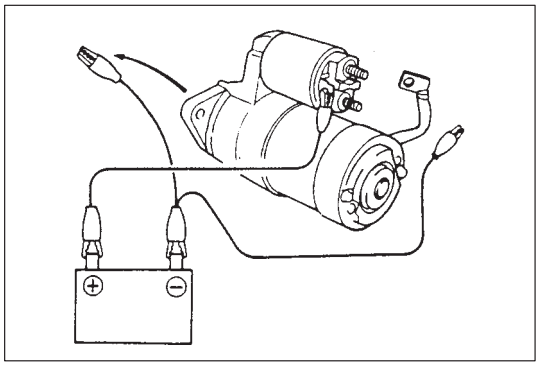
Connect battery to magnetic switch as shown.
Check that plunger and pinion (over-running clutch) move outward.
If plunger and pinion (over-running clutch) don't move, replace magnetic switch.



1. Terminal 'M'

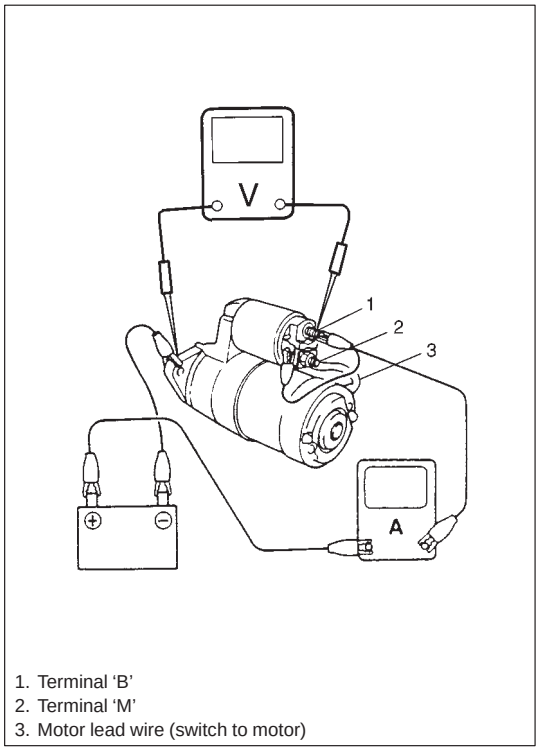
2) Hold-in Coil Test

While connected as above with plunger out, disconnect negative lead from terminal 'M'.
Check that plunger and pinion remain out.
If plunger and pinion return to inward. replace magnetic switch.



3) Plunger and Pinion Return Test

Disconnect negative lead from starting motor body.
Check that plunger and pinion return inward.
If plunger and pinion don't return, replace magnetic switch.



1. Terminal 'B'
2. Terminal 'M'
3. Motor lead wire (switch to motor)

4) No-Load Performance Test

a) Connect motor lead wire (switch to motor) to terminal 'M'.
b) Connect battery and ammeter to starter as shown.

NOTE:
Use wires as thick as possible (The wire which is as thick as a negative battery cable.) and tighten each terminal.

c) Check that starter rotates smoothly and steadily with pinion moving out. Check that ammeter indicates specified current.

Specified current: 110 A MAX. at 11 V (between terminal 'B' and starter body)

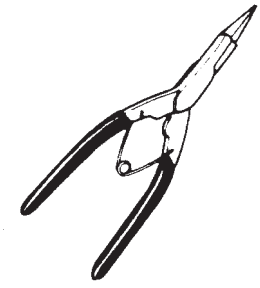
SPECIFICATION

Voltage			12 volts
Output			1.7 kW
Rating			30 seconds
Direction of rotation			Clockwise as viewed from pinion side
Brush length			17.5 mm (0.69 in.)
Number of pinion teeth			11
Performance		Condition	Guarantee
Around at 20·C (68·F)	No load characteristic	11.0 V	110 A maximum 2400 rpm minimum
	Load characteristic	7.7 V 400 A	16.0 N·m (1.6 kg-m, 11.6 lb-ft) minimum 740 rpm minimum
	Locked characteristic	3.5 V	940 A maximum 28.9 N·m (2.9 kg-m, 20.1 lb-ft) minimum
	Magnetic switch operating voltage		8 volts maximum

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	○ Front and rear bush. ○ Plunger. ○ Pinion drive lever. ○ Internal gear. ○ Planetary carrier shaft. ○ Planetary gear ○ Ball

SPECIAL TOOL



09900-06107
Snap ring pliers
(Opening type)

SECTION 6H

CHARGING SYSTEM

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

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Accessory Drive Belt 6H- 5
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SPECIFICATIONS 6H-13
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GENERATOR 6H-13
TIGHTENING TORQUE SPECIFICATIONS 6H-13
SPECIAL TOOLS 6H-14

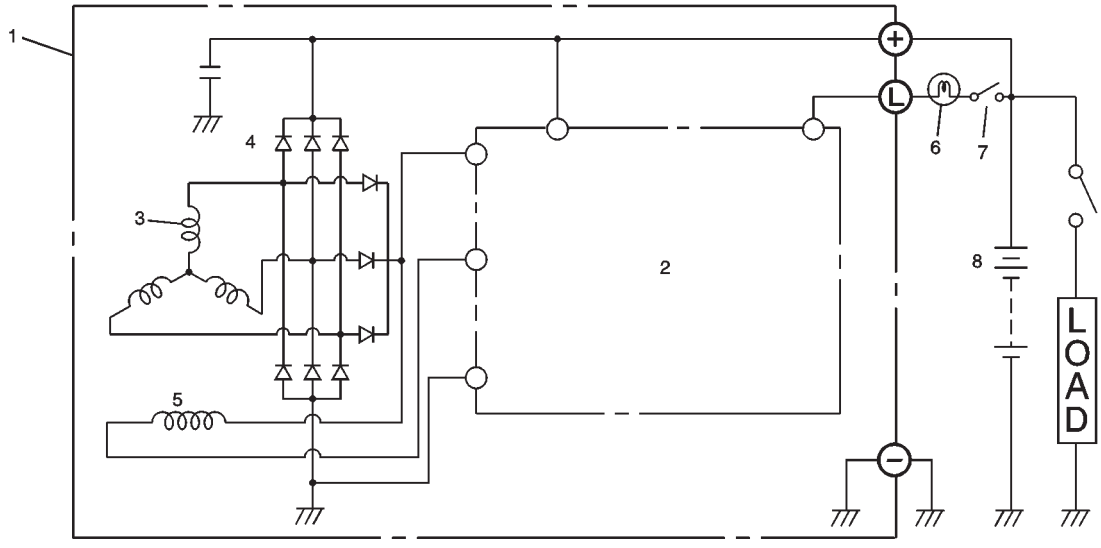
GENERAL DESCRIPTION

GENERATOR

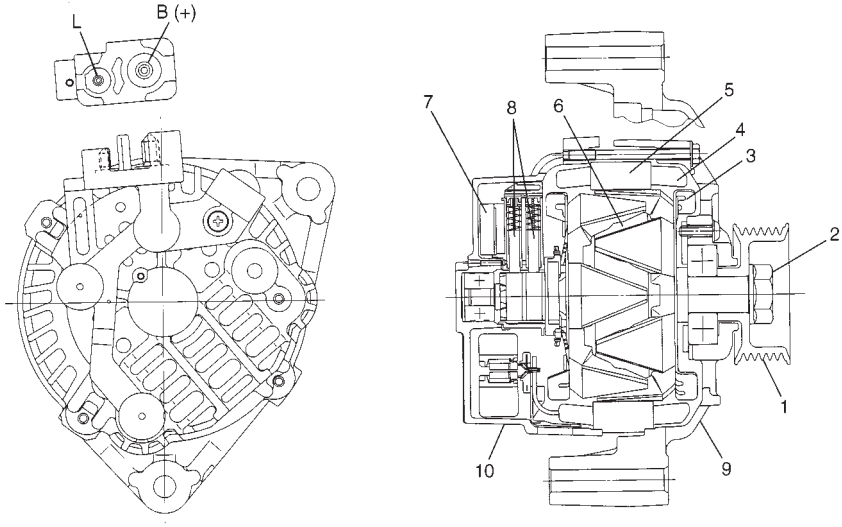
The generator is a small and high performance type with an IC regulator incorporated.
The internal components are connected electrically as shown below figure.

The generator features are as follows:

- ○ Solid state regulator is mounted inside the generator.
- ○ All regulator components are enclosed into a solid mold.
- ○ The regulator along with the brush holder assembly are installed into the rear housing.
- ○ The IC regulator uses integrated circuits and controls the voltage produced by the generator, and the voltage setting can not be adjusted.
- ○ The generator rotor bearings contain enough grease to eliminate the need for periodic lubrication.
  Two brushes carry current through the two slip rings to the field coil mounted on the rotor, and under normal conditions will provide long period of maintenance-free service.
- ○ The stator windings are assembled on the inside of a laminated core that forms part of the generator frame.
- ○ A condenser mounted in the rear housing suppresses radio noise.

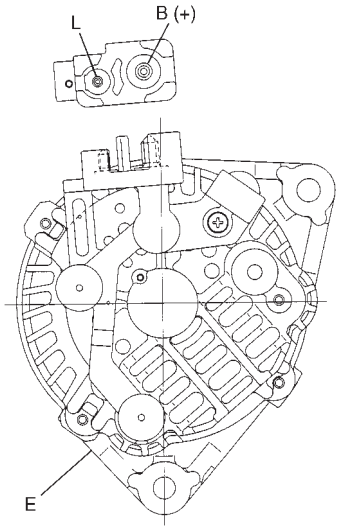


1. Generator with regulator assembly
2. IC regulator
3. Stator coil
4. Diode
5. Field coil (rotor coil)
6. Charge indicator light
7. Main switch
8. Battery



1. Pulley
2. Pulley nut
3. Rotor fan
4. Stator coil
5. Stator core
6. Field coil
7. Regulator
8. Brush
9. Front housing
10. Rear housing

B : Generator output (Battery terminal)
L : Lamp terminal



B : Generator output
(Battery terminal)
E : Ground
L : Lamp terminal

DIAGNOSIS
GENERATOR

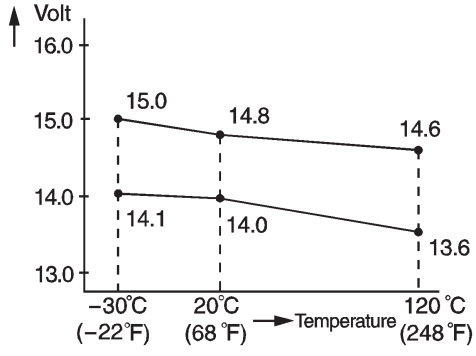
CAUTION:
- ○ **Do not mistake polarities of B (+) terminal and L terminal.**
- ○ **Do not create a short circuit between B (+) and L terminals. Always connect these terminals through a lamp.**
- ○ **Do not connect any load between L and E.**
- ○ **When connecting a charger or a booster battery to vehicle battery, refer to this section describing battery charging.**

Trouble in charging system will show up as one or more of following conditions:
1) Charge warning light operation.
2) An undercharged battery as evidenced by slow cranking or indicator dark.
3) An overcharged battery as evidenced by excessive spewing of electrolyte from vents.

Noise from generator may be caused by a loose drive pulley, loose mounting bolts, worn or dirty bearings, defective diode, or defective stator.

FAULTY INDICATOR LAMP OPERATION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Charge warning light does not light with ignition ON and engine off	○ Fuse blown ○ Light burned out ○ Wiring connection loose ○ IC regulator or field coil faulty ○ Poor contact between brush and slip ring	Check fuse. Replace light. Tighten loose connection. Check generator Repair or replace.
Charge warning light does not go out with engine running (battery requires frequent recharging)	○ Drive belt loose or worn ○ IC regulator or generator faulty ○ Wiring faulty	Adjust or replace drive belt. Check charging system. Repair wiring.



No-load Check

1) Run engine from idling up to 2,000 rpm and read meters.

NOTE:
Turn off switches of all accessories (wiper, heater etc.).

Standard current: 10 A maximum

Standard voltage: 14.0 – 14.8 V (at 20°C, 68°F)

NOTE:
Consideration should be taken that voltage will differ somewhat with regulator case temperature as shown in left figure.

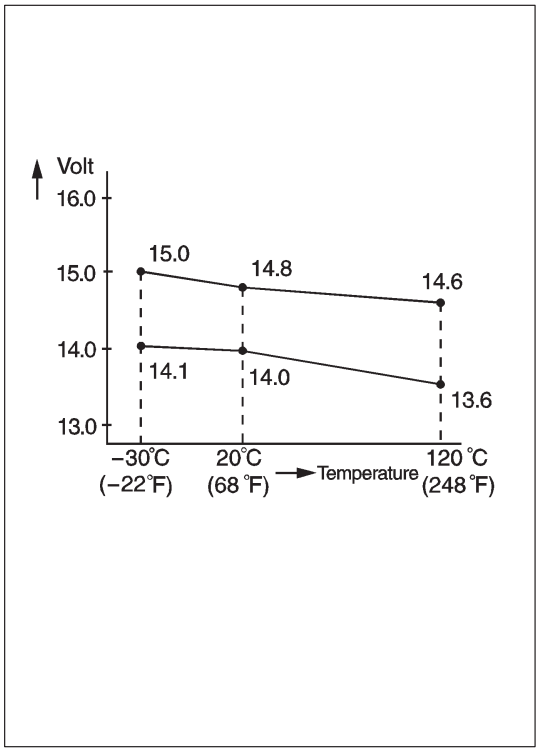
Higher Voltage

If voltage is higher than standard value, check ground of brushes. If brushes are not grounded, replace IC regulator.

Lower Voltage

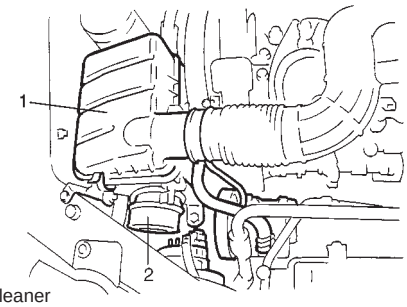
If voltage is below or in standard value, turn on head light and heater motor and increase engine speed up to 2000 – 2500 rpm soon after starting engine, and read maximum value on ammeter immediately.

If current is less than 56 A, repair or replace generator.



OVERCHARGED BATTERY

1) To determine battery condition, refer to BATTERY section.
2) If obvious overcharge condition exists as evidenced by excessive spewing of electrolyte, measure generator B (+) terminal voltage at engine 2000 rpm.
3) If measured voltage is higher than upper limit value, proceed to disassembly section of generator service.
4) Check ground of brushes. If brushes are not grounded, replace IC regulator. Then check field coil for grounds and shorts, referring to “INSPECTION” section.



1. Air cleaner
2. Air cleaner suction pipe

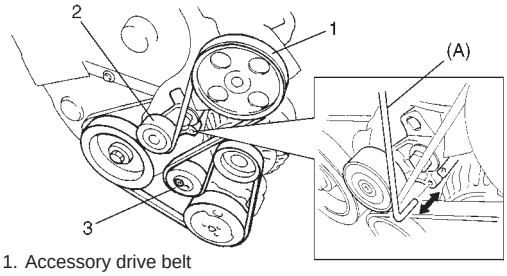
ON-VEHICLE SERVICE

GENERATOR

ACCESSORY DRIVE BELT

INSPECTION

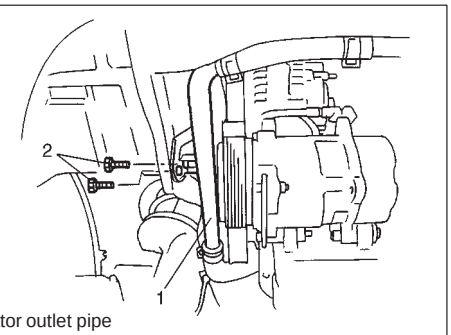
1) Remove air cleaner and air cleaner suction pipe.



1. Accessory drive belt
2. Dynamic roller tensioner
3. Roller tensioner

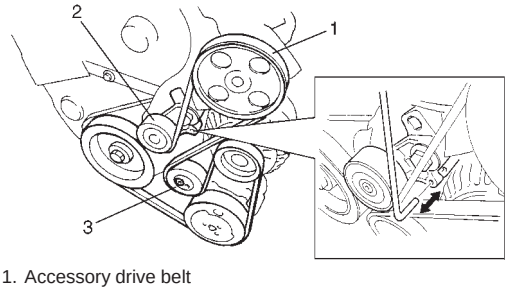
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
   If any of above conditions are found replace accessory drive belt.
3) Using special tool (A), check that dynamic roller tensioner hole and generator mount bracket hole are aligned.
   If they are not aligned, perform following items.

   Special Tool
   (A): 09919-56520/OUT0000075



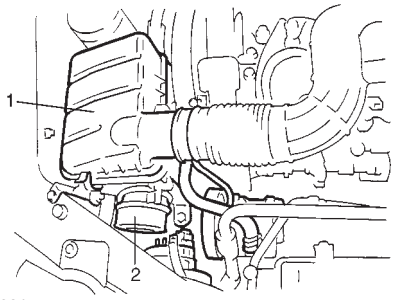
1. Radiator outlet pipe
2. Radiator outlet pipe bolt

   i) Remove engine under cover (right side).
   ii) Remove radiator outlet pipe tightening bolts.



1. Accessory drive belt
2. Dynamic roller tensioner
3. Roller tensioner

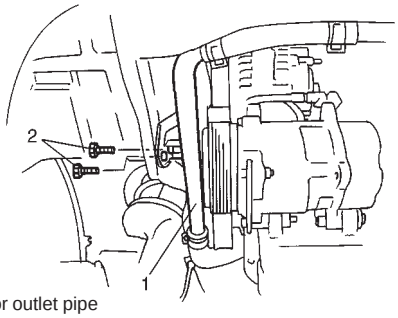
   iii) Adjust belt tension by referring to step 3) to 7) of ACCESSORY DRIVE BELT INSTALLATION in this section.
   If belt tension can not be adjusted within specified value, replace the accessory drive belt.



1. Air cleaner
2. Air cleaner suction pipe

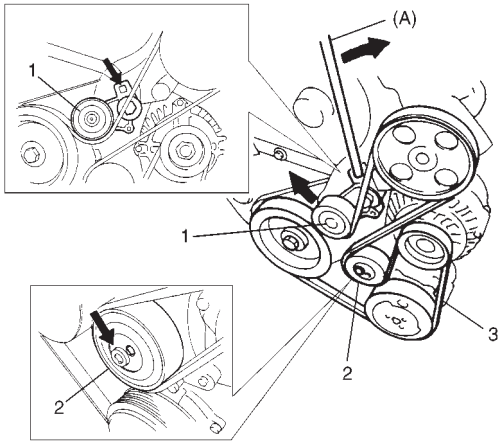
REMOVAL

1) Remove air cleaner and air cleaner suction pipe.



1. Radiator outlet pipe
2. Radiator outlet pipe bolt

2) Remove engine under cover (right side).
3) Remove radiator outlet pipe tightening bolts.

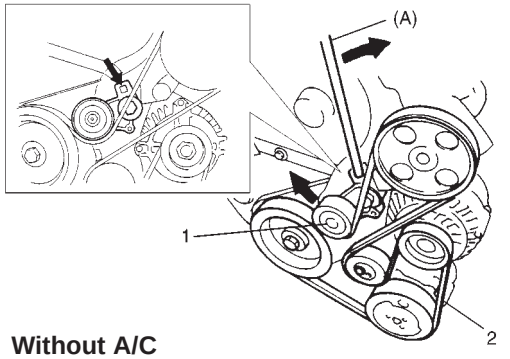


1. Dynamic roller tensioner
2. Roller tensioner
3. Accessory drive belt

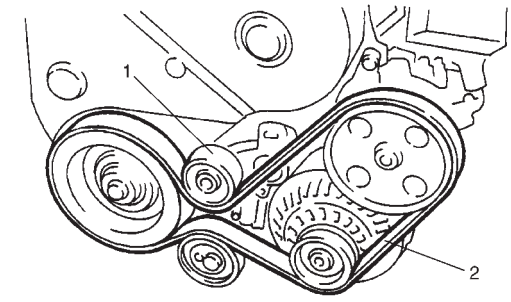
4) Loosen roller tensioner tightening bolt.
5) Using special tool (A) for dynamic roller tensioner, turn dynamic roller tensioner clockwise to loosen it.

Special Tool
(A): 09919-56540

6) While holding the tensioner, remove accessory drive belt.



Without A/C



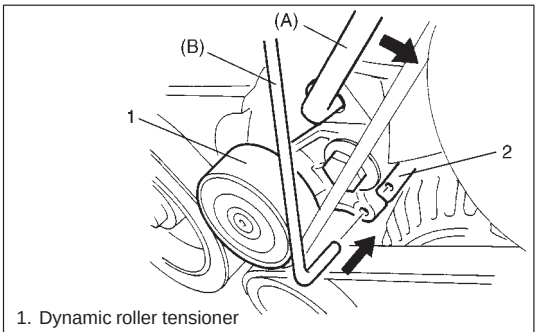
1. Dynamic roller tensioner
2. Accessory drive belt

INSTALLATION

1) Using special tool (A) for dynamic roller tensioner, turn dynamic roller tensioner to loosen it.

   Special Tool
   (A): 09919-56540

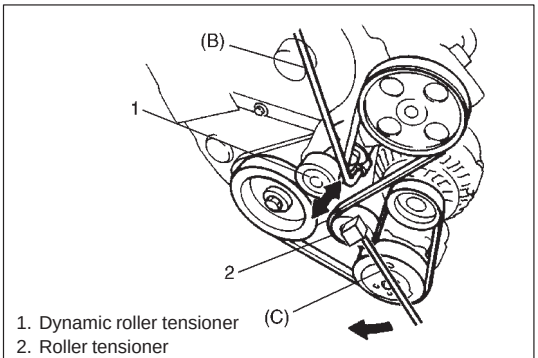
2) While holding dynamic roller tensioner, install accessory drive belt.



1. Dynamic roller tensioner
2. Generator mount bracket

3) With tensioner hole and the generator mount bracket hole aligned by turning dynamic roller tensioner, insert special tool (B) into them.
4) Remove special tool (A) and lock dynamic roller tensioner by using special tool (B).

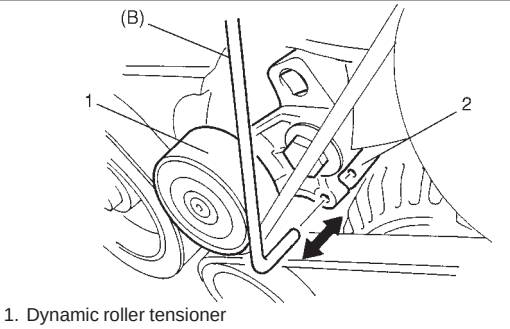
   Special Tool
   (B): 09919-56520/OUT0000075



1. Dynamic roller tensioner
2. Roller tensioner

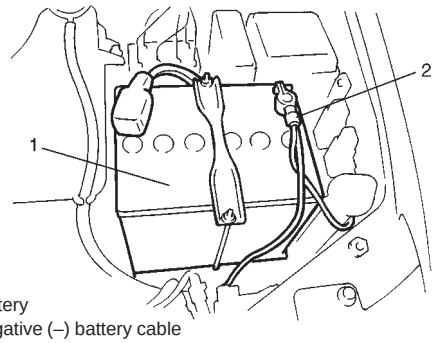
5) Using special tool (C), turn roller tensioner clockwise to until special tool (B) becomes free. With dynamic roller tensioner kept in that state, fix it by tightening its bolt to specified torque.
6) Turn crankshaft pulley 4 revolutions.

   Special Tool
   (C): 09919-56530/OUT0000115



1. Dynamic roller tensioner
2. Generator mount bracket

7) Using special tool (C), check that dynamic roller tensioner hole and generator mount bracket hole are aligned. If they are not aligned, repeat step 3) to 5).
8) Install radiator outlet pipe tightening bolt.
9) Install engine under cover.
10) Install air cleaner and air cleaner suction pipe.



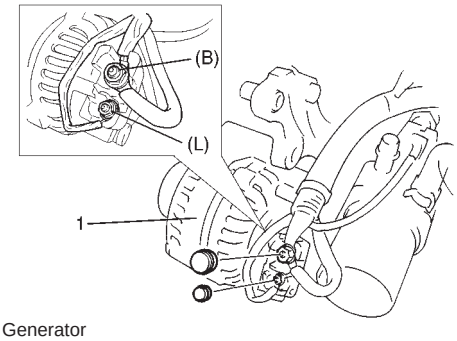
1. Battery
2. Negative (–) battery cable

UNIT REPAIR OVERHAUL

GENERATOR

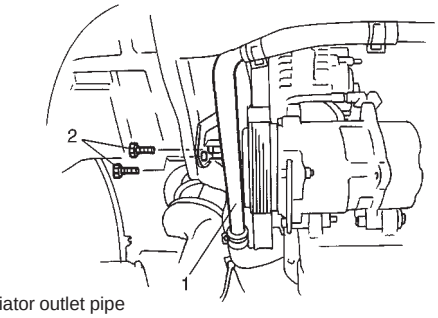
DISMOUNTING

1) Disconnect negative (–) cable at battery.



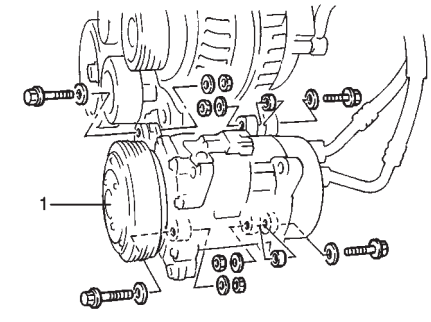
1. Generator

2) Disconnect (B) and (L) terminal wire from generator.



1. Radiator outlet pipe
2. Radiator outlet pipe bolt

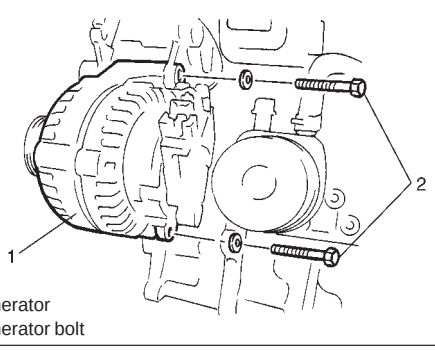
3) Remove engine under cover (right side) and remove radiator outlet pipe bolt (2 pcs.).
4) Remove accessory drive belt. Refer to “ACCESSORY DRIVE BELT” in this section.
5) Disconnect A/C Compressor Coupler (if equipped).



1. A/C Compressor

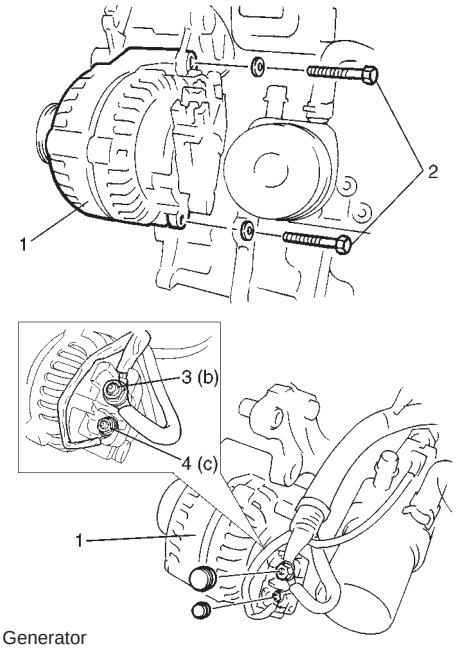
6) Loosen A/C Compressor mounting bolt (4 pcs) and remove A/C Compressor. Refer to section 1B “AIR CONDITIONING” section. (if equipped)

NOTE:
Hang removed A/C Compressor with wire hook or the like so as to prevent A/C hose from bending and twisting excessively or being pulled.



1. Generator
2. Generator bolt

7) Remove generator.



1. Generator
2. Generator bolt
3. 'B' terminal
4. 'L' terminal

REMOUNTING

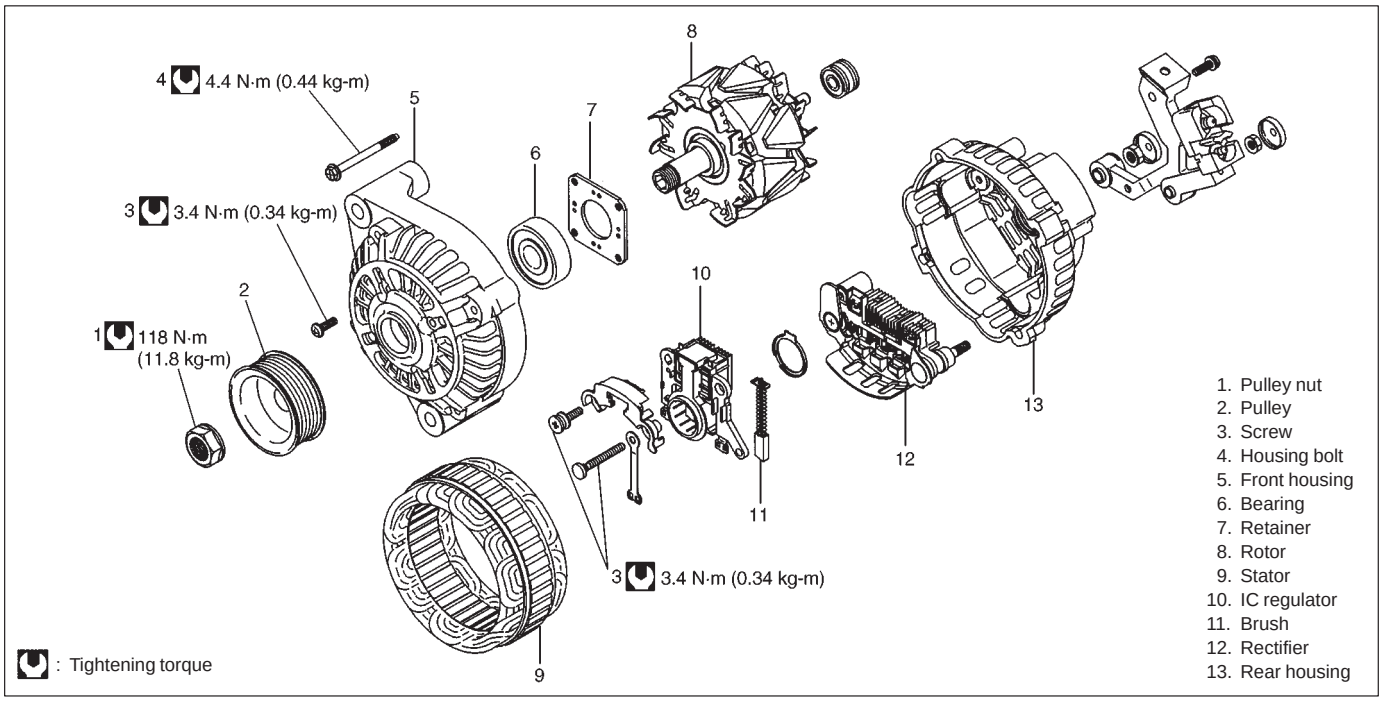
Reverse removal procedure for installation noting the followings.

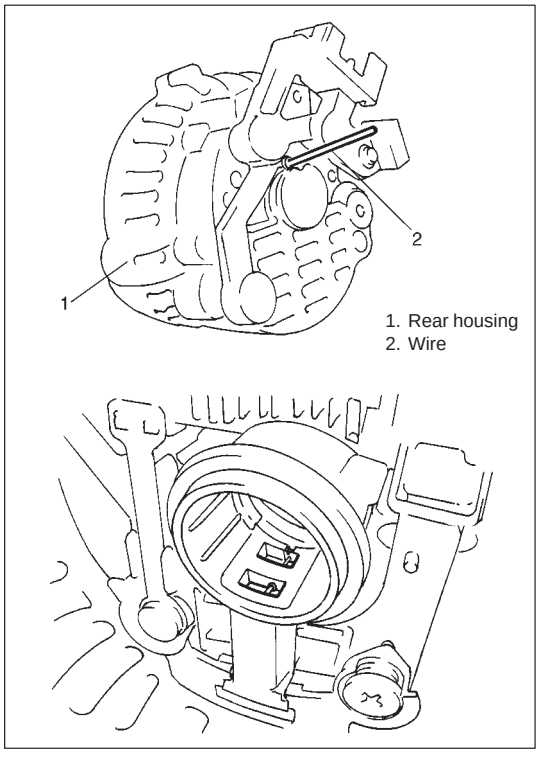
○ Tighten generator bolts and its terminal as follows.

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.2 lb-ft)
(b): 10.0 N·m (1.0 kg-m, 7.2 lb-ft)
(c): 4.0 N·m (0.4 kg-m, 2.9 lb-ft)

○ **Adjust accessory drive belt tension, referring to "ACCESSORY DRIVE BELT INSTALLATION" in this section.**

DISASSEMBLY AND REASSEMBLY





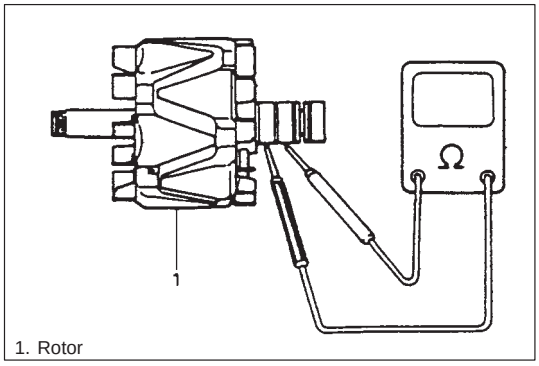
Assemble noting the following.

○ Push brushes into brush holder, then support brushes by inserting appropriate wire from hole of rear housing.

NOTE:

- ○ **After installing rotor, remove wire.**
- ○ **Check to make sure that match marks on front and rear housing are aligned.**
- ○ **Do not apply grease to rear (rotor) bearing. Remove oil completely if found in bearing box of rear housing.**

○ After assembling generator, make sure that rotor turns smoothly.

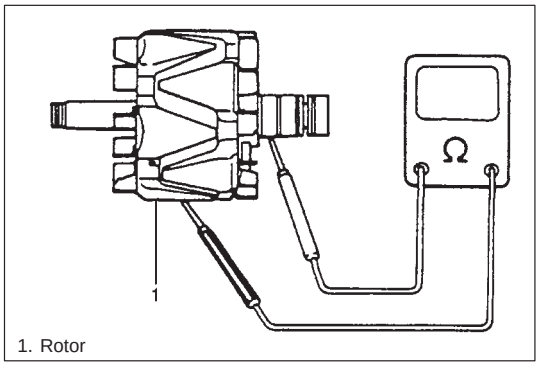


1. Rotor

INSPECTION

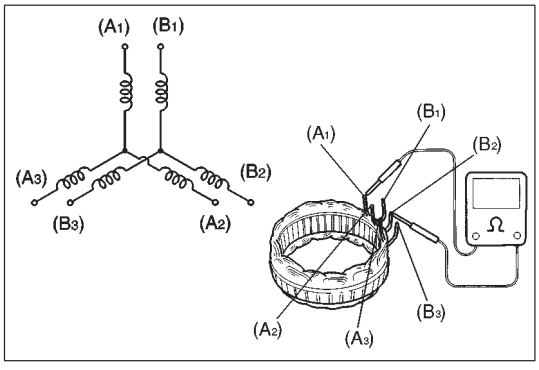
Rotor

1) Using ohmmeter, check for continuity between slip rings of rotor. If there is no continuity, replace rotor.



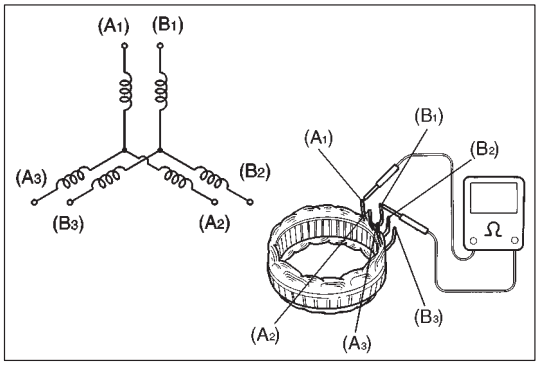
1. Rotor

2) Using ohmmeter, check that there is no continuity between slip ring and rotor core. If there is continuity, replace rotor.
3) Check slip rings for roughness or scoring. If rough or scored, replace rotor.

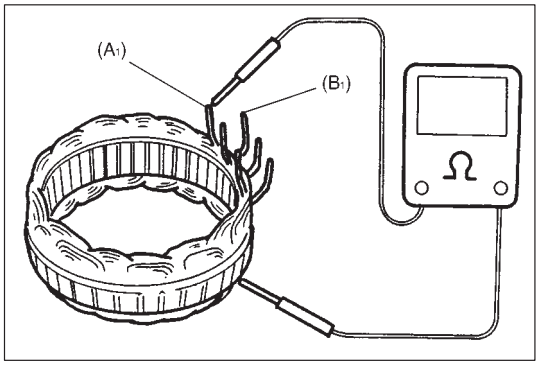


Stator

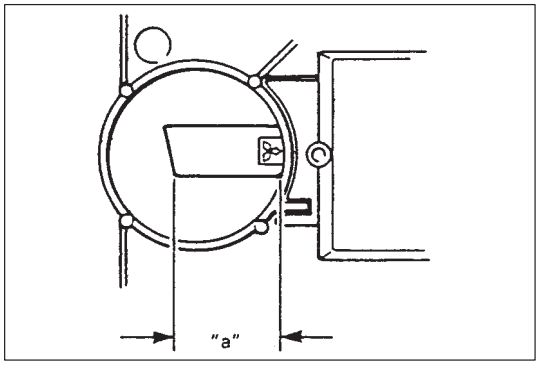
1) Using ohmmeter, check continuity between all stator leads so that two sets of connected coils can be identified as shown below.
   If not, replace stator.



2) Check that there is no continuity between (A_1) lead and (B_1) lead as shown.
   If there is continuity, replace stator.



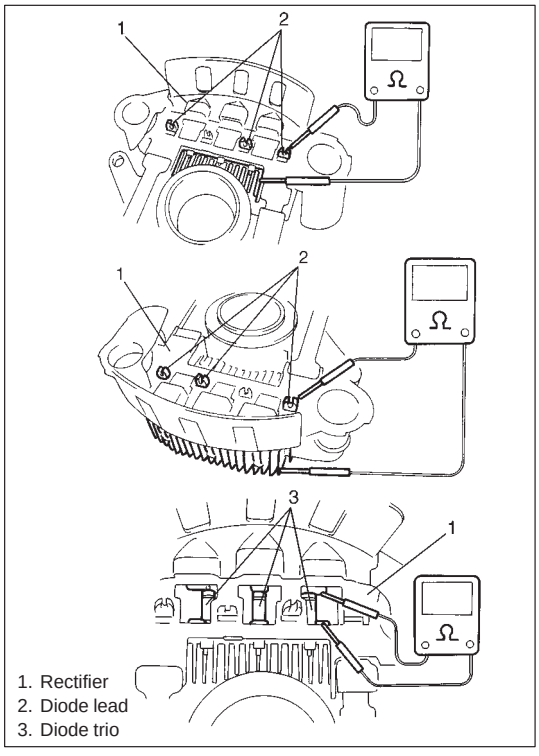
3) Check that there is no continuity between (A_1), (B_1) lead and stator core.
   If there is continuity, replace stator.



Brush and brush holder

Check each brush for wear by measuring its length.
If brush is found worn down below service limit, replace brush.

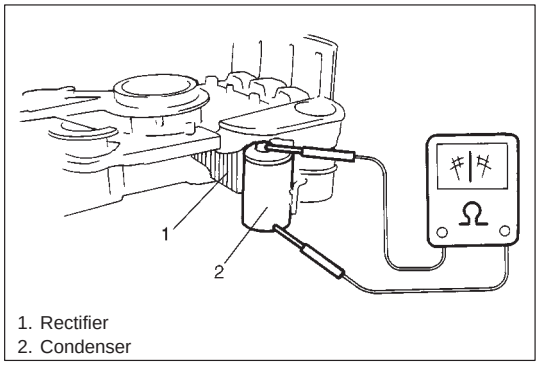
Brush length "a"
Standard: 11 mm (0.43 in.)
Service limit: 2 mm (0.08 in.)



1. Rectifier
2. Diode lead
3. Diode trio

Rectifier

1) Using an ohmmeter, check continuity between each of upper and lower rectifier bodies and each diode lead.
   Check both directions by reversing probes of ohmmeter and there should be only one-way continuity in each case.
   If check result is not satisfactory, replace rectifier.
2) In the same manner as described in above step 1), check that there is only one-way continuity between both leads of diode trio.



1. Rectifier
2. Condenser

Condenser

Using an ohmmeter, check no continuity happening as soon as continuity happened in a moment.
If not, replace rectifier.

Reference condenser capacity : Approx. 2.2 I F

SPECIFICATIONS

BATTERY

Battery type		75D23L
Rated capacity	AH/5HR, 12 Volts	54
Electrolyte	L (US/Imp. pt)	3.9 (8.24/6.86)
Electrolyte S.G.		1.28 when fully charged at 20°C (68°F)

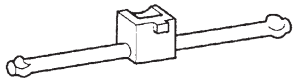
GENERATOR

Type	80 A type
Rated voltage	12 V
Nominal output	80 A
Permissible max. speed	18000 r/min.
No-load speed	1200 r/min (rpm)
Setting voltage	14.0 to 14.8 V
Permissible ambient temperature	–30 to 90·C (–22 to 194·F)
Polarity	Negative ground
Rotation	Clockwise viewed from pulley side

TIGHTENING TORQUE SPECIFICATIONS

Fastening	Tightening torque		
	N·m	kg-m	Ib-ft
Body ground bolt	8	0.8	6.0
Generator mounting bolts and nut	23	2.3	16.5
“B” terminal nut	10	1.0	7.2
“L” terminal nut	4	0.4	2.9
Pulley nut	118	11.8	85.5
Terminal screw	3.4	0.34	2.5
Drive end bearing plate screws	3.4	0.34	2.5
Rectifier screws	3.4	0.34	2.5
Regulator and brush holder screws			
Housing bolts	4.4	0.44	3.2

SPECIAL TOOLS

		
09919-56520/OUT0000075 ROLLER PIN	09919-56530/OUT0000115 TENSION LEVER	09919-56540 TENSION LEVER

SECTION 6K

EXHAUST SYSTEM

NOTE:
For the descriptions (items) not found in this section of this manual, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

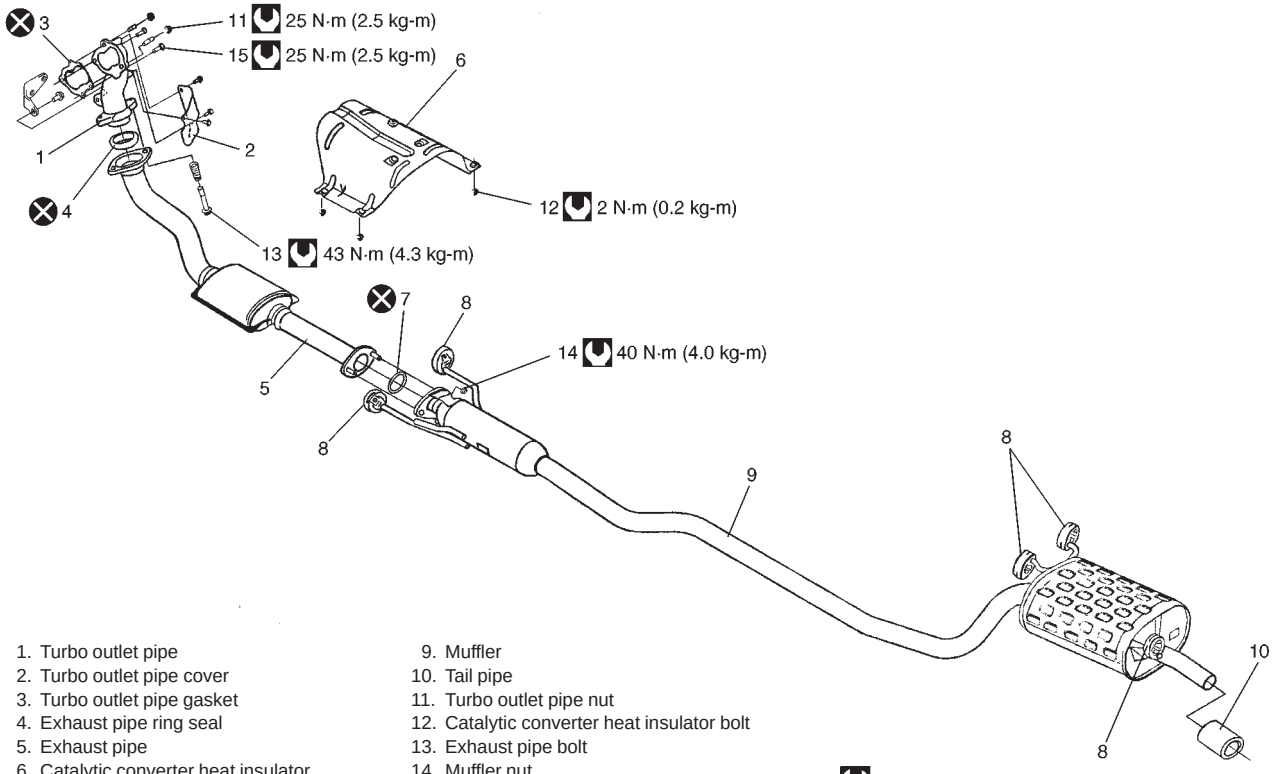
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MAINTENANCE 6K-2
ON-VEHICLE SERVICE 6K-2

GENERAL DESCRIPTION

The exhaust system consists of a exhaust manifold, a turbo charger, a exhaust pipe, a muffler and seals, gasket and etc., and the exhaust pipe has the catalytic converter for oxidation.

The catalytic converter for oxidation is an emission control device added to the exhaust system to lower the levels of Hydrocarbon (HC) and Carbon Monoxide (CO) pollutants in the exhaust gas.



1. Turbo outlet pipe
2. Turbo outlet pipe cover
3. Turbo outlet pipe gasket
4. Exhaust pipe ring seal
5. Exhaust pipe
6. Catalytic converter heat insulator
7. Exhaust pipe gasket
8. Muffler mounting
9. Muffler
10. Tail pipe
11. Turbo outlet pipe nut
12. Catalytic converter heat insulator bolt
13. Exhaust pipe bolt
14. Muffler nut
15. Turbo outlet pipe bolt

: Tightening Torque
: Do not reuse

MAINTENANCE

WARNING:
To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.

At every interval of periodic maintenance service, and when vehicle is raised for other service, check exhaust system as follows:

○ Check rubber mountings for damage, deterioration, and out of position.
○ Check exhaust system for leakage, loose connection, dent and damage.
If bolts or nuts are loosened, tighten them to specified torque. Refer to previous page for torque data.
○ Check nearby body areas for damaged, missing, or mispositioned part, open seam, hole, loose connection or any other defect which could permit exhaust fumes to seep into vehicle.
○ Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to passenger compartment carpet.
○ Any defect should be fixed at once.

ON-VEHICLE SERVICE

EXHAUST MANIFOLD

Refer to Section 6A4 for removal and installation procedures of exhaust manifold.
○ Check gasket and seal for deterioration or damage.
Replace them as necessary.

EXHAUST PIPE

For replacement of exhaust pipe, be sure to hoist vehicle and observe WARNING under “Maintenance” and following.

CAUTION:
As exhaust center pipe have catalytic converter for oxidation in it, it should not be exposed to any impulse.
Be careful not to drop it or hit it against something.

○ Tighten bolts and nuts to specified torque when reassembling.
Refer to previous page for location of bolts and nuts.
○ After installation, start engine and check each joint of exhaust system for leakage.

SECTION 7A

MANUAL TRANSMISSION

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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GENERAL DESCRIPTION

CONSTRUCTION AND SERVICING

The transmission provides five forward speeds and one reverse speed by means of three synchronizers and three shafts-input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

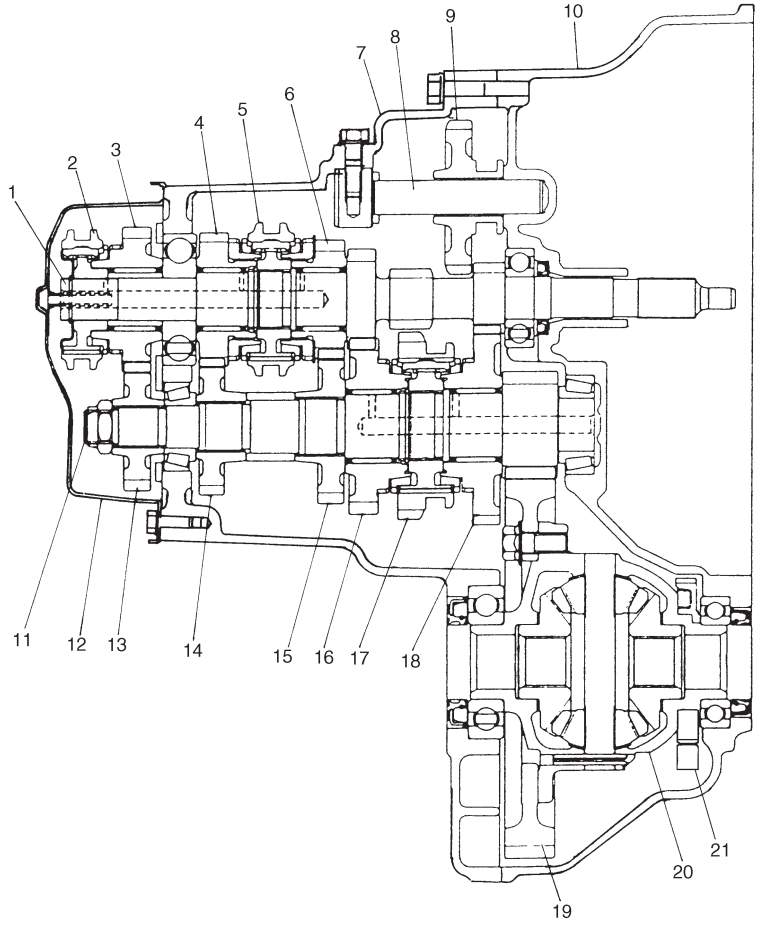
The low speed synchronizer is mounted on counter shaft and engaged with counter shaft first gear or second gear, while the high speed synchronizer is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

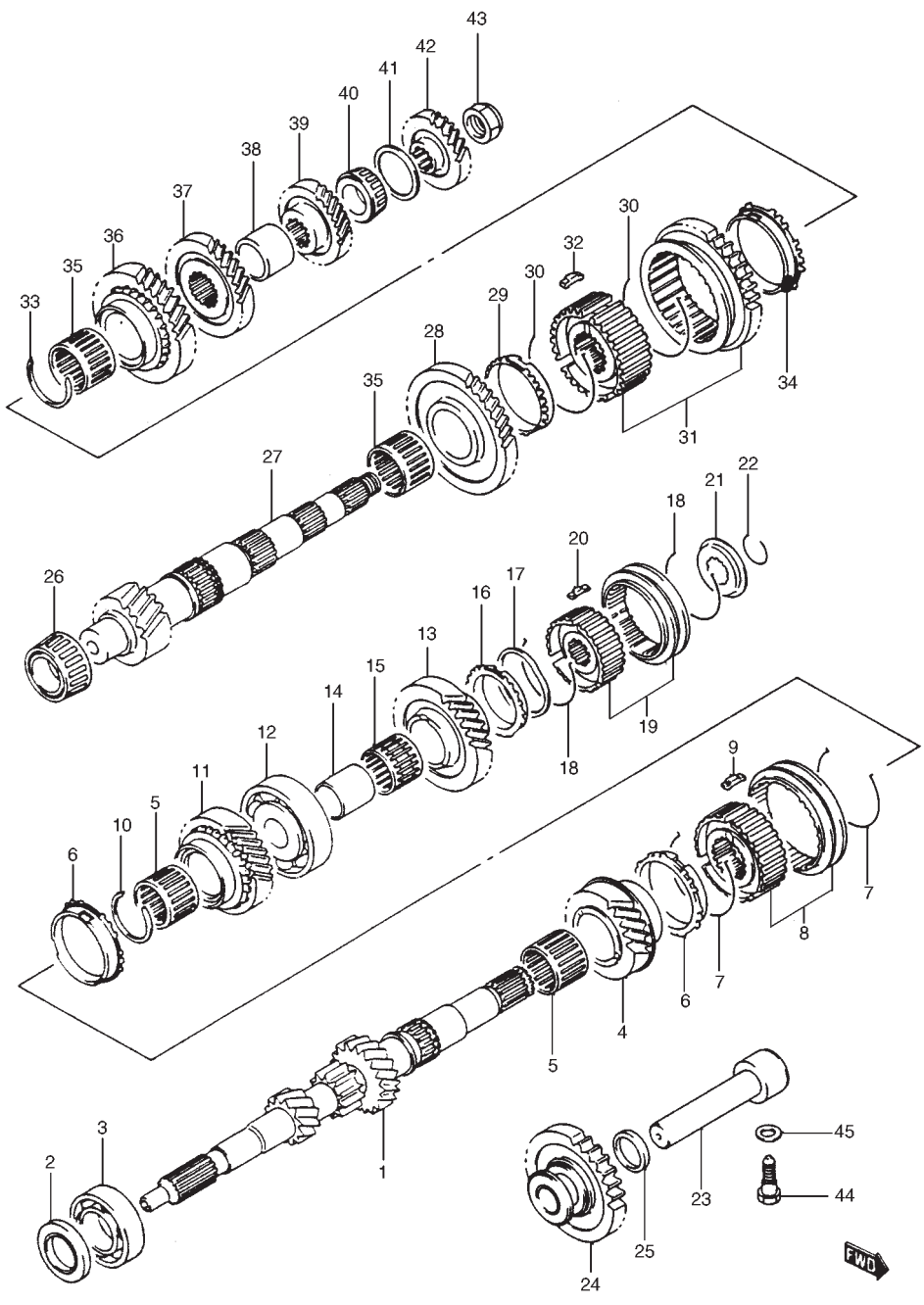
The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transmission case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of counter shaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.



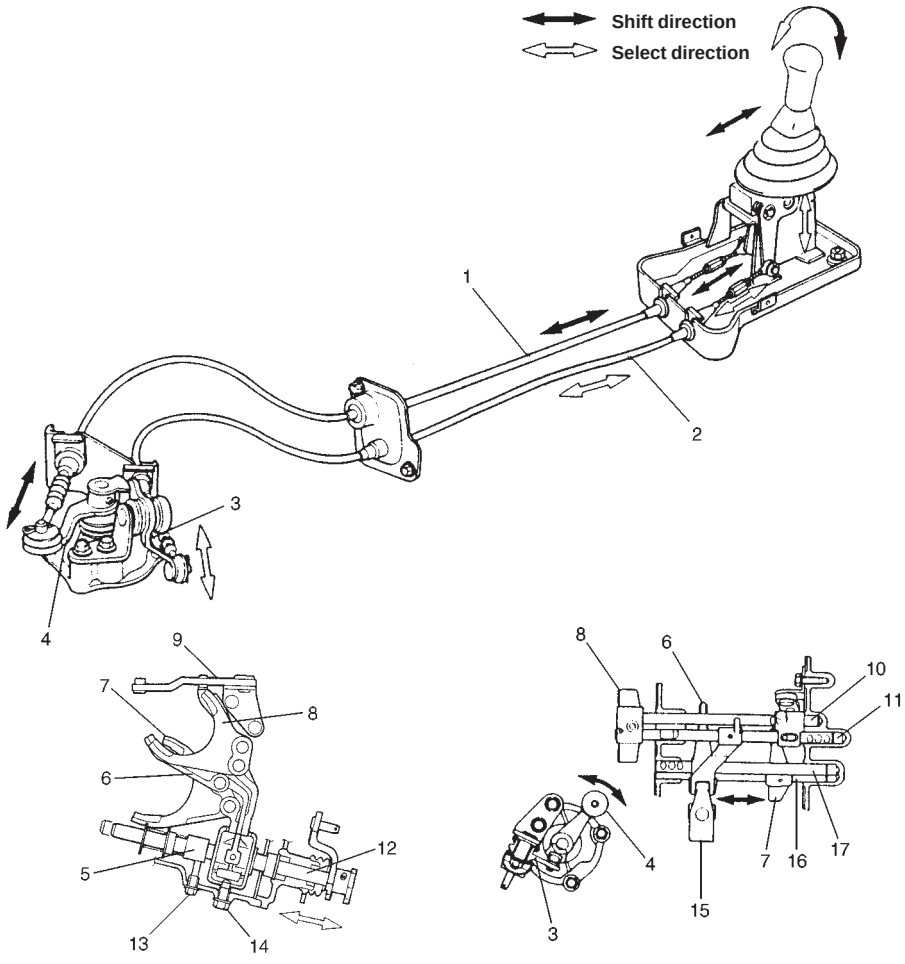
1. Input shaft
2. 5th speed sleeve & hub
3. Input shaft 5th gear
4. Input shaft 4th gear
5. High speed sleeve & hub
6. Input shaft 3rd gear
7. Left case
8. Reverse gear shaft
9. Reverse idler gear
10. Right case
11. Countershaft
12. Left cover
13. Countershaft 5th gear
14. Countershaft 4th gear
15. Countershaft 3rd gear
16. Countershaft 2nd gear
17. Low speed sleeve & hub
18. Countershaft 1st gear
19. Final gear
20. Differential case
21. VSS



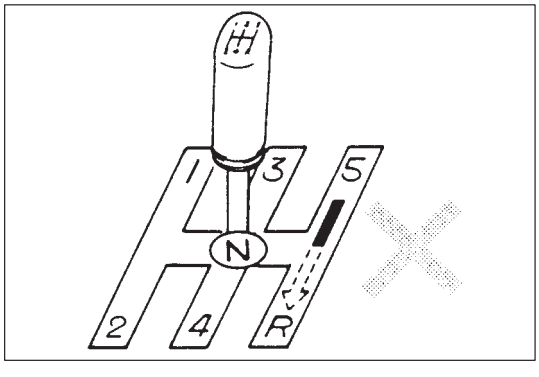
1. Input shaft
2. Oil seal
3. Input shaft R bearing
4. Input shaft 3rd gear
5. 3rd & 4th gear bearing
6. High speed synchronizer ring
7. High speed synchronizer spring
8. High speed sleeve & hub
9. High speed synchronizer key
10. Circlip
11. Input shaft 4th gear
12. Input shaft L bearing
13. Input shaft 5th gear
14. 5th gear spacer
15. 5th gear bearing
16. 5th speed synchronizer ring
17. Synchronizer ring spring
18. 5th synchronizer spring
19. 5th speed sleeve & hub
20. 5th synchronizer key
21. 5th synchronizer hub plate
22. Circlip
23. Reverse gear shaft
24. Reverse idler gear
25. Reverse shaft washer
26. Countershaft R bearing
27. Countershaft
28. Countershaft 1st gear
29. 1st gear synchronizer ring
30. Low speed synchronizer spring
31. Low speed sleeve & hub
32. Low speed synchronizer key
33. Circlip
34. 2nd gear synchronizer ring
35. 1st & 2nd gear bearing
36. Countershaft 2nd gear
37. Countershaft 3rd gear
38. 3rd & 4th gear spacer
39. Countershaft 4th gear
40. Countershaft L bearing
41. Bearing set shim
42. Countershaft 5th gear
43. Countershaft nut
44. Reverse shaft bolt
45. Washer

GEAR SHIFT MECHANISM

The gear shifting control system consists of following main parts. Movement of gear shift control lever is transmitted to gear shift & select shaft through gear shift and gear select cables.



1. Gear shift control cable
2. Gear select control cable
3. Gear select lever
4. Gear shift lever
5. 5th & reverse gear shift cam
6. High speed shift fork
7. Low speed gear shift fork
8. 5th gear shift fork
9. Reverse gear shift lever
10. 5th & reverse gear shift guide shaft
11. 5th & reverse gear shift shaft
12. Gear shift & select shaft
13. 5th-reverse gear shift lock guide bolt
14. Gear shift interlock bolt
15. Gear shift & select lever
16. Low speed gear shift shaft
17. High speed gear shift shaft

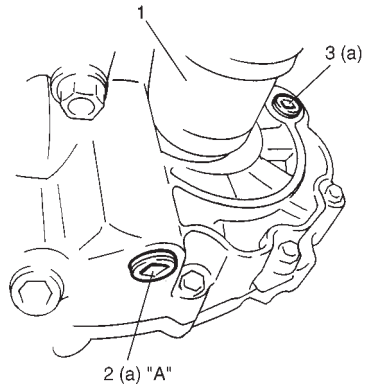


5TH & REVERSE GEAR SHIFT CAM

5th & reverse gear shift cam, cam guide return spring and 5th to reverse interlock guide bolt are provided to prevent the gear from being directly shifted from 5th to reverse.

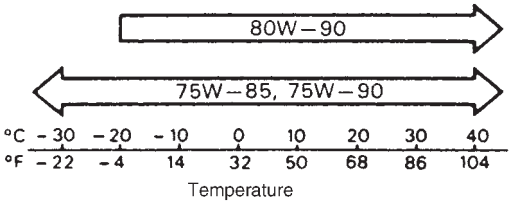
DIAGNOSIS

Condition	Possible Cause	Correction
Gears slipping out of mesh	○ Worn shift fork shaft	Replace.
	○ Worn shift fork or synchronizer sleeve	Replace.
	○ Weak or damaged locating springs	Replace.
	○ Worn bearings on input shaft or countershaft	Replace.
	○ Worn chamfered tooth on sleeve and gear	Replace sleeve and gear.
Hard shifting	○ Inadequate lubricant	Replenish.
	○ Improper clutch pedal free travel	Adjust.
	○ Distorted or broken clutch disc	Replace.
	○ Damaged clutch pressure plate	Replace clutch cover.
	○ Worn synchronizer ring	Replace.
	○ Worn chamfered tooth on sleeve or gear	Replace sleeve or gear.
	○ Worn gear shift control shaft joint bush	Replace.
	○ Distorted shift shaft	Replace.
Noise	○ Inadequate or insufficient lubricant	Replenish.
	○ Damaged or worn bearing(s)	Replace.
	○ Damaged or worn gear(s)	Replace.
	○ Damaged or worn synchronizer parts	Replace.



1. Drive shaft (LH)
2. Oil drain plug
3. Oil level/filler plug

Viscosity chart
SAE



ON-VEHICLE SERVICE

OIL CHANGE

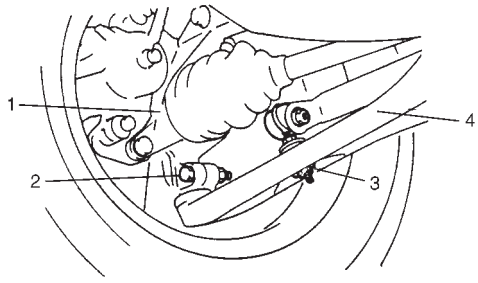
1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
2) With vehicle lifted up, check oil level and leakage.
   If leakage exists, correct it.
3) Drain old oil and fill new specified oil by specified amount (up to level hole).
4) Torque drain and level/filler plugs as specified below. Apply sealant to thread of drain plug before installation.

"A": Sealant 99000-31110

Tightening Torque
(a): 21 N·m (2.1 kg-m, 15.5 lb-ft)

NOTE:
- **It is recommended to use API GL-4 75W-90 gear oil.**
- **Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.**

Oil specification: API GL-4
For SAE classification, refer to viscosity chart at the left.
Oil capacity: 2.2 liters (4.6/3.9 US/Imp. pt)

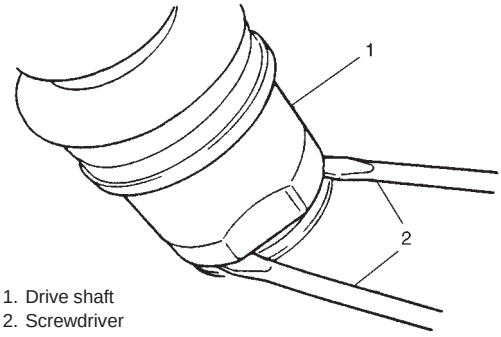


1. Steering knuckle
2. Ball stud bolt
3. Link nut
4. Lower arm

DIFFERENTIAL SIDE OIL SEAL

REPLACEMENT

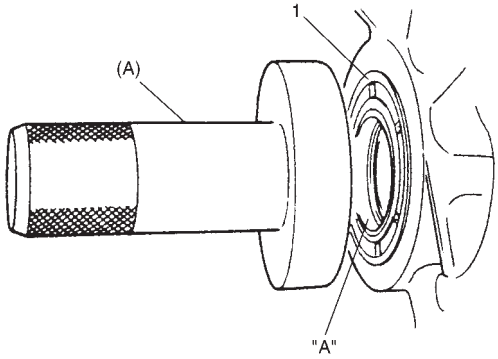
1) Lift up vehicle and drain transmission oil.
2) Remove ball stud bolt and link nut, and then separate suspension arm from knuckle.



1. Drive shaft
2. Screwdriver

3) ○ In case of left side oil seal:
   By using large size screwdrivers, pull out drive shaft joint so as to release snap ring fitting of joint spline at differential side. Pushing knuckle portion outward, detach drive shaft at differential side.

   ○ In case of right side oil seal:
   Remove center drive shaft referring to item CENTER DRIVE SHAFT in SECTION 4.



1. Differential side oil seal

4) Remove oil seal and install a new one until it becomes flush with case surface by using special tool and hammer.

   NOTE:
   When installing oil seal, face its spring side inward.

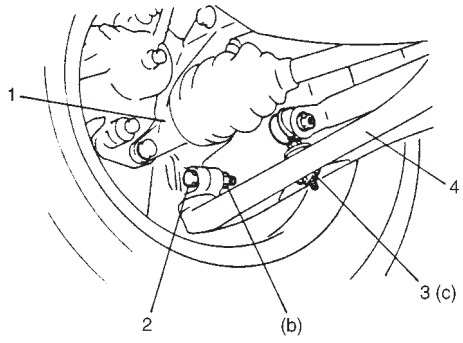
   Special Tool
   (A): 09913-75810 (for RH)
   09913-75520 (for LH)

5) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

   “A”: Grease 99000-25010

6) Install right side drive shaft and center drive shaft referring to item CENTER DRIVE SHAFT in SECTION 4.

CAUTION:
- **Be careful not to scratch oil seal lip with drive shaft joint while inserting.**
- **Make sure to insert drive shaft joint fully and seat its snap ring as it was.**
- **Do not hit joint boot with hammer or the like. Nothing but hands is allowed to use when inserting joint.**



1. Steering knuckle
2. Ball stud bolt
3. Link nut
4. Lower arm

7) Connect ball stud with knuckle and fasten with bolt to specification.

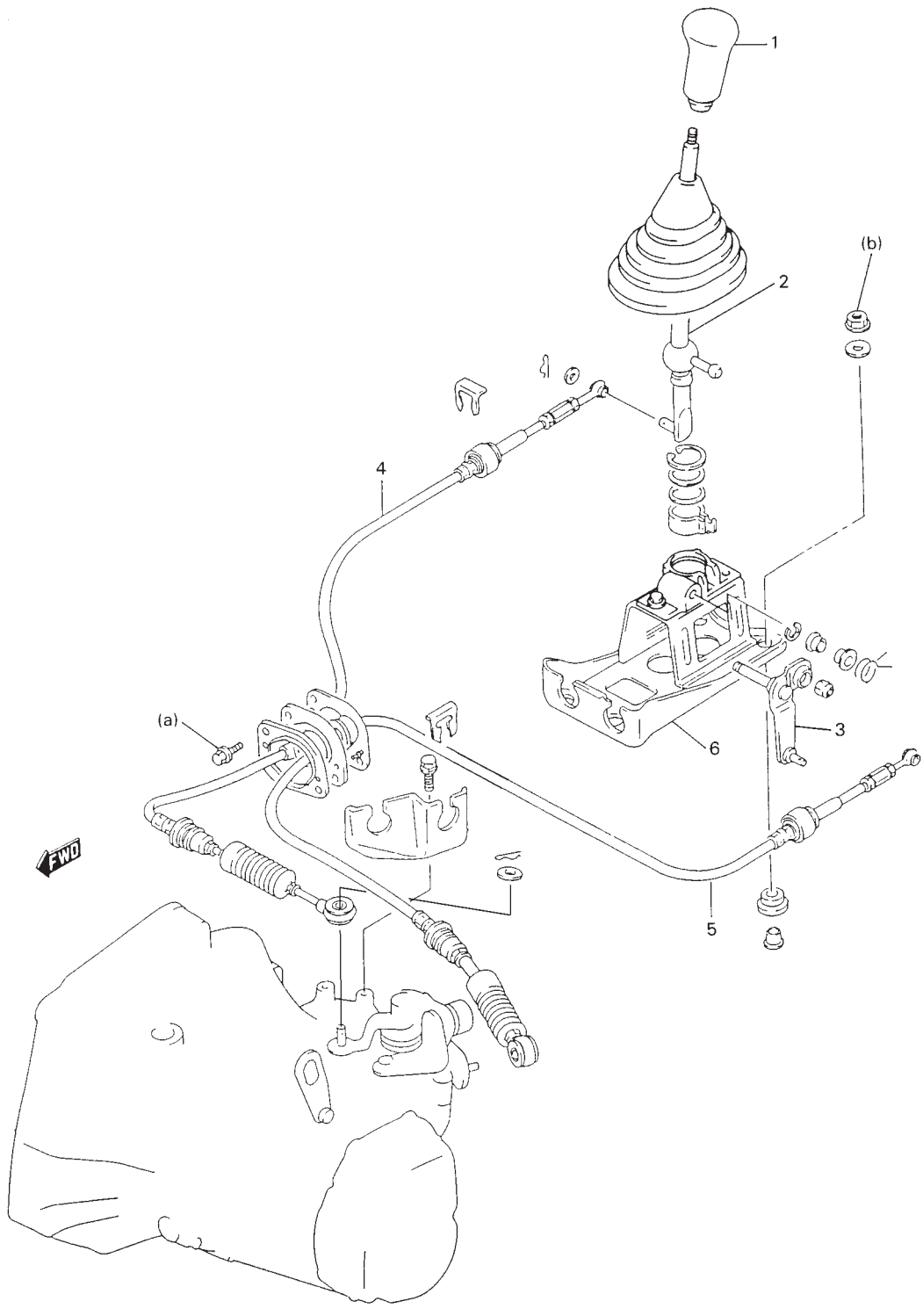
Tightening Torque
(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)

8) Install stabilizer bar to suspension arm and fasten link nut to specification.

Tightening Torque
(c): 28 N·m (2.8 kg-m, 20.5 lb-ft)

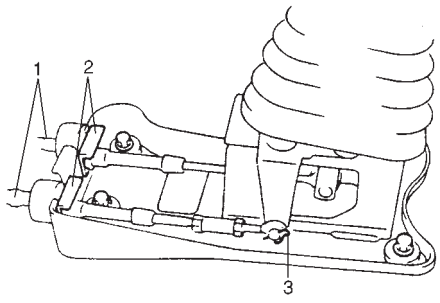
9) Fill transmission oil as specified and make sure that oil has been sealed with oil seal.

GEAR SHIFT CONTROL



1. Gear shift control lever knob
2. Gear shift control lever
3. Gear select control arm
4. Gear shift control cable
5. Gear select control cable
6. Gear shift control guide

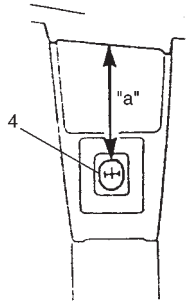
Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)
(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

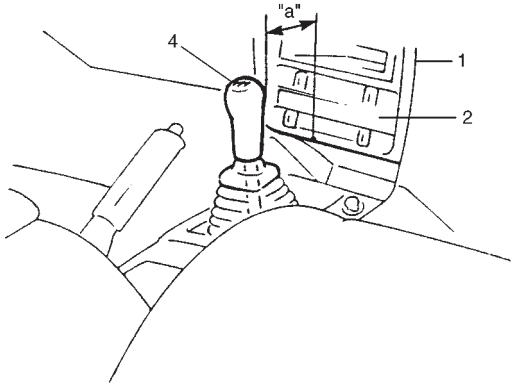


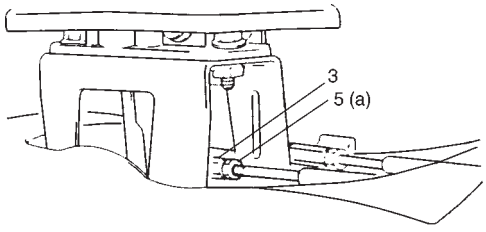
1. Shift & select control cables
2. E-rings
3. Clip

REMOVAL

1) Remove parking brake lower cover and console box.
2) Remove E-rings and clips from shift & select control cables.
3) Remove gear shift lever assembly.







1. Instrument panel
2. Heater control panel
3. Shift cable adjusting nut
4. Control lever knob
5. Lock nut

INSTALLATION

Reverse removal procedure for installation and note as follows.

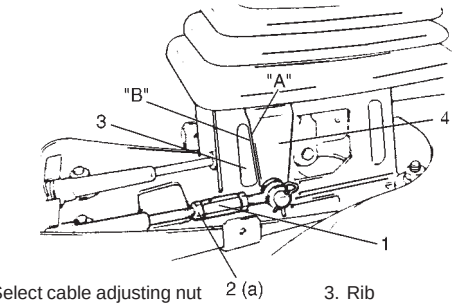
○ Adjustment of shift cable.
With shift lever in NEUTRAL position, adjust shift cable adjusting nut so that distance “a” between edge of instrument panel and center of shift knob measured as shown.

NOTE:
○ After shift cable adjustment, tighten lock nut securely.

Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)

○ Make sure that boots are installed correctly.

Distance “a”: 137 mm (5.4 in.)

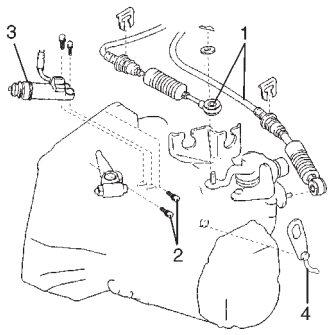


1. Select cable adjusting nut
2. Lock nut
3. Rib
4. Select arm

○ Adjustment of select cable.
With shift lever in NEUTRAL position, adjust select cable adjusting nut so that front side end surface “A” of select arm and rear side line of rib “B” are aligned.

NOTE:
After select cable adjustment, tighten lock nut securely.

Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)



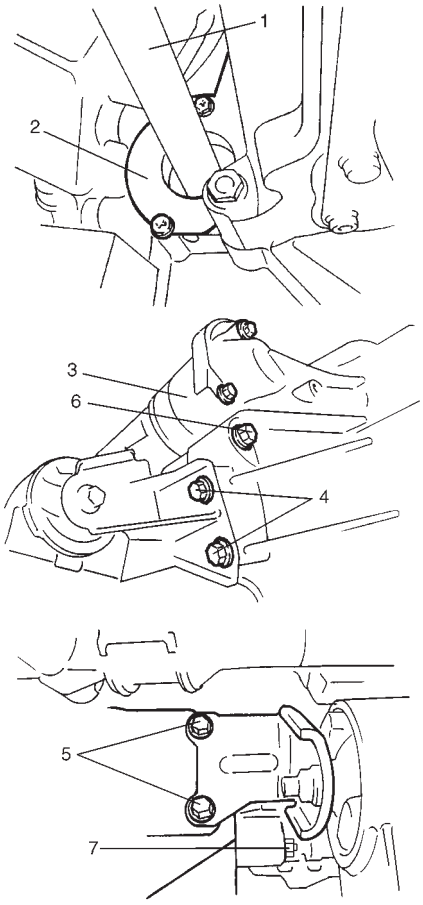
1. Control cable
2. Transmission to engine bolts
3. Clutch operating cylinder
4. Ground cable

UNIT REPAIR OVERHAUL

DISMOUNTING OF TRANSMISSION

UNDER HOOD

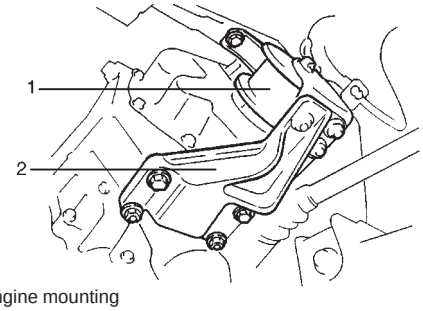
1) Disconnect battery ground cable from battery.
2) Undo wiring harness clamps and coupler.
3) Remove control cables as shown figure.
4) Remove transmission to engine bolts.



1. Center drive shaft
2. Center drive shaft plate
3. Starting motor
4. Engine front mounting bracket bolt
5. Engine rear mounting bracket bolt
6. Transmission to engine bolt
7. Transmission to engine nut

ON LIFT

5) Drain transmission oil referring to OIL CHANGE of ON VEHICLE SERVICE in this section.
6) Remove engine under cover of left side.
7) Remove clutch operation cylinder and ground cable.
8) Remove clutch housing lower plate.
9) Remove LH and RH drive shaft and center drive shaft referring to DIFFERENTIAL SIDE OIL SEAL in this section.
10) Remove center drive shaft plate.
11) Remove starting motor.
12) Remove engine front and engine rear mounting bracket bolts.
13) Remove transmission to engine bolt and nut.
14) Lower vehicle and support transmission with transmission jack.



1. LH engine mounting
2. LH engine bracket

15) Remove LH engine mounting and bracket.
16) Remove other attached parts from transmission, if any.
17) Pull transmission out so as to disconnect input shaft from clutch disc and then lower it.

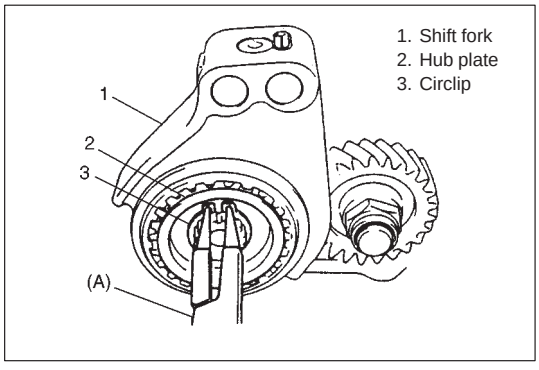
REMOUNTING

For remounting, reverse dismounting procedure.
Use specified torque as given below.

Tightening torque	N·m	Kg-m	lb-ft
Transmission to engine bolts and nut	61	6.1	44.5
LH engine mounting to body bolts	55	5.5	40.0

CAUTION:
- ○ **Care should be taken not to scratch oil seal lip with drive shaft while raising transmission.**
- ○ **Do not hit drive shaft joint with hammer when installing it into differential gear.**

- ○ Push in left side drive shaft joint fully so as to snap ring of shaft engages with differential gear.
- ○ Set each clamp for wiring securely.
- ○ Fill transmission with oil as specified.
- ○ Connect battery and check function of engine, clutch and transmission.



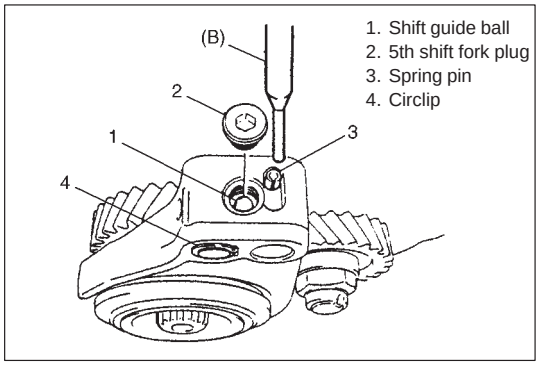
DISASSEMBLING UNIT

FIFTH GEARS

1) Remove 8 bolts and take off transmission side cover.
2) Using special tool, remove circlip and then hub plate.

CAUTION:
Care should be taken not to distort side cover when it is removed from left case.

Special Tool
(A): 09900-06107

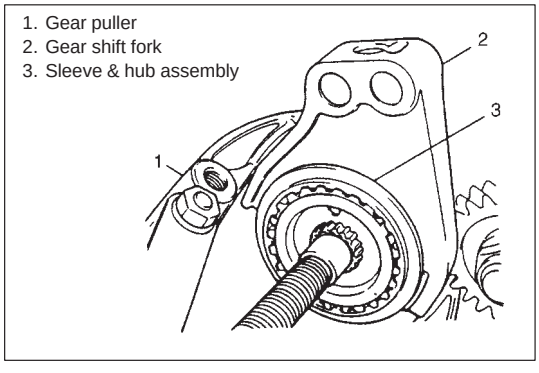


3) Remove shift fork plug and guide ball.

NOTE:
Use of magnet would facilitate removal of guide ball.

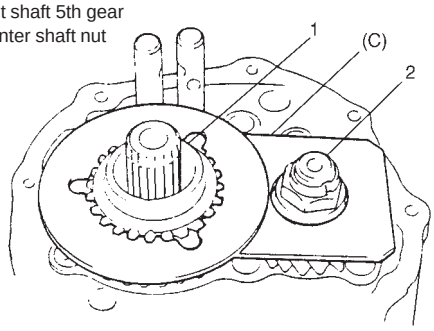
4) Drive out spring pin by using special tool and hammer.

Special Tool
(B): 09922-85811



5) Remove gear shift fork, sleeve & hub assembly, synchronizer ring spring, synchronizer ring and 5th gear all together. Gear puller is required for this work.

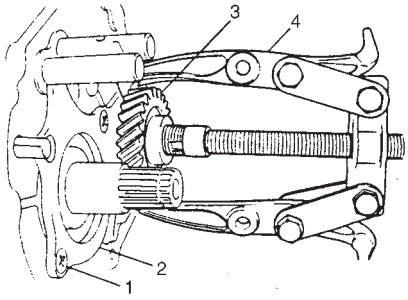
CAUTION:
Be careful not to pinch synchronizer ring spring when removing.



1. Input shaft 5th gear
2. Counter shaft nut

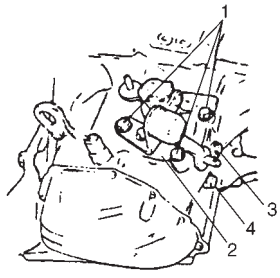
6) Unfasten caulking of countershaft nut, install main shaft 5th gear and special tool to stop rotation of shafts, and then remove countershaft nut.

Special Tool
(C): 09927-76010



1. Plate screw
2. Left case plate
3. Countershaft 5th gear
4. Gear puller

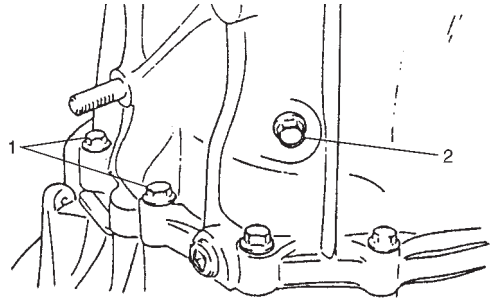
7) Remove special tool, main shaft 5th gear, needle bearing and then counter shaft 5th gear. Gear puller would be necessary if spline fitting of counter shaft 5th gear is tight.
8) Remove 6 screws and take off left case plate, and then bearing set shim.



1. Bolt
2. Gear shift guide case
3. Gear shift interlock bolt
4. 5th and REV interlock guide bolt

GEAR SHIFTER

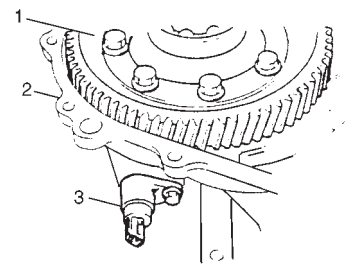
1) Remove gear shift interlock bolt and 5th to REV interlock guide bolt from transmission case.
2) Remove gear shift & select shaft assembly.



1. Transmission case bolt
2. Reverse shaft bolt

MAIN SHAFT AND COUNTERSHAFT

1) For removal procedure, refer to Steps 3), 6) and 8) of Gear Shifter, Main Shaft and Countershaft in Section 7A (DISASSEMBLING UNIT) of the Service Manual mentioned in FOREWORD of this manual.
2) Remove transmission case outside bolts and clutch housing bolts.
3) For removal procedure, refer to Steps 10) and 12) to 16) of Gear Shifter, Main Shaft and Countershaft in Section 7A (DISASSEMBLING UNIT) of the Service Manual mentioned in FOREWORD of this manual.

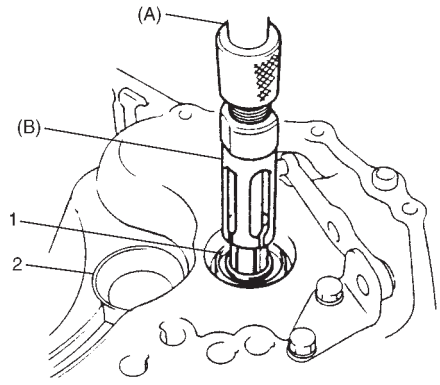


1. Differential assembly
2. Transmission right case
3. VSS

RIGHT CASE

1) Remove differential gear assembly from right case.
2) Remove bolt and then pull out VSS.

CAUTION:
Be careful not to damage VSS when removing it.



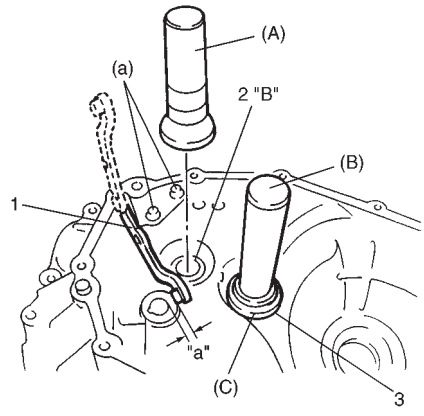
1. Input shaft oil seal
2. Countershaft R bearing cup

3) Remove input shaft oil seal by using special tools (combination of bearing remover and sliding shaft).

Special, Tool
(A): 09930-30102
(B): 09923-74510

4) Also pull out countershaft R bearing cup by using bearing remover 09941-64511 with sliding shaft 09930-30102.

NOTE:
If input shaft R bearing has been left in right case, pull it out by using bearing remover 09923-74510 with sliding shaft 09930-30102.



1. Reverse gear shift lever
2. Input shaft oil seal
3. Countershaft R bearing cup

SUB ASSEMBLY SERVICE

RIGHT CASE

1) If reverse gear shift lever has been removed, fasten it with 2 bolts after applying thread lock cement.

   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

   NOTE:
   ○ **When installing reverse gear shift lever, set distance "a" between lever end and shaft bore to be 5 mm (0.2 in.).**

   Distance "a": 5 mm (0.2 in.)

   ○ **Distance "a" can be measured by installing reverse gear shaft provisionally.**
   ○ **When "a" is 5 mm (0.2 in.), clearance between reverse idler gear groove and shift lever end will be 1 mm (0.04 in.).**

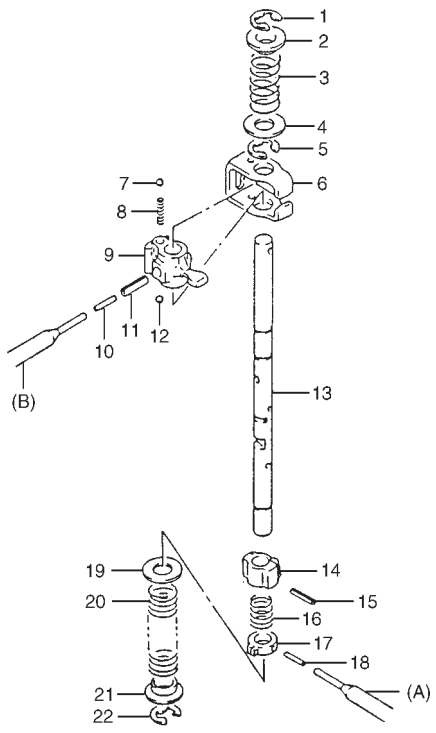
2) Install input shaft oil seal facing its spring side upward. Use special tool and hammer for installation and apply grease to oil seal lip.

   "B": SUZUKI SUPER GREASE A, 99000-25010

   Special Tool
   (A): 09951-76010

3) Install countershaft R bearing cup by using special tools and hammer.

   Special Tool
   (B): 09924-74510
   (C): 09925-68210



1. E-ring
2. Select spring guide
3. Reverse select spring
4. Thrust washer
5. E-ring
6. Gear shift interlock plate
7. Ball
8. Gear shift interlock spring
9. Gear shift select lever
10. Spring pin
11. Spring pin
12. Ball
13. Gear shift select shaft
14. Fifth/reverse gear shift cam
15. Spring pin
16. Cam guide return spring
17. Fifth/reverse gear shift cam guide
18. Spring pin
19. Thrust washer
20. Low select spring
21. Select spring guide
22. E-ring

GEAR SHIFTER

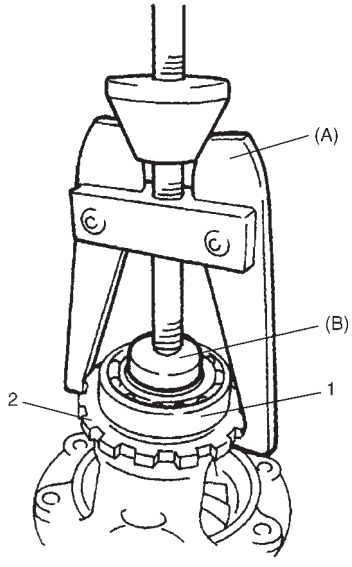
Gear Shift and Select Shaft Assembly

1) To disassemble component parts, use special tools and 2.8 – 3.0 mm (0.11 in.) pin remover in addition.

Special Tool
(A): 09922-85811(4.5 mm)
(B): 09925-78210 (6.0 mm)

2) Clean all parts thoroughly, inspect them and replace with new ones as required.
3) Assemble component parts by reversing removal procedure.

NOTE:
- **When driving in spring pins, prevent shaft from being bent by supporting it with wood block.**
- **Assemble 5th & REV gear shift cam by winding cam guide return spring, and then drive in spring pin.**
- **Locate low speed select spring (Lower position) and reverse select spring (Yellow-Upper position) correctly.**



1. R bearing
2. Sensor rotor

DIFFERENTIAL ASSEMBLY

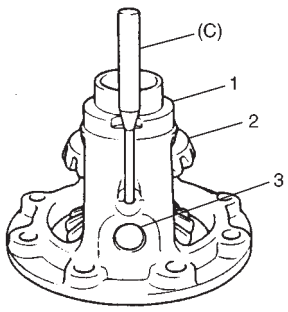
Disassembly

1) Using special tool, remove R bearing and sensor rotor.

Special Tool
(A): 09913-60910
(B): 09925-88210

2) Remove L bearing by using puller while supporting its center shaft as described above.
3) Support differential case with soft jawed vise and remove 8 final gear bolts then take out final gear.

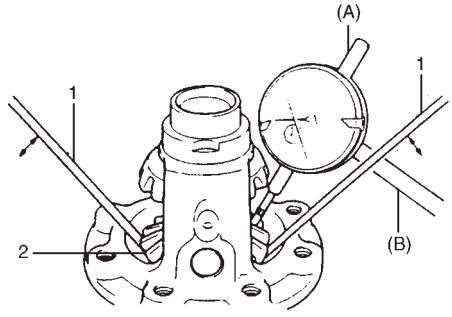
1. Differential case
2. Differential gear
3. Differential pinion shaft



5) Using special tool and hammer, drive out differential side pinion shaft pin and then disassemble component parts.

Special Tool
(C): 09922-85811 (4.5 mm)

Left side



1. Screwdriver
2. Differential gear

Adjustment and Reassembly

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

1) Assemble differential gear and measure thrust play of differential gear as follows.

Special Tool
(A): 09900–20606
(B): 09900–20701

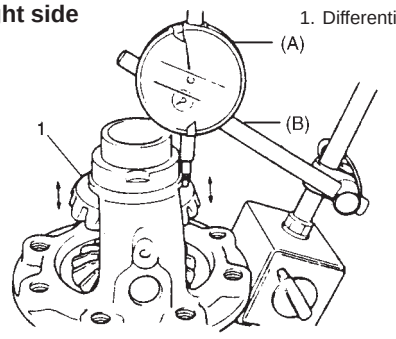
Differential gear thrust play:
0.05 – 0.33 mm (0.002 – 0.013 in.)

Left side

- ○ **Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear.**
- ○ **Using 2 screwdrivers, move gear up and down and read movement of dial gauge pointer.**

Right side

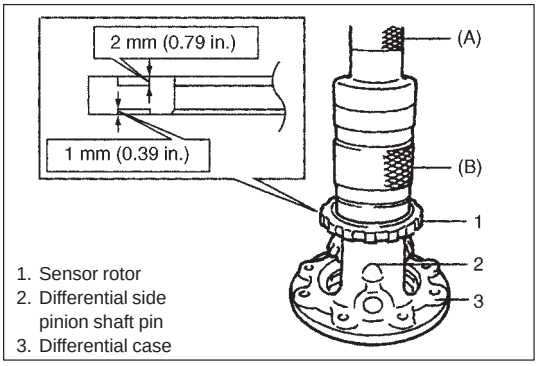
1. Differential gear



- ○ **Using similar procedure to the above, set dial gauge tip to gear shoulder.**
- ○ **Move gear up and down by hand and read dial gauge.**

2) If thrust play is out of specification, select suitable thrust washer from among following available size, install it and check again that specified gear play is obtained.

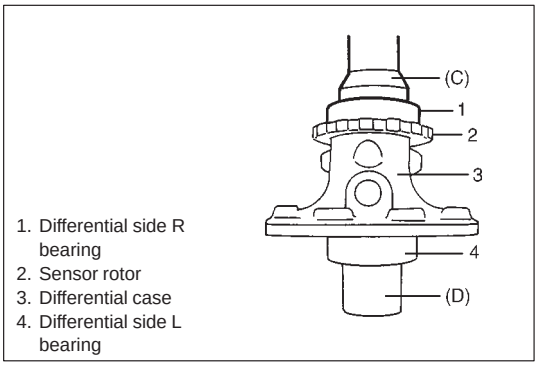
Available thrust washer thickness	0.9, 0.95, 1.0, 1.05, 1.1, 1.15 and 1.2 mm (0.035, 0.037, 0.039, 0.041, 0.043, 0.045, and 0.047 in.)



1. Sensor rotor
2. Differential side pinion shaft pin
3. Differential case

3) Drive in spring pin from right side till it is flush with differential case surface.
4) Using special tool and copper hammer, press-fit new sensor rotor, directing as shown.

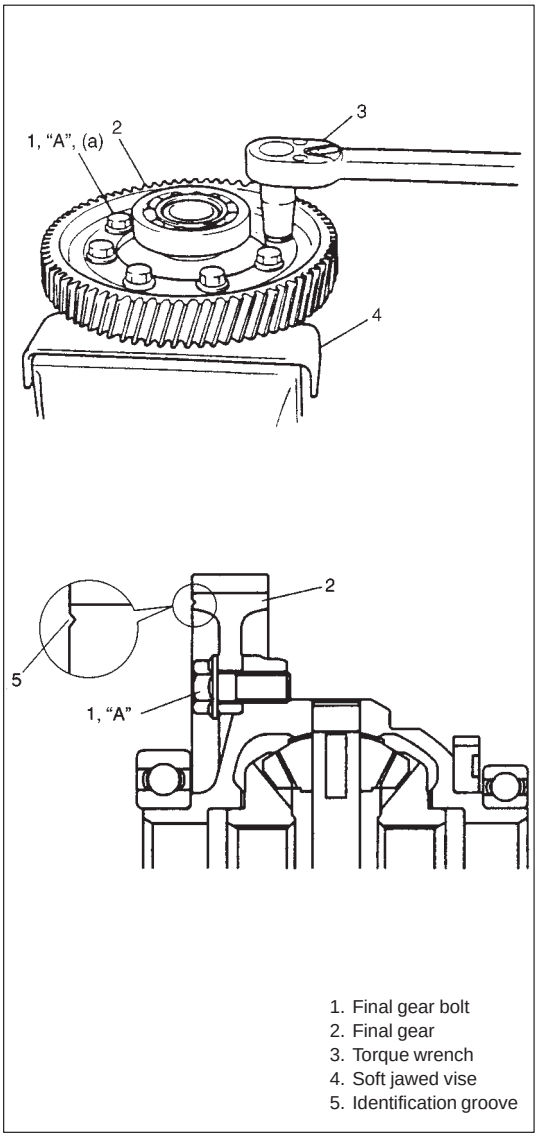
Special tool
(A): 09913-75520
(B): 09940-54910



1. Differential side R bearing
2. Sensor rotor
3. Differential case
4. Differential side L bearing

5) Press-fit L bearing by using special tool and copper hammer.
6) Support differential assembly as illustrated so as to L bearing is floating, and then press-fit R bearing like L bearing in Step 5).

Special tool
(C): 09951-76010
(D): 09951-16060



1. Final gear bolt
2. Final gear
3. Torque wrench
4. Soft jawed vise
5. Identification groove

7) Hold differential assembly with soft jawed vise, install final gear with grooved surface directed towards you and tighten bolts with specified torque. (Grooved surface and the head of bolt should be in the same side as shown in the figure.)
Apply thread lock cement to final gear bolts if reused.

NOTE:
If final gear has no identification groove on its surface, it can be installed regardless of its direction.

CAUTION:
- **Do not install the final gear in reverse direction of installing instruction. Failure to follow instruction could cause damage to gears.**
- **Do not use other bolts than specified in spare part catalog. Failure to follow instruction could cause damage to bolts and gears.**

"A": Thread lock cement 99000-32110
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

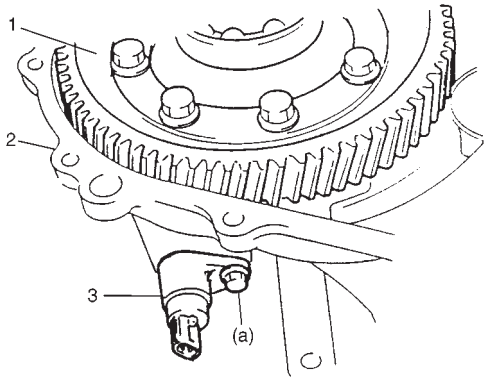
ASSEMBLING UNIT

DIFFERENTIAL TO LEFT CASE

1) Install differential assembly into right case.
2) Insert VSS applied with oil to its O-ring, then tighten it with bolt.

CAUTION:
- **While inserting case assembly into transmission, turn final gear by hand slightly so that gear can mesh easily.**
- **Never push or hit slit portion of case when inserting it. Such attempt may cause case to break.**

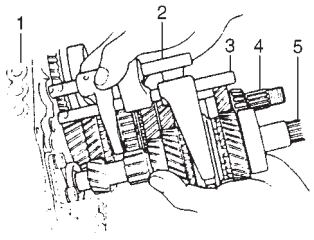
Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Differential assembly
2. Transmission right case
3. VSS

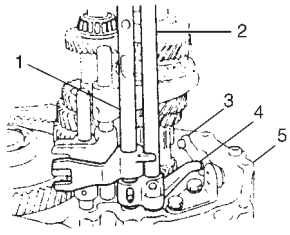
3) Join input shaft, countershaft, low speed gear shift shaft and high speed gear shift shaft assemblies all together, then install them into right case.

NOTE:
- **Input shaft R bearing on shaft can be installed into right case by tapping shaft with plastic hammer.**
- **Check to make sure that counter shaft is engaged with final gear while installing.**



1. Right case
2. Low speed gear shift shaft
3. High speed gear shift shaft
4. Countershaft assembly
5. Input shaft assembly

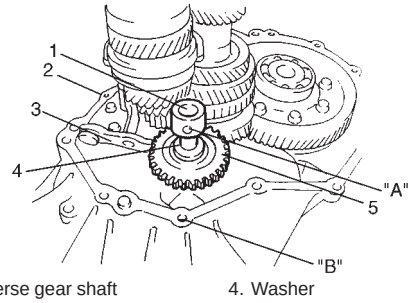
4) Install 5th & REV gear shift shaft with 5th & REV gear shift guide shaft into right case. Reverse gear shift arm has to be joined with reverse gear shift lever at the same time.



1. 5th & REV gear shift shaft
2. 5th & REV gear shift guide shaft
3. Reverse gear shift lever
4. Reverse gear shift arm
5. Right case

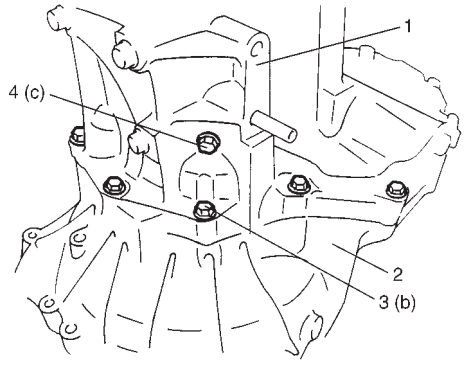
5) Make reverse idler gear with reverse gear shift lever, insert reverse gear shaft into case through idler gear and then align “A” in shaft with “B” in case.

NOTE:
- **Make sure that washer has been installed in shaft at above the gear.**
- **Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.**



1. Reverse gear shaft
2. Right case
3. Reverse gear shift lever
4. Washer
5. Reverse idler gear

“A”, “B” : Thread hole



1. Left case
2. Right case
3. Case bolt
4. Reverse shaft bolt

6) Clean mating surfaces of both right and left cases, coat mating surface of left case with sealant evenly then mate it with right case.

Sealant: SUZUKI BOND No.1215, 99000-31110

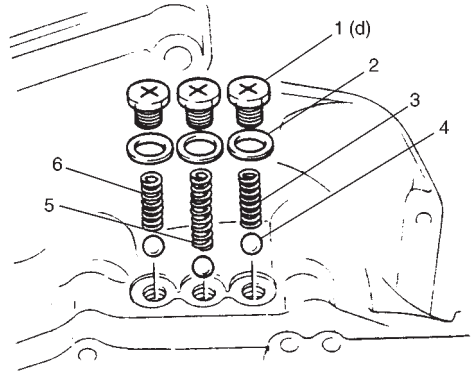
7) Tighten case bolts from outside to specified torque.

Tightening Torque
(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)

8) Install reverse shaft bolt with aluminum washer and tighten it.

Tightening Torque
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

9) Install another 2 case bolts from clutch housing side and tighten them to specification.



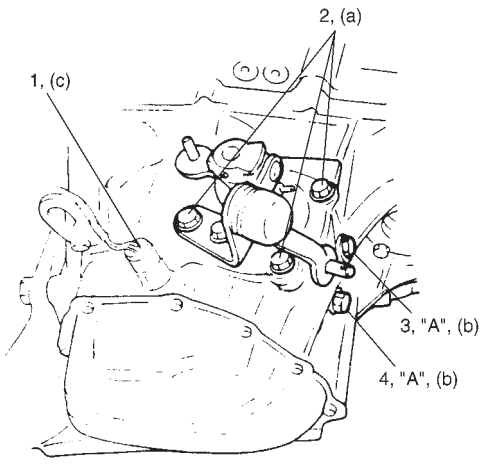
1. Gear shift fork shaft bolt
2. Washer
3. Low speed locating spring
4. Steel ball
5. High speed locating spring
6. 5th & REV locating spring

10) Check locating spring for deterioration and replace with new one as necessary.

Locating spring free length	Standard	Service Limit
Low speed and 5th & REV	26.1 mm (1.028 in)	25.0 mm (0.984 in)
High speed	40.1 mm (1.579 in)	39.0 mm (1.535 in)

11) Install steel ball and locating spring for respective gear shift shaft and tighten with bolt.

Tightening Torque
(d): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Back up light switch
2. Gear shift guide case bolt
3. Gear shift interlock bolt
4. 5th to REV Interlock guide bolt

GEAR SHIFT AND SELECT SHAFT ASSEMBLY

1) Clean mating surface of guide case.
2) Install gear shift and select shaft assembly with new gasket into transmission.
3) Tighten gear shift guide case bolts to specified torque.

Tightening Torque
(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

4) Install washer and gear shift interlock bolt applied with thread lock cement and them tighten it to specified torque.

Thread lock cement
“A”: 99000-32110 (SUZUKI BOND No.1322)

Tightening Torque
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

5) Install washer and 5th to REV interlock guide bolt applied with thread lock cement and then tighten it to specified torque.

Thread lock cement
“A”: 99000-32110 (SUZUKI BOND No.1322)

Tightening Torque
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

6) Tighten back up light switch to specified torque.

Tightening Torque
(c): 20 N·m (2.0 kg-m, 14.5 lb-ft)

7) Check input shaft for rotation in each gear position.
8) Also confirm function of back up light switch in reverse position by using ohmmeter.

TIGHTENING TORQUE SPECIFICATIONS

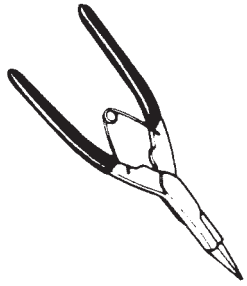
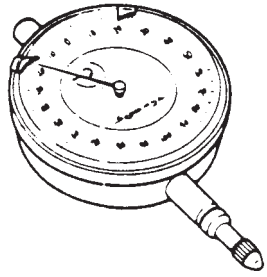
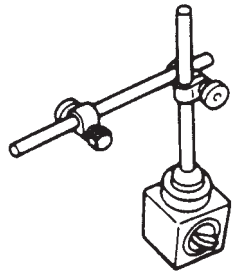
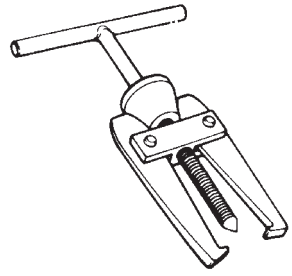
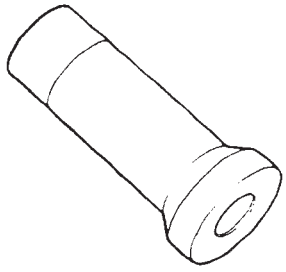
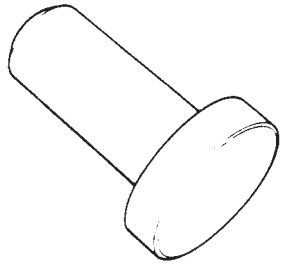
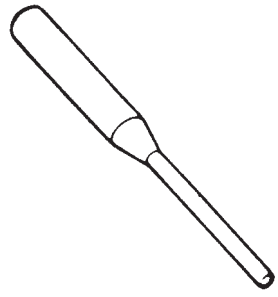
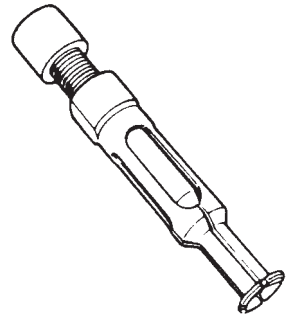
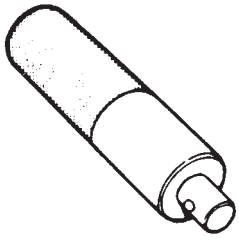
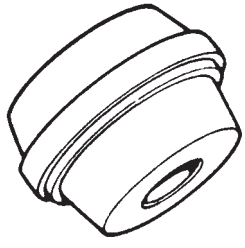
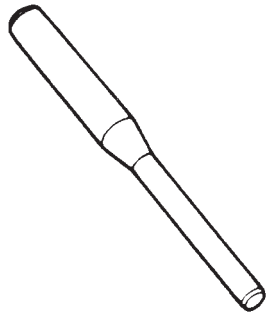
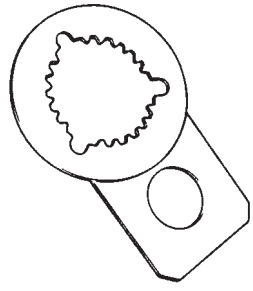
Fastening portion	Tightening Torque		
	N·m	kg-m	lb-ft
1. Oil filler/level plug	21	2.1	15.5
2. Oil drain plug			
3. Ball stud bolt and nut	60	6.0	43.5
4. Stabilizer link nut	28	2.8	20.5
5. Control cable bolts	6	0.6	4.5
6. Gear shift control guide nuts	13	1.3	9.5
7. Shift and select control cable lock nuts	6	0.6	4.5
8. Transmission to engine bolts	61	6.1	44.5
9. LH engine mounting to body bolts	55	5.5	40.0
10. Reverse gear shift lever bolts	23	2.3	17.0
11. Final gear bolts	90	9.0	65.0
12. VSS case bolt	5.5	0.55	4.0
13. Transmission case bolts	19	1.9	14.0
14. Reverse shaft bolt	23	2.3	17.0
15. Gear shift fork shaft bolts	13	1.3	9.5
16. Gear shift guide case bolts	19	1.9	14.0
17. Gear shift interlock bolt	23	2.3	17.0
18. Back up light switch	20	2.0	14.5

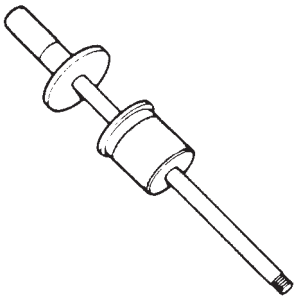
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	○ Oil seal lips ○ Gear shift control lever ○ Gear shift control shaft bushes
Sealant	SUZUKI BOND NO.1215 (99000-31110)	○ Oil drain plug ○ Gear shift shaft bolt ○ Mating surface of transmission case ○ Mating surface of side cover ○ Mating surface of gear shift guide case
Thread lock cement	THREAD LOCK 1322 (99000-32110)	○ Control lever knob ○ Reverse gear shift lever bolts ○ Oil gutter bolt ○ Left case plate screws ○ Gear shift yoke bolt ○ Shift fork plug

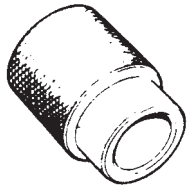
MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Thread lock cement	THREAD LOCK CEMENT SUPER 1333B (99000-32020)	○ Final gear bolts

SPECIAL TOOLS

 09900-06107 Snap ring pliers (Opening type)	 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09913-60910 Bearing puller
 09913-75810 Bearing installer	 09913-75520 Bearing installer	 09922-85811 Spring pin remover 4.5 mm	 09923-74510 Bearing remover
 09924-74510 Installer attachment	 09925-68210 Bearing outer race installer	 09925-78210 Spring pin remover 6 mm	 09927-76010 Gear holder



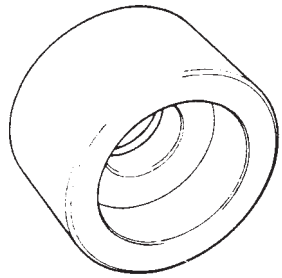
09930-30102
Sliding shaft



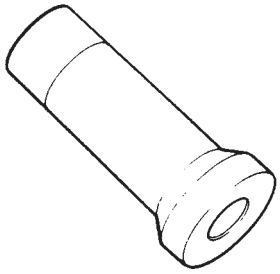
09940-53111
Bearing installer



09940-54910
Sensor rotor installer



09951-16060
Bush remover



09951-76010
Bearing installer

SECTION 7C1

CLUTCH (HYDRAULIC TYPE)

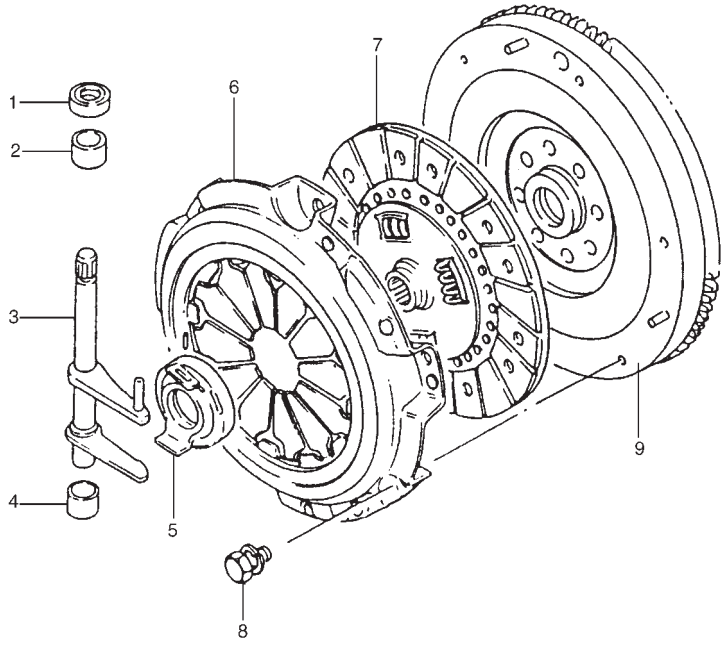
NOTE:
For the description (items) not found in this section, refer to the same section of Service Manual mentioned in FOREWORD of this manual.

CONTENTS

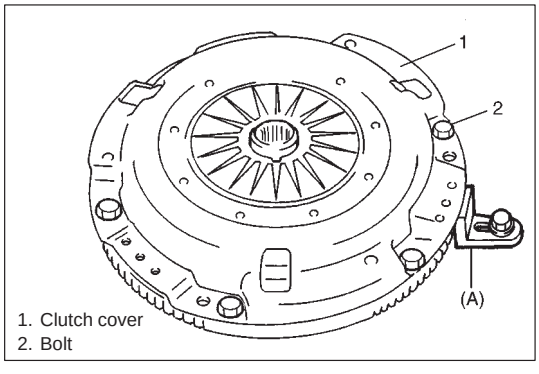
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Clutch Cover, Clutch Disc and Flywheel 7C1-2
TIGHTENING TORQUE SPECIFICATIONS 7C1-5
SPECIAL TOOLS 7C1-5

UNIT REPAIR OVERHAUL

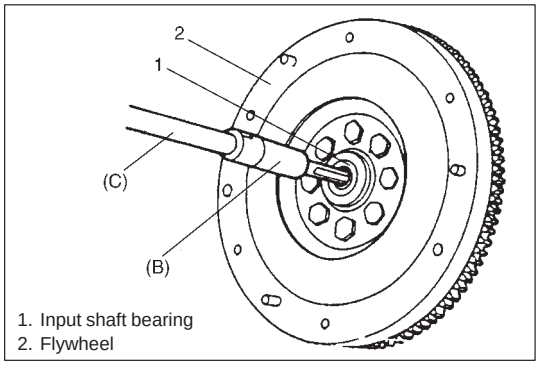
CLUTCH COVER, CLUTCH DISC AND FLYWHEEL



1. Release shaft seal
2. No.2 bush
3. Release shaft
4. No.1 bush
5. Release bearing
6. Clutch cover
7. Clutch disc
8. Clutch cover bolt
9. Flywheel



1. Clutch cover
2. Bolt



1. Input shaft bearing
2. Flywheel

DISMOUNTING AND REMOUNTING OF TRANSMISSION

Refer to Section 7A “MANUAL TRANSMISSION” section in this manual.

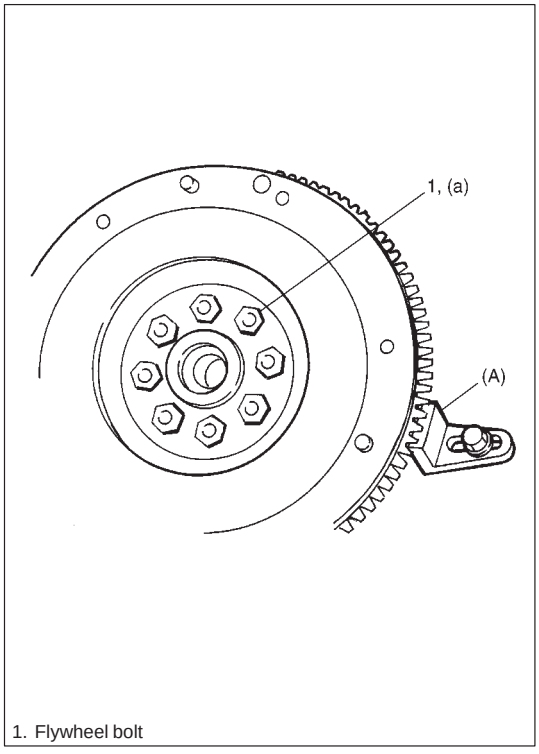
REMOVAL

1) Hold flywheel stationary with special tool and remove clutch cover bolts, clutch cover and clutch disc.

Special Tool
(A): 09916-96510/OUT0000049

2) Pull out input shaft bearing by using special tool and wrench.

Special Tool
(B): 09921-20200
(C): 09930-30102



1. Flywheel bolt

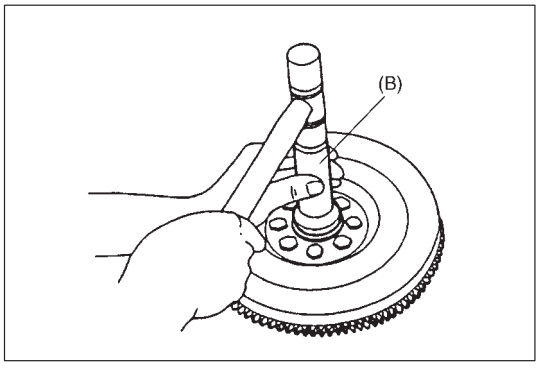
INSTALLATION

NOTE:
Before assembling, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.

1) Install flywheel to crankshaft and tighten bolts to specification.

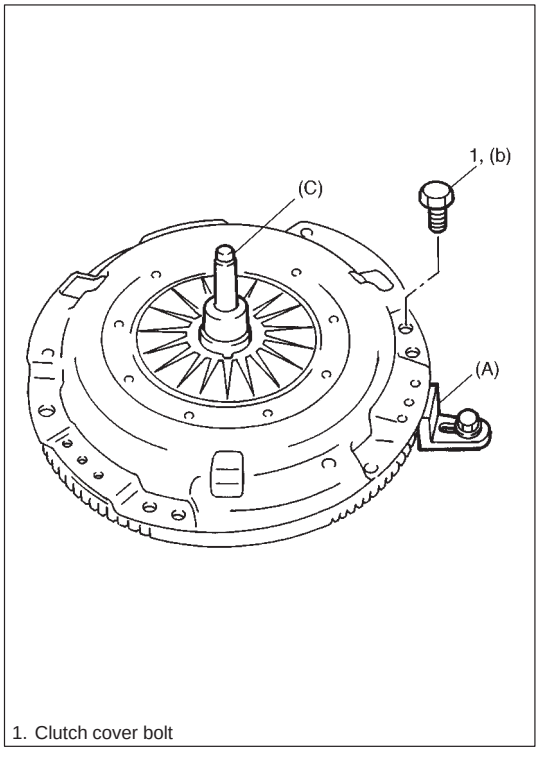
Special Tool
(A): 09916-96510/OUT0000049

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.2 lb-ft)



2) Using special tool, install input shaft bearing to flywheel.

Special Tool
(B): 09913-76010



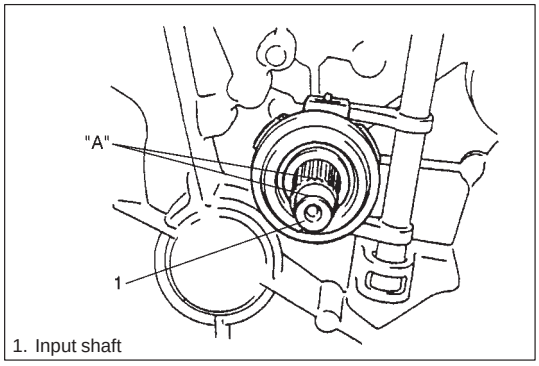
1. Clutch cover bolt

3) Aligning clutch disc with flywheel center by using special tool, install clutch cover and bolts.
Then tighten bolts to specification.

NOTE:
- **While tightening clutch cover bolts, compress clutch disc with special tool (clutch center guide) by hand so that disc is centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

Special Tool
(A): 09916-96510/OUT0000049
(C): 09923-36330

Tightening Torque
(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)



1. Input shaft

4) Slightly apply grease to input shaft, then join transmission assembly with engine. Refer to Section 7A “MANUAL TRANSMISSION” section in this manual for remounting procedure.

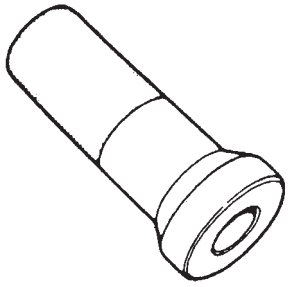
“A”: SUZUKI SUPER GREASE I, 99000-25210

NOTE:
When inserting transmission input shaft to clutch disc, turn crankshaft little by little to match the spline mesh.

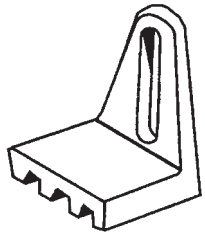
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening Torque		
	N·m	kg-m	lb-ft
1. Flare nut	16	1.6	11.5
2. Master cylinder nut	13	1.3	9.5
3. Flywheel bolts	50	5.0	36.2
4. Clutch cover bolts	25	2.5	18.0
5. Release arm bolt	13	1.3	9.5
6. Operating cylinder bolt	23	2.3	17.0
7. Clutch hose union bolt			

SPECIAL TOOLS



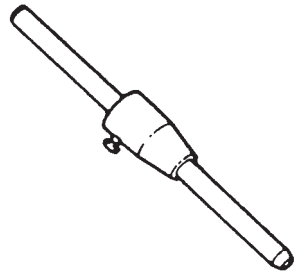
09913-76010
Bearing installer



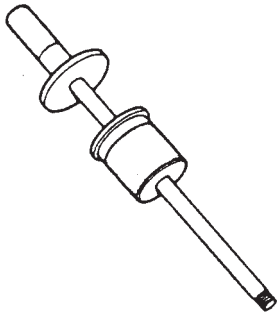
09916-96510/OUT0000049
Flywheel holder



09921-20200
Bearing remover



09923-36330
Clutch center guide



09930-30102
Sliding shaft

SECTION 8

BODY ELECTRICAL SYSTEM

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Precautions" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

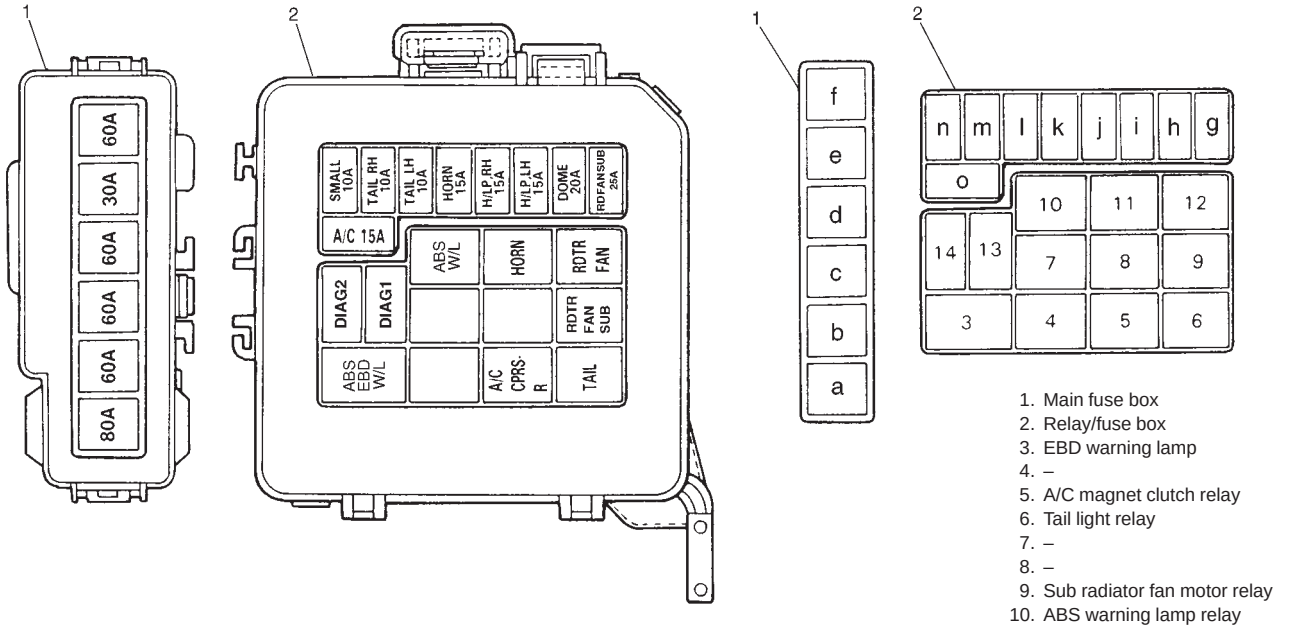
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Main Fuse and Relay Circuit 8- 2
Power Supply Diagram 8- 2
Combination Meter 8- 3
DIAGNOSIS 8- 4
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Engine Speed Sensor 8- 6
Engine Coolant Temperature Meter and Sender Gauge 8- 7
Engine Coolant Temperature Warning Light 8- 8
Oil Pressure Warning Light 8- 8
Glow Plug Indicator Light 8- 8

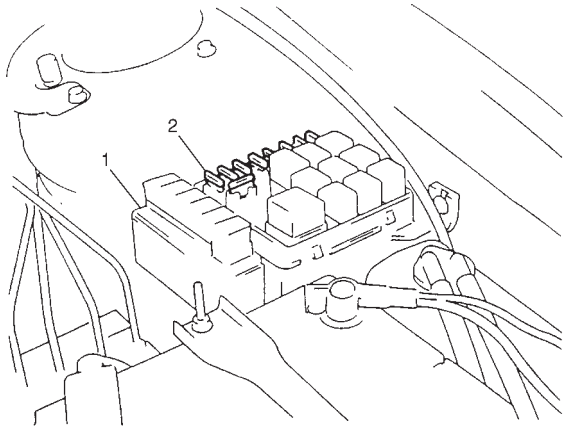
GENERAL DESCRIPTION

MAIN FUSE BOX AND RELAY/FUSE BOX

CAUTION:
○ When replacing a fuse, be sure to use one having a correct rated amperage.
○ Before replacing a fuse, turn OFF every switch of electric equipments including ignition switch.

LOCATION AND DESIGNATION





1. Main fuse box
2. Relay/fuse box
3. EBD warning lamp
4. –
5. A/C magnet clutch relay
6. Tail light relay
7. –
8. –
9. Sub radiator fan motor relay
10. ABS warning lamp relay
11. Horn relay
12. Radiator fan control relay
13. Diagnosis connector 1
14. Diagnosis connector 2

a. To battery
b. To headlight fuse (both side) and horn fuse
c. To ignition switch
d. To ABS pump motor relay and ABS solenoid valve relay
e. To radiator fan control relay
f. To A/C fuse and heater relay
g. Sub radiator fan fuse
h. Dome light fuse
i. Headlight fuse (LH)
j. Headlight fuse (RH)
k. Horn fuse
l. Tail light fuse (LH)
m. Tail light fuse (RH)
n. Small light fuse
o. A/C fuse

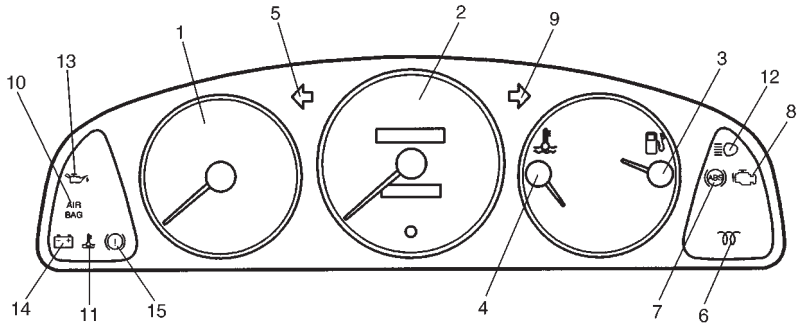
MAIN FUSE AND RELAY CIRCUIT

Refer to “WIRING DIAGRAM” SECTION in this manual.

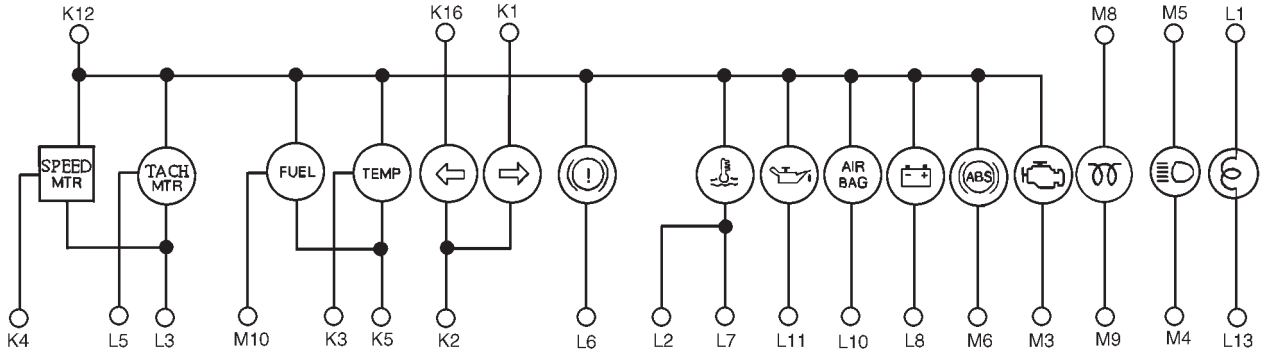
POWER SUPPLY DIAGRAM

Refer to “WIRING DIAGRAM” SECTION in this manual.

COMBINATION METER

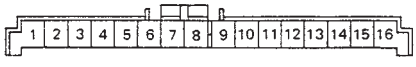


1. Tachometer
2. Speedometer
3. Fuel lever meter
4. Water temperature meter
5. Turn signal pilot light (LH)
6. Glow plug indicator
7. ABS warning light (if equipped)
8. MIL
9. Turn signal pilot light (RH)
10. AIR BAG warning light (if equipped)
11. Water temperature warning light
12. High beam light
13. Oil pressure warning light
14. Charge warning light
15. Brake warning light and EBD warning light

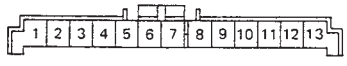


NOTE:
Terminal arrangement of coupler viewed from harness side.

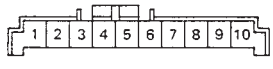
Coupler K



Coupler L



Coupler M



Coupler K

1.	To combination switch	G/W
2.	To ground	B
3.	To ECT sensor	P/B
4.	To VSS	V/Y
5.	To ground	B
6.	Blank	–
7.	Blank	–
8.	Blank	–
9.	Blank	–
10.	Blank	–
11.	Blank	–
12.	To ignition switch	B/W
13.	Blank	–
14.	Blank	–
15.	Blank	–
16.	To combination switch	G/Y

Coupler L

1.	To main fuse	R/Y
2.	To ignition switch	P
3.	To ground	B/O
4.	Blank	–
5.	To ECM	Br
6.	To brake fluid level switch, parking brake switch and ABS control module (if equipped)	R/B
7.	To ECT switch	V
8.	To generator	W/R
9.	Blank	–
10.	To air bag control module (if equipped)	Bl
11.	To oil pressure switch	Y/R
12.	Blank	–
13.	To tail light relay	R/Bl

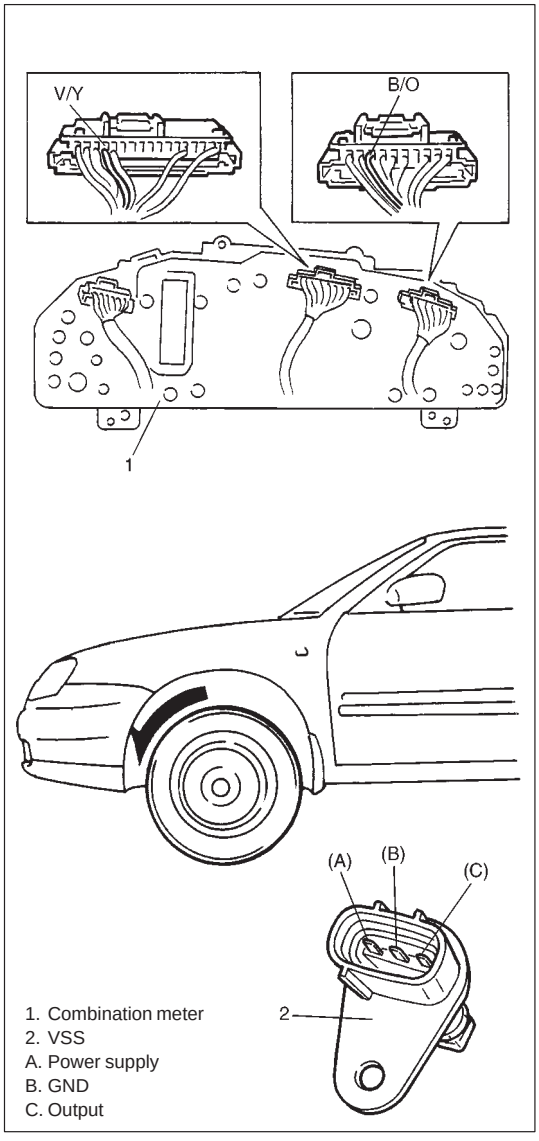
Coupler M

1.	Blank	–
2.	Blank	–
3.	To ECM	V
4.	To combination switch	R
5.	To main fuse box	Bl/B
6.	To ABS control module (if equipped)	R/Bl
7.	Blank	–
8.	To glow relay	Bl
9.	To ground	B
10.	To fuel level gauge	P/Bl

DIAGNOSIS

COMBINATION METER

Trouble	Possible Cause	Correction
Speedometer shows no operation.	IG. fuse blown Vehicle speed sensor faulty Speedometer faulty Wiring or grounding faulty Signal rotor on differential case faulty	Replace fuse to check for short. Check vehicle speed sensor. Replace speedometer. Repair. Check signal rotor.
Tachometer shows no operation.	IG. fuse blown Engine speed sensor faulty Tachometer faulty Wiring or grounding faulty Signal slit on flywheel faulty	Replace fuse to check for short. Check engine speed sensor. Replace tachometer. Repair. Check signal slit.
Engine coolant temperature warning light shows no lighting or no lighting off.	IG. fuse blown Bulb burn out Engine coolant temperature warning switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check engine coolant temperature warning switch. Repair.
Fuel level meter shows no operation.	IG. fuse blown Fuse meter faulty Fuel level gauge unit faulty Wiring or grounding faulty	Replace fuse to check for short. Check meter. Check gauge unit. Repair.
Engine coolant temperature meter shows no operation.	IG. fuse blown Engine coolant temperature meter faulty Engine coolant temperature sending unit faulty Wiring or grounding faulty	Replace fuse to check for short. Check meter. Check sending unit. Repair.
Oil pressure light shows no lighting.	IG. fuse blown Bulb burnt out Oil pressure switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check switch. Repair.
Brake warning light (parking brake light) shows no lighting.	IG. fuse blown Bulb burnt out Parking brake switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check parking brake switch. Repair.



ON-VEHICLE SERVICE

VEHICLE SPEED SENSOR (VSS)

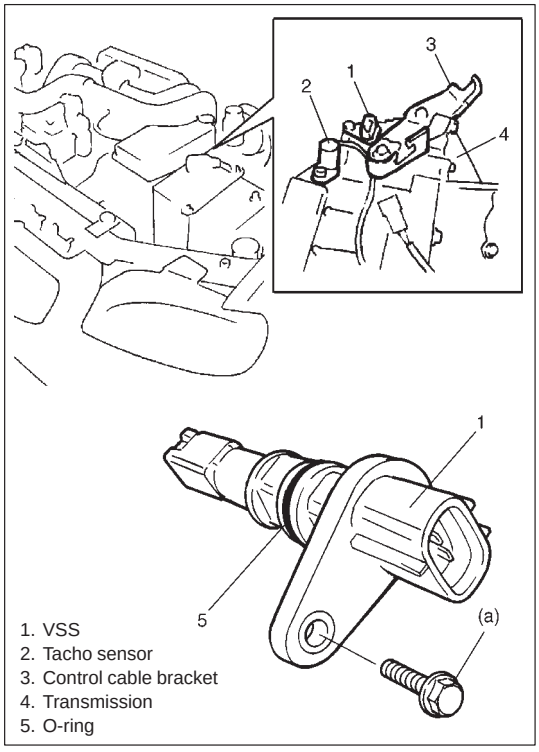
ON-VEHICLE INSPECTION

1) Disconnect negative (–) cable at battery.
2) Hoist vehicle and set transmission in neutral.
3) Remove combination meter from instrument panel and disconnect its couplers.
4) Connect voltmeter positive lead to terminal (V/Y) and negative lead to terminal (B/O).
5) Connect negative (–) cable to battery and then turn the ignition switch on position.
6) Turn front tire slowly by hands. Voltmeter should indicate deflection 0 – 1 V and 8 – 14 V a few times while tire is turned one revolution.
   If check result is not satisfactory, repair referring to the following table.

NOTE:

- **Vehicle speed sensor can not be checked by itself.**
- **Terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when the ignition switch is turned on position.**

Result Voltage	Possible cause	Measure
0 – 1 V (little voltage is changed)	IG. fuse blown B/O wire is open Speedometer faulty or V/Y wire is short (In case of checked by disconnect VSS coupler) VSS faulty	Replace and check for short. Repair. Replace or repair. Replace VSS.
8 – 14 V (little voltage is changed)	V/Y wire is open VSS faulty or VSS ground is open VSS power supply is open Signal rotor on differential case faulty	Repair. Replace or repair. Repair. Check signal rotor.



REMOVAL

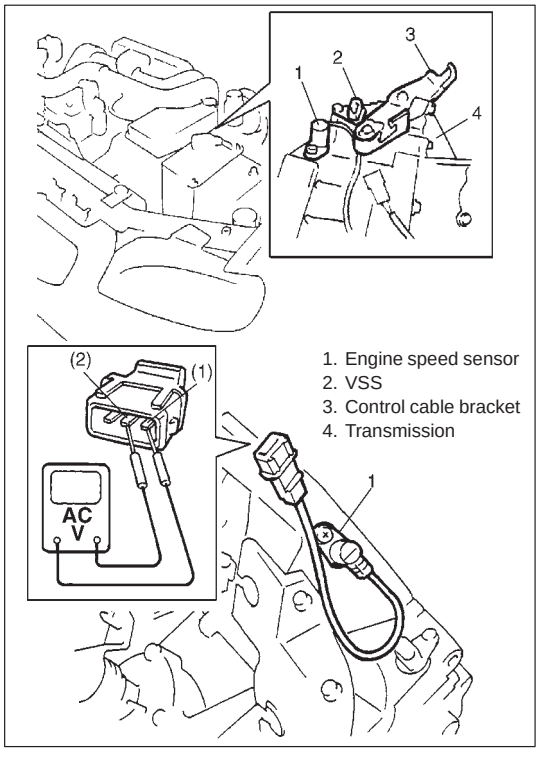
1) Disconnect negative (–) cable at battery.
2) Disconnect VSS coupler.
3) Loosen tightening bolt and remove VSS.

INSTALLATION

Reverse removal procedure for installation noting the following.

○ Check O-ring and VSS surface for their flawlessness, apply oil to O-ring and then install VSS to transmission.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

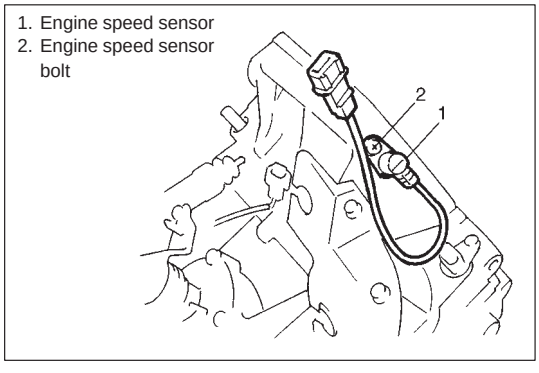


ENGINE SPEED SENSOR

INSPECTION

1) Disconnect negative (–) cable at battery.
2) Disconnect engine speed sensor coupler.
3) Check resistance between terminal (1) and terminal (2) in engine speed sensor lead as shown. If check result is not specified, replace.

Resistance: Approx. 370 Ω

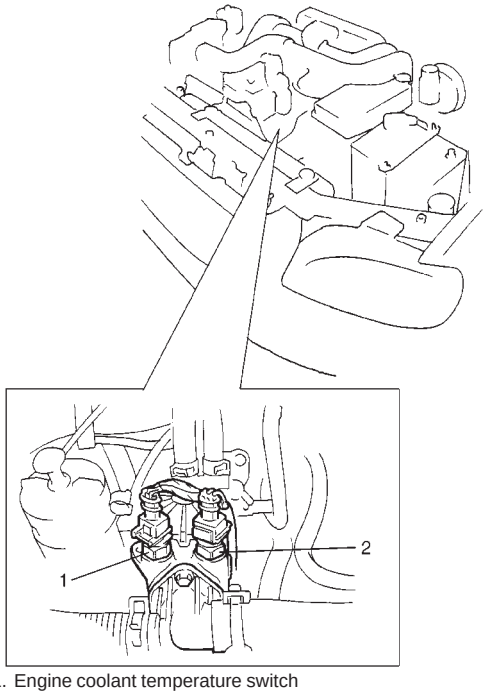


REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disconnect engine speed sensor coupler.
3) Loosen tightening bolt and remove engine speed sensor.

INSTALLATION

Reverse removal procedure for installation.



1. Engine coolant temperature switch
2. Engine coolant temperature sender gauge

ENGINE COOLANT TEMPERATURE METER AND SENDER GAUGE

SENDER GAUGE

REMOVAL

WARNING:
- **Make sure that engine coolant temperature is cold before removing any part of cooling system.**
- **Also be sure to disconnect negative cable from battery terminal before removing any part.**

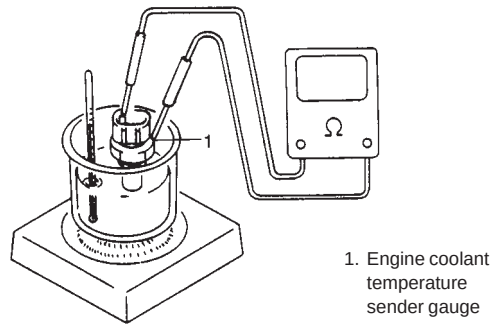
1) Disconnect negative (–) cable at battery.
2) Drain coolant.
3) Remove engine coolant temperature sender gauge.

INSTALLATION

Reverse removal procedure for installation noting the following.
Apply sealant to the thread of ECT sender gauge.

(A): Sealant 99000-31150

Tightening Torque
(a): 15 N·m (1.5 kg-m, 11.3 lb-ft)

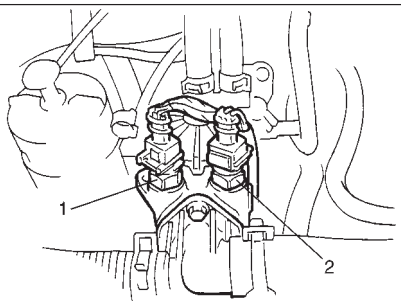


1. Engine coolant temperature sender gauge

INSPECTION

Warm up sender gauge. Thus make sure its resistance is decreased with increase of its temperature.

Temperature	Resistance
50·C (122·F)	770 – 871 I
120·C (248·F)	78 – 83 I



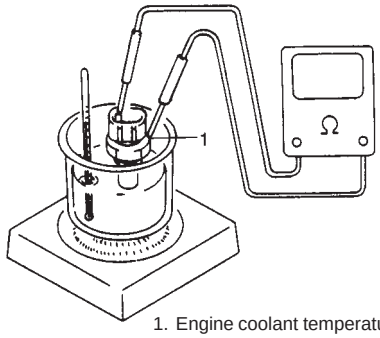
1. Engine coolant temperature switch
2. Engine coolant temperature sender gauge

ENGINE COOLANT TEMPERATURE WARNING LIGHT

ENGINE COOLANT TEMPERATURE SWITCH

REMOVAL AND INSTALLATION

Refer to “ENGINE COOLANT TEMPERATURE METER AND SENDER GAUGE” in this section.



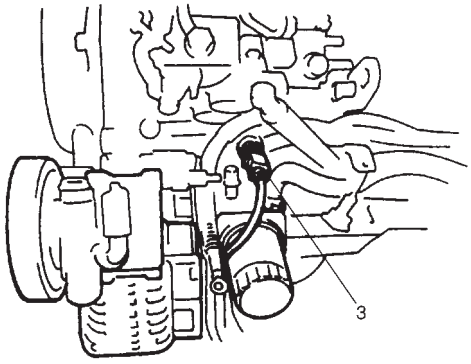
1. Engine coolant temperature switch

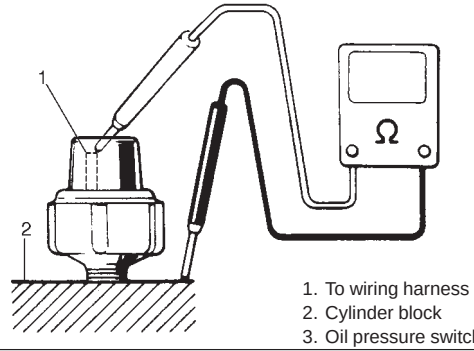
INSPECTION

Warm up ECT switch.

Make sure its continuity with increase of its temperature.

Temperature	Continuity
113·C (235·F) or more	Continuity





1. To wiring harness
2. Cylinder block
3. Oil pressure switch

OIL PRESSURE WARNING LIGHT

OIL PRESSURE SWITCH

INSPECTION

Use an ohmmeter to check switch continuity.

During Engine Running	No continuity (∞ Ⅰ)
At Engine Stop	Continuity (0 Ⅰ)

REMOVAL AND INSTALLATION

Refer to Section 6A4 “OIL PRESSURE CHECK” in this manual.

GLOW PLUG INDICATOR LIGHT

INSPECTION

Check glow plug relay.

Refer to section 6E3 “ENGINE and EMISSION CONTROL SYSTEM” section.

SECTION 8G

IMMOBILIZER CONTROL SYSTEM (IF EQUIPPED)

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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GENERAL DESCRIPTION

The immobilizer control system is designed to prevent vehicle burglar and consists of following components.

- ○ Fuel injection pump
- ○ Immobilizer Control Module
- ○ Ignition key (with built-in transponder)
- ○ Coil antenna

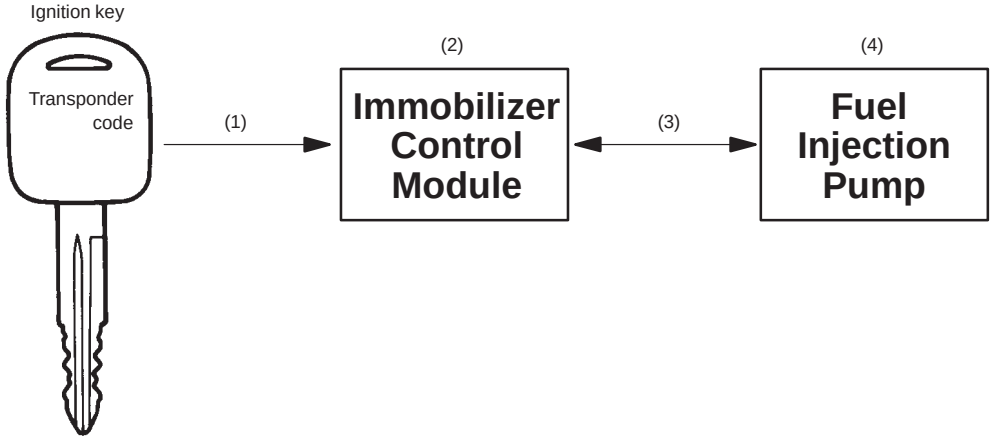
Operation of this system is as follows.

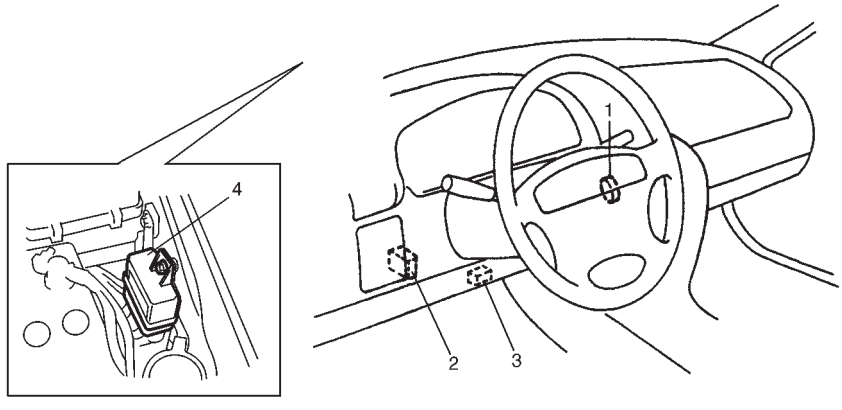
(1) Each ignition key has its own code Transponder code stored in memory. When the ignition switch is turned ON, Immobilizer Control Module tries to read the Transponder code through the coil antenna installed to the steering lock assembly.

(2) Immobilizer Control Module compares the Transponder code read in (1) and that registered in Immobilizer Control Module and checks if they match.

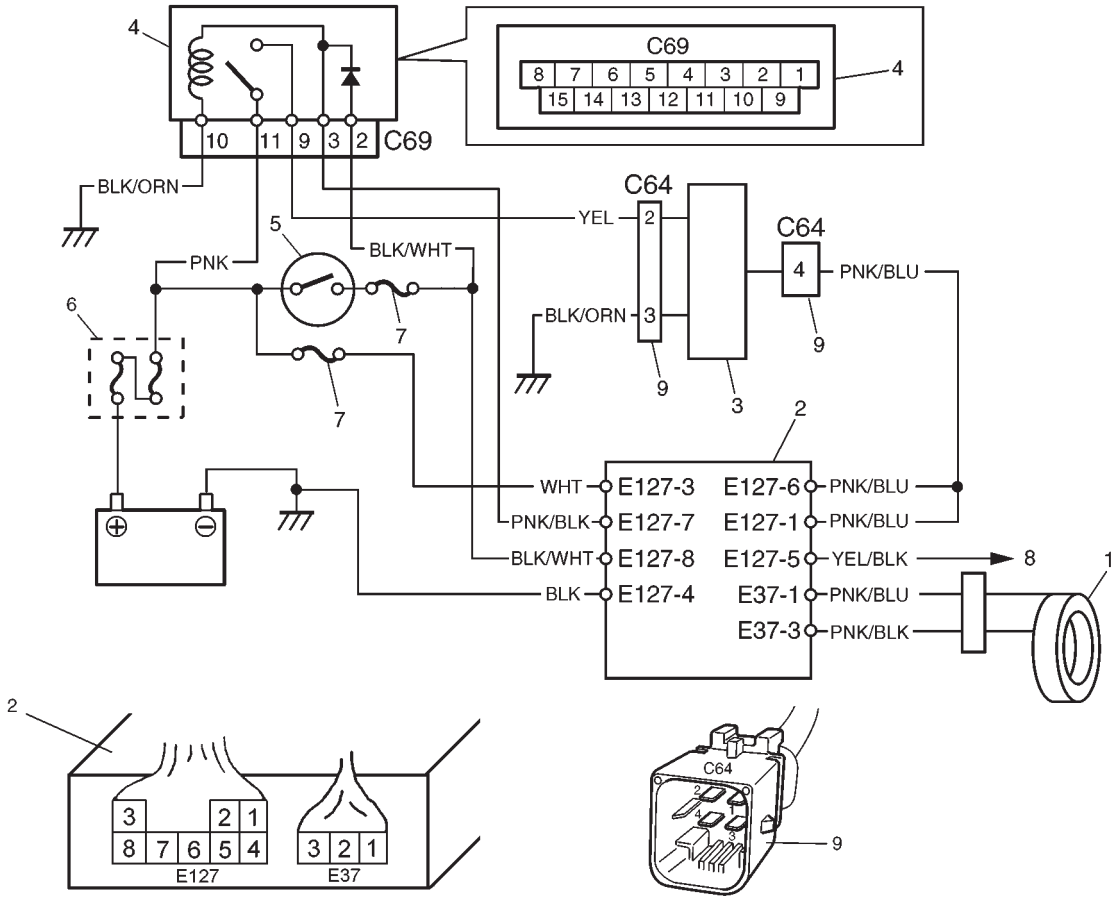
(3) When it is confirmed that two Transponder codes match each other as described above, Immobilizer Control Module and Fuel Injection Pump check if ECU codes registered in them respectively match.

(4) Only when it is confirmed that ECU codes match, fuel injection pump activates fuel cut valve to open fuel line so that fuel can be supplied into fuel injection pump and engine can be started (immobilizer system unlocked). If Transponder codes in Step (2) or ECU codes in Step (3) do not match, fuel cut valve is not activated (immobilizer system locked).



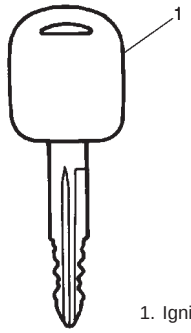


1. Coil antenna
2. Immobilizer Control Module
3. Data link connector (DLC)
4. Double relay



1. Coil antenna
2. Immobilizer control module
3. Fuel cut valve on fuel injection pump
4. Double relay
5. Ignition switch
6. Main fuse
7. Fuse
8. To data link connector
9. Fuel cut valve coupler (Fuel injection pump side)

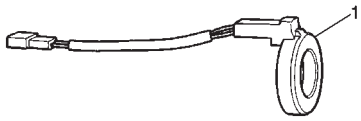
CONNECTOR	TERMINAL	WIRE COLOR	CIRCUIT
E37	1	PNK/BLU	Coil antenna +
	2	–	–
	3	PNK/BLK	Coil antenna –
E127	1	PNK/BLU	Serial data line between fuel injection pump and immobilizer control module
	2	–	–
	3	WHT	Power supply
	4	BLK	GND
	5	YEL/BLK	Serial data line for Suzuki scan tool
	6	PNK/BLU	Serial data line between fuel injection pump and immobilizer control module
	7	PNK/BLK	Power control of fuel injection pump
	8	BLK/WHT	Ignition signal
C64	1	–	–
	2	YEL	Power supply
	3	BLK/ORN	GND
	4	PNK/BLU	Serial data line between Suzuki scan tool and immobilizer control module



1. Ignition key with built-in transponder

IGNITION KEY

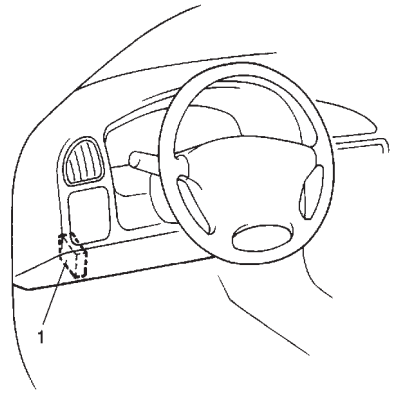
The ignition key for the immobilizer control system has a built-in transponder. Each transponder in the key has an each transmitting code (Transponder code). The code will transmitted from the key via the coil antenna to Immobilizer Control Module when the ignition switch is turned ON.



1. Coil antenna

COIL ANTENNA

The coil antenna is installed to the steering lock assembly. As it is energized by Immobilizer Control Module, it transmits the transponder code of the ignition key to Immobilizer Control Module.



1. Immobilizer Control Module

IMMOBILIZER CONTROL MODULE & FUEL INJECTION PUMP

Immobilizer Control Module:

Immobilizer Control Module is installed to the underside of the instrument panel at the driver's seat side.

As main functions, Immobilizer Control Module checks matching not only between the Transponder Code transmitted from the ignition key and that registered in Immobilizer Control Module (Up to 4 different Transponder codes can be registered.) but also between the ECU code transmitted from Fuel Injection Pump and that registered in Immobilizer Control Module. In addition, it has an onboard diagnostic system (self-diagnosis function) which is described in the following page.

Fuel Injection Pump:

As main functions, Fuel Injection Pump checks matching of ECU codes.

For installation position of Fuel Injection Pump, refer to ENGINE AND EMISSION CONTROL SYSTEM section of this manual.

ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION)

Immobilizer Control Module diagnoses troubles which may occur in the area including the following parts when the ignition switch is ON. It indicates the diagnosis result through Suzuki scan tool.

Immobilizer Control Module:	○ Transponder code ○ Coil antenna ○ ECU code ○ Serial data circuit between Immobilizer Control Module and Fuel Injection Pump ○ Immobilizer Control Module

DIAGNOSIS

Immobilizer Control Module has on-board diagnostic system (a system self-diagnosis function) as described previously.
Investigate where the trouble is by referring to “DIAGNOSTIC FLOW TABLE” and “DIAGNOSTIC TROUBLE CODE TABLE” on later pages.

PRECAUTIONS IN DIAGNOSING TROUBLES

[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

Immobilizer Control Module

○ Take a note of diagnostic trouble code indicated first.

[INTERMITTENT TROUBLES]

○ There are cases where Suzuki scan tool indicate a diagnostic trouble code representing a trouble which occurred only temporarily and has gone. In such case, it may occur that good parts are replaced unnecessarily. To prevent such accident, be sure to follow instructions given below when checking by using “Diagnostic Flow Table”.

* When trouble can be identified, it is not an intermittent one: Check coil antenna, ignition key, wires and each connection.
* When trouble can not be identified but Suzuki scan tool indicate a trouble code:
  Diagnose trouble by using that code No. and if ignition key, coil antenna, wires and each connection are all in good condition, turn OFF ignition switch and then ON after 10 seconds.

Then check what Suzuki scan tool indicates.
Only when it indicates trouble code again, substitute a known-good Fuel Injection Pump or Immobilizer Control Module and check again.
If it indicates not trouble code but normal code, it means that an intermittent trouble did occur and has gone. In this case, check wires and connections carefully again.

[NOTES ON SYSTEM CIRCUIT INSPECTION]

Refer to “Precautions for Electrical Circuit Service” and “Intermittents and Poor Connection” in Section 0A.

[Precaution after replacing Fuel Injection Pump or Immobilizer Control Module]

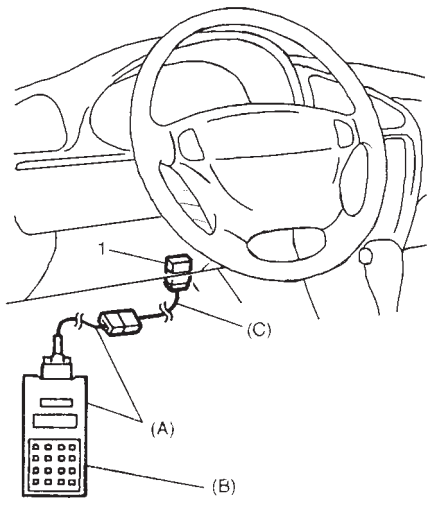
- ○ When Fuel Injection Pump was replaced, the ECU code must be registered in Fuel Injection Pump by performing procedure described in “Procedure after Fuel Injection Pump Replacement” Section. If it is not registered, Fuel Injection Pump would not function as Immobilizer Control System and accurate trouble diagnosis would not be assured.
- ○ When Immobilizer Control Module was replaced, including when replaced because rechecking by using a known-good Immobilizer Control Module was necessary during trouble diagnosis, the Transponder code and ECU code must be registered in Immobilizer Control Module by performing procedure described in “Procedure after Immobilizer Control Module Replacement” Section. If they are not registered, the engine would not start and accurate trouble diagnosis would not be assured.

DIAGNOSTIC FLOW TABLE

NOTE:

After replacing with Immobilizer Control Module and/or Fuel Injection Pump, register transponder code and ECU code according to "Procedure after Immobilizer Control Module Replacement" or "Procedure after Fuel Injection Pump Replacement". Otherwise, the accurate trouble diagnosis will not be assured.

STEP	ACTION	YES	NO
1	Turn ignition switch to start engine. Dose engine run?	Immobilizer control system is in good condition.	Go to Step 2.
2	Check DTC stored in immobilizer control module referring to "DIAGNOSTIC TROUBLE CODE CHECK". Are there DTC Nos 13 and/or 14?	Go to flow table for DTC No.	Go to Step 3.
3	Is there DTC No.12?	Go to flow table for DTC No.	Go to Step 4.
4	Are there DTC Nos11 and/or 31?	Go to flow table for DTC No.	Go to Step 5.
5	Are there DTC No.41, 42 or 43?	Go to flow table for DTC No.	Substitute a known-good immobilizer control module. And then go to Step 6.
6	Turn ignition switch to start engine. Dose engine run?	Immobilizer control system is in good condition.	Proceed to procedure 001 in Section 6E3.



1. Data link connector (DLC)

DIAGNOSTIC TROUBLE CODE (DTC) CHECK (IMMOBILIZER CONTROL MODULE)

1) Turn ignition switch OFF.
2) After setting cartridge to Suzuki scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

   Special Tool
   (A): 09931-76011 (Suzuki scan tool)
   (B): Mass storage cartridge
   (C): 09931-76030 (16/14 pin DLC cable)

3) Turn ignition switch OFF for 10 seconds and then ON.

   NOTE:
   When the ignition switch is turned off and then on again within 10 seconds, DTC41 is stored in the immobilizer control module.

4) Read DTC stored in immobilizer control module according to instructions displayed on Suzuki scan tool and print it or write it down. Refer to Suzuki scan tool operator's manual for further details.
   If Suzuki scan tool indicates "ECU NO RESPONSE", go to "Diagnostic Flow Table A".

   NOTE:
   When reading DTC stored in immobilizer control module using Suzuki scan tool, select "BCM" from the applications menu and "IMMOBILIZER" from the select system menu displayed on Suzuki scan tool.

5) After completing the check, turn ignition switch OFF and disconnect Suzuki scan tool from data link connector (DLC).

DIAGNOSTIC TROUBLE CODE TABLE

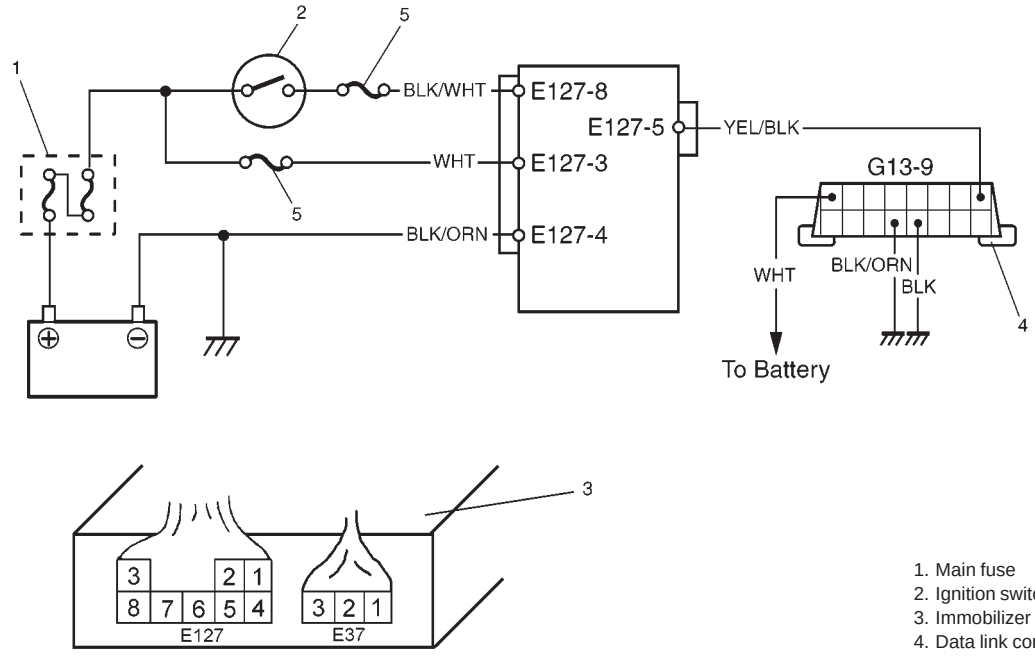
Immobilizer Control Module

DIAGNOSTIC TROUBLE CODE NO.	DIAGNOSTIC AREA	DIAGNOSIS
NO DTC	———	This code appears when none of the other codes are identified.
11	Transponder code	Diagnose trouble according to “DIAGNOSTIC FLOW TABLE” corresponding to each code No.
31		
12	Immobilizer Control Module	
13	Coil antenna or ignition key with built-in transponder	
14		
41	Fuel injection pump not registered	
43	ECU code not matched	
42	Serial data circuit (between Immobilizer Control Module and Fuel Injection Pump)	

NOTE:

- **When the ignition switch is turned off and then on again within 10 seconds, DTC 41 is stored in the immobilizer control module.**
- **If any DTC other than DTC 41 is stored in the immobilizer control module, the immobilizer system is locked (engine unable to start).**

TABLE A SCAN TOOL CAN NOT COMMUNICATE WITH IMMOBILIZER CONTROL MODULE



1. Main fuse
2. Ignition switch
3. Immobilizer Control Module
4. Data link connector (G13)
5. Fuse

STEP	ACTION	YES	NO
1	Check voltage between E127-8 terminal and body ground with ignition switch ON. Is it 10 – 14V?	Go to Step 2.	○ "BLK/WHT" wire open ○ Fuse broken
2	Check voltage between E127-3 terminal and body ground. Is it 10 – 14V?	Go to Step 3.	○ "WHT" wire open ○ Fuse broken
3	Is there continuity between E127-4 terminal and body ground?	Go to Step 4.	"BLK/ORN" wire open
4	Check voltage between G13-9 terminal and body ground with ignition switch ON. Is it 4 – 5V?	○ Poor E127-8, E127-3, E127-4 or E127-5 connection If connection and line are OK, substitute a known-good Immobilizer Control Module and recheck.	"YEL/BLK" wire open

DTC11 TRANSPONDER CODE NOT MATCHED
DTC31 TRANSPONDER CODE NOT REGISTERED

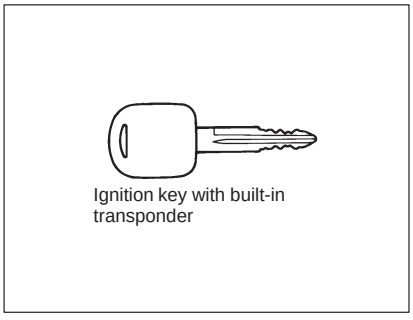
DESCRIPTION:

Immobilizer Control Module checks if Transponder code transmitted from ignition key and that registered in Immobilizer Control Module match when ignition switch is ON. If they do not, DTC 11 and 31 are set.

INSPECTION:

STEP	ACTION	YES	NO
1	Was “Immobilizer Diag. Flow Table” performed?	Go to Step 2.	Go to “Immobilizer Diag. Flow Table”.
2	Check that knob shape of ignition key being used is the same as shown in Fig. 1. Is it ignition key with built-in transponder?	Register ignition key in immobilizer control module according to the procedure described in “How to Register Ignition Key”. And then go to Step 3.	Replace ignition key.
3	Read DTC according to “Diagnostic Trouble Code Check” section. Does Suzuki scan tool indicate DTC 11 and/or 31 again?	Replace ignition key.	Go to “Immobilizer Diag. Flow Table”.

Fig. 1 for Step 2



DTC12 FAULT IN IMMOBILIZER CONTROL MODULE

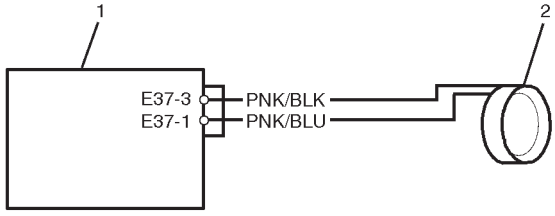
DESCRIPTION:

This DTC is set when an internal fault is detected in Immobilizer Control Module.

INSPECTION:

STEP	ACTION	YES	NO
1	Was “Immobilizer Diag. Flow Table” performed?	Go to Step 2.	Go to “Immobilizer Diag. Flow Table”.
2	1) Ignition switch OFF. 2) Disconnect connectors from Immobilizer Control Module. 3) Check for proper connection to Immobilizer Control Module at all terminals. Are they in good condition?	Substitute a known-good Immobilizer Control Module and recheck.	Repair or replace.

DTC13 NO TRANSPONDER CODE TRANSMITTED FROM IGNITION KEY
DTC14 COIL ANTENNA CIRCUIT MALFUNCTION



1. Immobilizer Control Module
2. Coil antenna

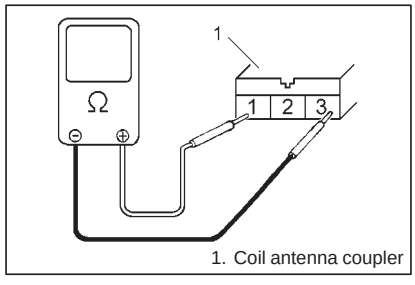
DESCRIPTION:

Immobilizer Control Module energizes the coil antenna when the ignition switch is ON and reads Transponder code from the ignition key. When Immobilizer Control Module cannot read Transponder code from the ignition key even when the coil antenna is energized, DTC 13 and 14 are set.

INSPECTION:

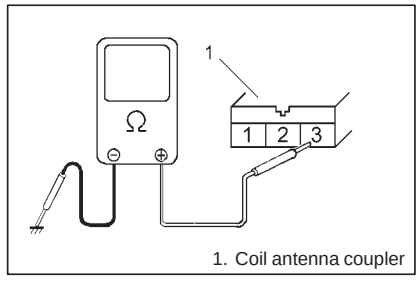
STEP	ACTION	YES	NO
1	Was “Immobilizer Diag. Flow Table” performed?	Go to Step 2.	Go to “Immobilizer Diag. Flow Table”.
2	1) Disconnect coil antenna coupler with ignition switch turned OFF. 2) Is there continuity between coil antenna coupler terminals E37-1 and E37-3? (See Fig. 1)	Go to Step 3.	Coil antenna open.
3	Measure resistance between terminals of coil antenna coupler and body ground. (See Fig. 2) Is it ∽ (infinity) I ?	Go to Step 4.	Coil antenna shorted to ground.
4	Poor E37-1 or E37-3 connection. 1) If connections are OK, substitute a known-good coil antenna. 2) Is DTC 13 and/or 14 also indicated with ignition switch turned ON?	Substitute a known-good Immobilizer Control Module and recheck.	Faulty coil antenna.

Fig. 1 for Step 2



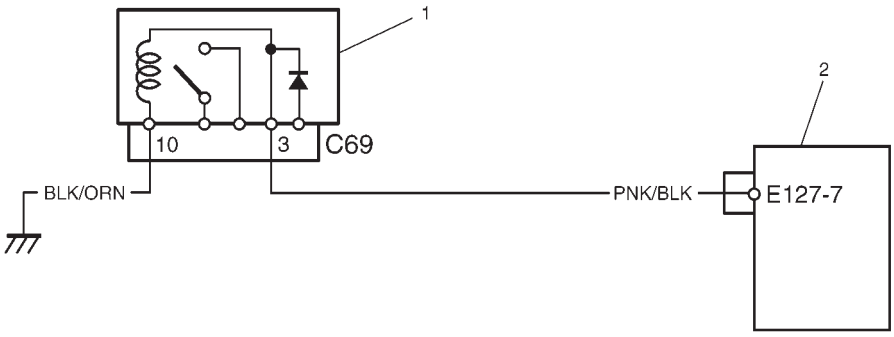
1. Coil antenna coupler

Fig. 2 for Step 3



1. Coil antenna coupler

DTC41 FUEL INJECTION PUMP NOT REGISTERED



1. Double relay
2. Immobilizer Control Module

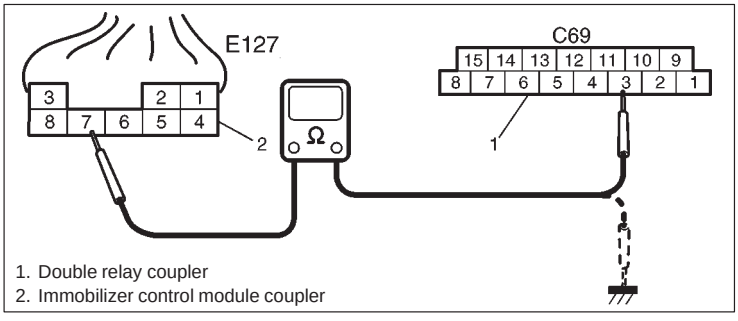
DESCRIPTION:

Immobilizer Control Module checks whether immobilizer system is locked with ignition switch OFF. If the system is unlocked, DTC 41 is set.

INSPECTION:

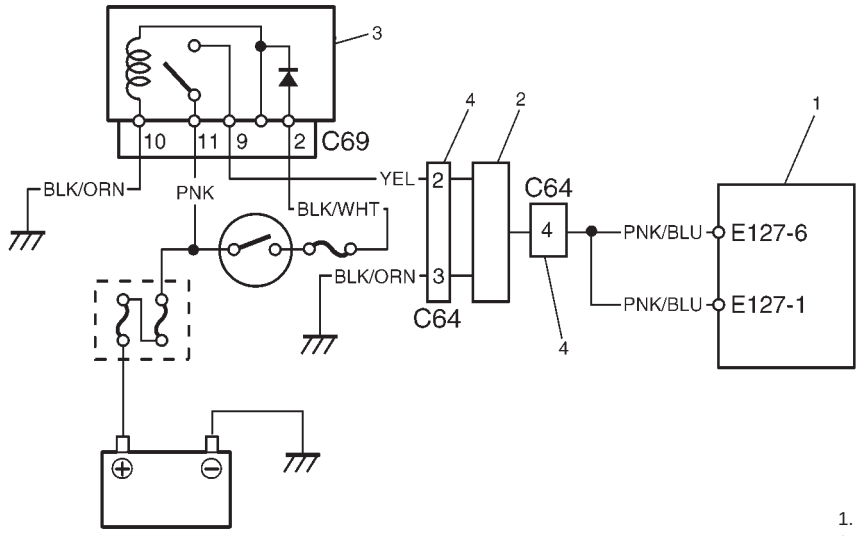
STEP	ACTION	YES	NO
1	Was “Immobilizer Diag. Flow Table” performed?	Go to Step 2.	Go to “Immobilizer Diag. Flow Table”.
2	1) Disconnect double relay at coupler. 2) Disconnect coupler at immobilizer control module. 3) Is there continuity between E127-7 of immobilizer control module coupler and C69-3 of double relay coupler? See Fig.1.	Go to Step 3.	○ “PNK/BLK” wire open or, ○ Poor E127-7 terminal connection
3	1) Check resistance between E127-7 of immobilizer control module coupler and body ground. See Fig.1. Is it infinity (∽)?	○ Poor E127-7 or C69-3 terminal connection ○ Faulty double relay If all above are OK, register ECU code in fuel injection pump according to “Procedure after Fuel Injection Pump Replacement” section. And then go to Step 4.	“PNK/BLK” wire shorted to ground
4	1) Read DTC according to “Diagnostic Trouble Code Check” section. Does Suzuki scan tool indicate DTC 41 again?	Substitute a known-good Fuel Injection Pump and recheck.	Go to “Immobilizer Diag. Flow Table”.

Fig. 1 for Step 2 and 3



1. Double relay coupler
2. Immobilizer control module coupler

DTC42 SERIAL DATA CIRCUIT MALFUNCTION (BETWEEN IMMOBILIZER CONTROL MODULE AND FUEL INJECTION PUMP)



1. Immobilizer control module
2. Fuel injection pump
3. Double relay
4. Coupler for fuel cut valve

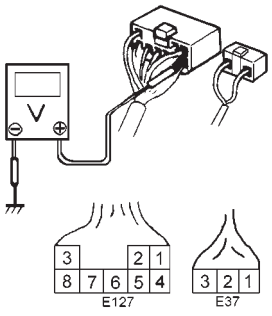
DESCRIPTION

If ECU code is not transmitted from Fuel Injection Pump, Immobilizer Control Module sets DTC42.

INSPECTION:

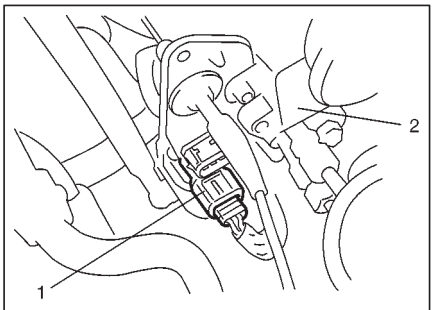
STEP	ACTION	YES	NO
1	Was “Immobilizer Diag. Flow Table” performed?	Go to Step 2.	Go to “Immobilizer Diag. Flow Table”.
2	1) Disconnect coupler at immobilizer control module. 2) Check voltage between coupler terminal below and body ground with ignition switch ON. See Fig.1. ○ E127-6 and body ground ○ E127-1 and body ground Are they 10 – 14 V?	Go to Step 3.	○ “PNK/BLU” wire open or ○ Poor C64-4 terminal connection
3	1) Disconnect fuel cut valve at coupler. See Fig.2. 2) Check voltage between C64-2 terminal and body ground with ignition switch ON. See Fig.3. Is it 10 – 14 V?	Go to Step 4.	○ “YEL” wire open, ○ “PNK” wire open, ○ “BLK/ORN” wire open or ○ Poor double relay coupler terminal connection
4	Is there continuity between C64-3 and body ground? See Fig.3.	○ Poor E127-1/6 terminals connection, ○ Poor fuel cut valve terminal connection, ○ Faulty double relay or ○ Faulty fuel injection pump	“BLK/ORN” wire open

Fig. 1 for step 2



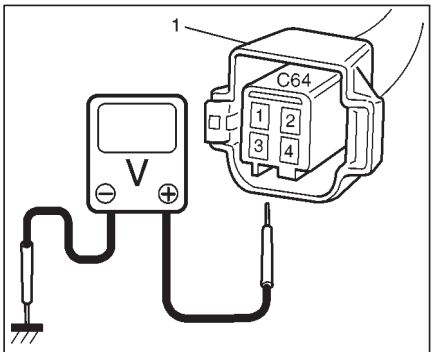
1. Immobilizer Control Module

Fig. 2 for step 3



1. Fuel cut valve coupler
2. Fuel injection pump

Fig. 3 for step 4



1. Fuel cut valve coupler (Engine harness side)

DTC43 ECU CODE NOT MATCHED

DESCRIPTION:

Immobilizer Control Module and Fuel Injection Pump check if ECU codes registered in them respectively match. If the codes do not match, Immobilizer Control Module sets DTC 43.

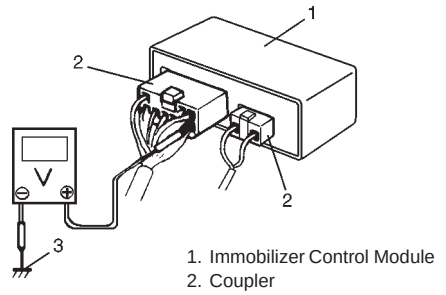
INSPECTION:

STEP	ACTION	YES	NO
1	Was “Immobilizer Diag. Flow Table” performed?	Go to Step 2.	Go to “Immobilizer Diag. Flow Table”.
2	1) Register ECU code in immobilizer control module according to “Procedure after Immobilizer Control Module Replacement” section. 2) Read DTC according to “Diagnostic Trouble Code Check” section. Does Suzuki scan tool indicate DTC 43 again?	Faulty fuel injection pump	Go to “Immobilizer Diag. Flow Table”.

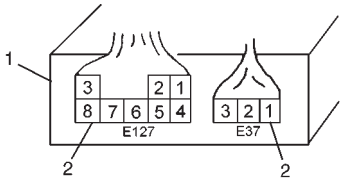
INSPECTION OF IMMOBILIZER CONTROL MODULE AND ITS CIRCUIT

Immobilizer Control Module and its circuit can be checked at Immobilizer Control Module wiring coupler by measuring voltage and resistance. Described here is only inspection of Immobilizer Control Module.

CAUTION:
Immobilizer Control Module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to Immobilizer Control Module with coupler disconnected from it.



1. Immobilizer Control Module
2. Coupler
3. Body ground



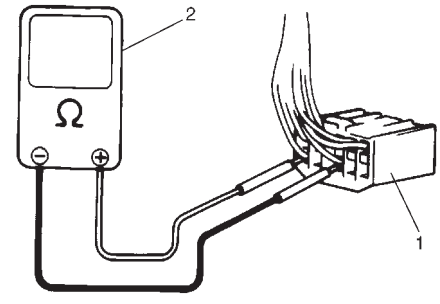
Voltage Check

1) Remove Immobilizer Control Module from body with ignition switch OFF referring to IMMOBILIZER CONTROL MODULE REMOVAL in this section.
2) Connect Immobilizer Control Module couplers to Immobilizer Control Module.
3) Check voltage at each terminal of couplers connected.

NOTE:
As each terminal voltage is affected by the battery voltage, confirm that it is 11V or more when ignition switch is ON.

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E37-1	Coil antenna +	0 V	Ignition switch ON
E37-2	–	–	–
E37-3	Coil antenna –	0 V	Ignition switch ON
E127-1	Serial data line between fuel injection pump and immobilizer control module	10 – 14 V	Ignition switch ON
E127-2	–	–	–
E127-3	Power supply	10 – 14 V	Ignition switch ON
E127-4	GND	–	–
E127-5	Serial data line between Suzuki scan tool and immobilizer control module	4 – 5 V	Ignition switch ON
E127-6	Serial data line between fuel injection pump and immobilizer control module	10 – 14 V	Ignition switch ON
E127-7	Power control of fuel injection pump	0 V	Ignition switch OFF
		10 – 14 V	Ignition switch ON
E127-8	Ignition signal	0 V	Ignition switch OFF
		10 – 14 V	Ignition switch ON

NOTE:
When measuring voltage at E127-4 and E127-3 terminals with ignition switch turned ON, be sure to turn ignition switch ON before connecting positive probe of voltmeter to E37-1 or E37-3 terminal. If it is not turned ON first, DTC13 (Diagnostic Trouble Code 13) may be indicated.



1. Immobilizer Control Module coupler disconnected
2. Ohmmeter

Resistance Check

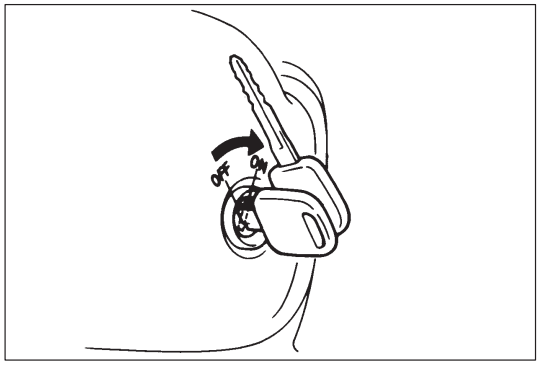
1) Disconnect Immobilizer Control Module couplers from Immobilizer Control Module with ignition switch OFF.

CAUTION:
Never touch terminals of Immobilizer Control Module itself or connect voltmeter or ohmmeter.

2) Check resistance between each terminal of couplers disconnected.

CAUTION:
- **Be sure to connect ohmmeter probe from wire harness side of coupler.**
- **Be sure to turn OFF ignition switch for this check.**
- **Resistance in table below represents that when parts temperature is 20°C (68°F).**

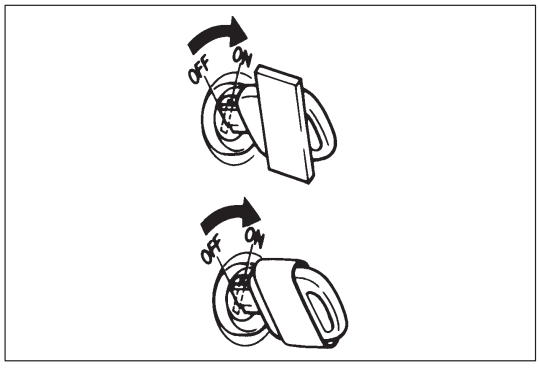
TERMINAL	CIRCUIT	NORMAL RESISTANCE	CONDITION
E127-4 – E127-3	Coil antenna	Continuity	–



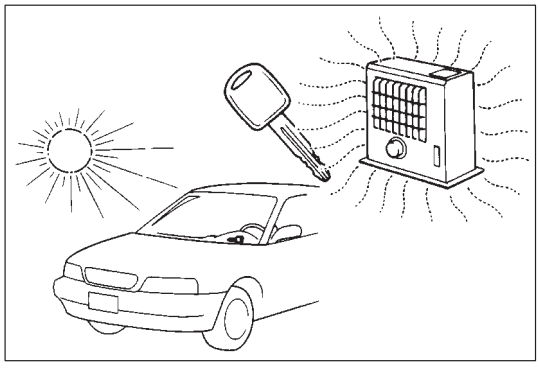
ON-VEHICLE SERVICE

Precautions in handling immobilizer control system

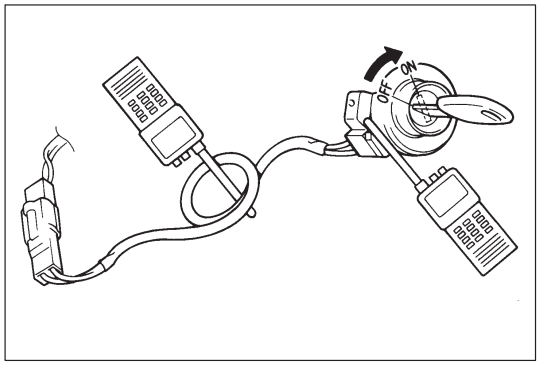
○ Don't turn ON ignition switch with ignition key for immobilizer control system put together with another one or placed quite close to another one. Or the system may detect abnormal condition and prevent engine from starting.



○ Do not turn ON ignition switch by using ignition key with any type of metal wound around its grip or in contact with it. Or the system may detect abnormal condition and prevent engine from starting.



○ Do not leave ignition key where high temperature is anticipated. High temperature will cause transponder in ignition key to be abnormal or damaged.



○ Do not turn ON ignition switch with a radio antenna placed near coil antenna or its harness to Immobilizer Control Module. Or the system may detect abnormal condition and prevent engine from starting.

IMMOBILIZER CONTROL MODULE

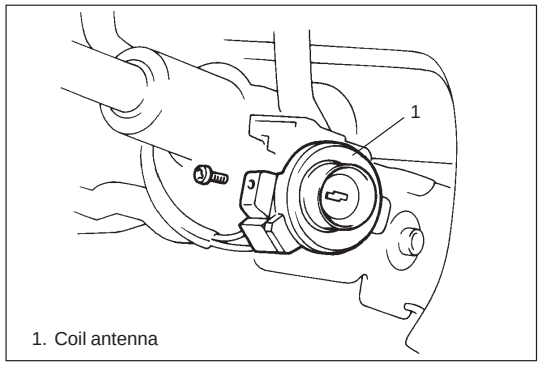
Removal

1) Disconnect negative (–) cable at battery.
2) Disconnect couplers.
3) Remove immobilizer control module.

Installation

Reverse removal procedure for installation

NOTE:
After replacing Immobilizer Control Module, be sure to register Transponder code and ECU code in Immobilizer Control Module by performing procedure described in "Procedure after Immobilizer Control Module Replacement".



1. Coil antenna

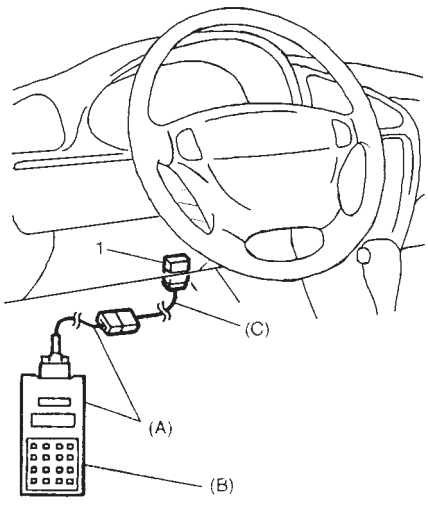
COIL ANTENNA

Removal

1) Disconnect negative (–) cable at battery.
2) Remove air bag module (if equipped), steering wheel and combination switch assembly (together with steering sensor if suspension control system is equipped).
   Refer to Section 3C1 or 3G.
3) Remove coil antenna.

Installation

For installation, reverse removal procedure, surely referring to Section 3C1 (with air bag) or 3G (with suspension control system).



1. Data link connector (DLC)

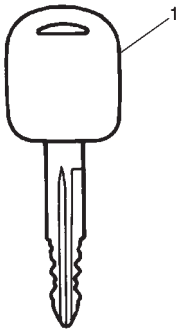
HOW TO REGISTER IGNITION KEY

Register the ignition key with a built-in transponder in Immobilizer Control Module by using the following procedure.

1) Prepare Suzuki scan tool (TECH 1A kit and cartridge for immobilizer control system).
2) With ignition switch OFF, connect Suzuki scan tool to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special Tool
(A): 09931-76011 (Tech 1A)
(B): Immobilizer cartridge
(C): 09931-76030 (16/14-pin DLC cable)

NOTE:
For operation procedure of Suzuki scan tool, refer to Suzuki scan tool operator's manual.



1. Ignition key with built-in transponder

3) Prepare ignition key with a built-in transponder. And then turn ignition switch ON by using it.
4) Number of Transponder codes for ignition key with a built-in transponder that can be registered in Immobilizer Control Module is limited to 4. If needed, clear all Transponder codes for ignition key with a built-in transponder that have been registered in Immobilizer Control Module by executing the "F2: CLR. TRANS COD (Clear transponder code)" command in the SELECT MODE menu by using Suzuki scan tool.

NOTE:
When "CLR. TRANS COD (Clear transponder code)" command is executed while no DTC is stored in the immobilizer control module, the immobilizer system remains unlocked. The immobilizer system changes into the locked state if the ignition switch is turned off for 10 seconds or longer and then turned on.

5) Using Suzuki scan tool, register Transponder code in Immobilizer Control Module by executing "ENT. TRANS COD (Enter transponder code)" command in SELECT MODE menu.
6) Make sure that DTC 11 and 31 are not displayed on Suzuki scan tool after ignition switch is turned OFF for 10 seconds or more and then ON.

7) If any other Transponder code for ignition key with a built-in transponder needs to be registered, repeat above Steps 3), 5) and 6).

NOTE:
- ○ **Up to 4 Transponder codes for ignition key with a built-in transponder can be registered.**
- ○ **It is not possible to register the same Transponder code for ignition key with a built-in transponder as the one already registered in Immobilizer Control Module.**

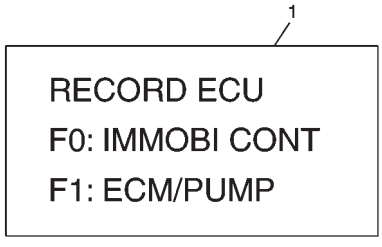
PROCEDURE AFTER IMMOBILIZER CONTROL MODULE REPLACEMENT

When Immobilizer Control Module was replaced, including when replaced because rechecking by using a known-good Immobilizer Control Module was necessary during trouble diagnosis, register Transponder code and ECU code in Immobilizer Control Module by performing following procedure.

1) Perform Steps 1) and 2) described in “How to register ignition key” section.
2) Prepare ignition key with a built-in transponder. And then turn ignition switch ON by using it.
3) Using Suzuki scan tool, clear all transponder codes registered in Immobilizer Control Module by executing “CLR. TRANS COD (Clear transponder code)” command in SELECT MODE menu.

NOTE:
When “CLR. TRANS COD (Clear transponder code)” command is executed while no DTC is stored in the immobilizer control module, the immobilizer system remains unlocked. The immobilizer system changes into the locked state if the ignition switch is turned off for 10 seconds or longer and then turned on.

4) Using Suzuki scan tool, register Transponder code in Immobilizer Control Module by executing “ENT. TRANS COD (Enter transponder code)” command in SELECT MODE menu.
5) Using Suzuki scan tool, register ECU code in Immobilizer Control Module by executing “IMMOBI CONT” command in RECORD ECU menu.



1. Suzuki scan tool screen

CAUTION:
While IMMOBI CONT command is being executed, Suzuki scan tool requires VIN to be entered. When entering VIN, make sure to follow the procedure described in Operator’s Manual supplied with the immobilizer cartridge. Incorrect VIN will cause the immobilizer system to be locked (engine unable to start).

6) Make sure that DTC 43 is not displayed on Suzuki scan tool after ignition switch is turned OFF for 10 seconds or more and then ON.
7) If any other Transponder code for ignition key with a built-in transponder needs to be registered, repeat above Steps 2), 4) and 6).

NOTE:
- **Up to 4 Transponder codes for ignition key with a built-in transponder can be registered.**
- **It is not possible to register the same Transponder code for ignition key with a built-in transponder as the one already registered in Immobilizer Control Module.**

PROCEDURE AFTER FUEL INJECTION PUMP REPLACEMENT

CAUTION:
After replacing the fuel injection pump with a new one whose ECU code has not been registered, be sure to register it according to the following procedure. Without registration, the immobilizer system does not operate properly.

NOTE:
- **ECU code can be registered to the fuel injection pump once only.**
- **If both immobilizer control module and fuel injection pump are replaced at the same time, execute "Procedure after Immobilizer Control Module replacement" first and then "Procedure after Fuel Injection Pump replacement".**

When fuel injection pump was replaced, register ECU code in fuel injection pump by performing following procedure.

1) Perform Steps 1) and 2) described in "How to register ignition key" section. And then turn ignition switch ON.

RECORD ECU
F0: IMMOBI CONT
F1: ECM/PUMP

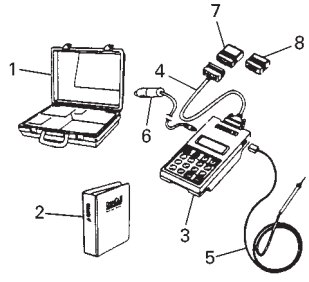
2) Using Suzuki scan tool, register ECU code in fuel injection pump by executing “ECM/PUMP” command in RECORD ECU menu.

NOTE:

- **Turn on and off the ignition switch according to the instructions that appear on the screen of Suzuki scan tool.**
- **It takes 1 minute (max) until registration of ECU code to the fuel injection pump is completed.**

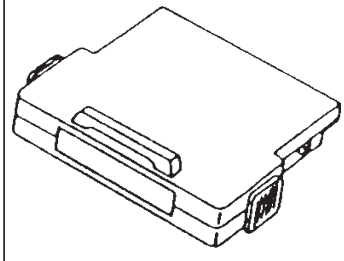
3) Make sure that DTC 43 is not displayed on Suzuki scan tool after ignition switch is turned OFF for 10 seconds or more and then ON.

SPECIAL TOOLS

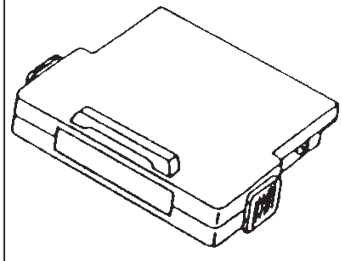


1. Storage case
2. Operator’s manual
3. Tech 1A
4. DLC cable (14/26 pin, 09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

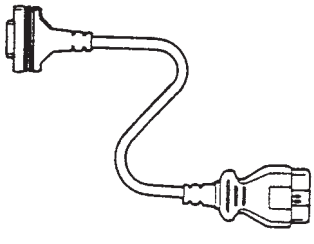
09931-76011
Suzuki scan tool (Tech 1A kit)



Immobilizer cartridge of version 1.4



Mass storage cartridge of version 1.6



NOTE:
Use this cable only with immobilizer cartridge of version 1.1 or more.
Use of this cable with 96 immobilizer cartridge will disable 96 immobilizer cartridge from operating properly.

09931-76030
16/14 pin DLC cable

SECTION 8A

WIRING DIAGRAM

NOTE:

- **This section describes only the different points of this face lifted model from the former models. For information not included here, refer to SY413/SY416/SY418/SY419 WIRING DIAGRAM MANUAL (99512-60G60-015) mentioned in the FOREWORD.**
- **When performing works related to electric systems, observe cautions and warning in SECTION 8A-1 of WIRING DIAGRAM MANUAL mentioned in Foreword of this manual for the purpose of protection of electrical parts and prevention of fire from occurrence.**

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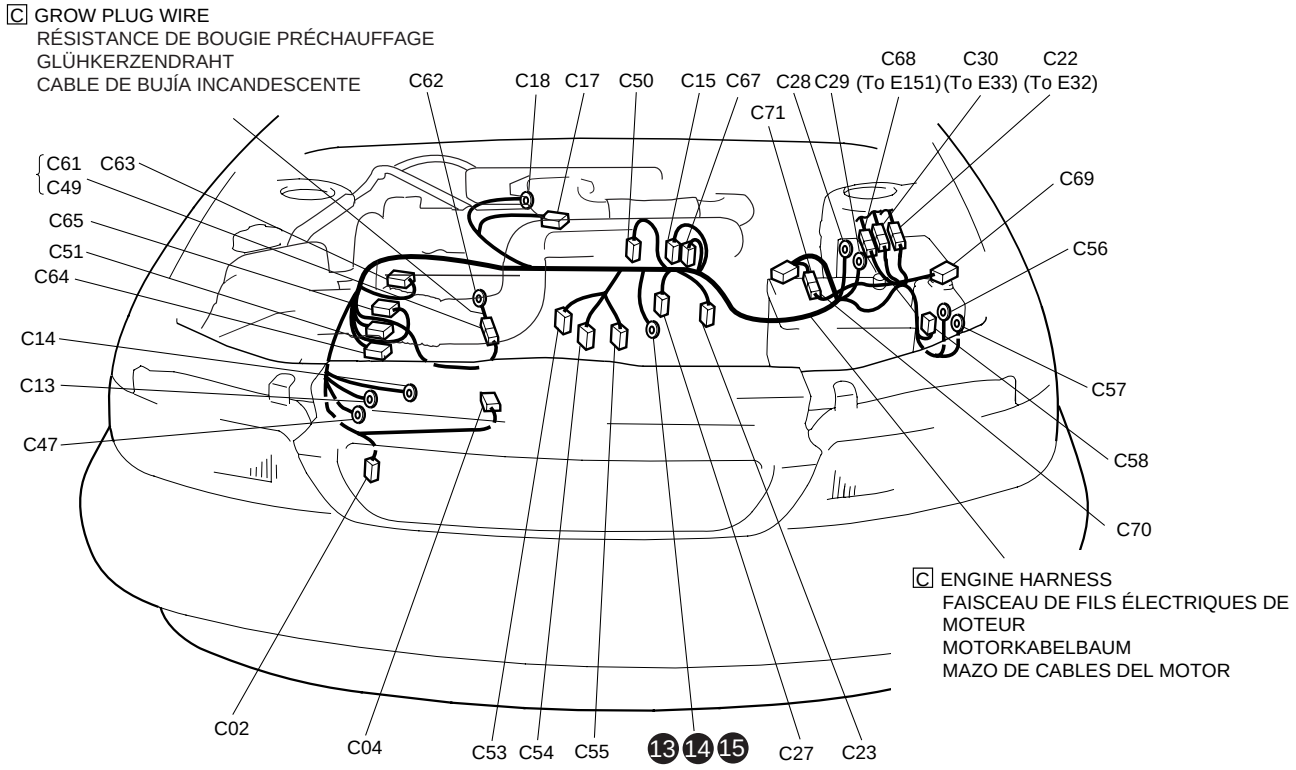
IMMOBILIZER CONTROL SYSTEM 8A-7-22

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C

8A-3 CONNECTOR LAYOUT DIAGRAM
SCHÉMA DE POSITIONS DES BLOCS RACCORD DE CÂBLAGE
STECKVERBINDER-ANORDNUNGSDIAGRAMM
DIAGRAMA DE LA DISPOSICIÓN DE LOS CONECTORES

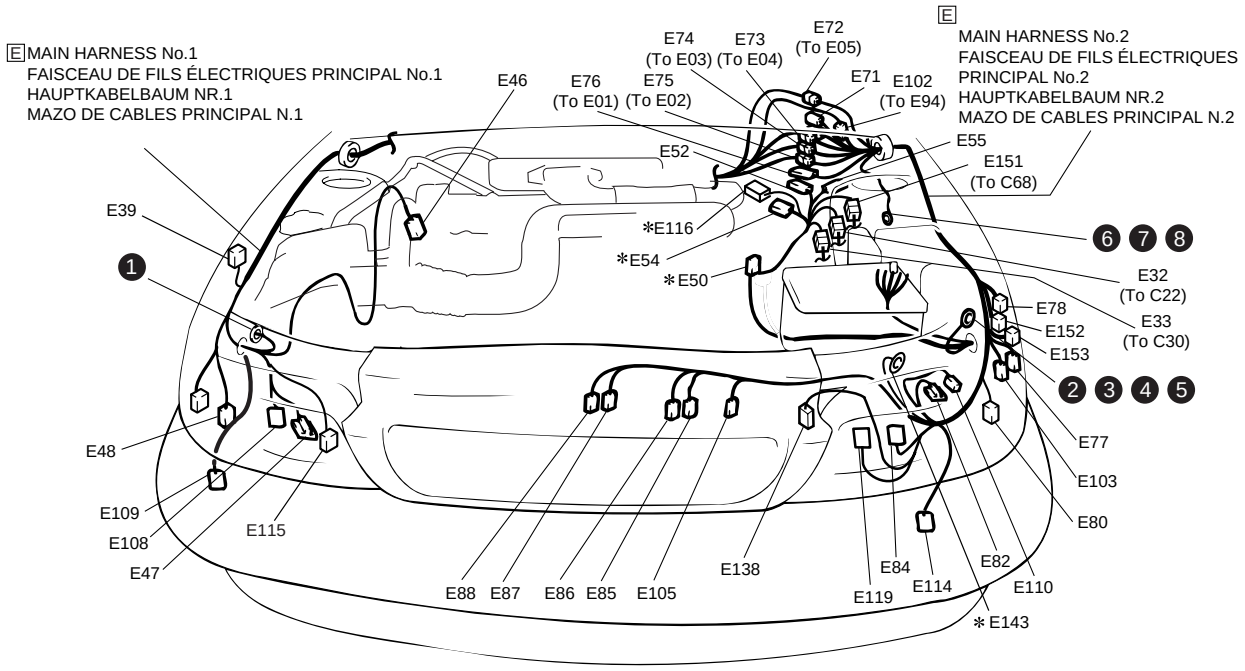
C:ENGINE HARNESS & GROW PLUG WIRE
FAISCEAU DE FILS -ÉLECTRIQUES DE MOTEUR ET RÉSISTANCE DE BOUGIE PRÉCHAUFFAGE
MOTORKABELBAUM UND GLÜHKERZENDRAHT
MAZO DE CABLES DEL MOTOR Y CABLE DE BUJÍA INCANDESCENTE



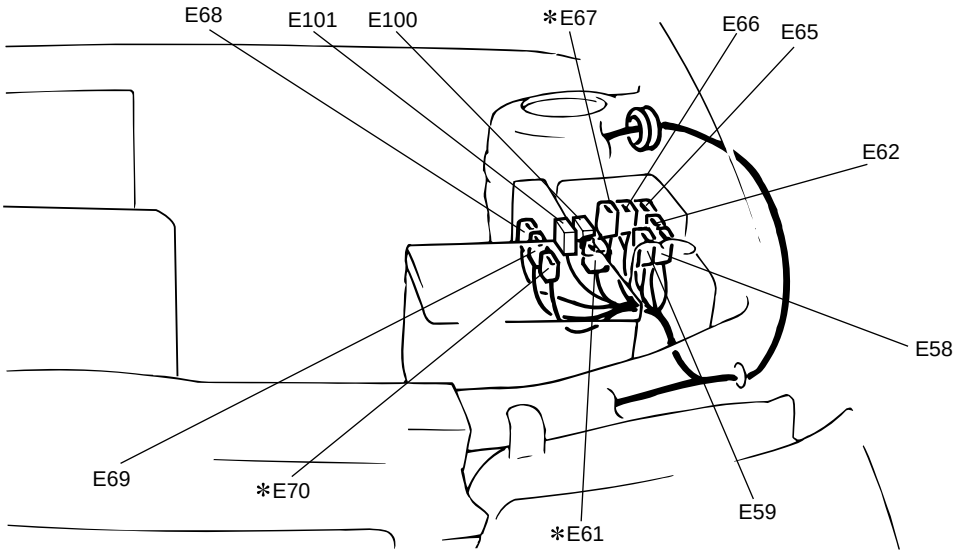
CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
C: ENGINE HARNESS / C: FAISCEAU DE FILS ÉLECTRIQUES DE MOTEUR / C: MOTORKABELBAUM C: MAZO DE CABLES DEL MOTOR	
C02	A/C COMPRESSOR / COMPRESSEUR DE CLIMATISEUR / KLIMAANLAGENKOMPRESSOR COMPRESSOR DEL ACONDICIONADOR DE AIRE
C04	OIL PRESSURE SWITCH / CONTACTEUR DE PRESSION D'HUILE / ÖLDRUCKSCHALTER INTERRUPTOR DE PRESION DEL ACEITE
C13	GENERATOR / GENERATEUR / GENERATOR GENERADOR
C14	GENERATOR / GENERATEUR / GENERATOR GENERADOR
C15	EGR ON/OFF VALVE #1
C17	STARTING MOTOR / DÉMARREUR / STARTERMOTOR MOTO DE ARRANQUE
C18	STARTING MOTOR / DÉMARREUR / STARTERMOTOR MOTO DE ARRANQUE
C22	MAIN HARNESS (To E32) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E32) / HAUPTKABELBAUM (ZUR E32) MAZO DE CABLES PRINCIPAL (AL E32)
C23	VEHICLE SPEED SENSOR/ CAPTEUR DE VITESSE DE VÉHICULE / FAHRZEUGGESCHWINDIGKEIT-SENSOR SENSOR DE LA VELOCIDAD DEL VEHÍCULO
C27	BACK-UP LIGHT SWITCH / CONTACTEUR DE FER DE RECUL / RUCKFAHRLICHTSCHALTER INTERRUPTOR DE LA LUZ DE MARCHA ATRAS
C28	MAIN FUSE / FUSIBLE PRINCIPAL / HAUPTSICHERUNG FUSIBLE PRINCIPAL
C29	MAIN FUSE / FUSIBLE PRINCIPAL / HAUPTSICHERUNG FUSIBLE PRINCIPAL
C30	MAIN HARNESS (To E33) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E33) / HAUPTKABELBAUM (ZUR E33) MAZO DE CABLES PRINCIPAL (AL E33)
C47	GENERATOR / GENERATEUR / GENERATOR GENERADOR
C49	GLOW PLUG WIRE (To C61) / RÉSISTANCE DE BOUGIE PRÉCHAUFFAGE (VERS C61) / GLÜHKERZENDRAHT (ZUR C61) CABLE DE BUJÍA INCANDESCENTE (AL C61)
C50	TDC SENSOR / TDC - SENSOR / DÉTECTEUR TDC SENSOR DE TDC
C51	THROTTLE POSITION SWITCH / INTERRUPTEUR DE POSITION DU PAPILLON / DROSSELKLAPPENÖFFNUNGSSCHALTER INTERRUPTOR DE POSICIÓN DEL ACELERADOR
C53	EGR WATER TEMPERATURE SWITCH / MANOCONTACT DE TEMPÉRATURE D' EAU DE EGR EGR WASSERTEMPERATURSCHALTER / INTERRUPTOR DE LA TEMPERATURA DEL AGUA DE EGR
C54	WATER TEMPERATURE GAUGE / INDICATEUR DE TEMPÉRATURE DE L' EAU / KÜHLMITTELTEMPERATURMESSER MEDIDOR DE LA TEMPERATURA DEL AGUA
C55	WATER TEMPERATURE WARNING SWITCH MANOCONTACT DE RAPPEL DE TEMPÉRATURE D' EAU WASSERTEMPERATUR-WARNSCHALTER INTERRUPTOR DE AVISO DE LA TEMPERATURA DELAGUA
C56	GLOW PLUG CONTROL UNIT / DISPOSITIF DE COMMANDE DE BOUGIE PRÉCHAUFFAGE / GLÜHKERZEN-STEUEREINHEIT UNIDAD DE CONTROL DE BUJÍAS INCANDESCENTES
C57	GLOW PLUG CONTROL UNIT / DISPOSITIF DE COMMANDE DE BOUGIE PRÉCHAUFFAGE / GLÜHKERZEN-STEUEREINHEIT UNIDAD DE CONTROL DE BUJÍAS INCANDESCENTES
C58	GLOW PLUG CONTROL UNIT / DISPOSITIF DE COMMANDE DE BOUGIE PRÉCHAUFFAGE / GLÜHKERZEN-STEUEREINHEIT UNIDAD DE CONTROL DE BUJÍAS INCANDESCENTES
C63	NEEDLE MOVEMENT SENSOR
C64	FUEL PUMP / POMPE A CARBURANT / KRAFTSTOFFÖRDERPUMPE BOMBA DE COMBUSTIBLE
C65	EGR ON/OFF VALVE#2
C67	IDLE SOLENOID
C68	MAIN HARNESS (To E151) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E151) / HAUPTKABELBAUM (ZUR E151) MAZO DE CABLES PRINCIPAL (AL E151)
C69	W RELAY
C70	FUSIBLE LINK
C71	FUSIBLE LINK
C: GLOW PLUG WIRE / C: RÉSISTANCE DE BOUGIE PRÉCHAUFFAGE / C: GLÜHKERZENDRAHT C: CABLE DE BUJÌA INCANDESCENTE	
C61	ENGINE HARNESS (To C49) / FAISCEAU DE FILS ÉLECTRIQUES DE MOTEU (VERS C49) / MOTORKABELBAUM (ZUR C49) MAZO DE CABLES DEL MOTOR (AL C49)
C62	GLOW PLUG / BOUGIE DE PRECHAUFFAGE / GLÜHKERZE BUJIA INCANDESCENTE

E

E: MAIN HARNESS
FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL ET FAISCEAU DE FILS ÉLECTRIQUES DE COMPARTIMENT MOTEUR
HAUPTKABELBAUM UND MOTORRAUM-KABELBAUM
MAZO DE CABLES PRINCIPAL Y MAZO DE CABLES DEL COMPARTIMIENTO DEL MOTOR



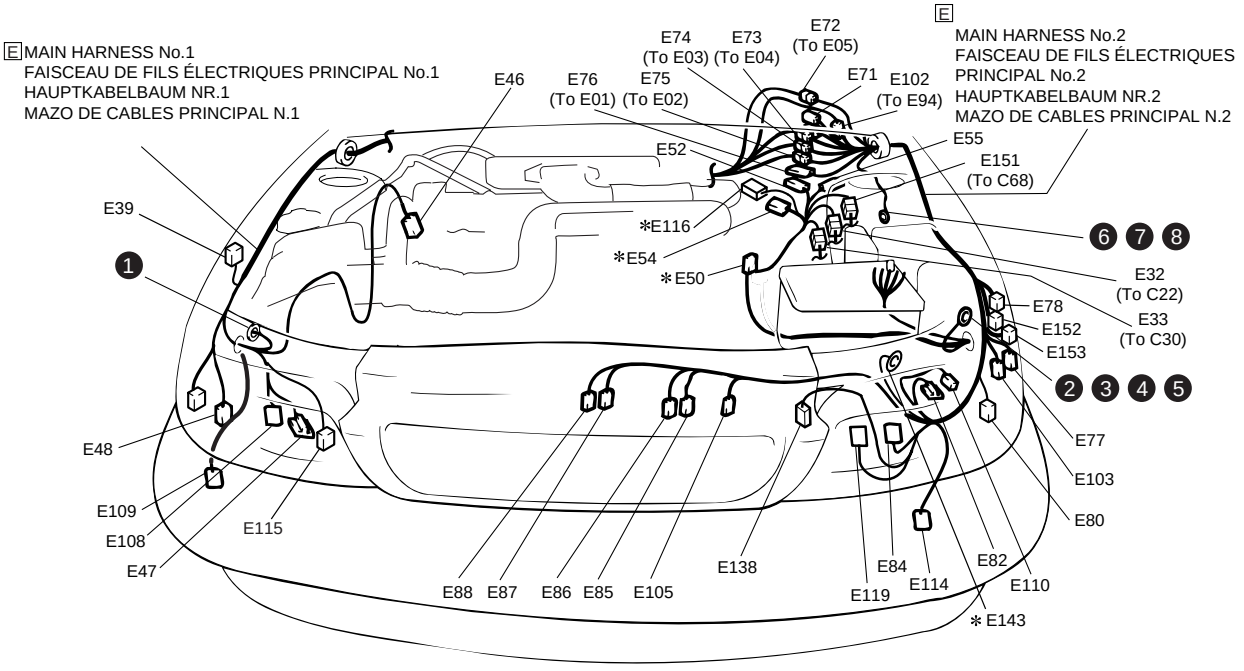
E: MAIN HARNESS (RELAY BOX)
FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (BOITE DE RELAIS)
HAUPTKABELBAUM (RELAISKASTEN)
MAZO DE CABLES PRINCIPAL (CAJC DE RELES)



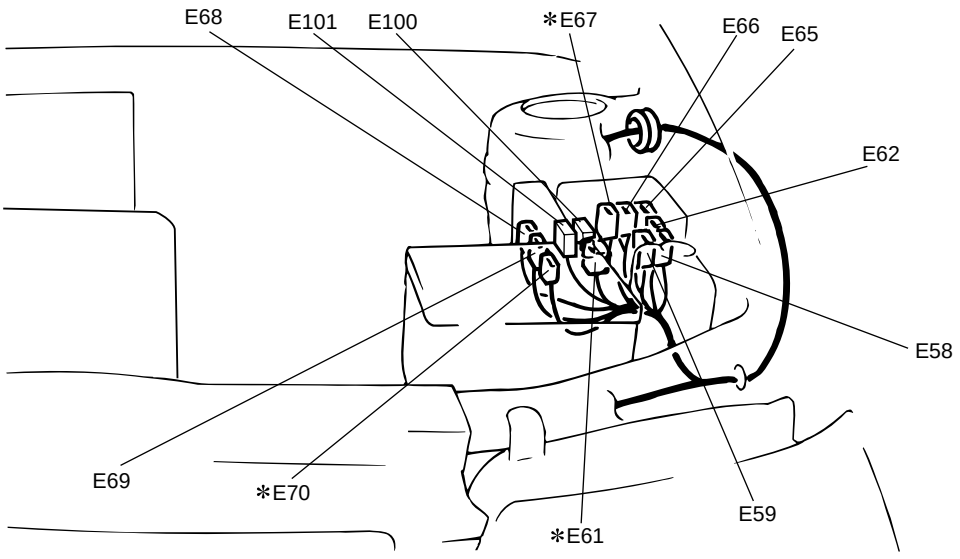
CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
E: MAIN HARNESS / E: FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL / E: HAUPTKABELBAUM E: MAZO DE CABLES PRINCIPAL	
E32	ENGINE HARNESS (To C22) / FAISCEAU DE FILS ÉLECTRIQUES DE MOTEU (VERS C22) / MOTORKABELBAUM (ZUR C22) MAZO DE CABLES DEL MOTOR (AL C22)
E33	ENGINE HARNESS (To C30) / FAISCEAU DE FILS ÉLECTRIQUES DE MOTEU (VERS C30) / MOTORKABELBAUM (ZUR C30) MAZO DE CABLES DEL MOTOR (AL C30)
E39	SIDE TURN SIGNAL LIGHT (DRIVER SIDE) / CLIGNOTANT LATERAL (COTE CONDUCTEUR) SEITLICHE BLINKLEUCHTE (FAHRERSEITE) / LUZ DE SEÑAL DE DIRECCION LATERAL (LADO DEL CONDUCTOR)
E46	ABS FRONT SPEED SENSOR (R) / DETECTEUR DE MARCHE AVANT D' ABS (D) ABS - FAHRTGESCHWINDIGKEITSFÜHLER VORNE (R) / SENSOR DE VELOCIDAD DELANTERA DE ABS (D)
E47	HEAD LIGHT (R) / PROJECTEUR (D) / SCHEINWERFER (R) FARO (D)
E48	FRONT TURN SIGNAL LIGHT (DRIVER SIDE) / CLIGNOTANT AVANT (COTE CONDUCTEUR) VORDERE BLINKLEUCHTE (FAHRERSEITE) / LUZ DE DIRECCION DELANNTERA (LADO DEL CONDUCTOR)
E50	ABS PUMP MOTOR / MOTEUR DE POMPE D'ABS / ABS - PUMPENMOTOR MOTOR DE LA BOMBA DE ABS
E52	WINDSHIELD WIPER MOTOR / MOTEUR D' ESSUIE-GLACE / WISCHERMOTOR MOTOR DEL LIMPIAPARABRISAS
E54	BRAKE FLUID LEVEL SWITCH / CONTACTEUR DE NIVEAU DE LIQUIDE DE FREIN / BREMSKONTROLLSCHALTER INTERRUPTOR DEL NIVEL DEL FLUIDO DEL FRENO
E55	ABS FRONT SPEED SENSOR (L) / DETECTEUR DE MARCHE AVANT D' ABS (G) ABS - FAHRTGESCHWINDIGKEITSFÜHLER VORNE (L) / SENSOR DE VELOCIDAD DELANTERA DE ABS (I)
E71	J/C
E72	MAIN HARNESS (To E05) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E05) / HAUPTKABELBAUM (ZUR E05) MAZO DE CABLES PRINCIPAL (AL E05)
E73	MAIN HARNESS (To E04) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E04) / HAUPTKABELBAUM (ZUR E04) MAZO DE CABLES PRINCIPAL (AL E04)
E74	MAIN HARNESS (To E03) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E03) / HAUPTKABELBAUM (ZUR E03) MAZO DE CABLES PRINCIPAL (AL E03)
E75	MAIN HARNESS (To E02) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E02) / HAUPTKABELBAUM (ZUR E02) MAZO DE CABLES PRINCIPAL (AL E02)
E76	MAIN HARNESS (To E01) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E01) / HAUPTKABELBAUM (ZUR E01) MAZO DE CABLES PRINCIPAL (AL E01)
E77	WINDSHIELD WASHER MOTOR / MOTEUR DE LAVE-GLACE / WASCHERMOTOR MOTOR DEL LAVADOR DEL PARABRISAS
E78	SIDE TURN SIGNAL LIGHT (PASSENGER SIDE) / CLIGNOTANT LATERAL (COTE PASSAGER) SEITLICHE BLINKLEUCHTE (BEI FAHRERSEITE) / LUZ DE SEÑAL DE DIRECCION LATERAL (LADO DEL PASAJERO)
E80	FRONT TURN SIGNAL LIGHT (PASSENGER SIDE) / CLIGNOTANT AVANT (COTE PASSANGER) VORDERE BLINKLEUCHTE (BEI FAHRERSEITE) / LUZ DE DIRECCION DELANNTERA (LADO DEL PASAJERO)
E82	HEAD LIGHT (L) / PRO ECTEUR (G) / SCHEINWERFER (L) FARO (I)
E84	RADIATOR FAN MOTOR / MOTEUR DU VENTILATEUR DE RADIATEUR / KÜHLERGEBLÄSEMOTOR MOTOR DEL VENTILADOR DEL RADIADOR
E85	HORN1 / AVERTISSEUR SONORE1 / HUPE1 BOCINA1
E86	HORN1 / AVERTISSEUR SONORE1 / HUPE1 BOCINA1
E87	HORN2 (IF EQUIPPED) / AVERTISSEUR SONORE2 (LE CAS ECHEANT) / HUPE2 (FALLS VORHANDEN) BOCINA2 (DE EQUIPARSE)
E88	HORN2 (IF EQUIPPED) / AVERTISSEUR SONORE2 (LE CAS ECHEANT) / HUPE2 (FALLS VORHANDEN) BOCINA2 (DE EQUIPARSE)
E102	MAIN HARNESS (To E94) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E94) / HAUPTKABELBAUM (ZUR E94) MAZO DE CABLES PRINCIPAL (AL E94)
E103	REAR WASHER MOTOR / MOTEUR DE LAVE-GLACE ARRIERE / HINTERER WASCHERMOTOR MOTOR DEL LAVADOR TRASERO
E105	DUAL PRESSURE SWITCH / PRESSOSTAT DOUBLE / DOPPELDRUCKSCHALTER INTERRUPTOR DE PRESION DOBLE
E108	FRONT POSITION LIGHT (EXCEPT SAUDIARABIA) / FEU DE POSITION AVANT (SAUF ARABIE SAOUDITE) VORDERE POSITIONSLEUCHTE (AUSSER SAUDI-ARABIEN) / LUZ DE POSICION DELANTERA (EXCEPTO ARABIA SAUDI)
E109	FOG LIGHT (L) / ANTIBROUILLARD (G) / NEBELLEUCHTE (L) FARO ANTINIEBLA (I)
E110	FRONT POSITION LIGHT (L) (EXCEPT SAUDIARABIA) / FEU DE POSITION AVANT(G) (SAUF ARABIE SAOUDITE) VORDERE POSITIONSLEUCHTE (L) (AUSSER SAUDIARABIEN) / LUZ DE POSICION DELANTERA (I) (EXCEPTO ARABIA SAUDI)
E114	FOG LIGHT (R) / ANTIBROUILLARD (D) / NEBELLEUCHTE (R) FARO ANTINIEBLA (D)
E115	HEAD LIGHT LEVELING MOTOR (R) / MOTEUR DE REGLAGE DES PROJECTEURS (D) / SCHEINWERFER - EINSTELLER (R) ACTUADOR DE NIVELACION DE LOS FAROS(D)
E116	ABS ACTUATOR UNIT & CONTROL MODULE ASSEMBLY ENSEMBLE DE DISPOSITIF DE COMMANDE ABS ET DE MODULE DE COMMANDE ABS-STELLGLIEDEINHEIT U. STEUERMODUL-BAUGRUPPE CONJUNTO DEL MÓDULO DE CONTROL Y UNIDAD DEL ACTUADOR DEL ABS
E119	RADIATOR FAN MOTOR (SUB) / MOTEUR DU VENTILATEUR DE RADIATEUR (SECONDAIRE) / KÜHLERGEBLÄSEMOTOR (NEBEN) MOTOR DEL VENTILADOR DEL RADIADOR (SECUNDARIO)

E

E: MAIN HARNESS
FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL ET FAISCEAU DE FILS ÉLECTRIQUES DE COMPARTIMENT MOTEUR
HAUPTKABELBAUM UND MOTORRAUM-KABELBAUM
MAZO DE CABLES PRINCIPAL Y MAZO DE CABLES DEL COMPARTIMIENTO DEL MOTOR



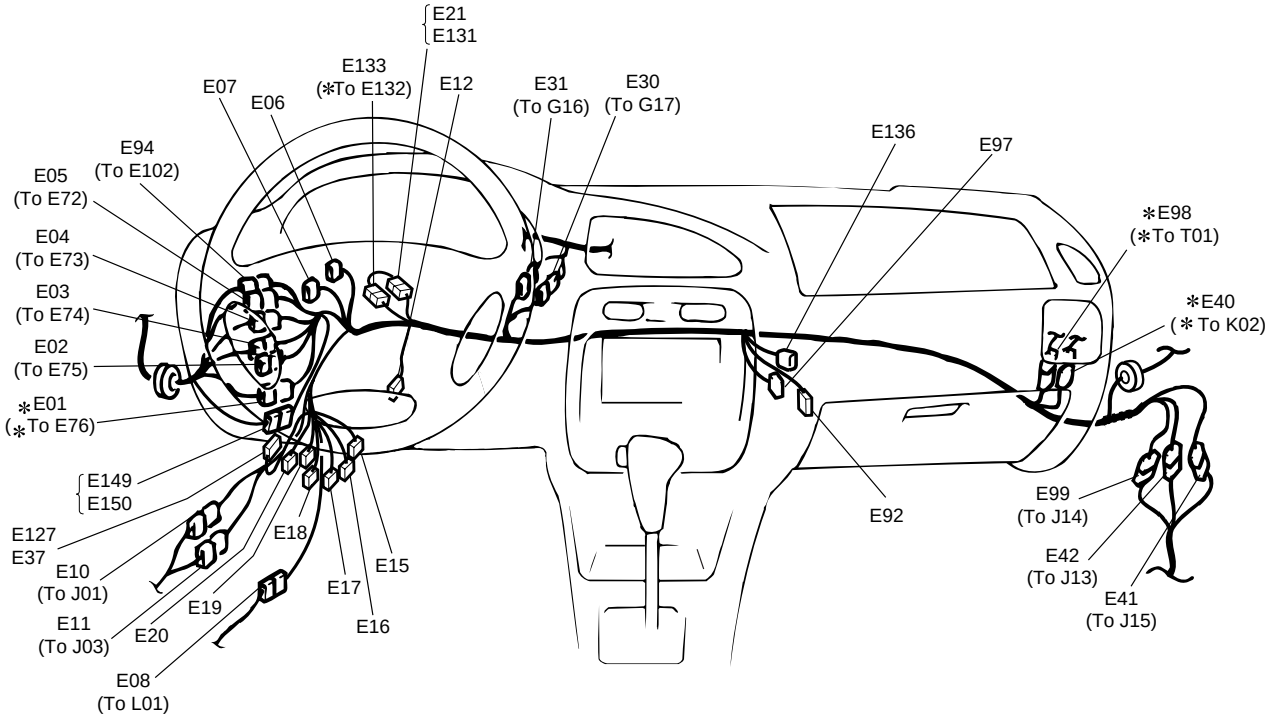
E: MAIN HARNESS (RELAY BOX)
FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (BOITE DE RELAIS)
HAUPTKABELBAUM (RELAISKASTEN)
MAZO DE CABLES PRINCIPAL (CAJC DE RELES)



CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
E: MAIN HARNESS / E: FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL / E: HAUPTKABELBAUM E: MAZO DE CABLES PRINCIPAL	
E138	RADIATOR FAN SWITCH (SUB) COMMUTATEUR DE VENTILATEUR DE RADIATEUR (SECONDAIRE) KÜHLERGEBLÄSESCHALTER (NEBEN) INTERRUPTOR DEL VENTILADOR DEL RADIADOR (SECUNDARIO)
E143	HEAD LIGHT LEVELING MOTOR (L) MOTEUR DE REGLAGE DES PROJECTEURS (G) SCHEINWERFER - EINSTELLER (L) ACTUADOR DE NIVELACION DE LOS FAROS (I)
E151	ENGINE HARNESS (To C68) FAISCEAU DE FILS ÉLECTRIQUES DE MOTEU (VERS C68) MOTORKABELBAUM (ZUR C68) MAZO DE CABLES DEL MOTOR (AL C68)
E152	NOISE SUPPRESSOR CONDENSATEUR ANTIPARASITE STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
E153	NOISE SUPPRESSOR CONDENSATEUR ANTIPARASITE STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
E: MAIN HARNESS (RELAY BOX) / E: FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (BOITE DE RELAIS) / E: HAUPTKABELBAUM (RELAISKASTEN) E: MAZO DE CABLES PRINCIPAL (CAJC DE RELES)	
E58	TAIL LIGHT RELAY RELAIS DU FEU ARRIERE HECKLICHTRELAIS RELE DE LA LUZ DE COLA
E59	A/C COMPRESSOR RELAY KLIMAANLAGENKOMPRESSORRELAIS RELAIS DE COMPRESSEUR A/C RELÉ DEL COMPRESSOR DEL ACONDICIONADOR DE AIRE
E61	ABS PUMP MOTOR RELAY RELAIS DE MOTEUR DE POMPE D' ABS ABS - PUMPENMOTORRELAIS RELÉ DEL MOTOR DE LA BOMBA DE ABS
E62	RADIATOR FAN RELAY (SUB) RELAIS DE VENTILATEUR DE RADIATEUR (SECONDAIRE) KÜHLERGEBLÄSE - RELAIS (NEBEN) RELÉ DEL VENTILADOR DEL RADIADOR (SECUNDARIO)
E65	RADIATOR FAN CONTROL RELAY RELAIS DE MOTEUR DE VENTILATEUR DE RADIATEUR KÜHLERVENTILATOR-MOTORRELAIS RELÉ DE CONTROL DEL VENTILADOR DEL RADIADOR
E66	HORN REAY RELAIS D' AVERTISSEUR SONORE HUPENRELAISRELE DE BOCINA
E67	ABS FAIL SAFTY RELAY RELAIS DE SECURITE D' ABS ABS -NOTLAUFSI CHERUNGSRELAIS SOLENOIDE DE CAMBIO ABS
E68	MAIN FUSE FUSIBLE PRINCIPAL HAUPTSICHERUNG FUSIBLE PRINCIPAL
E69	MAIN FUSE FUSIBLE PRINCIPAL HAUPTSICHERUNG FUSIBLE PRINCIPAL
E70	MAIN FUSE FUSIBLE PRINCIPAL HAUPTSICHERUNG FUSIBLE PRINCIPAL
E100	DIAGNOSIS CONNECTOR 1 CONNECTEUR DE DIAGNOSTIC 1 DIAGNOSESTECKER 1 CONECTOR DE DIAGNOSTICO 1
E101	DIAGNOSIS CONNECTOR 2 CONNECTEUR DE DIAGNOSTIC 2 DIAGNOSESTECKER 2 CONECTOR DE DIAGNOSTICO 2

E

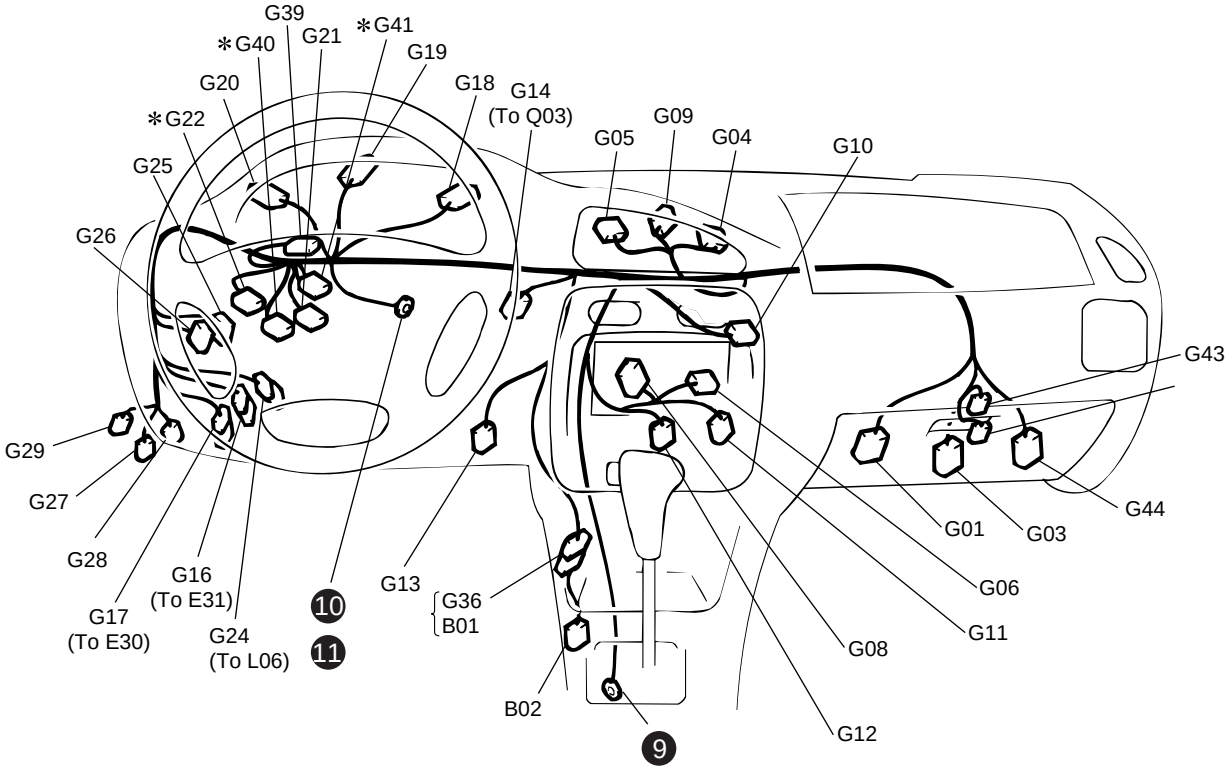
E:MAIN HARNESS
FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL
HAUPTKABELBAUM
MAZO DE CABLES PRINCIPAL



CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
E: MAIN HARNESS / E: FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL / E: HAUPTKABELBAUM E: MAZO DE CABLES PRINCIPAL	
E01	MAIN HARNESS (To E76) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E76) / HAUPTKABELBAUM (ZUR E76) MAZO DE CABLES PRINCIPAL (AL E76)
E02	MAIN HARNESS (To E75) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E75) / HAUPTKABELBAUM (ZUR E75) MAZO DE CABLES PRINCIPAL (AL E75)
E03	MAIN HARNESS (To E74) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E74) / HAUPTKABELBAUM (ZUR E74) MAZO DE CABLES PRINCIPAL (AL E74)
E04	MAIN HARNESS (To E73) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E73) / HAUPTKABELBAUM (ZUR E73) MAZO DE CABLES PRINCIPAL (AL E73)
E05	MAIN HARNESS (To E72) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E72) / HAUPTKABELBAUM (ZUR E72) MAZO DE CABLES PRINCIPAL (AL E72)
E06	J/C
E07	J/C
E08	FLOOR HARNESS (To L01) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L01) BODENWANNEN-KABELBAUM (ZUR L01) / MAZO DE CABLES DEL PISO (AL L01)
E10	FRONT & REAR DOOR HARNESS (To J01) / FAISCEAU DE FILS ÉLECTRIQUES DES PORTES AVANT ET ARRIÈRE (VERS J01) VORDER- UND HINTERTÜR-KABELBAUM (ZUR J01) / MAZO DE CABLES DE LAS PUERTAS DELANTERAS Y TRASERAS (AL J01)
E11	FRONT & REAR DOOR HARNESS (To J03) / FAISCEAU DE FILS ÉLECTRIQUES DES PORTES AVANT ET ARRIÈRE (VERS J03) VORDER- UND HINTERTÜR-KABELBAUM (ZUR J03) / MAZO DE CABLES DE LAS PUERTAS DELANTERAS Y TRASERAS (AL J03)
E12	BRAKE LIGHT SWITCH / CONTACTEUR DE TEMOIN DE FREIN / BREMSLICHTSCHALTER INTERRUPTOR DE LUZ DEL FRENO
E15	J/B
E16	J/B
E17	J/B
E18	J/B
E19	J/B
E20	WARNING CONTROLLER / BUZZER / SONNERIE DE DISPOSITIF DE COMMANDE D' ALARME / WARNSUMMERREGLER ZUMBADOR DEL CONTROLADOR DE ADVERTENCIA ZOEMER
E21	DRL CONTROLLER (To E131) / REGULATEUR D' EJ (VERS E131) / TFL - REGLER (ZUR E131) CONTROLADOR DRL (AL E131) / DRL REGELAAR (NAAR E131)
E24	DIODE #1 / DIODE #1 / DIODE #1 DIODO #1
E30	INSTRUMENT PANEL HARNESS (To G17) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHE DE BORD (VERS G17) ARMATURENBRETTKABELBAUM (ZUR G17) / MAZO DE CABLES DEL TABLERO DE INSTRUMENTOS (AL G17)
E31	INSTRUMENT PANEL HARNESS (To G16) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHE DE BORD (VERS G16) ARMATURENBRETTKABELBAUM (ZUR G16) / MAZO DE CABLES DEL TABLERO DE INSTRUMENTOS (AL G16)
E37	COIL ANTENNA / CADRE FIXE / RAHMENANTENNE ANTENA DE CUADRO
E40	DOME LIGHT HARNESS (To K02) / FAISCEAU DE FILS ÉLECTRIQUES DE PLAFONNIER (VERS K02) RAUMLEUCHTEN-KABELBAUM (ZUR K02) / MAZO DE CABLES DE LA LUZ DE DOMO (AL K02)
E41	FRONT & REAR DOOR HARNESS (To J15) / FAISCEAU DE FILS ÉLECTRIQUES DES PORTES AVANT ET ARRIÈRE (VERS J15) VORDER- UND HINTERTÜRKABELBAUM (ZUR J15) / MAZO DE CABLES DE LAS PUERTAS DELANTERAS Y TRASERAS (AL J15)
E42	FRONT & REAR DOOR HARNESS (To J13) / FAISCEAU DE FILS ÉLECTRIQUES DES PORTES AVANT ET ARRIÈRE (VERS J13) VORDER- UND HINTERTÜRKABELBAUM (ZUR J13) / MAZO DE CABLES DE LAS PUERTAS DELANTERAS Y TRASERAS (AL J13)
E92	ECM
E94	MAIN HARNESS (To E102) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E102) / HAUPTKABELBAUM (ZUR E102) MAZO DE CABLES PRINCIPAL (AL E102)
E97	A/C AMPLIFIRE / AMPLIFICATEUR DE CLIM / KLIMAANLAGENVERSTÄRKER AMPLIFICADOR DE A/C
E98	SLIDING ROOF HARNESS (To T01) / FAISCEAU DE FILS ÉLECTRIQUES DE TOIT OUVRANT COULISSANT (VERS T01) SCHIEBEDDACHKABELBAUM (ZUR T01) / MAZO DE CABLES DEL TECHO DESLIZANTE (AL T01)
E99	FRONT & REAR DOOR HARNESS (To J14) / FAISCEAU DE FILS ÉLECTRIQUES DES PORTES AVANT ET ARRIÈRE (VERS J14) VORDER- UND HINTERTÜRKABELBAUM (ZUR J14)
E127	ICM
E131	DRL CONTROLLER (To E21) / REGULATEUR D' EJ (VERS E21) / TFL - REGLER (ZUR E21) CONTROLADOR DRL (AL E21)
E132	DRL CONTROLLER (To E133) / REGULATEUR D' EJ (VERS E133) / TFL - REGLER (ZUR E133) CONTROLADOR DRL (AL E133)
E133	DRL CONTROLLER (To E132) / REGULATEUR D' EJ (VERS E132) / TFL - REGLER (ZUR E132) CONTROLADOR DRL (AL E132)
E136	DIODE #2 / DIODE #2 / DIODE #2 DIODO #2
E149	MAIN HARNESS (To E150) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E150) / HAUPTKABELBAUM (ZUR E150) MAZO DE CABLES PRINCIPAL (AL E150)
E150	MAIN HARNESS (To E147) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E147) / HAUPTKABELBAUM (ZUR E147) MAZO DE CABLES PRINCIPAL (AL E147)

B **G**

G:INSTRUMENT PANEL HARNESS & B: A/C HARNESS
G:FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHE DE BORD ET B: FAISCEAU DE FILS ÉLECTRIQUES D'AIR CONDITIONNÉ
G:ARMATURENBRETT-KABELBAUM UND B: KLIMAANLAGEN-KABELBAUM
G:MAZO DE CABLES DEL TABLERO DE INSTRUMENTOS Y B: MAZO DE CABLES DEL ACONDICIONADOR DE AIRE

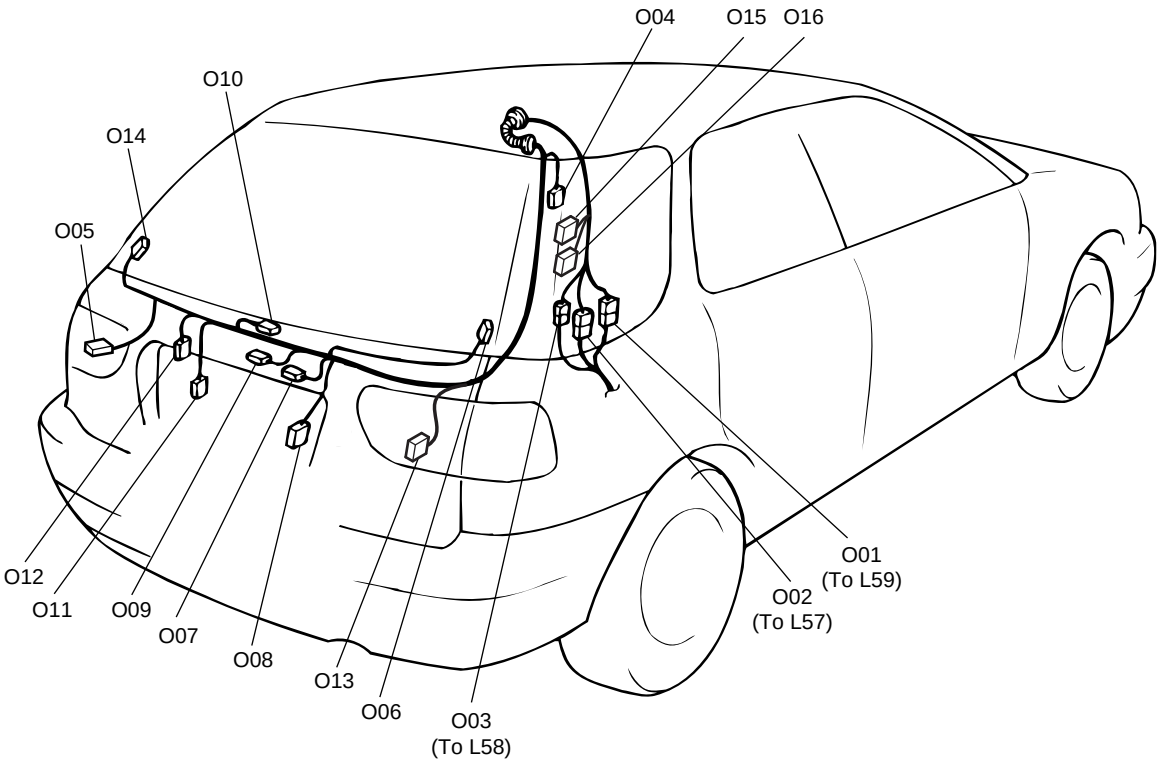


CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
B: A/C HARNESS / B: FAISCEAU DE FILS ÉLECTRIQUES D'AIR CONDITIONNÉ / B: KLIMAANLAGEN-KABELBAUM B: MAZO DE CABLES DEL ACONDICIONADOR DE AIRE	
B01	INSTRUMENT PANEL HARNESS (To G36) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHE DE BORD (VERS G36) ARMATURENBRETT-KABELBAUM (ZUR G36) / MAZO DE CABLES DEL TABLERO DE INSTRUMENTOS (AL G36)
B02	MODE ACTUATOR / COMMANDE DE MODE / MODUS-STELLGLIED ACTUADOR DE MODO
G: INSTRUMENT PANEL HARNESS / G: FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHE DE BORD / G: ARMATURENBRETT-KABELBAUM G: MAZO DE CABLES DEL TABLERO DE INSTRUMENTOS	
G01	BLOWER MOTOR MAIN RELAY / RELAIS PRINCIPAL DE MOTEUR DE SOUFFLERIE / GEBLÄSEMOTOR-HAUPTRELAIS RRELÉ PRINCIPAL DEL MOTOR DEL SOPLADOR
G02	BLOWER FAN MOTOR RESISTER / RÉSISTANCE DE MOTEUR DE VENTILATEUR DE SOUFFLERIE GEBLÄSEVENTILATORMOTOR-WIDERSTAND / RESISTOR DEL MOTOR DEL VENTILADOR DEL SOPLADOR
G03	BLOWER FAN MOTOR / MOTEUR DE VENTILATEUR DE SOUFFLERIE / GEBLÄSEVENTILATORMOTOR MOTOR DEL VENTILADOR DEL SOPLADOR
G04	REAR DEFOGGER SWITCH / CONTACTEUR DE DEGIVREUR ARRIERE / HECKSCHEIBENHEIZUNGS-SCHALTER UNTERRUPTOR DEL DESEMPAÑADOR TRASERO
G05	HAZARD WARNING LIGHT SWITCH / CONTACTEUR DE SIGNAL DE DETRESSE / WARNBLINKERSCHALTER INTERRUPTOR DE AVISO DE PELIGRO
G06	BLOWER FAN MOTOR SWITCH / COMMANDE DE VENTILATEUR DE MOTEUR DE SOUFFLERIE GEBLÄSEMOTORVENTILATOR-SCHALTER / INTERRUPTOR DEL VENTILADOR DEL MOTOR DEL SOPLADOR
G08	A/C SWITCH / CONTACTEUR DE CLIMATISEUR / KLIMAANSLAGENSCHALTER INTERRUPTOR DEL ACONDICIONADOR DE AIRE
G09	CLOCK / HORLOGE / UHR RELOJ
G10	RADIO / RADIO / RADIO RADIO
G11	ASHTRAY ILLUMINATION / ECLAIRAGE CENDRIER / ASCHENBECHERLEUCHTE LUZ DEL CENIDERO
G12	CIGARETTE LIGHTER / ALLUME -CIGARE / ZIGARETTENANZÜNDER ENCENDEDOR DE CIGARRILLOS
G13	DATA LINK CONNECTOR / CONNECTEUR DE LIAISON DES DONNEES / ALDL-.STECKER (FLIESSBANDDIAGNOSEANSCHLUSS) CONECTOR PARA ENLACE DE DATOS
G14	AIR BAG HARNESS (To Q03) / FAISCEAU DE FILS ÉLECTRIQUES DE SAC GONFLABLE (VERS Q03) AIRBAG-KABELBAUM (ZUR Q03) / MAZO DE CABLES DEL COLCHEÓN DE AIRE (AL Q03)
G16	MAIN HARNESS (To E31) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E31) / HAUPTKABELBAUM (ZUR E31) MAZO DE CABLES PRINCIPAL (AL E31)
G17	MAIN HARNESS (To E30) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E30) / HAUPTKABELBAUM (ZUR E30) MAZO DE CABLES PRINCIPAL (AL E30)
G18	COMBINATION METER / TABLEAU DES INSTRUMENT / KOMBINSTRUMENT MEDIDOR DE COMBINACION
G19	COMBINATION METER / TABLEAU DES INSTRUMENT / KOMBINSTRUMENT MEDIDOR DE COMBINACION
G20	COMBINATION METER / TABLEAU DES INSTRUMENT / KOMBINSTRUMENT MEDIDOR DE COMBINACION
G21	POWER MIRROR CONTROL SWITCH / CONTACTEUR DE COMMANDE ELECTRIQUE DE RETROVISEUR SCHALTER FÜR ELEKTRISCH VERSTELLBAREN SPIEGEL / INTERRUPTOR DE CONTROL DEL ESPEJO MOTRIZ
G24	FLOOR HARNESS (To L06) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L06) BODENWANNEN-KABELBAUM (ZUR L06) / MAZO DE CABLES DEL PISO (AL L06)
G25	J/C
G26	J/C
G27	J/B
G28	J/B
G29	J/B
G36	A/C HARNESS (To B01) / FAISCEAU DE FILS ÉLECTRIQUES D'AIR CONDITIONNÉ (VERS B01) KLIMAANLAGEN-KABELBAUM (ZUR B01) / MAZO DE CABLES DEL ACONDICIONADOR DE AIRE (AL B01)
G39	FOG SWITCH / CONTACTEUR DE ANTIBROUILLARD / NEBELSCHLUSSSCHALTER ANTINIEBLA TRASERO
G40	REAR FOG SWITCH / CONTACTEUR DE ANTIBROUILLARD ARRIERE / HINTERER NEBELSCHLUSSSCHALTER INTERRUPTOR DEL ANTINIEBLA TRASERO
G41	HEAD LIGHT LEVELING SWITCH / CONTECTEUR DE REGLAGE DES PROJECTEURS SCHALTER FÜR SCHEINWERFERHÖHENVERSTELLUNG / INTERRUPTOR DE NIVELACION DE LOS FAROS
G43	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
G44	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO

O

O:BACK DOOR HARNESS
FAISCEAU DE FILS ÉLECTRIQUES DE HAYON
HECKKLAPPEN-KABELBAUM
MAZO DE CABLES DE LA PUERTA POSTERIOR

(WAGON)
(BREAK)
(KOMBI)
(WAGON)

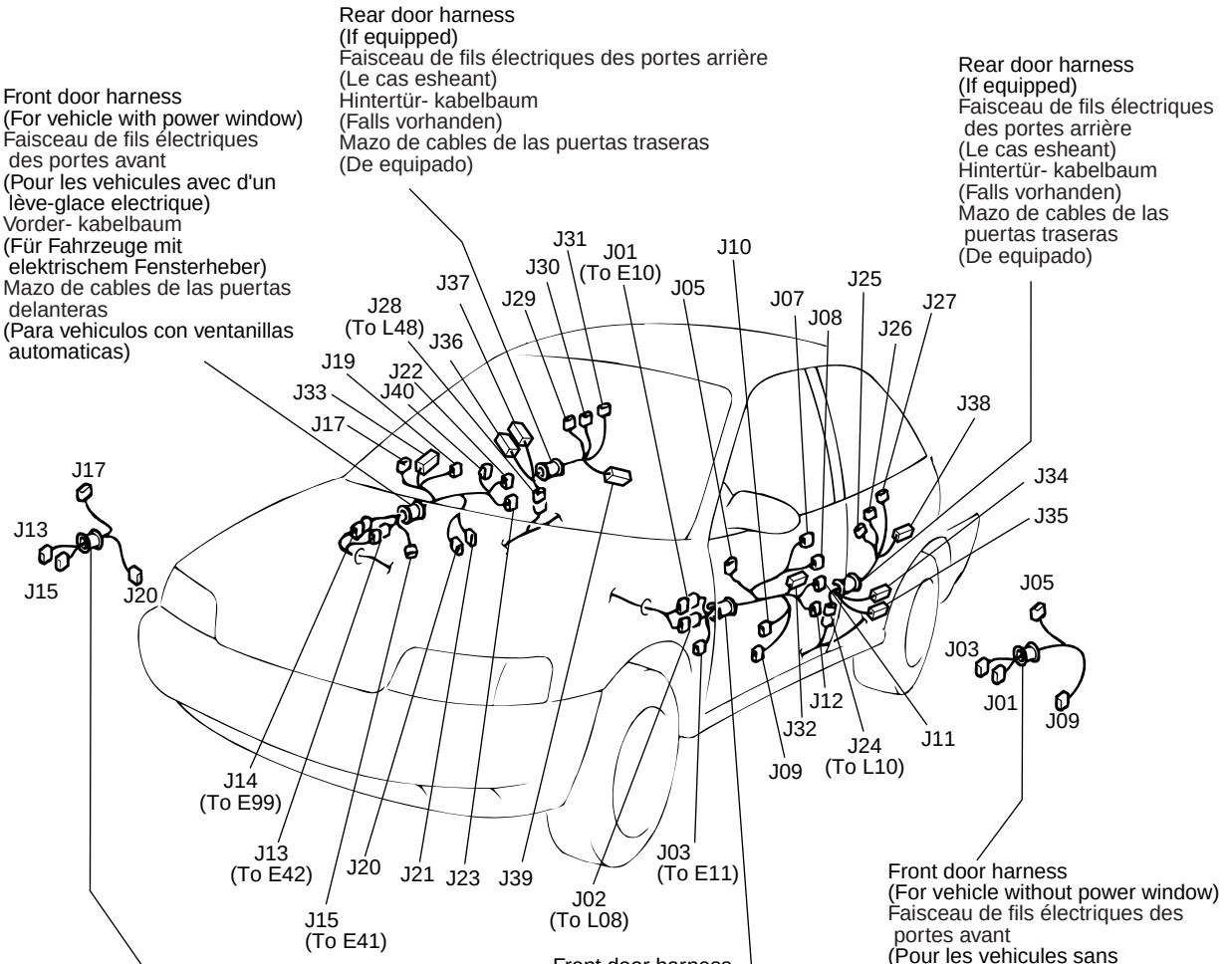


CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
O: BACK DOOR HARNESS / O: FAISCEAU DE FILS ÉLECTRIQUES DE HAYON / O: HECKKLAPPEN-KABELBAUM O: MAZO DE CABLES DE LA PUERTA POSTERIOR	
O01	FLOOR HARNESS (To L59) FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L59) BODENWANNEN-KABELBAUM (ZUR L59) MAZO DE CABLES DEL PISO (AL L59)
O02	FLOOR HARNESS (To L57) FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L57) BODENWANNEN-KABELBAUM (ZUR L57) MAZO DE CABLES DEL PISO (AL L57)
O03	FLOOR HARNESS (To L58) FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L58) BODENWANNEN-KABELBAUM (ZUR L58) MAZO DE CABLES DEL PISO (AL L58)
O04	HIGH MOUNTED STOP LIGHT FEU DE STOP SURELEVE DRITTE BREMSLEUCHTE LUZ DE PARADA DE MONTAJE ELEVADO
O05	BACK-UP LIGHT (L) FEU DE RECUL (G) RÜCKFAHRSCHEINWERFER (L) LUZ DE MARCHA ATRAS (I)
O06	REAR DEFOGGER DEGIVREUR ARRIERE HECKSCHEIBEHEIZUNG DESEMPAÑADOR TRASERO
O07	BACK DOOR LOCK MOTOR MOTEUR DE VERROUILLAGE HINTEÜR-SPERRMOTOR INTERRUPTOR DE BLOQUEO
O08	LICENSE LIGHT (R) LAMPE DE PLAQUE D' I MMATRICULATION (D) KENNZEI CHENLEUCHTE (R) LUZ DE PLACA DE MATRICULA (D)
O09	REAR WIPER D' ESSUIE-GLACE ARRIERE HECKSCHEIBENWISCHER LIMPIA LUNETAS TRASERO
O10	HIGH MOUNTED STOP LIGHT FEU DE STOP SURELEVE DRITTE BREMSLEUCHTE LUZ DE PARADA DE MONTAJE ELEVADO
O11	LICENSE LIGHT (L) LAMPE DE PLAQUE D ' I MMATRICULATION (G) KENNZEI CHENLEUCHTE (L) LUZ DE PLACA DE MATRICULA (I)
O12	REAR DOOR SWITCH (PASSENGER SIDE) CONTACTEUR DE PORTIERE ARRIERE (COTE PASSAGER) FONDTÜRSCHALTER (BEIFAHRERSEITE) INTERRUPTOR DE LA PUERTA TRASERA(LADO DEL PASAJAERO)
O13	BACK-UP LIGHT (R) FEU DE RECUL (D) RÜCKFAHRSCHEINWERFER (R) LUZ DE MARCHA ATRAS (D)
O14	REAR DEFOGGER DEGIVREUR ARRIERE HECKSCHEIBEHEIZUNG DESEMPAÑADOR TRASERO
O15	NOISE SUPPRESSOR CONDENSATEUR ANTIPARASITE STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
O16	NOISE SUPPRESSOR CONDENSATEUR ANTIPARASITE STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO

J

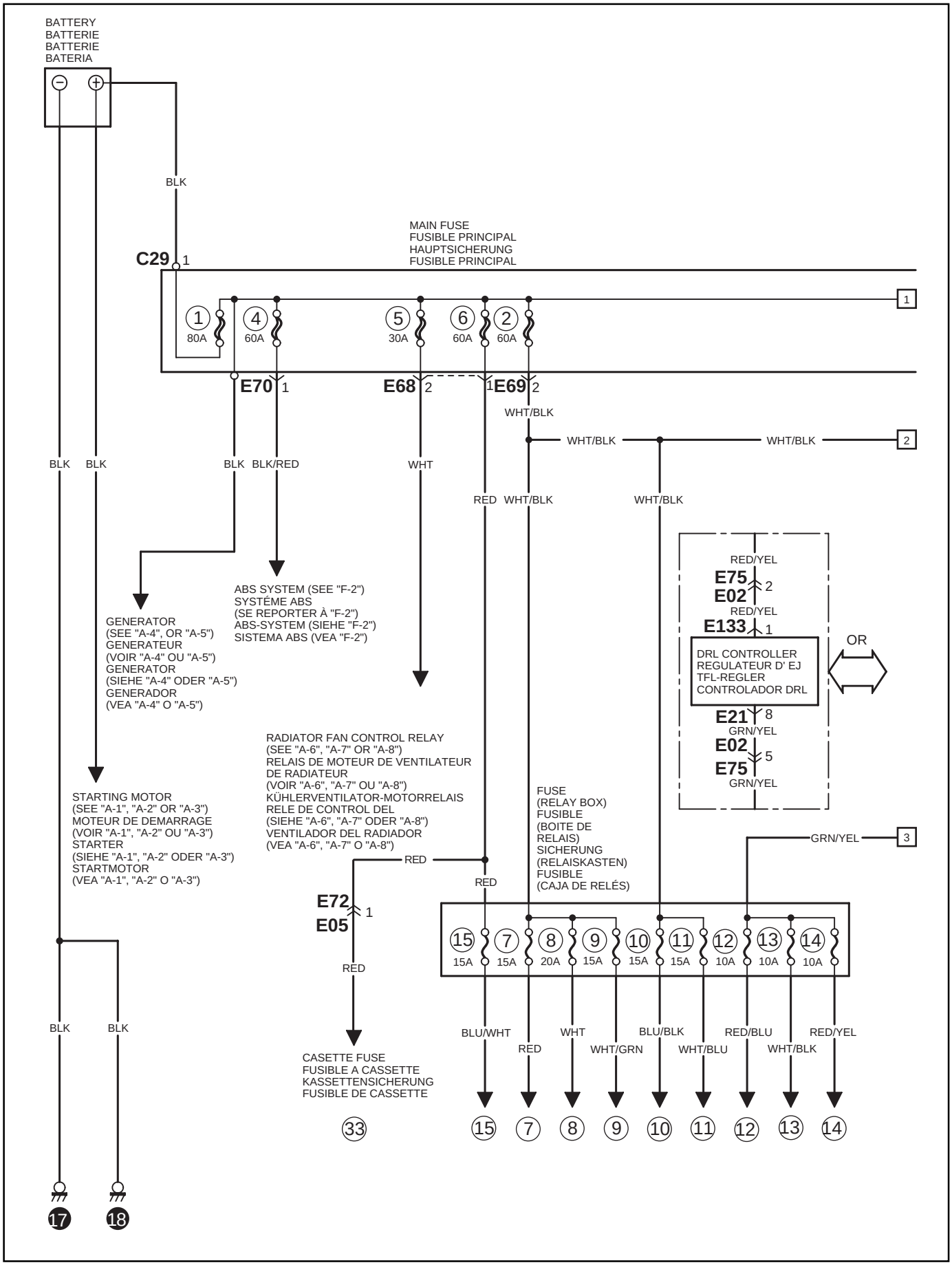
DOOR
PORTE
TÜREN
PUERTAS

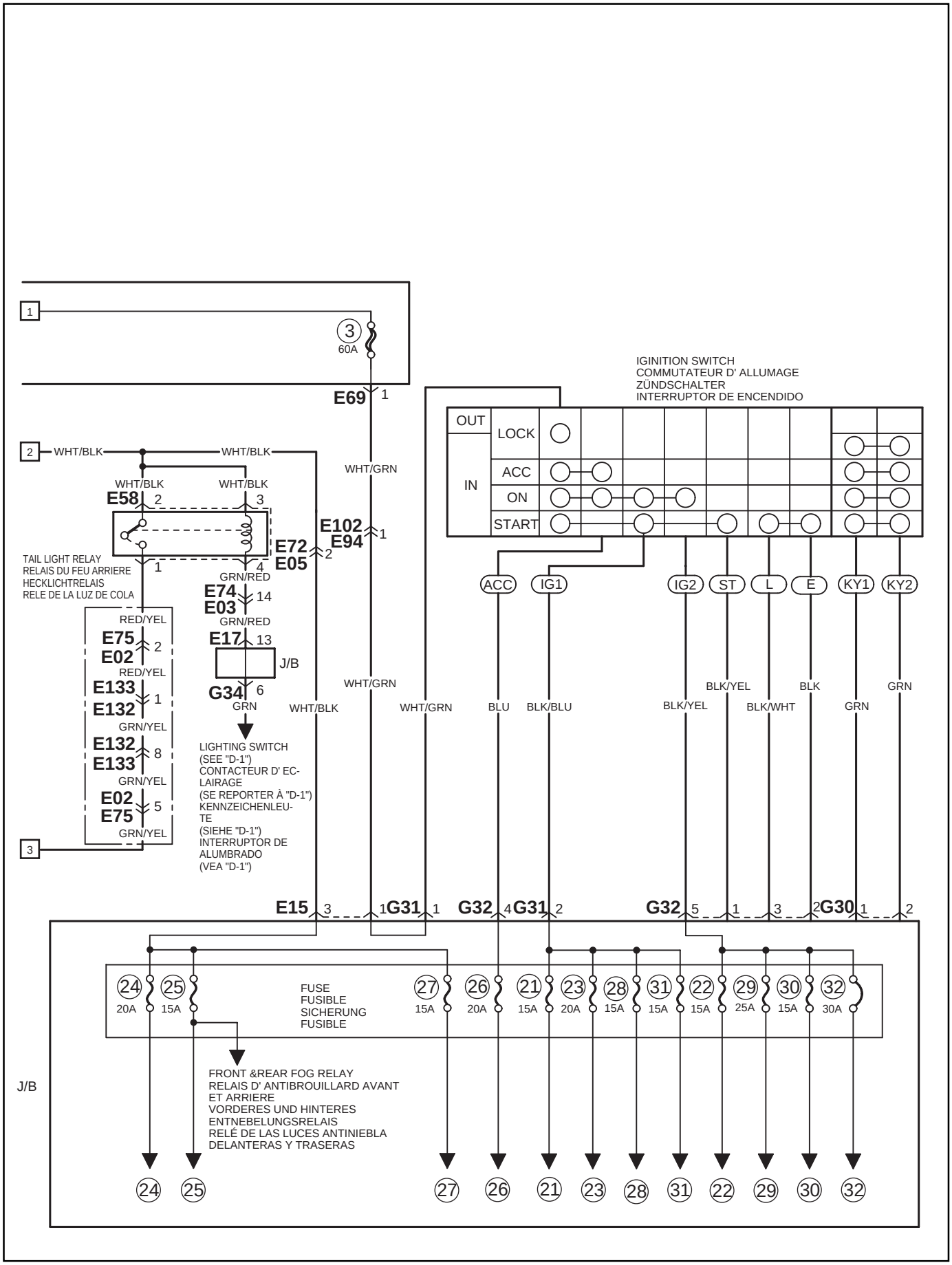
J:FRONT & REAR DOOR HARNESS
FAISCEAU DE FILS ÉLECTRIQUES DES PORTES AVANT ET ARRIÈRE
VORDER- UND HINTERTÜR-KABELBAUM
MAZO DE CABLES DE LAS PUERTAS DELANTERAS Y TRASERAS



CONNECTOR NO. CONNECTEUR NO. STECKER NR. CONECTOR N.	CONNECTIVE POSITION POSITION DE RACCORDEMENT ANSCHLUSSPOSITION POSICIÓN DE CONEXIÓN
J: FRONT & REAR DOOR HARNESS / J: FAISCEAU DE FILS LECTRIQUES DES PORTES AVANT ET ARRI RE J: VORDER- UND HINTERT R-KABELBAUM / J: MAZO DE CABLES DE LAS PUERTAS DELANTERAS Y TRASERAS	
J01	MAIN HARNESS (To E10) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E10) / HAUPTKABELBAUM (ZUR E10) MAZO DE CABLES PRINCIPAL (AL E10)
J02	FLOOR HARNESS (To L08) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L08) BODENWANNEN-KABELBAUM (ZUR L08) / MAZO DE CABLES DEL PISO (AL L08)
J03	MAIN HARNESS (To E11) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E11) / HAUPTKABELBAUM (ZUR E11) MAZO DE CABLES PRINCIPAL (AL E11)
J05	POWER MIRROR MOTOR (L) / MOTER DU RETROVISEUR ELECTRIQUE (G) MOTOR FÜR ELEKTRISCH VERSTELLBAREN SPIEGEL (L) / MOTOR DEL ESPEJO MOTRIZ (I)
J07	POWER WINDOW MAIN SWITCH / CONTACTEUR PRINCIPAL DE VITRE ELECTRIQUE / FENSTERHEBER-HAUPTSCHALTER INTERRUPTOR PRINCIPAL DE LA VENTANILLA MOTRIZ
J08	DOOR LOCK SWITCH / CONTACTEUR DE VERROUILLAGE DE PORTIERE SCHALTER FÜR ELECKTRISCHE TÜRVERRIEGELUNG / INTERRURTOR DE BLOQUEO DE CAS PUERTAS
J09	FRONT SPEAKER (L) / HAUT-PARLEUR AVANT (G) / LAUTSPRECHER VORNE (L) ALTAVOZ DELANTERO (I)
J10	FRONT POWER WINDOW MOTOR (DRIVER SIDE) / MOTEUR DE GLACE ELECTRIQUE AVANT (COTE CONDUCTEUR) VORDERE FENSTERHEBERMOTOR (FAHRERSEITE) / MOTOR DE LA VENTANILLA MOTRIZ DELANTERA (LADO DEL CONDUCTOR)
J11	FRONT DOOR LOCK MOTOR & KEY SWITCH (DRIVER SIDE) / MOTEUR DE VERROUILLAGE ET CONTACTEUR DE CLE DE PORTIERE AVANT (COTE CONDUCTEUR) VORDERTÜRVERRIEGELUNGSMOTOR U, SCHLÜSSELSCHALTER (FAHRERESE ITE) / MOTOR DE BLOQUEO DE LA PUERTA DELANTERA E INTERRUPTOR DE LLAVE, (LADO DEL CONDUCTOR)
J12	FRONT DOOR LOCK MOTOR & KEY SWITCH (DRIVER SIDE) / MOTEUR DE VERROUILLAGE ET CONTACTEUR DE CLE DE PORTIERE AVANT (COTE CONDUCTEUR) VORDERTÜRVERRIEGELUNGSMOTOR U, SCHLÜSSELSCHALTER (FAHRERESE ITE) / MOTOR DE BLOQUEO DE LA PUERTA DELANTERA E INTERRUPTOR DE LLAVE, (LADO DEL CONDUCTOR)
J13	MAIN HARNESS (To E42) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E42) / HAUPTKABELBAUM (ZUR E42) MAZO DE CABLES PRINCIPAL (AL E42)
J14	MAIN HARNESS (To E99) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E99) / HAUPTKABELBAUM (ZUR E99) MAZO DE CABLES PRINCIPAL (AL E99)
J15	MAIN HARNESS (To E41) / FAISCEAU DE FILS ÉLECTRIQUES PRINCIPAL (VERS E41) / HAUPTKABELBAUM (ZUR E41) MAZO DE CABLES PRINCIPAL (AL E41)
J17	POWER MIRROR MOTOR (R) / MOTER DU RETROVISEUR ELECTRIQUE (D) MOTOR FÜR ELEKTRISCH VERSTELLBAREN SPIEGEL (R) / MOTOR DEL ESPEJO MOTRIZ (D)
J19	FRONT POWER WINDOW SUB SWITCH (PASSENGER SIDE) / CONTACTEUR SECONDAIRE DE LEVE-GLACE ELECTRIQUE AVANT (COTE PASSAGER) VORDERFENSTER-NEBENSCHALTER. (BEIFAHRERSEITE) / INTERRUPTOR SECUNDARIO DE LA VENTANILLA MOTRIZ DELANTERA. (LADO DEL PASAJERO)
J20	FRONT SPEAKER (R) / HAUT-PARLEUR AVANT (D) / LAUTSPRECHER VORNE (R) ALTAVOZ DELANTERO (D)
J21	FRONT POWER WINDOW MOTOR (PASSENGER SIDE) / MOTEUR DE GLACE ELECTRIQUE AVANT (COTE PASSAGER) VORDERE FENSTERHEBERMOTOR (BEIFAHRERSEITE) / MOTOR DE LA VENTANILLA MOTRIZ DELANTERA (LADO DEL PASAJERO)
J22	FRONT DOOR LOCK MOTOR (PASSENGER SIDE) / MOTEUR DE VERROUILLAGE (COTE PASSAGER) VORDERTÜRVERRIEGELUNGSMOTOR (BEIFAHRERSEITE) / MOTOR DE BLOQUEO DE LA PUERTA DELANTERA (LADO DEL PASAJERO)
J23	KEY SWITCH (PASSENGER SIDE) / CONTACTEUR DE CLE DE PORTIERE AVANT (COTE PASSAGER) SCHLÜSSELSCHALTER (BEIFAHRERSEITE) / INTERRUPTOR DE LLAVE, (LADO DEL PASAJERO)
J24	FLOOR HARNESS (To L10) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VERS L10) BODENWANNEN-KABELBAUM (ZUR L10) / MAZO DE CABLES DEL PISO (AL L10)
J25	REAR POWER WINDOW MOTOR (DRIVER SIDE) / MOTEUR DE GLACE ELECTRIQUE ARRIERE (COTE CONDUCTEUR) MOTOR DES HINTEREN FENSTERHEBERS (FAHRERSEITE) / MOTOR DE LA VENTANILLA MOTRIZ TRASERA (LADO DEL CONDUCTOR)
J26	REAR POWER WINDOW SUB SWITCH (DRIVER SIDE) / CONTACTEUR SECONDAIRE DE LEVE-GLACE ELECTRIQUE ARRIERE (COTE CONDUCTEUR) FONDFENSTERHEBER-NEBENSCHALTER (FAHRERSEITE) / VENTANILLA MOTRIZ TRASERA (LADO DEL CONDUCTOR)
J27	REAR DOOR LOCK MOTOR (DRIVER SIDE) / MOTEUR DE VERROUILLAGE DE PORTIERE ARRIERE (COTE CONDUCTEUR) FONDTÜRVERRIEGELUNGSMOTOR U. SCHLÜSSELSCHALTER (FAHRERSEITE) / MOTOR DE BLOQUEO DE LA PUERTA TRASERA (LADO DEL CONDUCTOR)
J28	FLOOR HARNESS (To L48) / FAISCEAU DE FILS ÉLECTRIQUES DE PLANCHER (VRES L48) BODENWANNEN-KABELBAUM (ZUR L48) / MAZO DE CABLES DEL PISO (AL L48)
J29	REAR POWER WINDOW MOTOR (PASSENGER SIDE) / MOTEUR DE GLACE ELECTRIQUE ARRIERE (COTE PASSAGER) MOTOR DES HINTEREN FENSTERHEBERS (BEIFAHRERSEITE) / MOTOR DE LA VENTANILLA MOTRIZ TRASERA (LADO DEL PASAJERO)
J30	REAR POWER WINDOW SUB SWITCH (PASSENGER SIDE) / CONTACTEUR SECONDAIRE DE LEVE-GLACE ELECTRIQUE ARRIERE (COTE PASSAGER) FONDFENSTERHEBER-NEBENSCHALTER (BEIFAHRERSEITE) / INTERRUPTOR SECUNDARIO DE LA VENTANILLA MOTRIZ TRASERA (LADO DEL PASAJERO)
J31	REAR DOOR LOCK MOTOR (PASSENGER SIDE) / MOTEUR DE VERROUILLAGE DE PORTIERE ARRIERE (COTE PASSAGER) FONDTÜRVERRIEGELUNGSMOTOR U. SCHLÜSSELSCHALTER (BEIFAHRERSEITE) / MOTOR DE BLOQUEO DE LA PUERTA TRASERA (LADO DEL PASAJERO)
J32	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J33	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J34	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J35	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J36	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J37	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J38	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J39	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO
J40	NOISE SUPPRESSOR / CONDENSATEUR ANTIPARASITE / STÖRUNGSUNTERDRÜCKER SUPRESOR DE RUIDO

8A-6 POWER SUPPLY DIAGRAM
8A-6 SCHEMA DU CIRCUIT D'ALIMENTATION
8A-6 STROMVERSORGUNGSDIAGRAMM
8A-6 DIAGRAMA DE ALIMENTACIÓN




1
3
60A
E69
1
IGINITION SWITCH
COMMUTATEUR D' ALLUMAGE
ZÜNDSCHALTER
INTERRUPTOR DE ENCENDIDO
OUT
IN
LOCK
ACC
ON
START
2
WHT/BLK
WHT/BLK
WHT/BLK
WHT/BLK
E58
2
3
E102
E94
1
E72
E05
2
1
4
TAIL LIGHT RELAY
RELAIS DU FEU ARRIERE
HECKLICHTRELAIS
RELE DE LA LUZ DE COLA
GRN/RED
E74
E03
14
GRN/RED
E17
13
J/B
G34
6
GRN
RED/YEL
E75
E02
2
RED/YEL
E133
E132
1
GRN/YEL
E132
E133
8
GRN/YEL
E02
E75
5
GRN/YEL
3
WHT/GRN
WHT/GRN
WHT/BLK
WHT/GRN
BLU
BLK/BLU
BLK/YEL
BLK/YEL
BLK/YEL
BLK/WHT
BLK
GRN
GRN
ACC
IG1
IG2
ST
L
E
KY1
KY2
LIGHTING SWITCH
(SEE "D-1")
CONTACTEUR D' EC-
LAIRAGE
(SE REPORTER À "D-1")
KENNZEICHENLEU-
TE
(SIEHE "D-1")
INTERRUPTOR DE
ALUMBRADO
(VEA "D-1")
E15
3
1
G31
1
G32
4
G31
2
G32
5
1
3
2
G30
1
2
24
20A
25
15A
FUSE
FUSIBLE
SICHERUNG
FUSIBLE
27
15A
26
20A
21
15A
23
20A
28
15A
31
15A
22
15A
29
25A
30
15A
32
30A
J/B
FRONT &REAR FOG RELAY
RELAIS D' ANTIBROUILLARD AVANT
ET ARRIERE
VORDERES UND HINTERES
ENTNEBELUNGSRELAIS
RELÉ DE LAS LUCES ANTINIEBLA
DELANTERAS Y TRASERAS
24
25
27
26
21
23
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31
22
29
30
32

SECTION 8A-7
SECTION 8A-7
ABSCHNITT 8A-7
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SYSTEM CIRCUIT DIAGRAM
SCHÉMA DES CIRCUITS ÉLECTRIQUES
SYSTEM-SCHALTDIAGRAMM
DIAGRAMA DEL CIRCUITO ELÉCTRICO

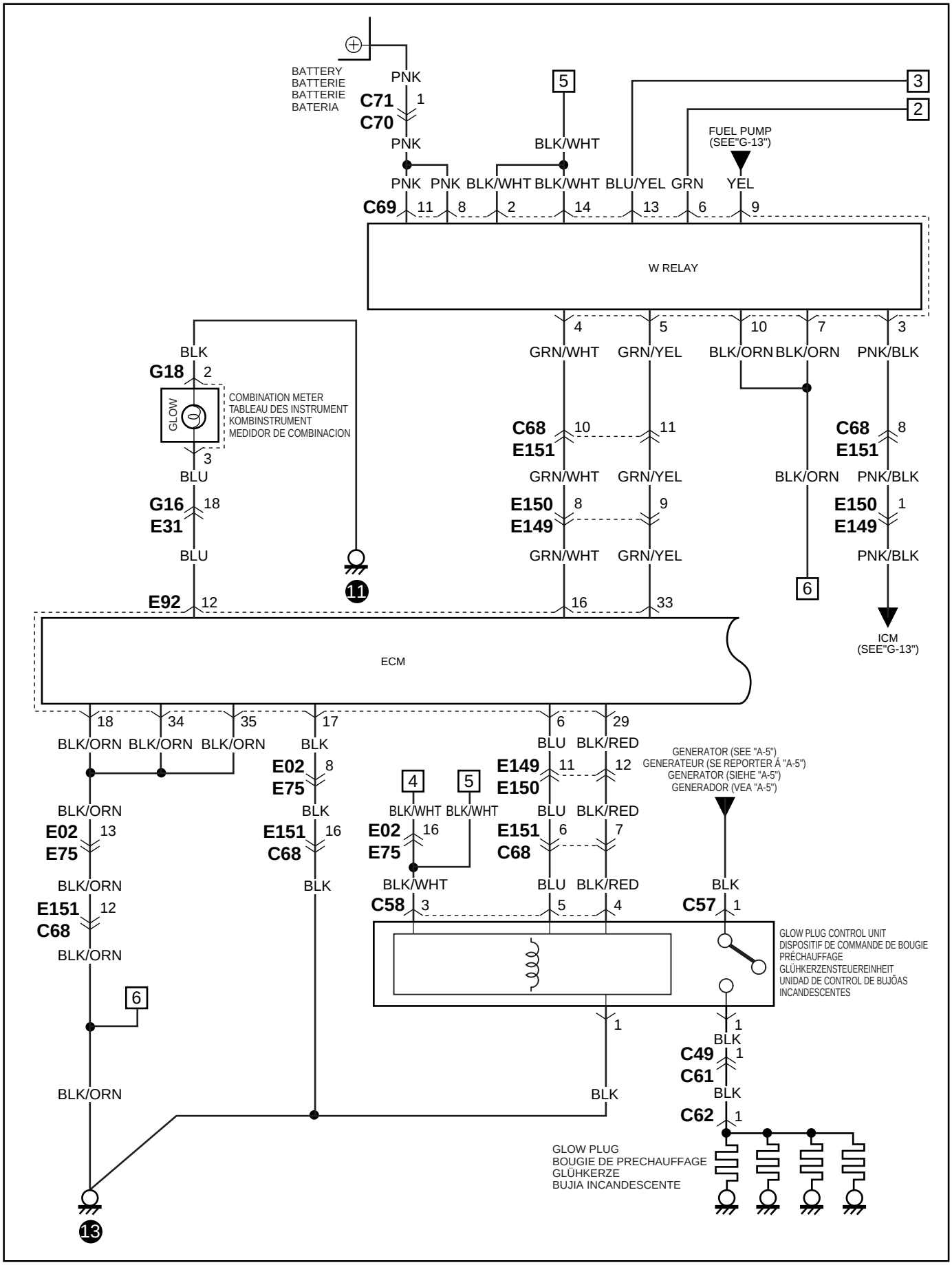
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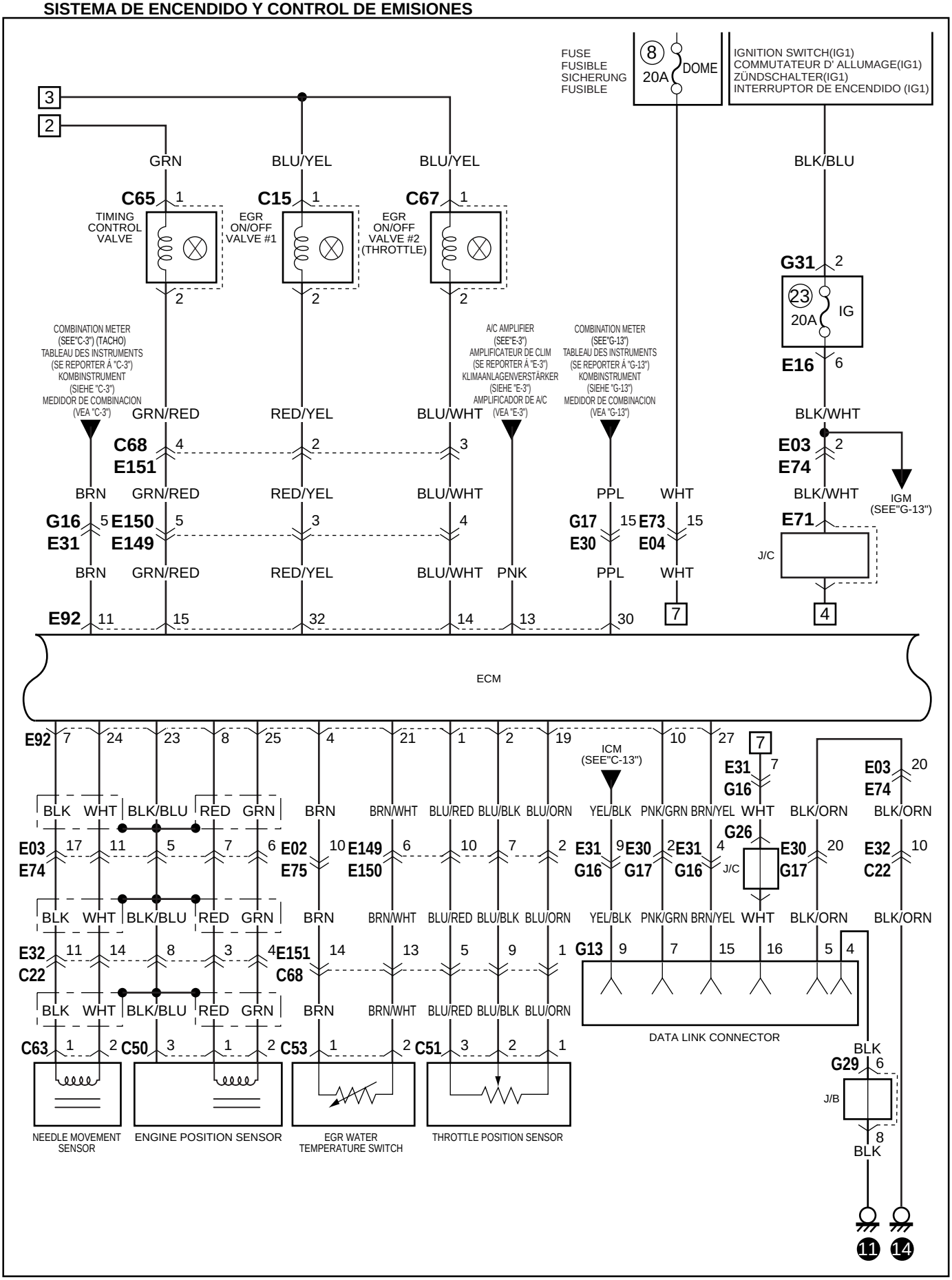
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MEMO
NOTE
NOTIZEN
NOTAS

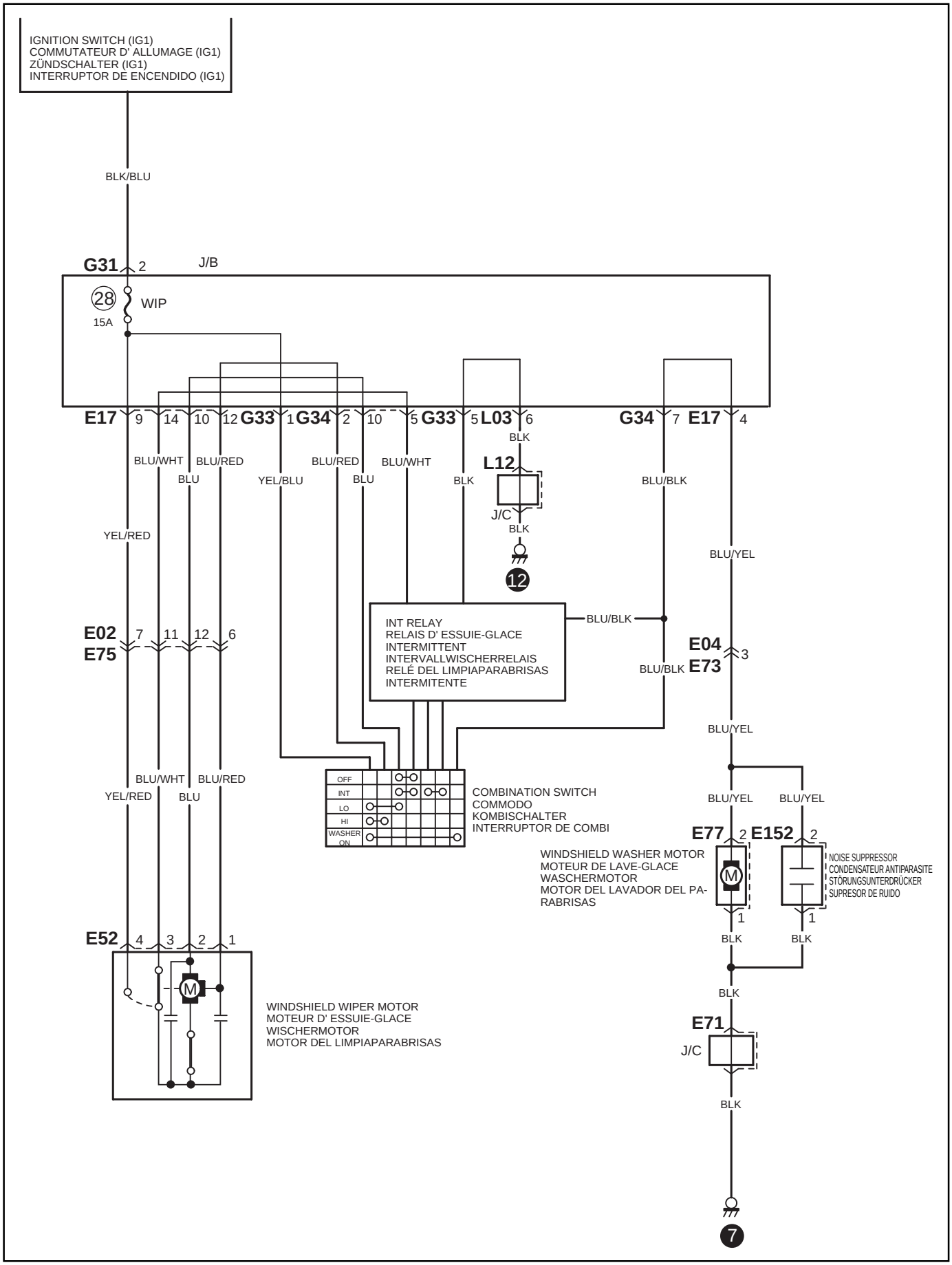
A-15 IGNITION & EMISSION CONTROL SYSTEM 1of2
SYSTEME DE COMMANDE DE L'ALLUMAGE ET GAZ D'ECHAPPEMENT
ZÜNDUNGS UND ABGASREGELSYSTEM
SISTEMA DE ENCENDIDO Y CONTROL DE EMISIONES



A-15 IGNITION & EMISSION CONTROL SYSTEM 2of2
SYSTEME DE COMMANDE DE L'ALLUMAGE ET GAZ D'ECHAPPEMENT
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SISTEMA DE ENCENDIDO Y CONTROL DE EMISIONES

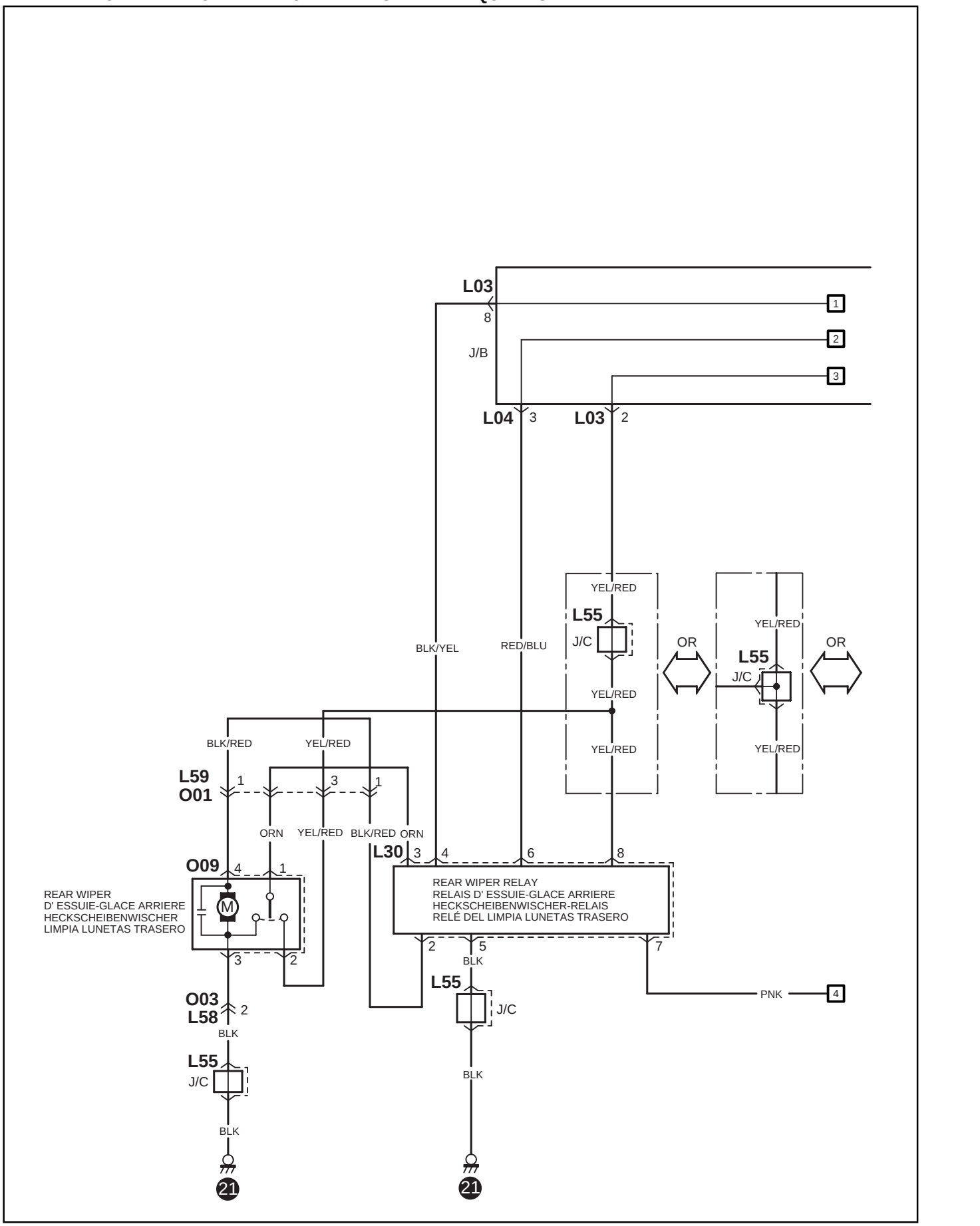


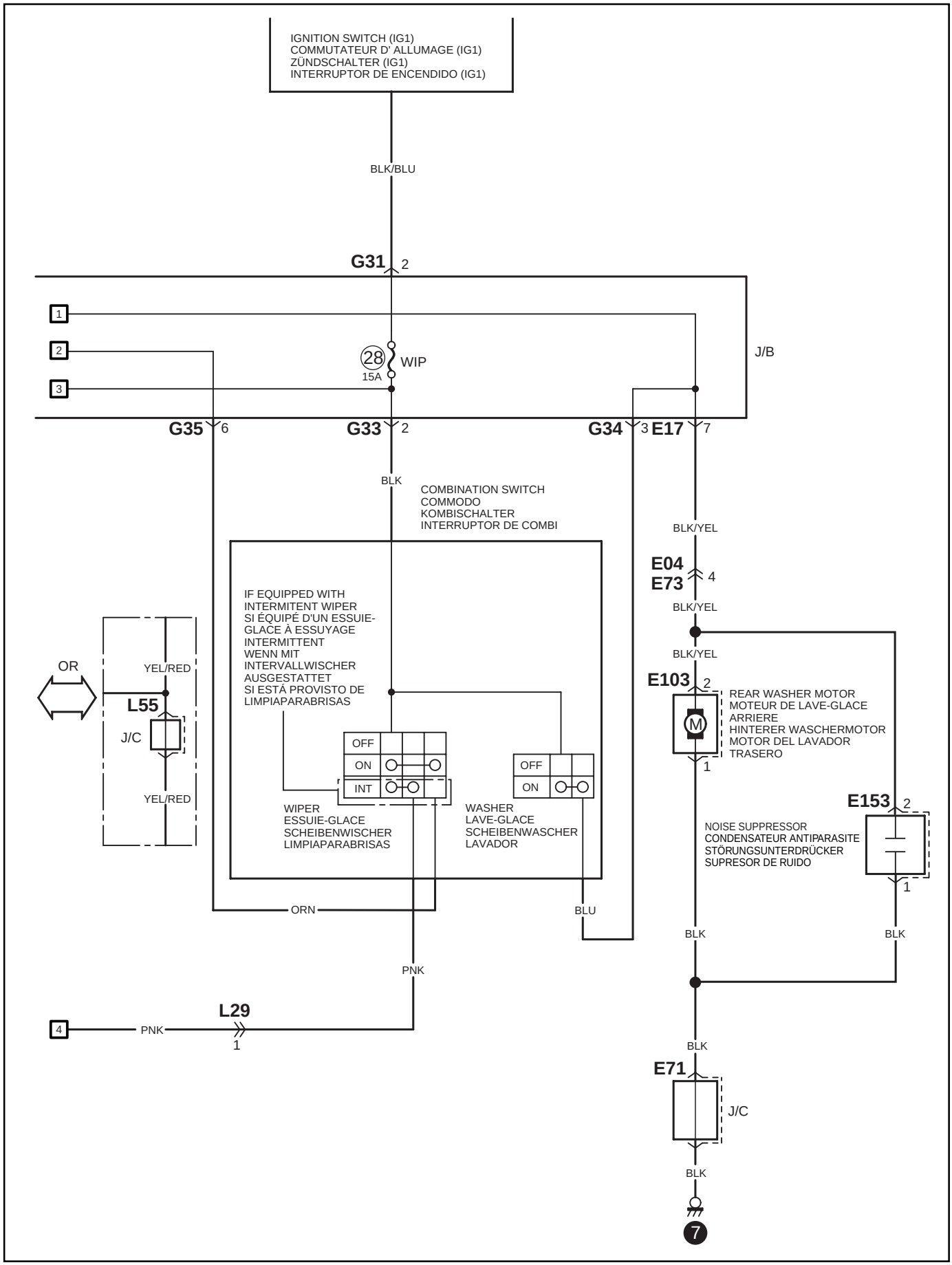
B-1 WINDSHIELD WIPER AND WASHER
ESSUIE-GLACE ET LAVE-GLACE
WINDSCHUTZSCHEIBENWISCHER UND WASCHER
LIMPIAPARABRISAS Y LAVADOR



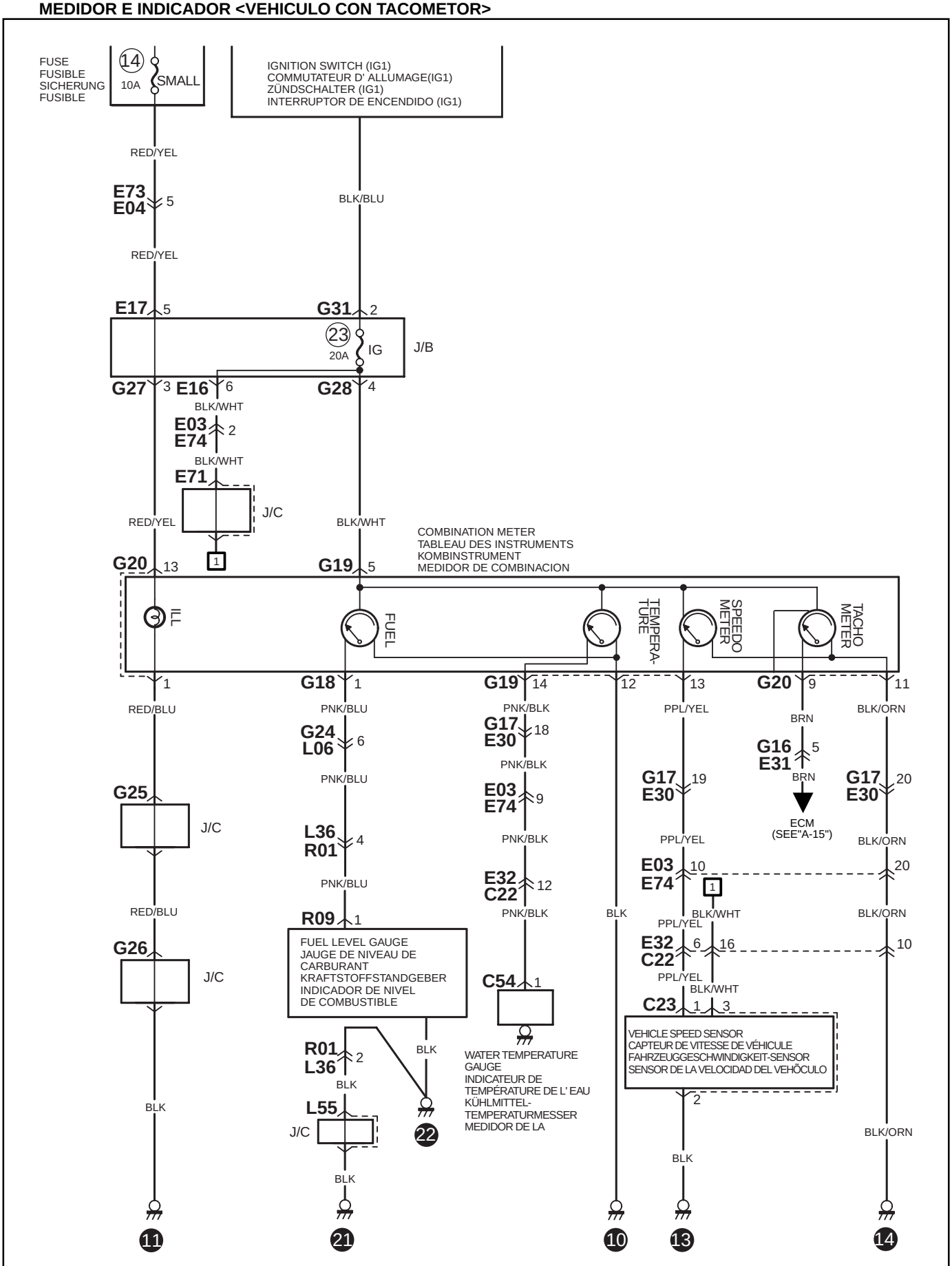
MEMO
NOTE
NOTIZEN
NOTAS

B-2 REAR WIPER AND WASHER <IF EQUIPPED>
ESSUIE-GLACE ET LAVE-GLACE ARRIERE <LE CAS ECHEANT>
HECKSCHEIBENWISCHER UND -WASCHER <FALLS VORHANDEN>
LIMPIADOR Y LAVADOR DE RA LUNETA TRASERA <DE EQUIPARSE>



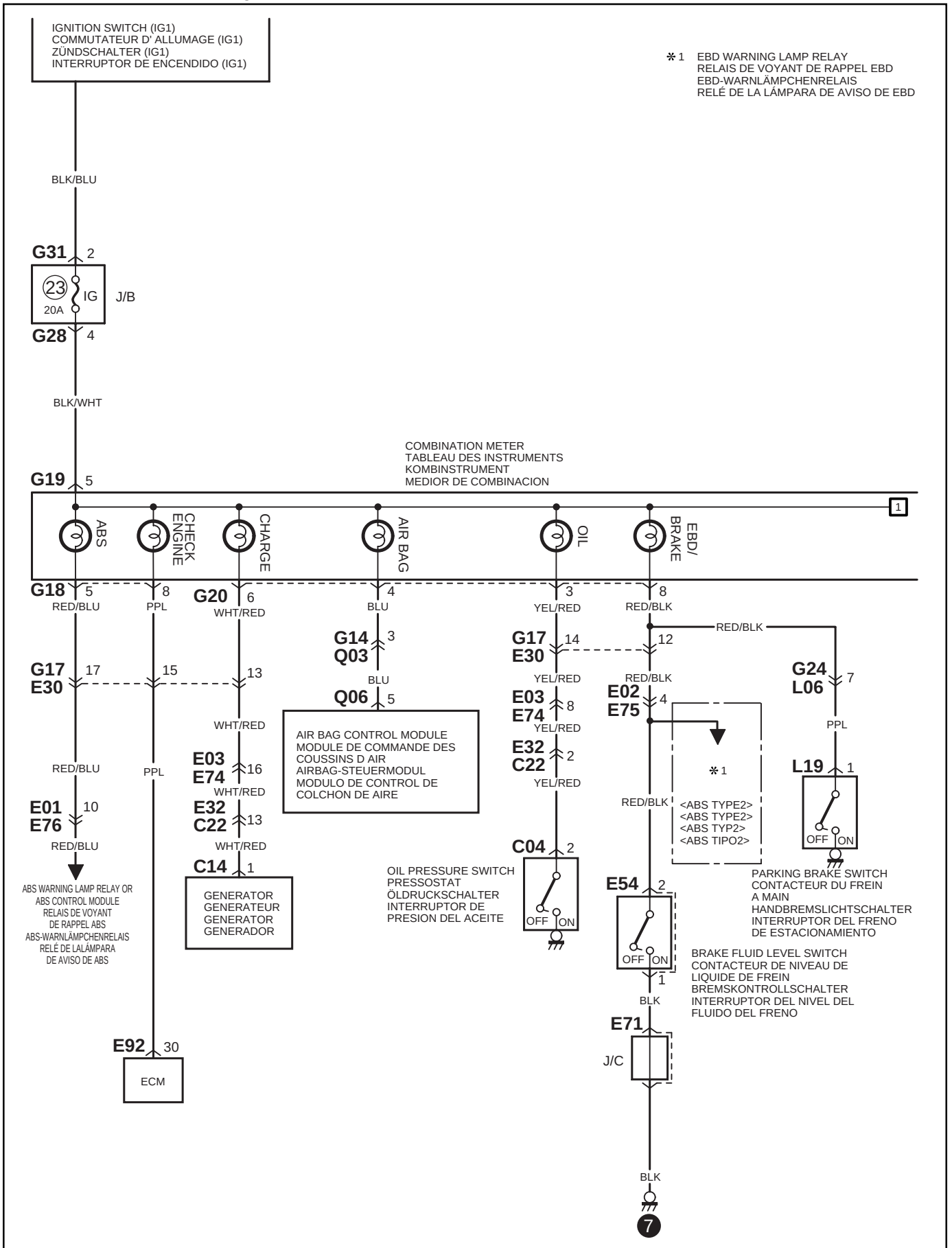

IGNITION SWITCH (IG1)
COMMUTATEUR D' ALLUMAGE (IG1)
ZÜNDSCHALTER (IG1)
INTERRUPTOR DE ENCENDIDO (IG1)
BLK/BLU
G31 2
1
2
3
28
15A
WIP
J/B
G35 6
G33 2
G34 3
E17 7
BLK
COMBINATION SWITCH
COMMODO
KOMBISCHALTER
INTERRUPTOR DE COMBI
IF EQUIPPED WITH INTERMITENT WIPER
SI ÉQUIPÉ D'UN ESSUIE-GLACE À ESSUYAGE INTERMITTENT
WENN MIT INTERVALLWISCHER AUSGESTATTET
SI ESTÁ PROVISTO DE LIMPIAPARABRISAS
OFF
ON
INT
WIPER
ESSUIE-GLACE
SCHEIBENWISCHER
LIMPIAPARABRISAS
OFF
ON
WASHER
LAVE-GLACE
SCHEIBENWASCHER
LAVADOR
OR
YEL/RED
L55
J/C
YEL/RED
ORN
BLU
PNK
4
PNK
L29
1
BLK/YEL
E04
E73
4
BLK/YEL
BLK/YEL
E103 2
M
1
REAR WASHER MOTOR
MOTEUR DE LAVE-GLACE ARRIERE
HINTERER WASCHERMOTOR
MOTOR DEL LAVADOR TRASERO
E153 2
NOISE SUPPRESSOR
CONDENSATEUR ANTIPARASITE
STÖRUNGSUNTERDRÜCKER
SUPRESOR DE RUIDO
1
BLK
BLK
BLK
E71
J/C
BLK
7

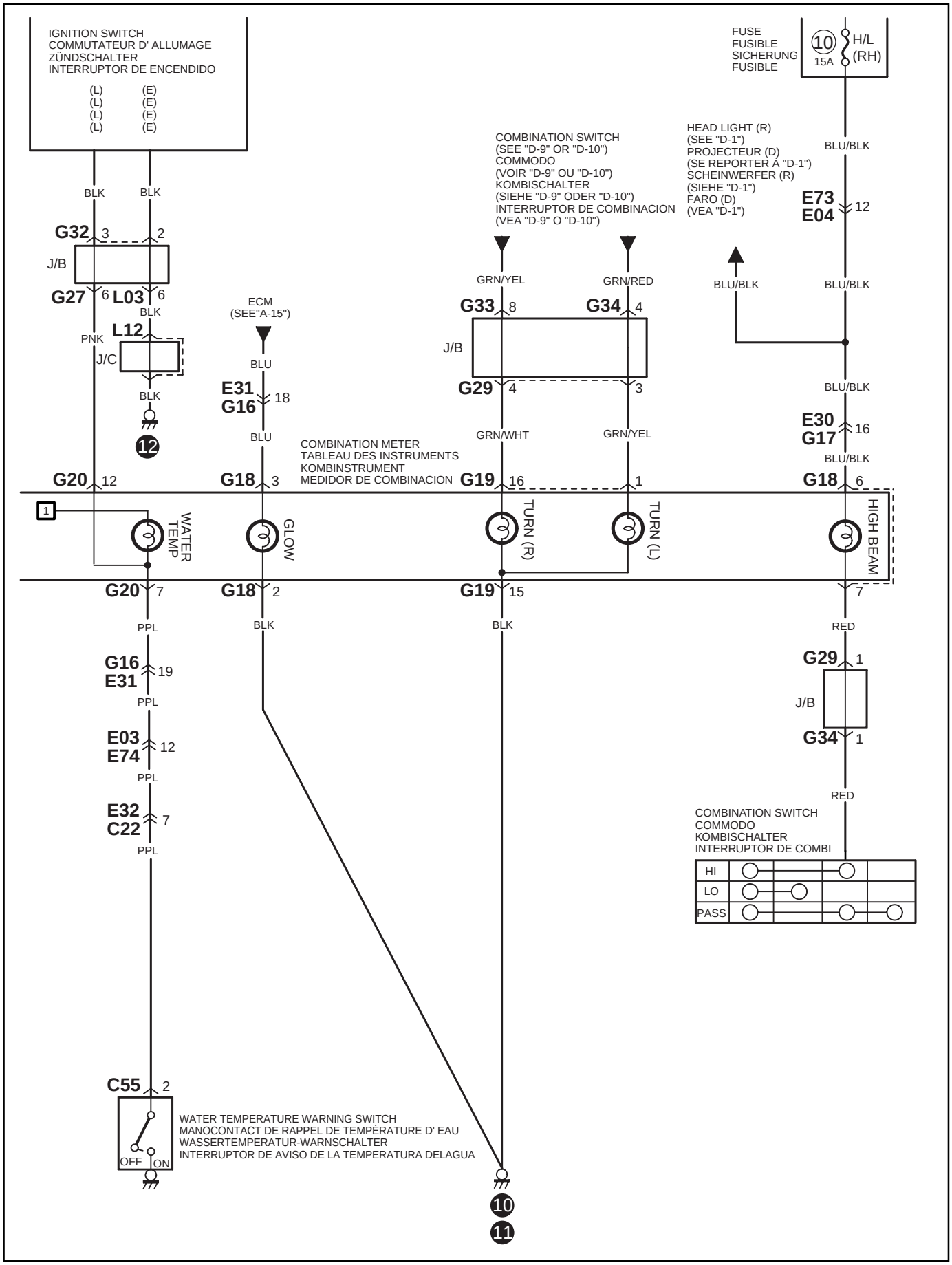
C-3 METER AND GAUGE <VEHICLE WITH TACHOMETER>
JAUGES ET COMPTEURS <VEHICULES AVEC TACHYMETRE>
ANZEIGE UND GEBER <FAHRZEUG MIT DREHZAHLMESSER>
MEDIDOR E INDICADOR <VEHICULO CON TACOMETOR>



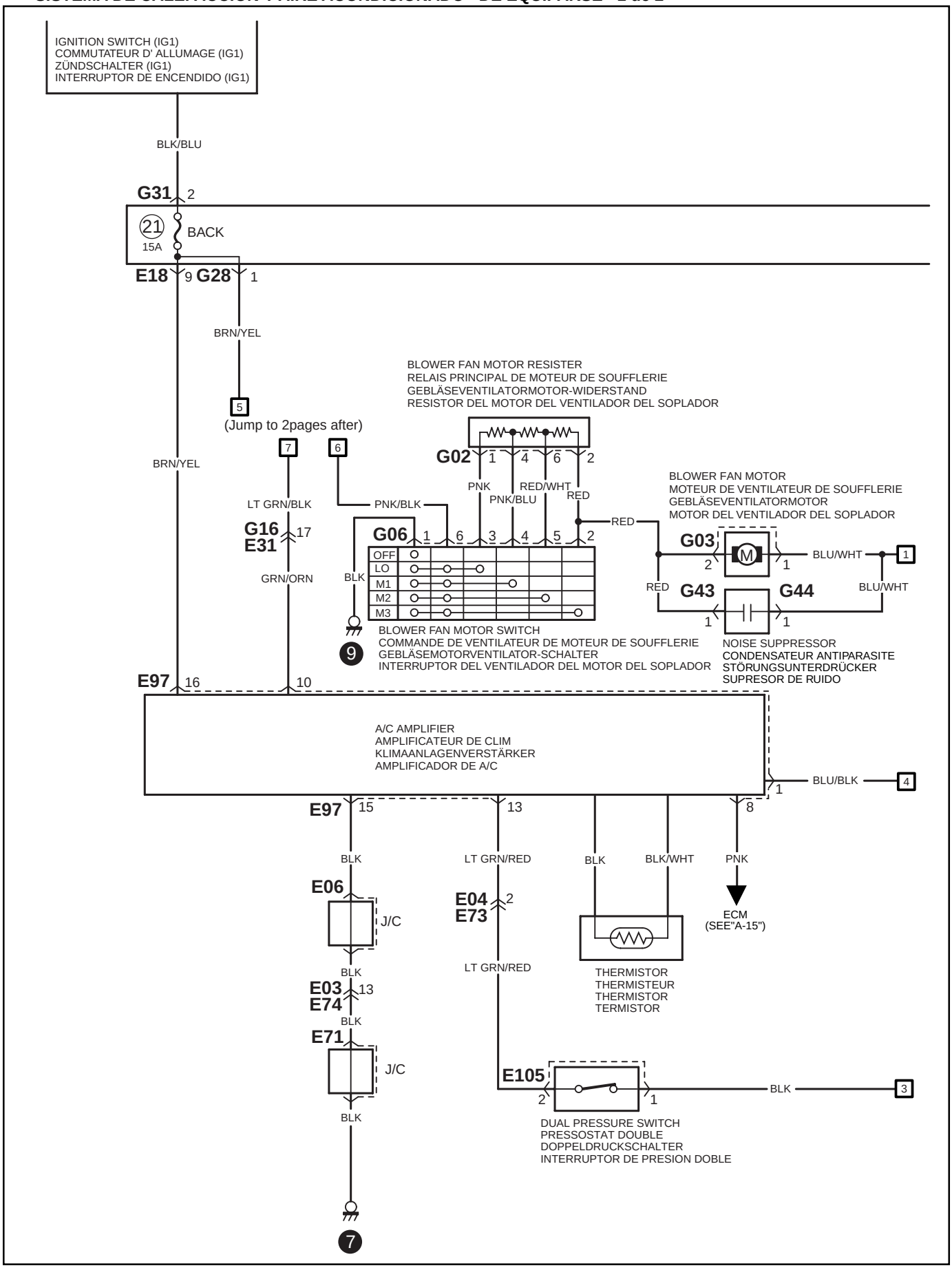
MEMO
NOTE
NOTIZEN
NOTAS

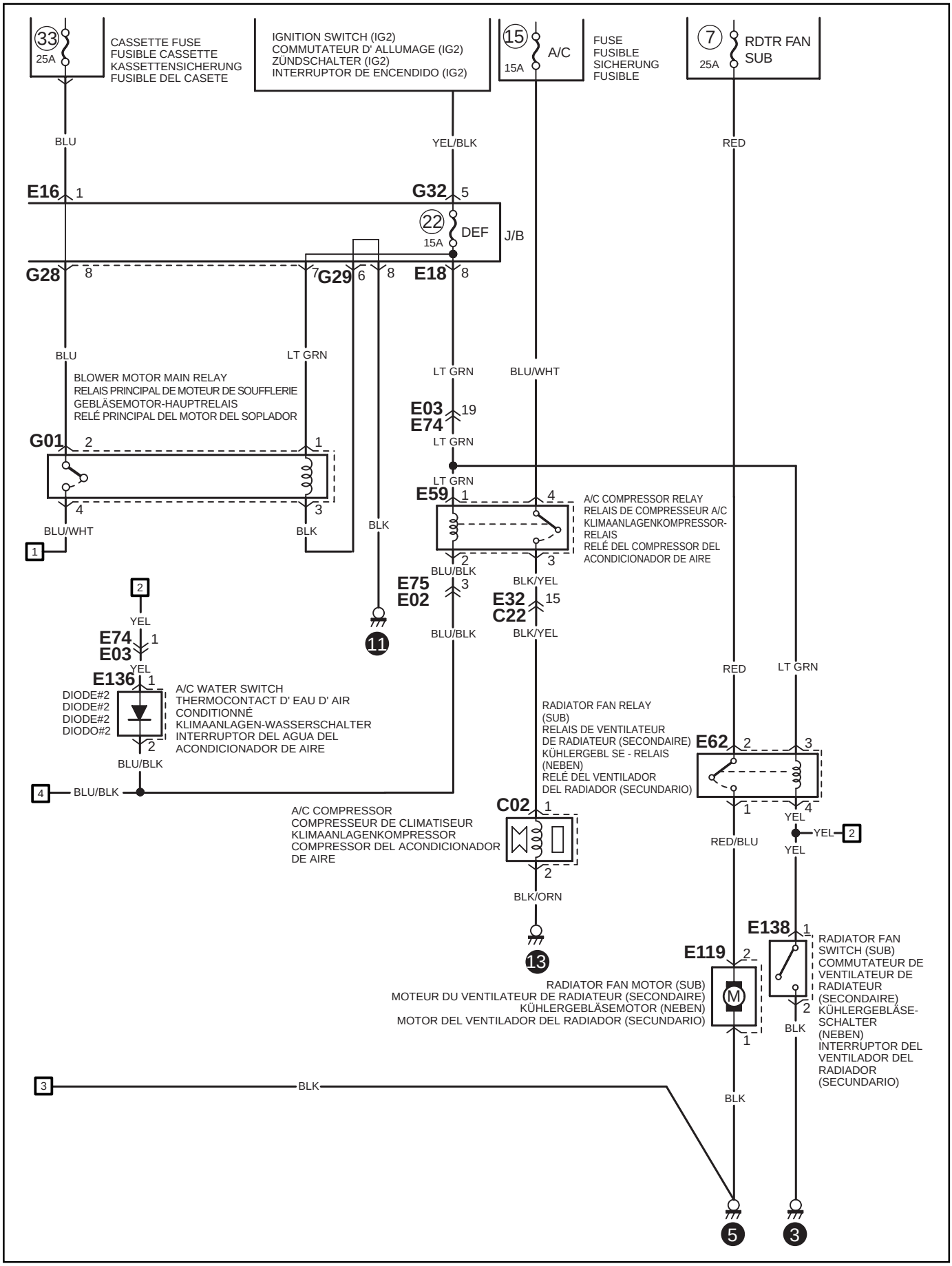
C-6 WARNING LAMP
LAMPE D'ALARME
WARNBLINKERKONTROLLEUCHTE
LAMPARA DE ADVERTENCIA



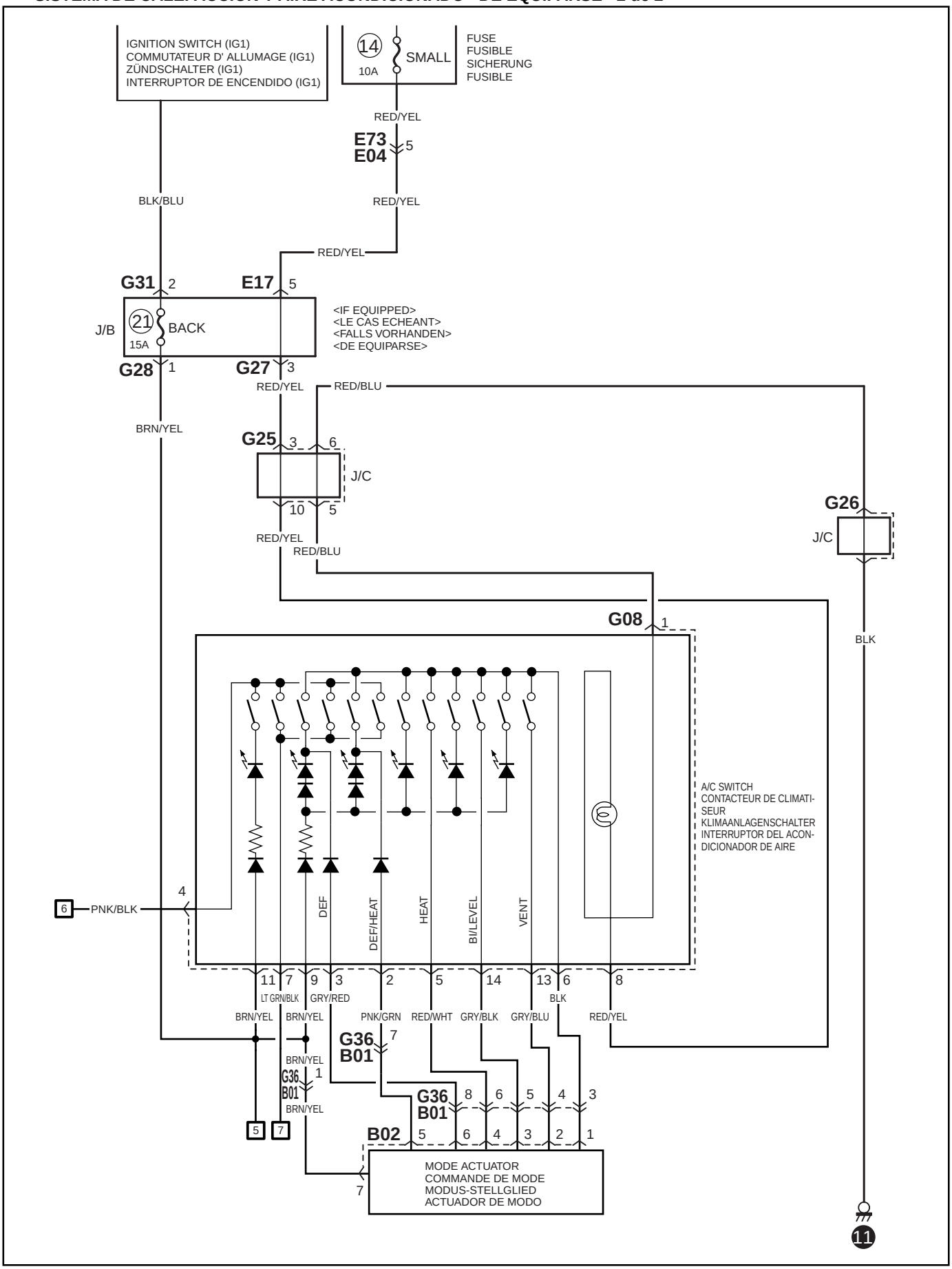

IGNITION SWITCH
COMMUTATEUR D' ALLUMAGE
ZÜNDSCHALTER
INTERRUPTOR DE ENCENDIDO
(L) (E)
(L) (E)
(L) (E)
(L) (E)
FUSE
FUSIBLE
SICHERUNG
FUSIBLE
10
15A
H/L
(RH)
HEAD LIGHT (R)
(SEE "D-1")
PROJECTEUR (D)
(SE REPORTER À "D-1")
SCHEINWERFER (R)
(SIEHE "D-1")
FARO (D)
(VEA "D-1")
COMBINATION SWITCH
(SEE "D-9" OR "D-10")
COMMODO
(VOIR "D-9" OU "D-10")
KOMBISCHALTER
(SIEHE "D-9" ODER "D-10")
INTERRUPTOR DE COMBINACION
(VEA "D-9" O "D-10")
BLK
BLK
G32 3 2
J/B
G27 6 L03 6
BLK
PNK
L12
J/C
BLK
12
ECM
(SEE"A-15")
BLU
E31
G16 18
BLU
GRN/YEL
GRN/RED
G33 8
G34 4
J/B
G29 4 3
GRN/WHT
GRN/YEL
BLU/BLK
BLU/BLK
BLU/BLK
E73
E04 12
BLU/BLK
E30
G17 16
BLU/BLK
COMBINATION METER
TABLEAU DES INSTRUMENTS
KOMBINSTRUMENT
MEDIDOR DE COMBINACION
G20 12
G18 3
G19 16
1
G18 6
1
WATER TEMP
GLOW
TURN (R)
TURN (L)
HIGH BEAM
G20 7
G18 2
G19 15
7
PPL
BLK
BLK
RED
G16
E31 19
PPL
G29 1
J/B
G34 1
E03
E74 12
PPL
RED
E32
C22 7
PPL
COMBINATION SWITCH
COMMODO
KOMBISCHALTER
INTERRUPTOR DE COMBI
HI
LO
PASS
C55 2
OFF
ON
WATER TEMPERATURE WARNING SWITCH
MANOCONTACT DE RAPPEL DE TEMPÉRATURE D' EAU
WASSERTEMPERATUR-WARNSCHALTER
INTERRUPTOR DE AVISO DE LA TEMPERATURA DELAGUA
10
11

E-3 HEATER & AIR CONDITIONING SYSTEM <IF EQUIPPED> 1 of 2
SYSTÈME DE CHAUFFAGE ET D'AIR CONDITIONNÉ <LE CAS ECHEANT> 1 de 2
HEIZUNGS- UND KLIMAANLAGEN-SYSTEM <FALLS VORHANDEN> 1 von 2
SISTEMA DE CALEFACCIÓN Y AIRE ACONDICIONADO <DE EQUIPARSE> 1 de 2



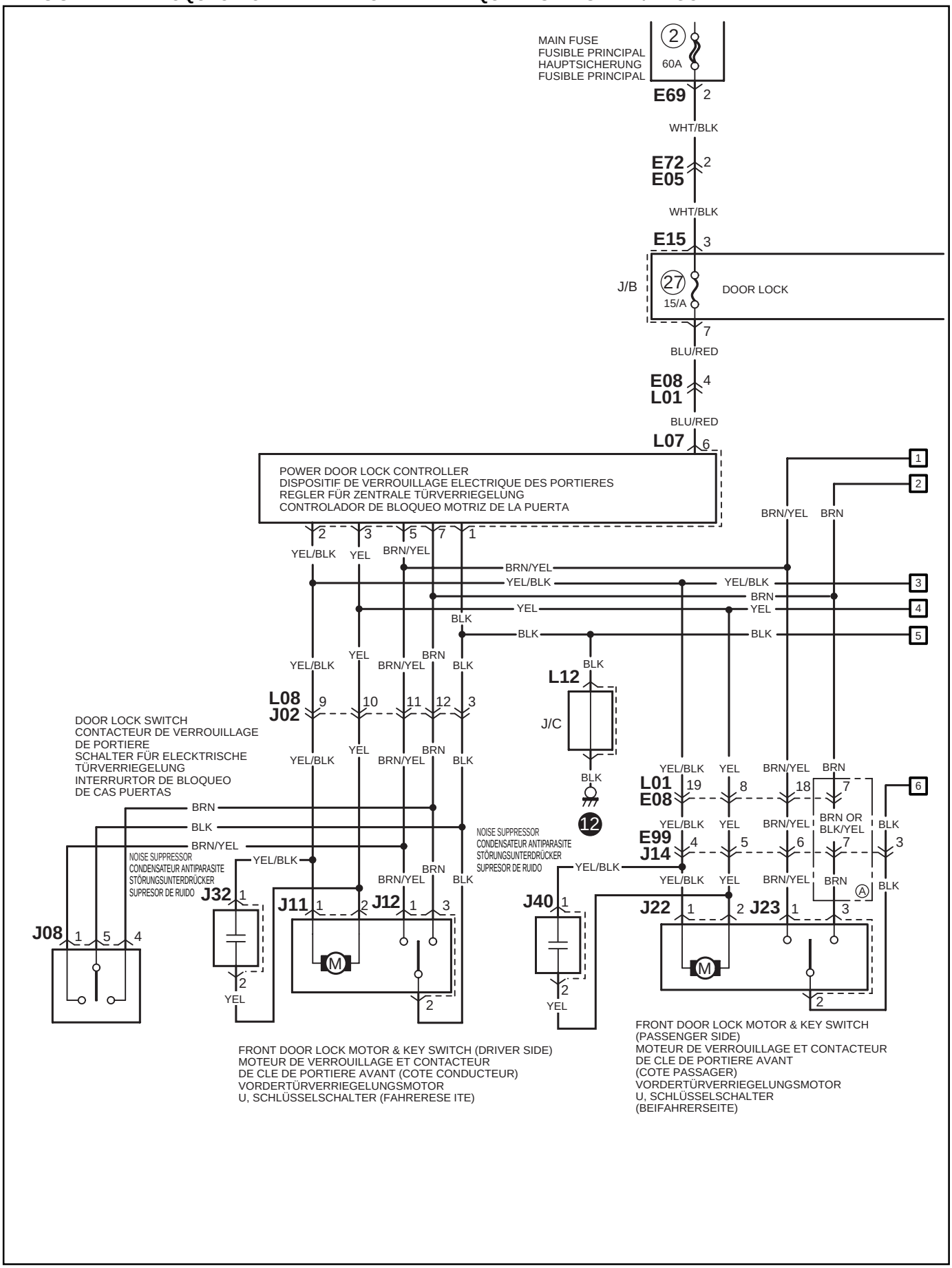

33
25A
CASSETTE FUSE
FUSIBLE CASSETTE
KASSETTENSICHERUNG
FUSIBLE DEL CASETE
IGNITION SWITCH (IG2)
COMMUTATEUR D' ALLUMAGE (IG2)
ZÜNDSCHALTER (IG2)
INTERRUPTOR DE ENCENDIDO (IG2)
15
15A
A/C
FUSE
FUSIBLE
SICHERUNG
FUSIBLE
7
25A
RDTR FAN
SUB
BLU
YEL/BLK
RED
E16
G32
22
15A
DEF
J/B
G28
G29
E18
BLU
LT GRN
LT GRN
BLU/WHT
BLOWER MOTOR MAIN RELAY
RELAIS PRINCIPAL DE MOTEUR DE SOUFFLERIE
GEBLÄSEMOTOR-HAUPTRELAIS
RELÉ PRINCIPAL DEL MOTOR DEL SOPLADOR
G01
E03
E74
19
LT GRN
LT GRN
E59
A/C COMPRESSOR RELAY
RELAIS DE COMPRESSEUR A/C
KLIMAANLAGENKOMPRESSOR-RELAIS
RELÉ DEL COMPRESSOR DEL ACONDICIONADOR DE AIRE
BLU/WHT
BLK
BLK
BLU/BLK
BLK/YEL
E75
E02
E32
C22
15
BLU/BLK
BLK/YEL
YEL
E74
E03
E136
DIODE#2
DIODE#2
DIODE#2
DIODO#2
A/C WATER SWITCH
THERMOCONTACT D' EAU D' AIR CONDITIONNÉ
KLIMAANLAGEN-WASSERSCHALTER
INTERRUPTOR DEL AGUA DEL ACONDICIONADOR DE AIRE
BLU/BLK
BLU/BLK
RADIATOR FAN RELAY (SUB)
RELAIS DE VENTILATEUR DE RADIATEUR (SECONDAIRE)
KÜHLERGEBL SE - RELAIS (NEBEN)
RELÉ DEL VENTILADOR DEL RADIADOR (SECUNDARIO)
RED
LT GRN
E62
A/C COMPRESSOR
COMPRESSEUR DE CLIMATISEUR
KLIMAANLAGENKOMPRESSOR
COMPRESSOR DEL ACONDICIONADOR DE AIRE
C02
RED/BLU
YEL
YEL
BLK/ORN
E138
E119
RADIATOR FAN MOTOR (SUB)
MOTEUR DU VENTILATEUR DE RADIATEUR (SECONDAIRE)
KÜHLERGEBLÄSEMOTOR (NEBEN)
MOTOR DEL VENTILADOR DEL RADIADOR (SECUNDARIO)
RADIATOR FAN SWITCH (SUB)
COMMUTATEUR DE VENTILATEUR DE RADIATEUR (SECONDAIRE)
KÜHLERGEBLÄSE-SCHALTER (NEBEN)
INTERRUPTOR DEL VENTILADOR DEL RADIADOR (SECUNDARIO)
BLK
BLK
BLK
11
13
5
3

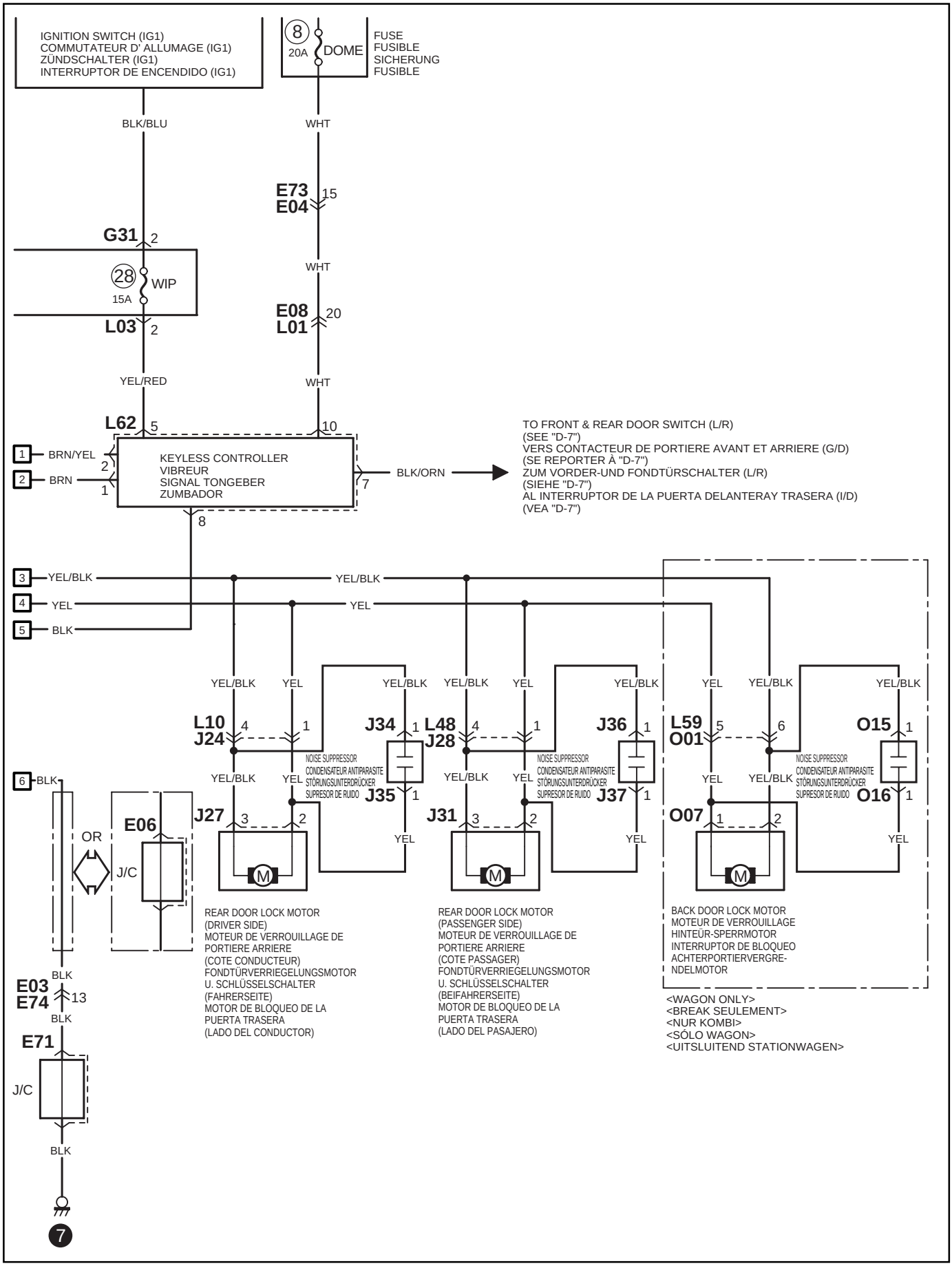
E-3 HEATER & AIR CONDITIONING SYSTEM <IF EQUIPPED> 2 of 2
SYSTÈME DE CHAUFFAGE ET D'AIR CONDITIONNÉ <LE CAS ECHEANT> 2 de 2
HEIZUNGS- UND KLIMAANLAGEN-SYSTEM <FALLS VORHANDEN> 2 von 2
SISTEMA DE CALEFACCIÓN Y AIRE ACONDICIONADO <DE EQUIPARSE> 2 de 2



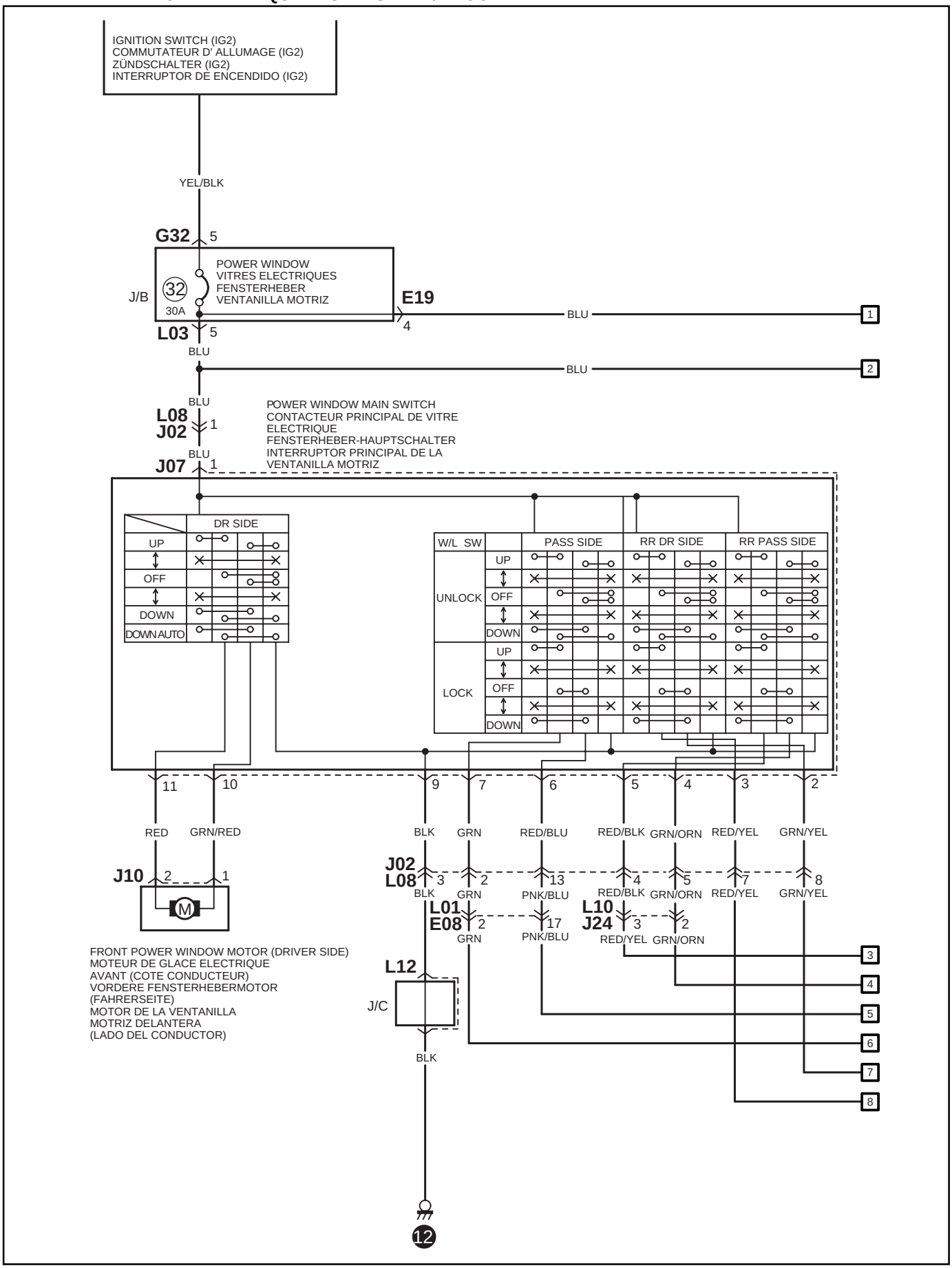
MEMO
NOTE
NOTIZEN
NOTAS

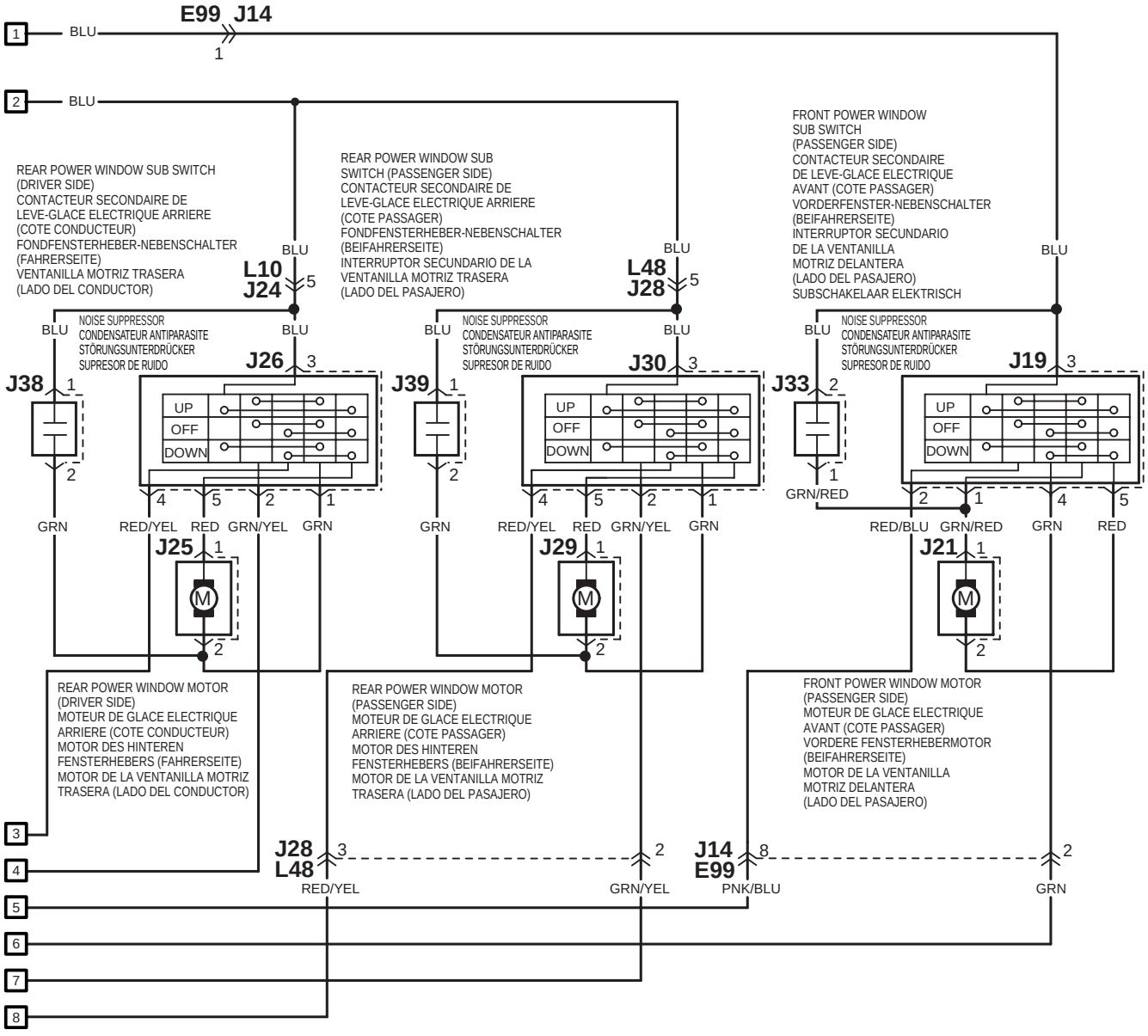
G-4 POWER DOOR LOCK SYSTEM <IF EQUIPPED> <SEDAN/WAGON>
SYSTEME DE VERROUILLAGE ELECTRIQUE DES PORTIERES <LE CAS ECHEANT> <BERLINE/BREAK>
ZENTRALVERRIEGELUNG <FALLS VORHANDEN> <LIMOUSINE/KOMBI>
SISTEMA DE BLOQUEO MOTRIZ DE LA PUERTA <DE EQUIPARSE> <SEDÁN/WAGON>



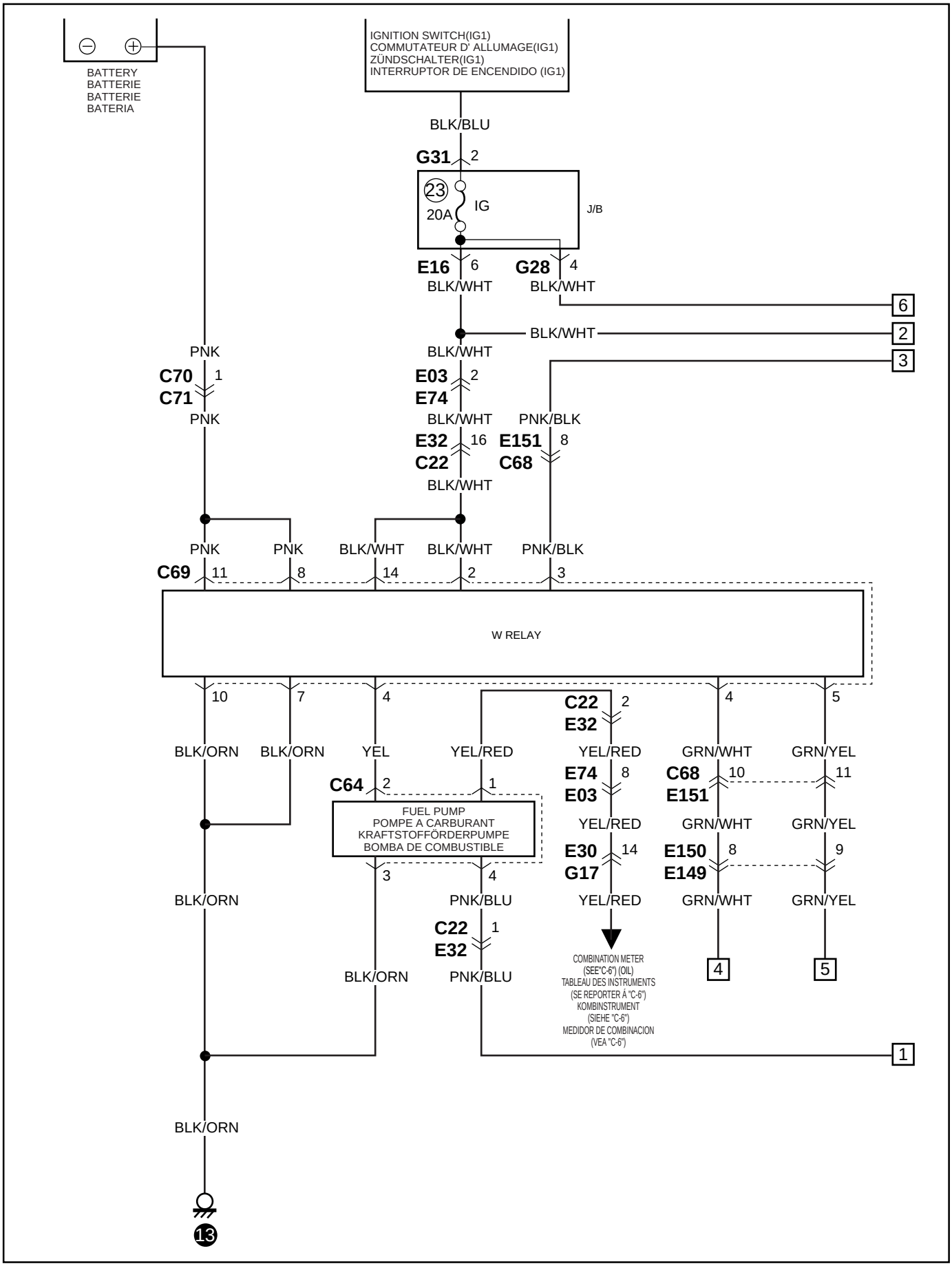

IGNITION SWITCH (IG1)
COMMUTATEUR D' ALLUMAGE (IG1)
ZÜNDSCHALTER (IG1)
INTERRUPTOR DE ENCENDIDO (IG1)
8
20A
DOME
FUSE
FUSIBLE
SICHERUNG
FUSIBLE
BLK/BLU
WHT
E73
E04
15
G31
2
28
15A
WIP
WHT
E08
L01
20
L03
2
YEL/RED
WHT
L62
5
10
1
BRN/YEL
2
BRN
1
KEYLESS CONTROLLER
VIBREUR
SIGNAL TONGEBER
ZUMBADOR
7
BLK/ORN
8
TO FRONT & REAR DOOR SWITCH (L/R)
(SEE "D-7")
VERS CONTACTEUR DE PORTIERE AVANT ET ARRIERE (G/D)
(SE REPORTER À "D-7")
ZUM VORDER-UND FONDTÜRSCHALTER (L/R)
(SIEHE "D-7")
AL INTERRUPTOR DE LA PUERTA DELANTERAY TRASERA (I/D)
(VEA "D-7")
3
YEL/BLK
4
YEL
5
BLK
YEL/BLK
YEL
L10
J24
4
1
J34
1
L48
J28
4
1
J36
1
L59
O01
5
6
O15
1
NOISE SUPPRESSOR
CONDENSATEUR ANTIPARASITE
STÖRUNGSUNTERDRÜCKER
SUPRESOR DE RUIDO
J35
1
J37
1
O16
1
6
BLK
OR
E06
J/C
J27
3
2
J31
3
2
O07
1
2
M
REAR DOOR LOCK MOTOR
(DRIVER SIDE)
MOTEUR DE VERROUILLAGE DE
PORTIERE ARRIERE
(COTE CONDUCTEUR)
FONDTÜRVERRIEGELUNGSMOTOR
U. SCHLÜSSELSCHALTER
(FAHRERSEITE)
MOTOR DE BLOQUEO DE LA
PUERTA TRASERA
(LADO DEL CONDUCTOR)
REAR DOOR LOCK MOTOR
(PASSENGER SIDE)
MOTEUR DE VERROUILLAGE DE
PORTIERE ARRIERE
(COTE PASSAGER)
FONDTÜRVERRIEGELUNGSMOTOR
U. SCHLÜSSELSCHALTER
(BEIFAHRERSEITE)
MOTOR DE BLOQUEO DE LA
PUERTA TRASERA
(LADO DEL PASAJERO)
BACK DOOR LOCK MOTOR
MOTEUR DE VERROUILLAGE
HINTEÜR-SPERRMOTOR
INTERRUPTOR DE BLOQUEO
ACHTERPORTIERVERGRE-
NDELMOTOR
<WAGON ONLY>
<BREAK SEULEMENT>
<NUR KOMBI>
<SÓLO WAGON>
<UITSLUITEND STATIONWAGEN>
BLK
E03
E74
13
BLK
E71
J/C
BLK
7

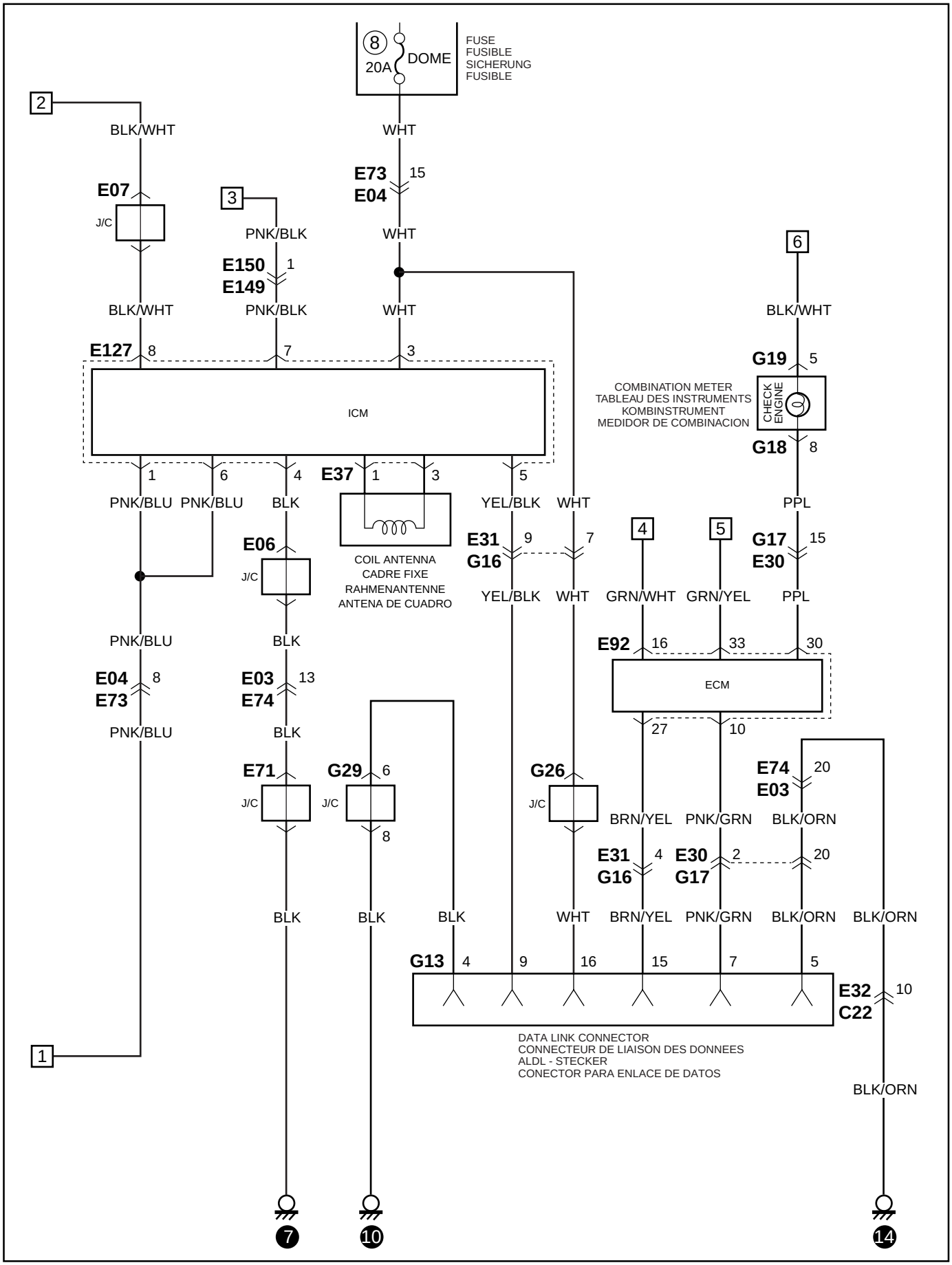
G-7 POWER WINDOW <IF EQUIPPED><SEDAN/WAGON>
VITRES ELECTRIQUES <LE CAS ECHEANT> <BERLINE/BREAK>
FENSTERHEBER <FALLS VORHANDEN> <LIMOUSINE/KOMBI>
VENTANILLA MOTRIZ <DE EQUIPARSE> <SEDÁN/WAGON>




E99 J14
1
BLU
REAR POWER WINDOW SUB SWITCH (DRIVER SIDE)
CONTACTEUR SECONDAIRE DE LEVE-GLACE ELECTRIQUE ARRIERE (COTE CONDUCTEUR)
FONDFENSTERHEBER-NEBENSCHALTER (FAHRERSEITE)
VENTANILLA MOTRIZ TRASERA (LADO DEL CONDUCTOR)
REAR POWER WINDOW SUB SWITCH (PASSENGER SIDE)
CONTACTEUR SECONDAIRE DE LEVE-GLACE ELECTRIQUE ARRIERE (COTE PASSAGER)
FONDFENSTERHEBER-NEBENSCHALTER (BEIFAHRERSEITE)
INTERRUPTOR SECUNDARIO DE LA VENTANILLA MOTRIZ TRASERA (LADO DEL PASAJERO)
FRONT POWER WINDOW SUB SWITCH (PASSENGER SIDE)
CONTACTEUR SECONDAIRE DE LEVE-GLACE ELECTRIQUE AVANT (COTE PASSAGER)
VORDERFENSTER-NEBENSCHALTER (BEIFAHRERSEITE)
INTERRUPTOR SECUNDARIO DE LA VENTANILLA MOTRIZ DELANTERA (LADO DEL PASAJERO)
SUBSCHAKELAAR ELEKTRISCH
L10 J24
L48 J28
NOISE SUPPRESSOR
CONDENSATEUR ANTIPARASITE
STÖRUNGSUNTERDRÜCKER
SUPRESOR DE RUIDO
J38
J26
J39
J30
J33
J19
UP
OFF
DOWN
GRN
RED/YEL
RED
GRN/YEL
GRN/RED
RED/BLU
J25
J29
J21
REAR POWER WINDOW MOTOR (DRIVER SIDE)
MOTEUR DE GLACE ELECTRIQUE ARRIERE (COTE CONDUCTEUR)
MOTOR DES HINTEREN FENSTERHEBERS (FAHRERSEITE)
MOTOR DE LA VENTANILLA MOTRIZ TRASERA (LADO DEL CONDUCTOR)
REAR POWER WINDOW MOTOR (PASSENGER SIDE)
MOTEUR DE GLACE ELECTRIQUE ARRIERE (COTE PASSAGER)
MOTOR DES HINTEREN FENSTERHEBERS (BEIFAHRERSEITE)
MOTOR DE LA VENTANILLA MOTRIZ TRASERA (LADO DEL PASAJERO)
FRONT POWER WINDOW MOTOR (PASSENGER SIDE)
MOTEUR DE GLACE ELECTRIQUE AVANT (COTE PASSAGER)
VORDERE FENSTERHEBERMOTOR (BEIFAHRERSEITE)
MOTOR DE LA VENTANILLA MOTRIZ DELANTERA (LADO DEL PASAJERO)
J28 L48
J14 E99
RED/YEL
GRN/YEL
PNK/BLU
GRN

G-13 IMMOBILIZER CONTROL SYSTEM
SYSTEME DE COMMANDE D'ANTIVOL
WEGFAHRSPERREN-STEUERUNG
SISTEMA DE CONTROL DEL INMOVILIZADOR




8
20A
DOME
FUSE
FUSIBLE
SICHERUNG
FUSIBLE
2
BLK/WHT
E07
J/C
BLK/WHT
E127
8
WHT
E73
15
E04
WHT
3
PNK/BLK
E150
1
E149
PNK/BLK
7
WHT
3
6
BLK/WHT
G19
5
COMBINATION METER
TABLEAU DES INSTRUMENTS
KOMBINSTRUMENT
MEDIDOR DE COMBINACION
CHECK ENGINE
G18
8
ICM
1
6
4
E37
1
3
5
PNK/BLU
PNK/BLU
BLK
COIL ANTENNA
CADRE FIXE
RAHMENANTENNE
ANTENA DE CUADRO
YEL/BLK
WHT
PPL
E06
J/C
E31
9
G16
7
4
5
G17
15
E30
YEL/BLK
WHT
GRN/WHT
GRN/YEL
PPL
PNK/BLU
BLK
E92
16
33
30
ECM
E04
8
E73
E03
13
E74
PNK/BLU
BLK
27
10
E71
J/C
G29
6
J/C
8
G26
J/C
E74
20
E03
BRN/YEL
PNK/GRN
BLK/ORN
E31
4
G16
E30
2
G17
20
BLK
BLK
BLK
WHT
BRN/YEL
PNK/GRN
BLK/ORN
BLK/ORN
G13
4
9
16
15
7
5
E32
10
C22
DATA LINK CONNECTOR
CONNECTEUR DE LIAISON DES DONNEES
ALDL - STECKER
CONECTOR PARA ENLACE DE DATOS
1
BLK/ORN
7
10
14

B C E

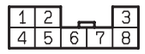
8A-8 LIST OF CONNECTORS
8A-8 LISTE DES BLOCS RACCORD DE C´BLAGE
8A-8 LISTE VON ANSCHL SSEN
8A-8 LISTA DE CONECTORES

✻1 For vehicle equipped with ABS
✻1 Pour les vèhicules équipés d'un système ABS
✻1 Fúr Fahrzeuge mit ABS
✻1 Para el vehÌculo equipado con ABS

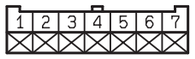
✻2 For vehicle equipped with power window
✻2 Pour les vèhicules équipés de lève-glace électrique
✻2 Fúr Fahrzeuge mit elektrischen Fensterhebern
✻2 Fúr Fahrzeuge mit elektrischen Fensterhebern

B

B01 (TO G36)



B02



C

C02



C04

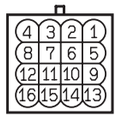


C14

C15



C22 (TO E32)



C23



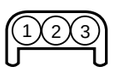
C47



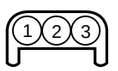
C49 (TO C61)



C50



C51



C53

C55

C56

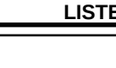
C57

C58

C61 (TO C49)

C62

C63



C64



C65



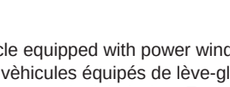
C67



C68 (TO E151)



C69

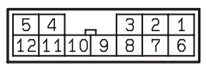


C70

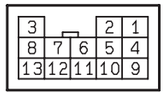
C71

E

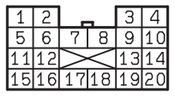
E01 (TO E76)



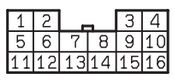
E02 (TO E75)



E03 (TO E74)



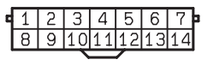
E04 (TO E73)



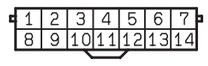
E05 (TO E72)



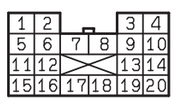
E06



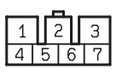
E07



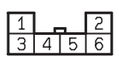
E08 (TO L01)



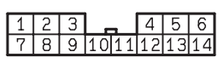
E15



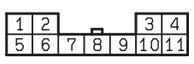
E16



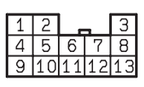
E17



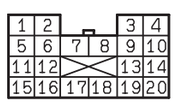
E18



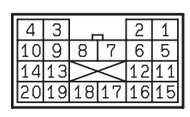
E19



E30 (TO G17)

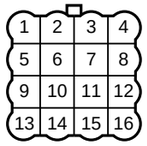


E31 (TO G16)



E G

E

E32 (TO C22)


E37


E52

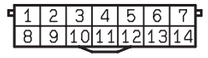

E54


E59

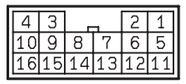

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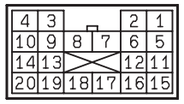

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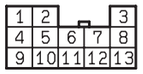

E69

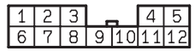

E71


E72 (TO E05)


E73 (TO E04)


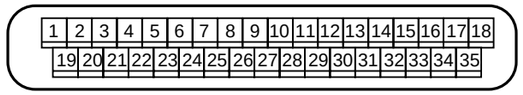
E74 (TO E03)


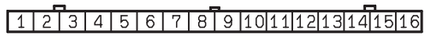
E75 (TO E02)


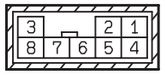
E76 (TO E01)


*1

E77


E92


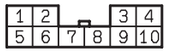
E97


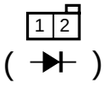
E99 (TO J14)


E103

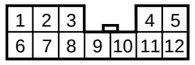

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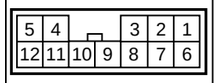

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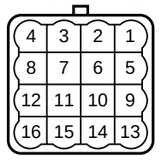

E127


E136


E138


E149 (TO E150)


E150 (TO E149)


E151 (TO C68)


E152

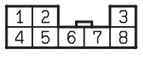

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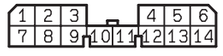

G

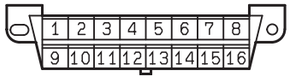
G01


G02

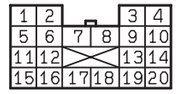

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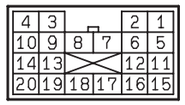

G06


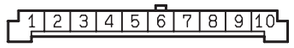
G08


G13


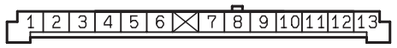
G14 (TO Q13)

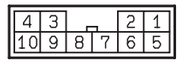

G16 (TO E31)


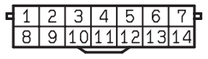
G17 (TO E30)


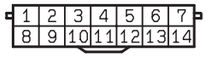
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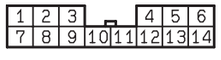
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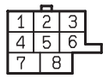

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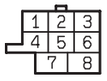
G24 (TO L06)


G25


G26


G27


G28


G29


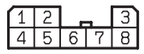
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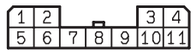

(IGNITION SWITCH)
(COMMUTATEUR D'ALLUMAGE)
(ZÜNDSCHALTER)
(INTERRUPTOR DE ENCENDIDO)

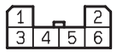
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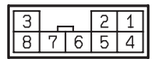

(IGNITION SWITCH)
(COMMUTATEUR D'ALLUMAGE)
(ZÜNDSCHALTER)
(INTERRUPTOR DE ENCENDIDO)

G

G33

(COMBINATION SWITCH)
(COMMODO)
(KOMBISCHAL TER)
(INTERRUPTOR DE COMBINACION)

G34

(COMBINATION SWITCH)
(COMMODO)
(KOMBISCHAL TER)
(INTERRUPTOR DE COMBINACION)

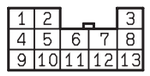
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(COMBINATION SWITCH)
(COMMODO)
(KOMBISCHAL TER)
(INTERRUPTOR DE COMBINACION)

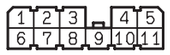
G36 (TO B01)


G43


G44


J

J02 (TO L08)


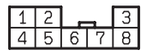
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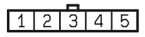
J08


J10


J11


J12


J14 (TO E99)


J19


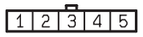
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J22


J23

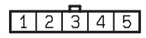

J24 (TO L10)


J25


J26


J28 (TO L48)


J29


J30


J31


J32


J33


J34


J35


J36

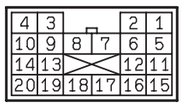

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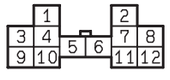

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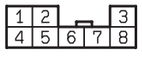

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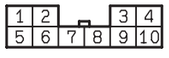

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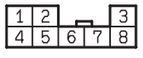

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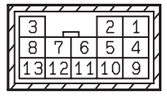
L01 (TO E08)


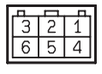
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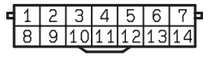
L04


L06 (TO G24)


L07

*2

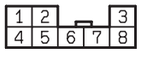
L08 (TO J02)


L10 (TO J24)


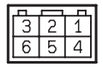
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L19

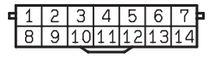

L29


L30

* FOR HATCHBACK
POUR HAYON
FÜR FLIESSHECK
PARA ESCOTILLA TRASERA

L36 (TO R01)

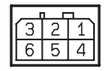

L48 (TO J28)

* FOR SEDAN
POUR LIMOUSINE
FÜR BERLINE
PARA SEDAN

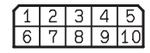
* FOR WAGON
POUR BREAK
FÜR KOMBI
PARA WAGON

L55


L58 (TO O03)

* WAGON ONLY
BREAK SEULEMENT
NUR FUR KOMBI
SOLO WAGON

L59 (TO O01)

* FOR WAGON
POUR BREAK
FÜR KOMBI
PARA WAGON

L62


O

O01 (TO L59)

* WAGON ONLY
BREAK SEULEMENT
NUR FUR KOMBI
SOLO WAGON

O03 (TO L58)

* WAGON ONLY
BREAK SEULEMENT
NUR FUR KOMBI
SOLO WAGON

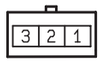
O07

* WAGON ONLY
BREAK SEULEMENT
NUR FUR KOMBI
SOLO WAGON

O09


O15


O16


Q	**Q03(TO G14)** 	**Q06** 							
R	**R01 (TO L36)** 	**R09** 								

Prepared by

SUZUKI MOTOR CORPORATION

Overseas Service Department

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Printed in Japan

Printing: October, 2000 320

IMPORTANT

WARNING/CAUTION/NOTE

Please read this manual and follow its instructions carefully. To emphasize special information, the words **WARNING**, **CAUTION** and **NOTE** have special meanings. Pay special attention to the messages highlighted by these signal words.

WARNING:
Indicates a potential hazard that could result in death or injury.

CAUTION:
Indicates a potential hazard that could result in vehicle damage.

NOTE:
Indicates special information to make maintenance easier or instructions clearer.

WARNING:
This service manual is intended for authorized SUZUKI dealers and qualified service mechanics only. Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual. Improper repair may result in injury to the mechanic and may render the vehicle unsafe for the driver and passengers.

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on or around the air bag system components must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS, CAUTIONS and "Service Precautions" under "On-Vehicle Service" in SECTION 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **If the air bag system and another vehicle system both need repair, SUZUKI recommends that the air bag system be repaired first, to help avoid unintentional activation of the air bag system.**
- **Do not modify the steering wheel, instrument panel or any other air bag system component. Modifications can adversely affect air bag system performance and lead to injury.**
- **If the vehicle will be exposed to temperatures over 93° C (200° F) (for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and seat belt pretensioner (if equipped)) beforehand to avoid component damage or unintended activation of the system.**

FOREWORD

This manual (Volumes 1 and 2) contains procedures for diagnosis, maintenance, adjustments, minor service operations, replacement of components (Service) and for disassembly and assembly of major components (Unit Repair-Overhaul).

VOLUME 1 contains Chassis, Electrical and Body sections (all sections except engine).
VOLUME 2 contains Engine sections (Section 6 – 6K).

Applicable model: SY413/SY416/SY418 on and after the following VIN NO.

HATCHBACK		
GA11S-200001	**JSAEGA11S00200001**	**JSAEGA41S00200001**
	JSAEGA31S00200001	**JSAEGB31S00200001**
SEDAN		
GC11S-200001	**JS2GB31S⍁15200001**	**JSAEGC31S15200001**
GC31S-200001	**JS2GB41S⍁15200001**	**JSAEGC41S00200001**
JS2GA11S⍁15200001	**JSAEGC11S00200001**	**JSAEGD31S00200001**
JS2GA31S⍁15200001	**JSAEGC31S00200001**	
JS2GA41S⍁15200001	**JSAEGC31S10200001**	
WAGON		
GC31W-200001	**JS2GB31W⍁15200001**	**JSAEGC31W10200001**
GC41W-200001	**JS2GB41W⍁15200001**	**JSAEGC31W15200001**
JS2GA31W⍁15200001	**JSAEGC11W00200001**	**JSAEGC41W00200001**
JS2GA41W⍁15200001	**JSAEGC31W00200001**	**JSAEGD31W00200001**

The contents are classified into sections each of which is given a section number as indicated in the Table of Contents on next page. And on the first page of each individual section is an index of that section.
This manual should be kept in a handy place for ready reference of the service work.
Strict observance of the so specified items will enable one to obtain the full performance of the vehicle.

When replacing parts or servicing by disassembling, it is recommended to use SUZUKI genuine parts, tools and service materials (lubricant, sealants, etc.) as specified in each description.

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others.
Therefore, note that illustrations may differ from the vehicle being actually serviced.
The right is reserved to make changes at any time without notice.

RELATED MANUAL

© **SY413/SY416/SY418 Wiring Diagram Manual**
(99512-60G60-015)

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

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NOTE:

The screen toned Sections 6 – 6K are included in Volume 2 of 2 and Section 8A is in Wiring Diagram Manual.

SECTION 0A

GENERAL INFORMATION

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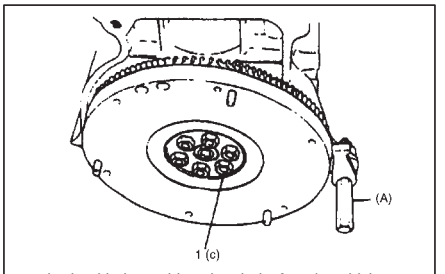
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HOW TO USE THIS MANUAL

1) There is a TABLE OF CONTENTS FOR THE WHOLE MANUAL on the first page of this manual, whereby you can easily find the section that offers the information you need. Also, there is a TABLE OF CONTENTS on the first page of EACH SECTION, where the main items in that section are listed.
2) Each section of this manual has its own pagination. It is indicated at the top of each page along with the Section name.
3) The SPECIAL TOOL usage and TIGHTENING TORQUE SPECIFICATION are given as shown in figure below.



1. Flywheel bolts or drive plate bolts for A/T vehicle

6) Install oil pump. Refer to Item “Oil pump” for installation of oil pump.
7) Install flywheel (M/T vehicle) or drive plate (A/T vehicle). Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts to specification.

Special Tool
(A): 09924-17810

Tightening Torque
(c): 78 N·m (7.8 kg-m, 56.5 lb-ft)

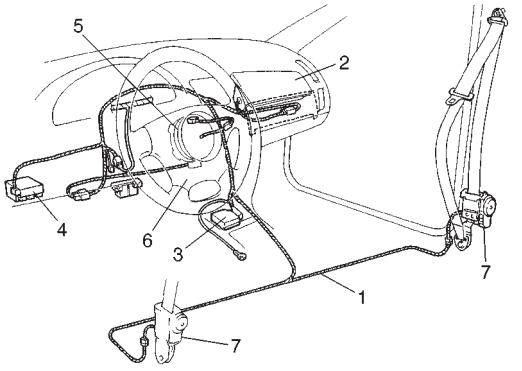
4) A number of abbreviations and symbols are used in the text. For their full explanations, refer to **“ABBREVIATIONS AND SYMBOLS MAY BE USED IN THIS MANUAL”** of this section.
5) The SI, metric and foot-pound systems are used as units in this manual.
6) DIAGNOSIS and CORRECTION are included in each section as necessary.
7) At the end of each section, there are descriptions of SPECIAL TOOLS, REQUIRED SERVICE MATERIALS and TIGHTENING TORQUE SPECIFICATIONS that should be used for the servicing work described in that section.

PRECAUTIONS

PRECAUTION FOR VEHICLES EQUIPPED WITH A SUPPLEMENTAL RESTRAINT (AIR BAG) SYSTEM

WARNING:

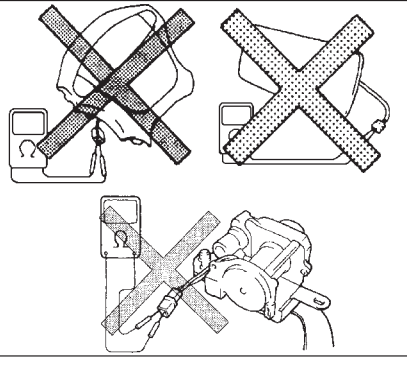
- **The configuration of air bag system parts are as shown in the figure. When it is necessary to service (remove, reinstall and inspect) these parts, be sure to follow procedures described in SECTION 9J. Failure to follow proper procedures could result in possible air bag system activation, personal injury, damage to parts or air bag system being unable to activate when necessary.**
- **If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.**
- **Do not modify the steering wheel, dashboard, or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.**
- **If the vehicle will be exposed to temperature over 93° C (200° F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended air bag system activation.**



1. Air bag wire harness
2. Passenger air bag (inflator) module (if equipped)
3. SDM
4. J/B
5. Contact coil
6. Driver air bag (inflator) module
7. Seat belt pretensioner (if equipped)

DIAGNOSIS

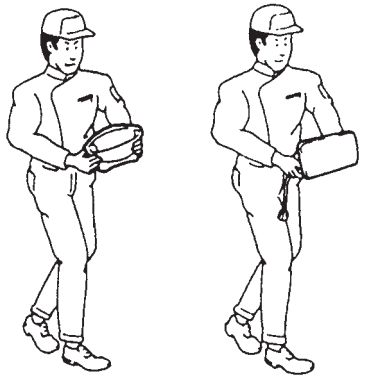
- When troubleshooting air bag system, be sure to follow “DIAGNOSIS” in SECTION 9J. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacement.
- Never use electrical test equipment other than that specified in this manual.



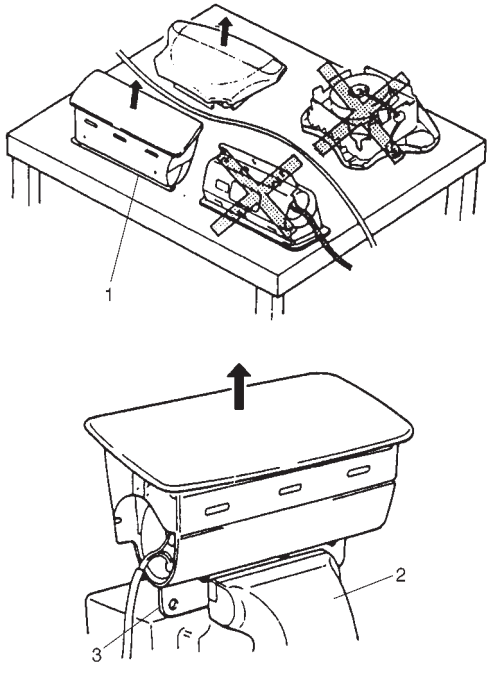
WARNING:

Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger) and seat belt pretensioners (driver an passenger). It is very dangerous as the electric current from the tester may deploy the air bag or activate the pretensioner.

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

SERVICING AND HANDLING

WARNING:

Many of service procedures require disconnection of "AIR BAG" fuse and all air bag (inflator) module(s) from initiator circuit to avoid an accidental deployment.

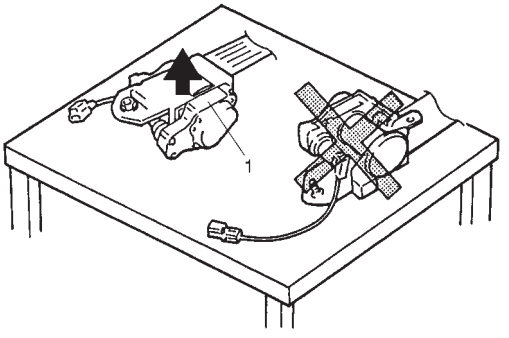
Driver and Passenger Air Bag (Inflator) Modules

- **For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65° C (150° F), without high humidity and away from electric noise.**
- **When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module. When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket. This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment. Otherwise, personal injury may result.**
- **Never dispose of live (undeployed) air bag (inflator) modules (driver and passenger). If disposal is necessary, be sure to deploy them according to deployment procedures described in SECTION 9J before disposal.**
- **The air bag (inflator) module immediately after deployment is very hot. Wait for at least half an hour to cool it off before proceeding the work.**
- **After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.**

WARNING:
SDM

- **During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM). Never strike or jar the SDM.**
- **Never power up the air bag system when the SDM is not rigidly attached to the vehicle. All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointing toward the front of the vehicle to ensure proper operation of the air bag system. The SDM could be activated when powered while not rigidly attached to the vehicle which could cause deployment and result in personal injury.**

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

WARNING:
Driver and Passenger Seat Belt Pretensioners

- **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65· C (150· F), without high humidity and away from electric noise.**
- **Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner. When placing a live seat belt pretensioner on a bench or other surface, always face its warning label attached side up, away from the surface. As the live must be placed with its warning label attached side facing up, place it on the workbench. Otherwise, personal injury may result.**
- **Never dispose of live (inactivated) seat belt pretensioners (driver and passenger). If disposal is necessary, be sure to activate them according to activation procedures described in SECTION 9J before disposal.**
- **The seat belt pretensioner immediately after activation is very hot. Wait for at least half an hour to cool it off before proceeding the work.**
- **With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.**

CAUTION:

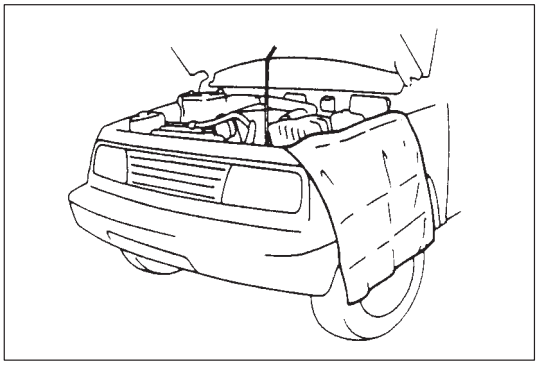
- **Even when the accident was light enough not to cause air bags to activate, be sure to inspect system parts and other related parts according to instructions under "Repair and Inspection Required after an Accident" in SECTION 9J.**
- **When servicing parts other than air bag system, if shocks may be applied to air bag system component parts, remove those parts beforehand.**
- **When handling the air bag (inflator) modules (driver and passenger), seat belt pretensioners (driver and passenger) or SDM, be careful not to drop it or apply an impact to it. If an excessive impact was applied (e.g., dropped from a height of 91.4 cm (3 feet) or more), never attempt disassembly or repair but replace it with a new one.**
- **When grease, cleaning agent, oil, water, etc. has got onto air bag (inflator) modules (driver and passenger) or seat belt pretensioners (drive and passenger), wipe off immediately with a dry cloth.**
- **Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**
- **Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.**
- **Never use air bag system component parts from another vehicle.**
- **When using electric welding, be sure to temporarily disable air bag system referring to "Disabling Air Bag System" described in "Precaution" in SECTION 9J.**
- **Never expose air bag system components parts directly to hot air (drying or baking the vehicle after painting) or flames.**
- **WARNING/CAUTION labels are attached on each part of air bag system components. Be sure to follow the instructions.**
- **After vehicle is completely repaired, perform "Air Bag Diagnostic System Check" described in "Diagnosis" in SECTION 9J.**

GENERAL PRECAUTIONS

The WARNING and CAUTION below describe some general precautions that you should observe when servicing a vehicle. These general precautions apply to many of the service procedures described in this manual, and they will not necessarily be repeated with each procedure to which they apply.

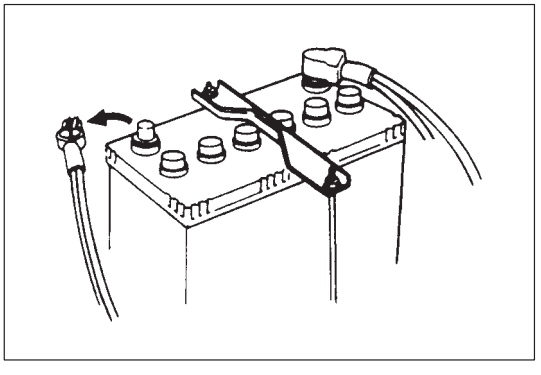
WARNING:

- **Whenever raising a vehicle for service, be sure to follow the instructions under "VEHICLE LIFTING POINTS" on SECTION 0A.**
- **When it is necessary to do service work with the engine running, make sure that the parking brake is set fully and the transmission is in Neutral (for manual transmission vehicles) or Park (for automatic transmission vehicles). Keep hands, hair, clothing, tools, etc. away from the fan and belts when the engine is running.**
- **When it is necessary to run the engine indoors, make sure that the exhaust gas is forced outdoors.**
- **Do not perform service work in areas where combustible materials can come in contact with a hot exhaust system. When working with toxic or flammable materials (such as gasoline and refrigerant), make sure that the area you work in is well-ventilated.**
- **To avoid getting burned, keep away from hot metal parts such as the radiator, exhaust manifold, tailpipe, muffler, etc.**
- **New and used engine oil can be hazardous. Children and pets may be harmed by swallowing new or used oil. Keep new and used oil and used engine oil filters away from children and pets. Continuous contact with used engine oil has been found to cause [skin] cancer in laboratory animals, brief contact with used oil may irritate skin. To minimize your exposure to used engine oil, wear a long-sleeve shirt and moisture-proof gloves (such as dishwashing gloves) when changing engine oil. If engine oil contacts your skin, wash thoroughly with soap and water. Launder any clothing or rags if wet with oil, recycle or properly dispose of used oil and filters.**
- **Make sure the bonnet is fully closed and latched before driving. If it is not, it can fly up unexpectedly during driving, obstructing your view and resulting in an accident.**

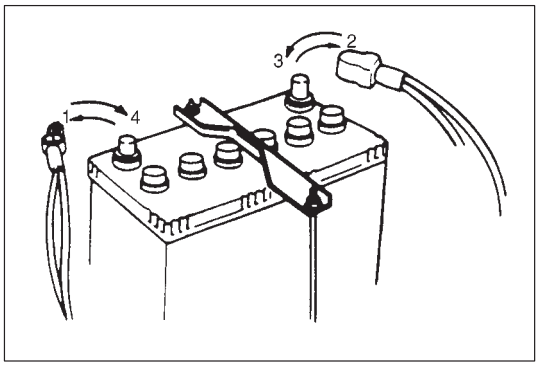


CAUTION:

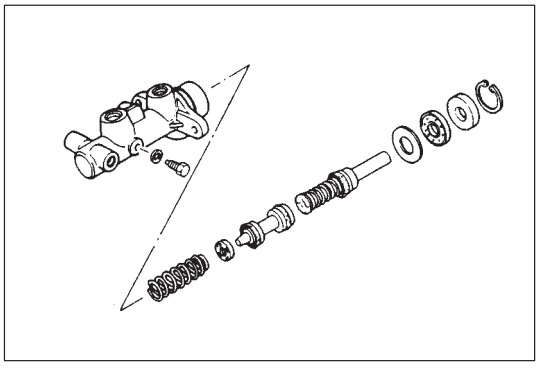
- **Before starting any service work, cover fenders, seats and any other parts that are likely to get scratched or stained during servicing. Also, be aware that what you wear (e.g, buttons) may cause damage to the vehicle's finish.**



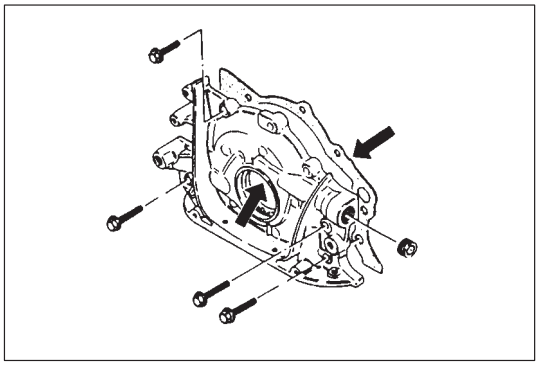
- **When performing service to electrical parts that does not require use of battery power, disconnect the negative cable of the battery.**



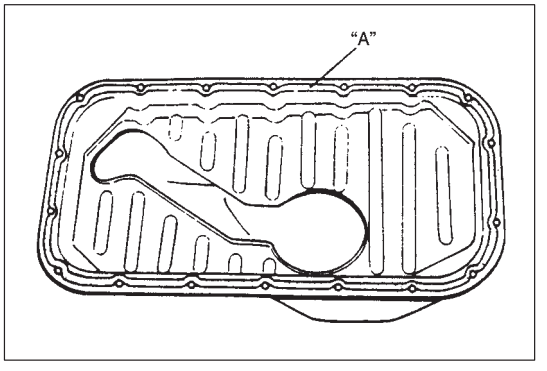
○ **When removing the battery, be sure to disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover.**



○ **When removing parts that are to be reused, be sure to keep them arranged in an orderly manner so that they may be reinstalled in the proper order and position.**



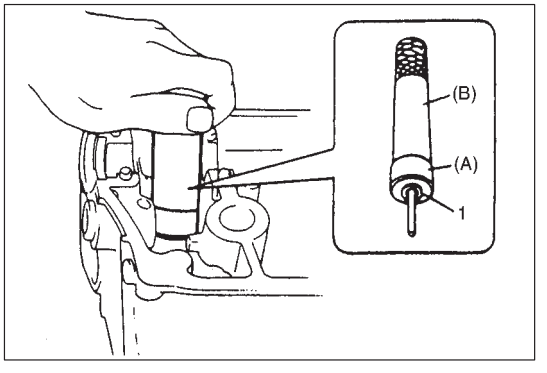
○ **Whenever you use oil seals, gaskets, packing, O-rings, locking washers, split pins, self-locking nuts, and certain other parts as specified, be sure to use new ones. Also, before installing new gaskets, packing, etc., be sure to remove any residual material form the mating surfaces.**



○ **Make sure that all parts used in reassembly are perfectly clean.**

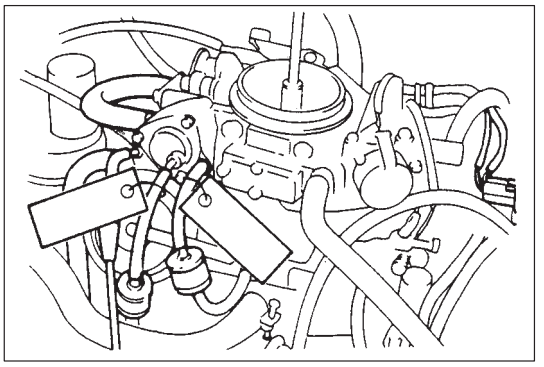
○ **When use of a certain type of lubricant, bond or sealant is specified, be sure to use the specified type.**

"A": Sealant 99000-31150

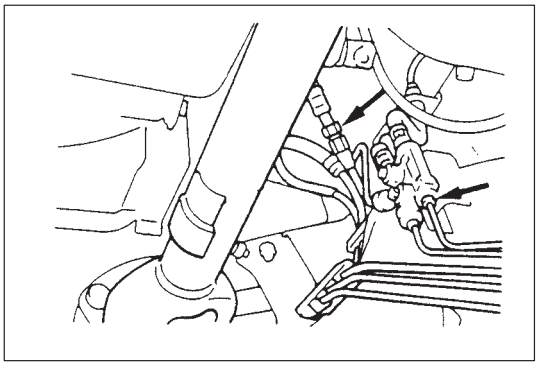


○ **Be sure to use special tools when instructed.**

Special Tool
(A): 09917-98221
(B): 09916-58210

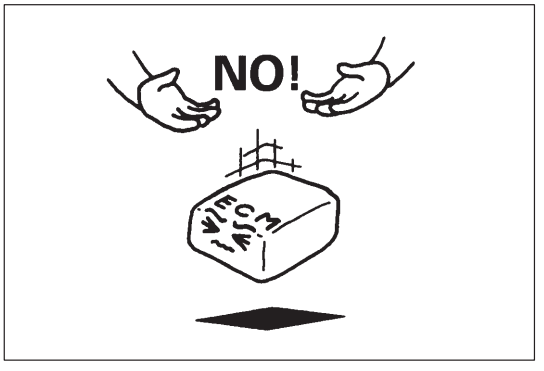


○ When disconnecting vacuum hoses, attach a tag describing the correct installation positions so that the hoses can be reinstalled correctly.

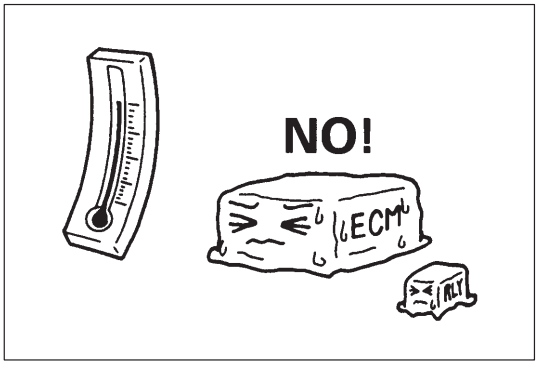


○ After servicing fuel, oil, coolant, vacuum, exhaust or brake systems, check all lines related to the system for leaks.

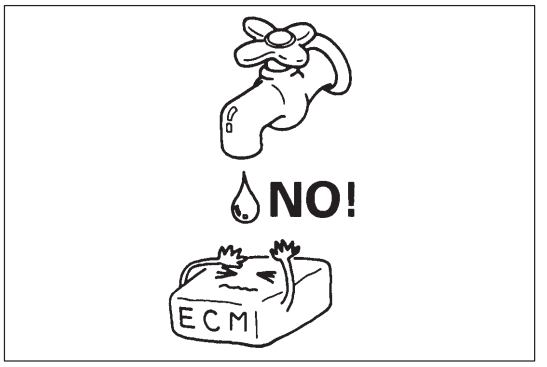
○ For vehicles equipped with fuel injection systems, never disconnect the fuel line between the fuel pump and injector without first releasing the fuel pressure, or fuel can be sprayed out under pressure.



○ Always be careful not to handle electrical parts (computer, relay, etc.) in a rough manner or drop them.



○ When performing a work that produces a heat exceeding 80°C in the vicinity of the electrical parts, remove the heat sensitive electrical part(s) beforehand.

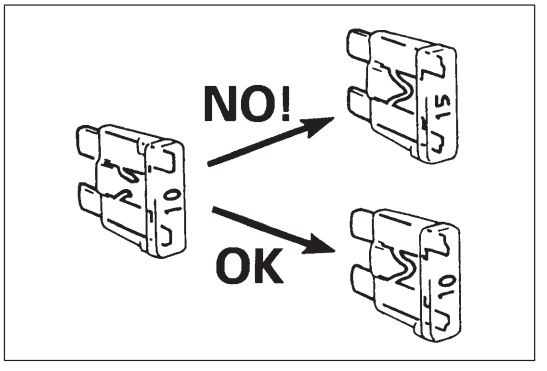


○ **Use care not to expose connectors and electrical parts to water which will be a cause of a trouble.**

PRECAUTION FOR CATALYTIC CONVERTER

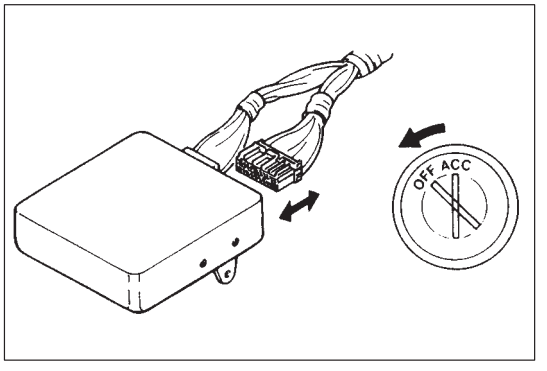
For vehicles equipped with a catalytic converter, use only unleaded gasoline and be careful not to let a large amount of unburned gasoline enter the converter or it can be damaged.

- **Conduct a spark jump test only when necessary, make it as short as possible, and do not open the throttle.**
- **Conduct engine compression checks within the shortest possible time.**
- **Avoid situations which can result in engine misfire (e.g. starting the engine when the fuel tank is nearly empty).**

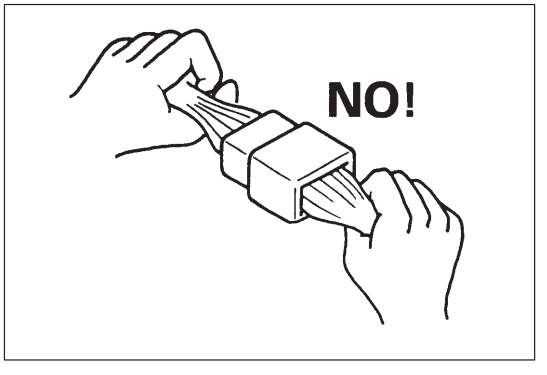


PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE

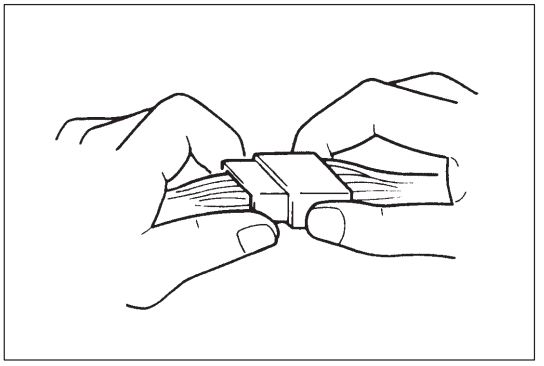
○ **When replacing a fuse, make sure to use a fuse of the specified capacity. Use of a fuse with a larger capacity will cause a damage to the electrical parts and a fire.**



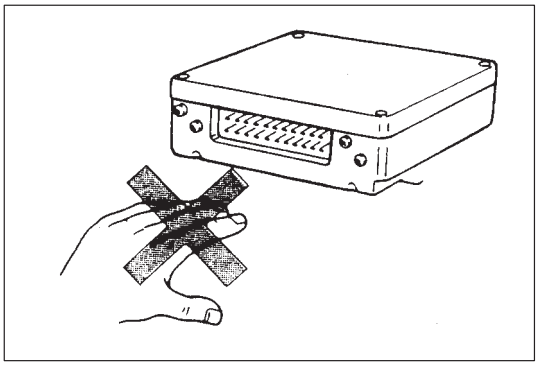
○ **When disconnecting and connecting coupler, make sure to turn ignition switch OFF, or electronic parts may get damaged.**



○ **When disconnecting connectors, never pull the wiring harnesses. Unlock the connector lock first and then pull them apart by holding connectors themselves.**



○ When connecting connectors, also hold connectors and put them together until they lock securely (a click is heard).

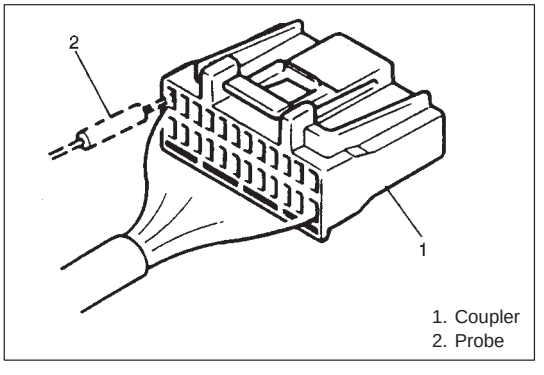


○ Be careful not to touch the electrical terminals of parts which use microcomputers (e.g. electronic control unit like as ECM, TCM, ABS control module, SDM etc). The static electricity from your body can damage these parts.

○ Never connect any tester (voltmeter, ohmmeter, or whatever) to electronic control unit when its coupler is disconnected. Attempt to do it may cause damage to it.

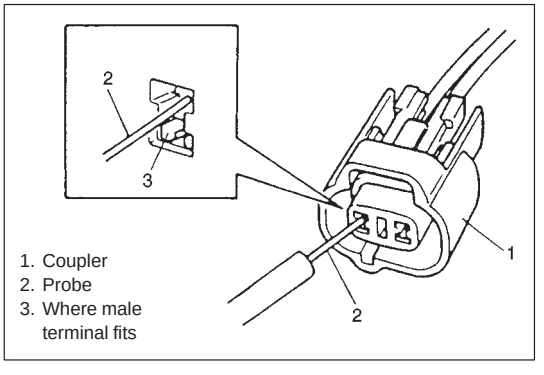
○ Never connect an ohmmeter to electronic control unit with its coupler connected to it. Attempt to do it may cause damage to electronic control unit and sensors.

○ Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained or personal injury may result. If not specified, use a voltmeter with high-impedance (M Ⅰ /V minimum) or a digital type voltmeter.



1. Coupler
2. Probe

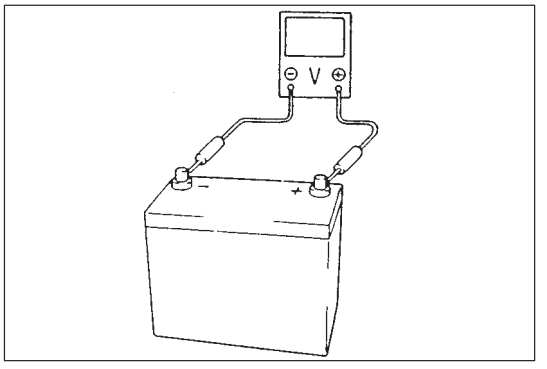
○ When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector.



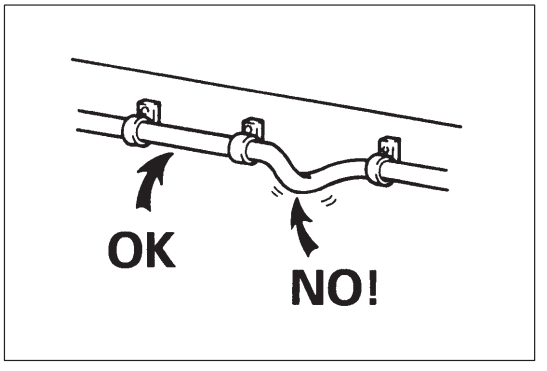
1. Coupler
2. Probe
3. Where male terminal fits

○ When connecting meter probe from terminal side of coupler because it can't be connected from harness side, use extra care not to bend male terminal of coupler of force its female terminal open for connection.
In case of such coupler as shown connect probe as shown to avoid opening female terminal.
Never connect probe where male terminal is supposed to fit.

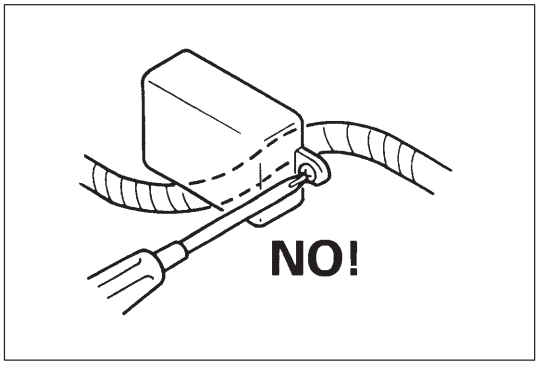
○ When checking connection of terminals, check its male half for bend and female half for excessive opening and both for locking (looseness), corrosion, dust, etc.



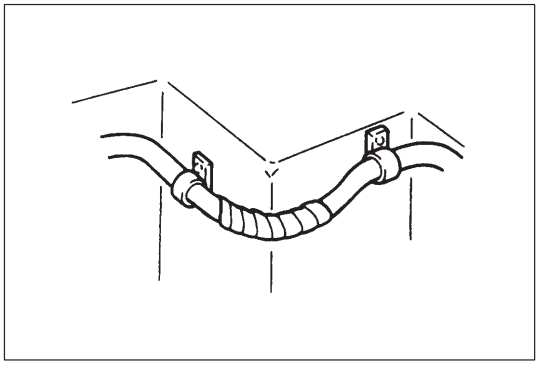
○ Before measuring voltage at each terminal, check to make sure that battery voltage is 11V or higher. Such terminal voltage check at low battery voltage will lead to erroneous diagnosis.



○ When installing the wiring harness, fix it with clamps so that no slack is left.



○ When installing vehicle parts, be careful so that the wiring harness is not interfered with or caught by any other part.



○ To avoid damage to the harness, protect its part which may contact against a part forming a sharp angle by winding tape or the like around it.

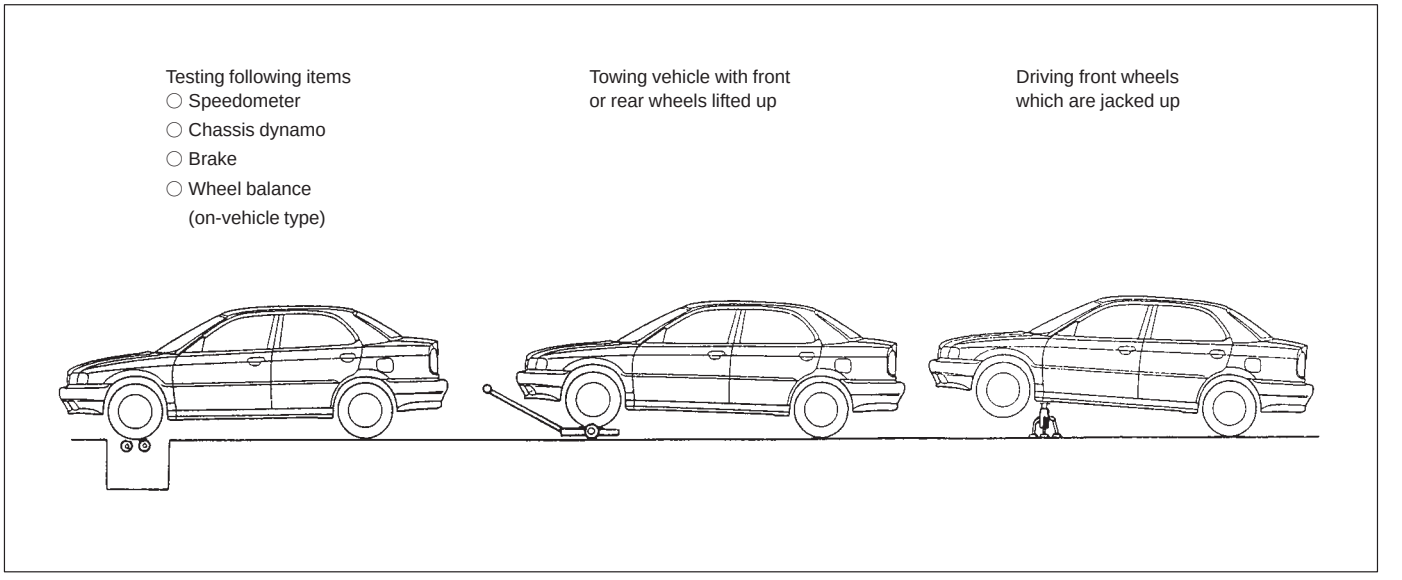
PRECAUTION FOR INSTALLING MOBILE COMMUNICATION EQUIPMENT

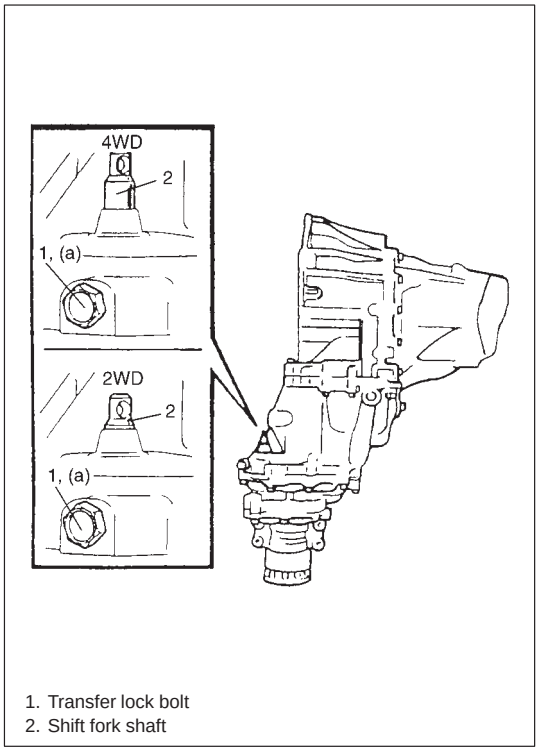
When installing mobile communication equipment such as CB (Citizens-Band)-radio or cellular-telephone, be sure to observe the following precautions.
Failure to follow cautions may adversely affect electronic control system.

- ○ **Keep the antenna as far away as possible from the vehicle's electronic control unit.**
- ○ **Keep the antenna feeder more than 20 cm (7.9 in.) away from electronic control unit and its wire harnesses.**
- ○ **Do not run the antenna feeder parallel with other wire harnesses.**
- ○ **Confirm that the antenna and feeder are correctly adjusted.**

PRECAUTION IN SERVICING FULL-TIME 4WD VEHICLE

When performing any of the following types of work, be sure to make the vehicle as front wheel drive by cutting transmission of driving force to the rear wheels. Otherwise, rear wheels are driven and vehicle accidents, damage and personal injury may result.





1. Transfer lock bolt
2. Shift fork shaft

SWITCHING FROM 4WD TO 2WD

Set 4WD/2WD select lever located at lower side of transfer driven case to 2WD.

1) Loosen transfer lock bolt.
2) Push in shift fork shaft fully.
3) With shift fork shaft pushed in, tighten transfer lock bolt.

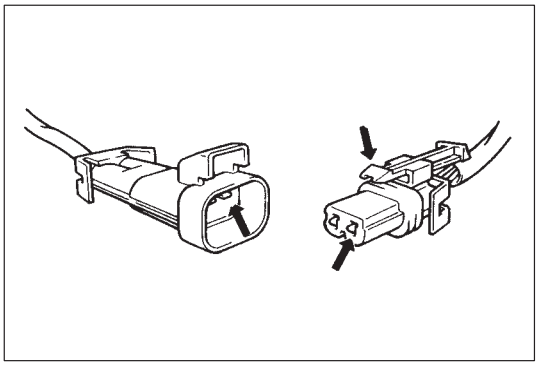
Tightening Torque
(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

NOTE:

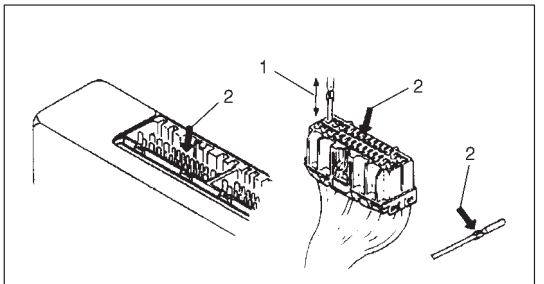
- **If shift fork shaft is hard to move, try to move it while turning it to the right and left little by little Do the same when setting back to 4WD after servicing vehicle.**
- **Upon completion of servicing, always set shift fork shaft back to 4WD.**

INTERMITTENT AND POOR CONNECTION

Most intermittents are caused by faulty electrical connections or wiring. When a check for proper connection is requested in a diagnostic flow chart, perform careful check of suspect circuits for:

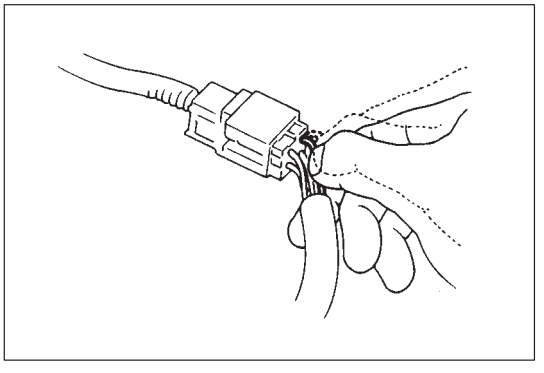


○ Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
○ Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact. However, cleaning the terminal with a sand paper or the like is prohibited.
○ Damaged connector body, exposing the terminals to moisture and dirt, as well as not maintaining proper terminal orientation with the component or mating connector.

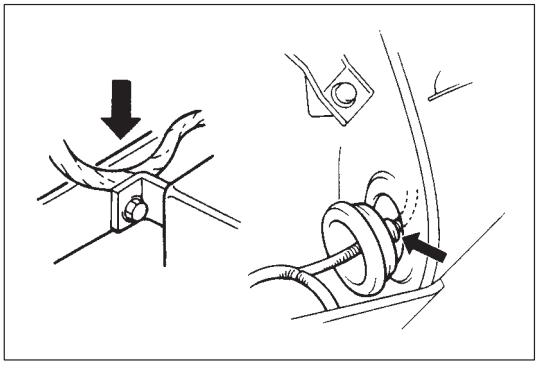


1. Check contact tension by inserting and removing just once
2. Check each terminal for bend and proper alignment

○ Improperly formed or damaged terminals.
Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal included in the connector test adapter kit (special tool). If contact tension is not enough, reform it to increase contact tension or replace.

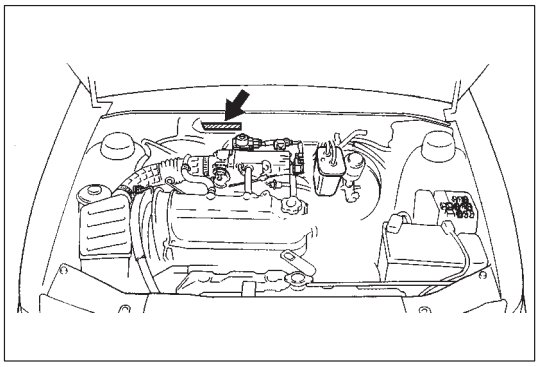


○ Poor terminal-to-wire connection.
Check each wire harness in problem circuits for poor connection by shaking it by hand lightly. If any abnormal condition is found, change the wire harness assembly or component parts with new ones.



○ Wire insulation which is rubbed through, causing an intermittent short as the bare area touches other wiring or parts of the vehicle.
○ Wiring broken inside the insulation. This condition could cause a continuity check to show a good circuit, but if only 1 or 2 strands of a multi-strand-type wire are intact, resistance could be far too high.

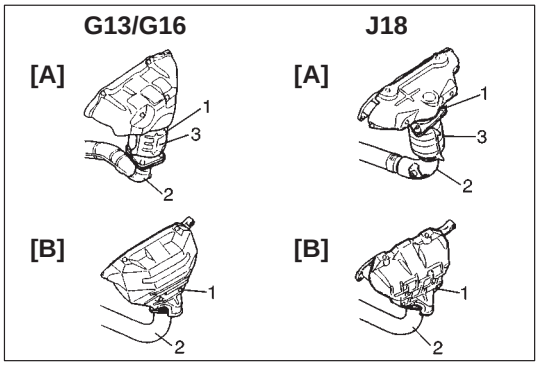
If any abnormality is found, repair or replace as a wire harness assembly.



IDENTIFICATION INFORMATION

VEHICLE IDENTIFICATION NUMBER

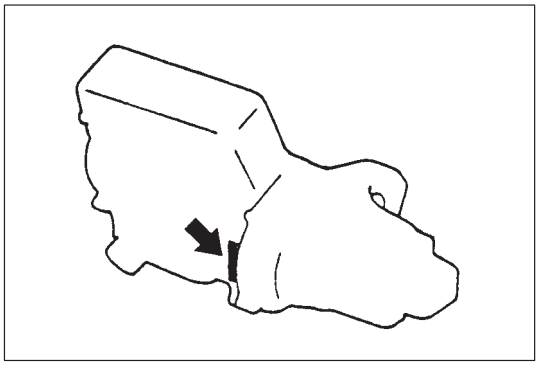
The number is located on the front dash panel in the engine room.



IDENTIFICATION WHETHER VEHICLE EQUIPPED WITH WU-TWC OR NOT

It can be identified by the shape of exhaust manifold (1) and exhaust pipe (2).

[A]: Vehicle equipped with WU-TWC (3).
[B]: Vehicle not equipped with WU-TWC.

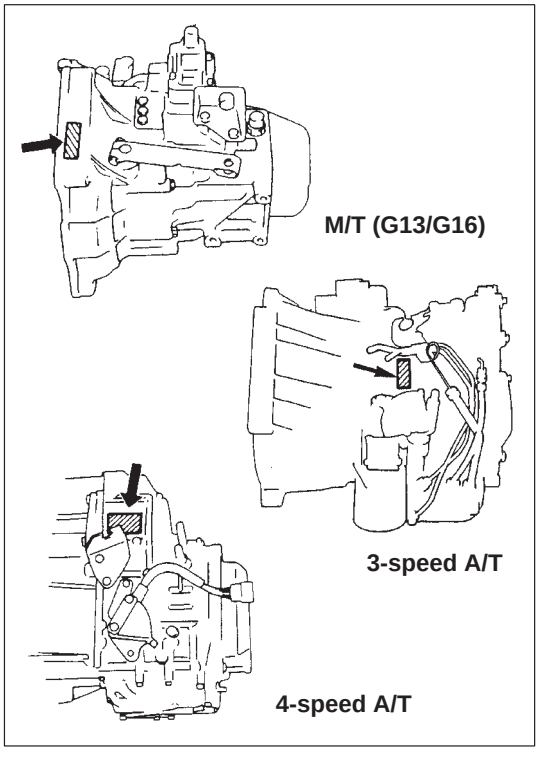


ENGINE IDENTIFICATION NUMBER

The number is located on the cylinder block.

G16X–XXXXXX

- Serial number
- Engine displacement (13:1.3 Litter, 16:1.6 Litter, 18:1.8 Litter)
- Engine type (G, J)



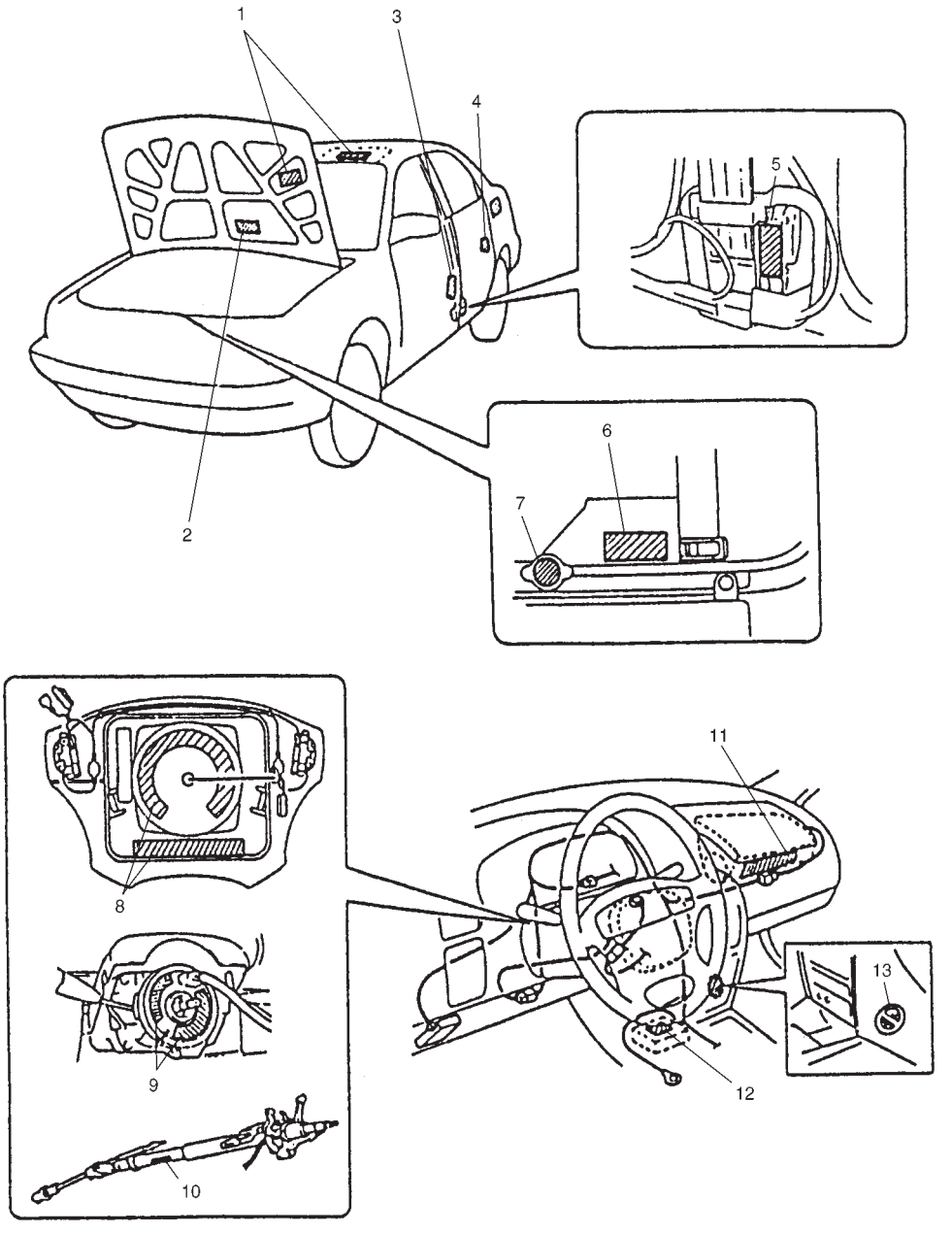
TRANSMISSION IDENTIFICATION NUMBER

The number is located on the transmission case.

WARNING, CAUTION AND INFORMATION LABELS

The figure below shows main labels among others that are attached to vehicle component parts. When servicing and handling parts, refer to WARNING/CAUTION instructions printed on labels.
If any WARNING/CAUTION label is found stained or damaged, clean or replace it as necessary.

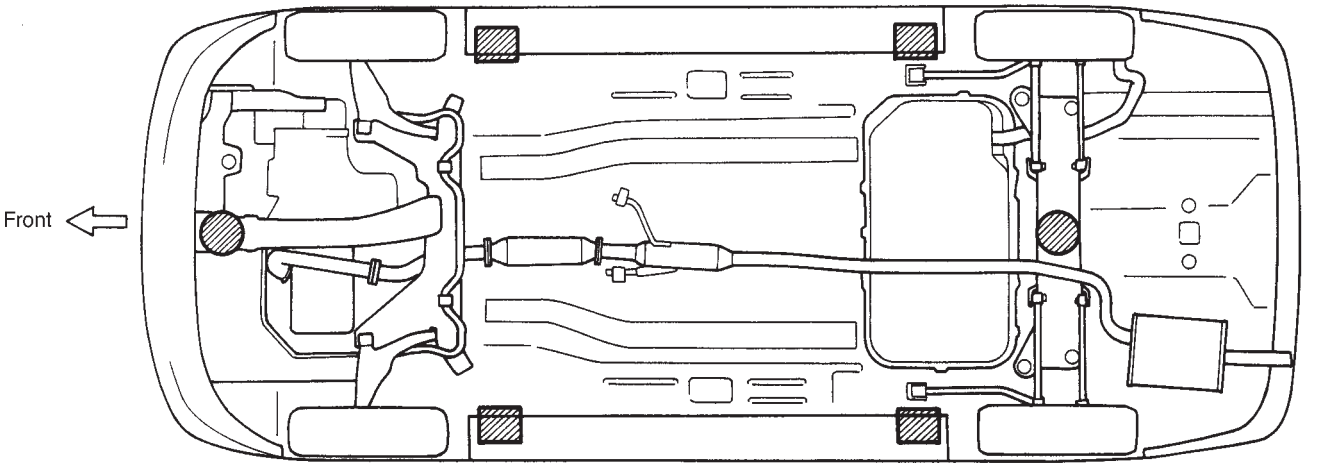
NOTE:
Air bag CAUTION/WARNING labels are attached on the vehicle equipped with air bag system only.



1. Air bag caution label
2. Emission control information label (if equipped)
3. Tire information placard
4. Child lock caution label
5. Seat belt pretensioner warning label (if equipped)
6. Engine cooling fan warning label
7. Radiator cap warning label
8. Air bag warning label on driver air bag (inflator) module
9. Air bag warning label on combination switch/contact coil assembly
10. Air bag caution label on steering column
11. Air bag warning label on passenger air bag (inflator) module
12. Air bag warning label on SDM
13. Child seat warning label (if equipped)

VEHICLE LIFTING POINTS

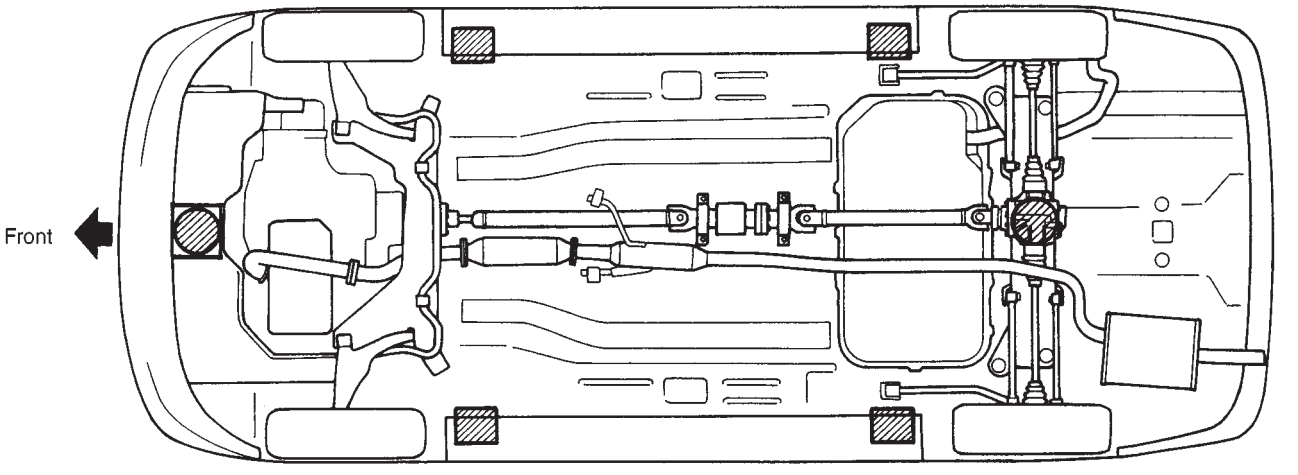
FOR 2WD VEHICLE



: Support position for frame contact hoist and safety stand

: Floor jack position

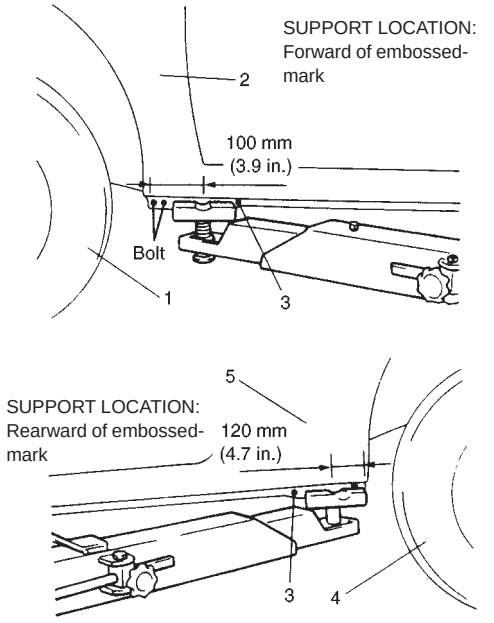
FOR 4WD VEHICLE



: Support position for frame contact hoist and safety stand

: Floor jack position

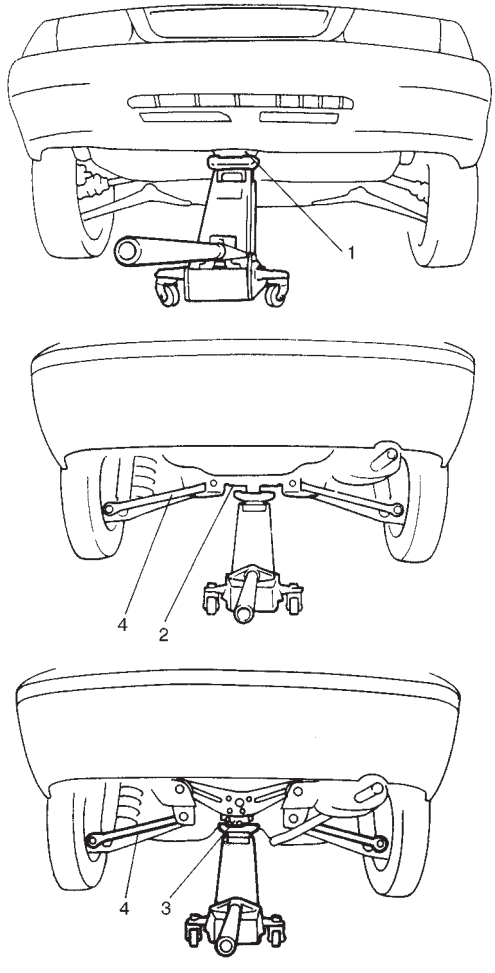
When using frame contact hoist:



1. Front left tire
2. Front fender left panel
3. Embossed-mark
4. Rear left tire
5. Rear left panel

WARNING:

- ○ **Before applying hoist to underbody, always take vehicle balance throughout service into consideration. Vehicle balance on hoist may change depending on what part to be removed.**
- ○ **Before lifting up the vehicle, check to be sure that end of hoist arm is not in contact with brake pipe, fuel pipe, bracket or any other part.**
- ○ **When using frame contact hoist, apply hoist as shown in figure (right and left at the same position). Lift up the vehicle till 4 tires are a little off the ground and make sure that the vehicle will not fall off by trying to move vehicle body in both ways. Work can be started only after this confirmation.**
- ○ **Make absolutely sure to lock hoist after vehicle is hoisted up.**



1. Engine mounting member(Front)
2. Rear suspension frame (sub frame) (2WD vehicle)
3. Rear differential (4WD vehicle)
4. Control rod

When Using Floor Jack:

For 2WD vehicle

In raising front or rear vehicle end off the floor by jacking, be sure to put the jack against the front end of the engine mounting member or rear suspension frame.

For 4WD vehicle

In raising front or rear vehicle end off the floor by jacking, be sure to put the jack against the jacking front panel or rear differential.

To perform service with either front or rear vehicle end jacked up, be sure to place safety stands under body so that body is securely supported. And then check to ensure that body does not slide on safety stands and the vehicle is held stable for safety's sake.

WARNING:

- ○ **Never apply jack against suspension parts (i.e., stabilizer, etc.) or vehicle floor, or it may get deformed.**
- ○ **If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety.**
  After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone.

ABBREVIATIONS AND SYMBOLS MAY BE USED IN THIS MANUAL

ABBREVIATIONS

A

ABS	:	Anti-Lock Brake System,
ATDC	:	After Top Dead Center
API	:	American Petroleum Institute
ATF	:	Automatic Transmission Fluid
ALR	:	Automatic Locking Retractor
AC	:	Alternating Current
A/T	:	Automatic Transmission
A/C	:	Air Conditioning
ABDC	:	After Bottom Dead Center
A/F	:	Air Fuel Mixture Ratio
A-ELR	:	Automatic-Emergency Locking Retractor

B

B+	:	Battery Positive Voltage
BTDC	:	Before Top Dead Center
BBDC	:	Before Bottom Dead Center

C

CKP Sensor	:	Crankshaft Position Sensor
CKT	:	Circuit
CMP Sensor	:	Camshaft Position Sensor
CO	:	Carbon Monoxide
CPP Switch	:	Clutch Pedal Position Switch (Clutch Switch, Clutch Start Switch)
CPU	:	Central Processing Unit
CRS	:	Child Restraint System

D

DC	:	Direct Current
DLC	:	Data Link Connector (Assembly Line Diag. Link, ALDL, Serial Data Link, SDL)
DOHC	:	Double Over Head Camshaft
DOJ	:	Double Offset Joint
DRL	:	Daytime Running Light
DTC	:	Diagnostic Trouble Code (Diagnostic Code)

E

EBCM	:	Electronic Brake Control Module, ABS Control Module
ECM	:	Engine Control Module
ECT Sensor	:	Engine Coolant Temperature Sensor (Water Temp. Sensor, WTS)
EGR	:	Exhaust Gas Recirculation
EGRT Sensor	:	EGR Temperature Sensor (Recirculated Exhaust Gas Temp. Sensor, REGTS)
EFE Heater	:	Early Fuel Evaporation Heater (Positive Temperature Coefficient, PTC Heater)
ELR	:	Emergency Locking Retractor
EVAP	:	Evaporative Emission
EVAP Canister	:	Evaporative Emission Canister (Charcoal Canister)

F

4WD	:	4 Wheel Drive

G

GEN	:	Generator
GND	:	Ground

H

HC	:	Hydrocarbons
HO2S	:	Heated Oxygen Sensor
HU	:	Hydraulic Unit

I

IAC Valve	:	Idle Air Control Valve
IAT Sensor	:	Intake Air Temperature Sensor (Air temperature Sensor, ATS)
ICM	:	Immobilizer Control Module
IG	:	Ignition
ISC Actuator	:	Idle Speed Control Actuator (Motor)

J

J/B : Junction Box (Junction Block)

L

LH : Left Hand

LSPV : Load Sensing Proportioning Valve

M

MAF Sensor : Mass Air Flow Sensor (Air Flow Sensor, AFS, Air Flow Meter, AFM)

MAP Sensor : Manifold Absolute Pressure Sensor (Pressure Sensor, PS)

Max : Maximum

MFI : Multiport Fuel Injection (Multipoint Fuel Injection)

Min : Minimum

MIL : Malfunction Indicator Lamp (“CHECK ENGINE” Light)

M/T : Manual Transmission

N

NOx : Nitrogen Oxides

O

OBD : On-Board Diagnostic System (Self-Diagnosis Function)

O/D : Overdrive

OHC : Over Head Camshaft

O2S : Oxygen Sensor

P

PCM : Powertrain Control Module

PNP : Park/Neutral Position

P/S : Power Steering

PSP Switch : Power Steering Pressure Switch (P/S Pressure Switch)

PCV : Positive Crankcase Ventilation

R

REV : Reverse

RH : Right Hand

S

SAE : Society of Automotive Engineers

SDM : Sensing and Diagnostic Module (Air bag controller, Air bag control module)

SFI : Sequential Multiport Fuel Injection

SIR : Supplemental Inflatable Restraint

SOHC : Single Over Head Camshaft

T

TBI : Throttle Body Fuel Injection (Single-Point Fuel Injection, SPI)

TCC : Torque Converter Clutch

TCM : Transmission Control Module (A/T Controller, A/T Control Module)

TP Sensor : Throttle Position Sensor

TR Switch : Transmission Range Switch

TVV : Thermal Vacuum Valve (Thermal Vacuum Switching Valve, TVSV, Bimetal Vacuum Switching Valve, BVSV)

TWC : Three Way Catalytic Converter (Three Way Catalyst)

2WD : 2 Wheel Drive

V

VIN : Vehicle Identification Number

VSS : Vehicle Speed Sensor

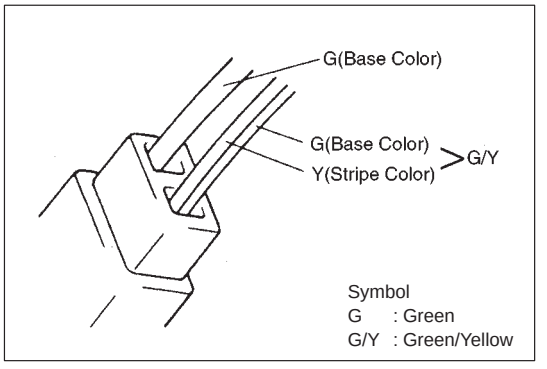
W

WU-OC : Warm Up Oxidation Catalytic Converter

WU-TWC : Warm Up Three-Way Catalytic Converter

WIRE COLOR SYMBOLS

Symbol		Wire Color	Symbol		Wire color
B	BLK	Black	Or	ORN	Orange
Bl	BLU	Blue	R	RED	Red
Br	BRN	Brown	W	WHT	White
G	GRN	Green	Y	YEL	Yellow
Gr	GRY	Gray	P	PNK	Pink
Lbl	LT BLU	Light blue	V	PPL	Violet
Lg	LT GRN	Light green			

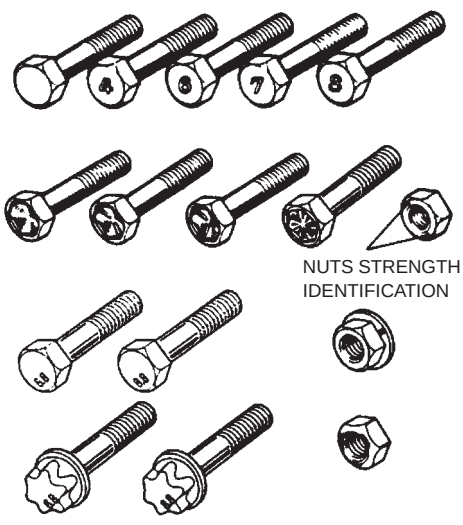


There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire. The single-colored wire uses only one color symbols (i.e. “G”). The dual-colored wire uses two color symbols (i.e. “G/Y”). The first symbol represents the base color of the wire (“G” in the figure) and the second symbol represents the color of the stripe (“Y” in the figure).

FASTENER INFORMATION

METRIC FASTENERS

Most of the fasteners used for this vehicle are metric fasteners. When replacing any fasteners, it is most important that replacement fasteners be the correct diameter, thread pitch and strength.



METRIC BOLTS-IDENTIFICATION CLASS NUMBERS OR MARKS CORRESPOND TO BOLT STRENGTH-INCREASING NUMBERS REPRESENT INCREASING STRENGTH.

FASTENER STRENGTH IDENTIFICATION

Most commonly used metric fastener strength property classes are 4T, 6.8, 7T, 8.8 and radial line with the class identification embossed on the head of each bolt. Some metric nuts will be marked with punch, 6 or 8 mark strength identification on the nut face. Figure shows the different strength markings.

When replacing metric fasteners, be careful to use bolts and nuts of the same strength or greater than the original fasteners (the same number marking or higher). It is likewise important to select replacement fasteners of the correct diameter and thread pitch. Correct replacement bolts and nuts are available through the parts division.

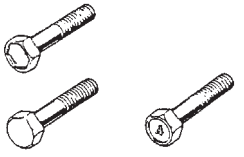
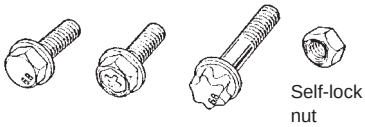
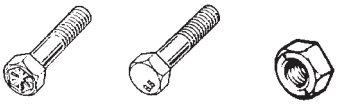
STANDARD TIGHTENING TORQUE

Each fastener should be tightened to the torque specified in each section of this manual. If no description or specification is provided, refer to the following tightening torque chart for the applicable torque for each fastener. When a fastener of greater strength than the original one is used, however, use the torque specified for the original fastener.

NOTE:

- ○ **For the flanged bolt, flanged nut and self-lock nut of 4T and 7T strength, add 10% to the tightening torque given in the chart below.**
- ○ **The chart below is applicable only where the fastened parts are made of steel or light alloy.**

Tightening torque chart

Thread Diameter (Nominal Diameter) (mm) / Strength		4	5	6	8	10	12	14	16	18
An equivalent of 4T strength fastener 	N·m	1.5	3.0	5.5	13	29	45	65	105	160
	kg-m	0.15	0.30	0.55	1.3	2.9	4.5	6.5	10.5	16
	lb-ft	1.0	2.5	4.0	9.5	21.0	32.5	47.0	76.0	116.0
An equivalent of 6.8 strength fastener without flange 	N·m	2.4	4.7	8.4	20	42	80	125	193	280
	kg-m	0.24	0.47	0.84	2.0	4.2	8.0	12.5	19.3	28
	lb-ft	2.0	3.5	6.0	14.5	30.5	58.0	90.5	139.5	202.5
An equivalent of 6.8 strength fastener with flange  Self-lock nut	N·m	2.4	4.9	8.8	21	44	84	133	203	298
	kg-m	0.24	0.49	0.88	2.1	4.4	8.4	13.3	20.3	29.8
	lb-ft	2.0	3.5	6.5	15.5	32.0	61.0	96.5	147.0	215.5
An equivalent of 7T strength fastener 	N·m	2.3	4.5	10	23	50	85	135	210	240
	kg-m	0.23	0.45	1.0	2.3	5.0	8.5	13.5	21	24
	lb-ft	2.0	3.5	7.5	17.0	36.5	61.5	98.0	152.0	174.0
An equivalent of 8.8 strength fastener without flange 	N·m	3.1	6.3	11	27	56	105	168	258	373
	kg-m	0.31	0.63	1.1	2.7	5.6	10.5	16.8	25.8	37.3
	lb-ft	2.5	4.5	8.0	19.5	40.5	76.0	121.5	187.0	270.0
An equivalent of 8.8 strength fastener with flange 	N·m	3.2	6.5	12	29	59	113	175	270	395
	kg-m	0.32	0.65	1.2	2.9	5.9	11.3	17.5	27	39.5
	lb-ft	2.5	5.0	9.0	21.0	43.0	82.0	126.5	195.5	286.0

SECTION 0B

MAINTENANCE AND LUBRICATION

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

CONTENTS

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Emission Control System 0B-11
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RECOMMENDED FLUIDS AND LUBRICANTS 0B-20

MAINTENANCE SCHEDULE

NORMAL CONDITION SCHEDULE

Interval: This interval should be judged by odometer reading or months, whichever comes first.				This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.					
			km (⌣1,000)	15	30	45	60	75	90
			Miles (⌣1,000)	9	18	27	36	45	54
			Months	12	24	36	48	60	72
1. ENGINE									
1-1. Drive belt			V-belt	I	R	I	R	I	R
			V-rib belt (Flat type)	—	—	I	—	—	R
1-2. Camshaft timing belt (except 1.8L)				Replace every 100,000 km (60,000 miles).					
1-3. Valve lash (except 1.8L)				—	I	—	I	—	I
1-4. Engine oil and oil filter	1.3L/1.6L (SG, SH, SJ grade oil) of class 1, 1.8L			R	R	R	R	R	R
	1.3L/1.6L (SE, SF grade oil) of class 1 1.3L/1.6L (SE, SF, SG, SH, SJ grade oil) of class 2			Replace every 10,000 km (6,000 miles) or 8 months.					
1-5. Engine coolant				—	—	R	—	—	R
1-6. Exhaust system				—	I	—	I	—	I
2. IGNITION SYSTEM									
2-1. Spark plugs	When unleaded fuel is used	Class 2	Nickel spark plug	—	R	—	R	—	R
			Iridium spark plug	—	—	—	R	—	—
		Class 1	Nickel spark plug	—	—	R	—	—	R
			Iridium spark plug	Replace every 105,000 km (63,000 miles) or 84 months					
	When leaded fuel is used			Refer to “Severe Driving Condition” schedule.					
3. FUEL SYSTEM									
3-1. Air cleaner filter			Paved-road	I	I	R	I	I	R
			Dusty condition	Refer to “Severe Driving Condition” schedule.					
3-2. Fuel lines				—	I	—	I	—	I
3-3. Fuel filter				Replace every 105,000 km (63,000 miles).					
3-4. Fuel tank				—	—	I	—	—	I

NOTES:

- ○ **Class 1: Vehicle equipped with oxygen sensor**
- ○ **Class 2: Vehicle not equipped with oxygen sensor**
- ○ **For Item 2-1 “spark plugs”, replace every 50,000km if the local law requires.**
- ○ **For Sweden, item 2-1, 4-1 and 4-2 should be performed by odometer reading only.**
- ○ **For Item 1-2 Camshaft timing belt: This belt may be replaced every 90,000 km (54,000 miles) according to customer’s maintenance convenience.**
- ○ **Nickel spark plug : 1.3 L/1.6 L/1.8 L: K20PR-U11 (DENSO), BKR6E-11 (NGK)**
- ○ **Iridium spark plug : 1.8 L: IFR6J11 (NGK)**

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.						
	km (∽1,000)	15	30	45	60	75	90
	Miles (∽1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
4. EMISSION CONTROL SYSTEM							
4-1. PCV (Positive Crankcase Ventilation) Valve	[Class 2]	—	—	I	—	—	I
	[Class 1]	—	—	—	—	—	I
4-2. Fuel evaporative emission control system		—	—	—	—	—	I
5. BRAKE							
5-1. Brake discs and pads (thickness, wear, damage)		I	I	I	I	I	I
Brake drums and shoes (wear, damage)		—	I	—	I	—	I
5-2. Brake hoses and pipes (leakage, damage, clamp)		—	I	—	I	—	I
5-3. Brake fluid		—	R	—	R	—	R
5-4. Brake lever and cable (damage, stroke, operation)		Inspect at first 15,000 km (9,000 miles) only.					
6. CHASSIS AND BODY							
6-1. Clutch (Travel and fluid level)		—	I	—	I	—	I
6-2. Tires/wheel discs (wear, damage, rotation)		I	I	I	I	I	I
6-3. Propeller shafts (4WD) and drive shafts		—	—	I	—	—	I
6-4. Suspension system (tightness, damage, rattle, breakage)		—	I	—	I	—	I
6-5. Steering system (tightness, damage, breakage, rattle)		—	I	—	I	—	I
6-6. Manual transmission oil (I: 1st 15,000 km only)		I	—	R	—	—	R
6-7. Rear differential oil (4WD) (R: 1st 15,000 km only)		R or I	—	I	—	I	—
6-8. Automatic transmission	Fluid level	—	I	—	I	—	I
	Fluid change	Replace every 165,000 km (99,000 miles).					
	Fluid hose	—	—	—	R	—	—
6-9. All latches,hinges and locks		—	I	—	I	—	I
6-10. Power steering (if equipped)		I	I	I	I	I	I

NOTES:

○ **"R": Replace or change**

○ **"I": Inspect and correct or replace if necessary**

MAINTENANCE RECOMMENDED UNDER SEVERE DRIVING CONDITIONS

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, it is recommended that applicable maintenance operation be performed at the particular interval as given in the chart below.

Severe condition code

A- Repeated short trips
B- Driving on rough and/or muddy roads
C- Driving on dusty roads
D- Driving in extremely cold weather and/or salted roads
E- Repeated short trips in extremely cold weather
F- Leaded fuel use
G- – – – – –
H- Trailer towing (if admitted)

Severe Condition Code	Maintenance		Maintenance Operation	Maintenance Interval
– B C D – – – –	ITEM 1-1 Drive belt (V-rib belt)		I	Every 15,000km (9,000 miles) or 12 months
			R	Every 45,000km (27,000 miles) or 36 months
A – C D E F – H	ITEM 1-4 Engine oil and filter		R	Every 5,000km (3,000 miles) or 4 months
A B C – E F – H	ITEM 2-1 Spark plugs	Nickel spark plug	R	Every 10,000km (6,000 miles) or 8 months
		Iridium spark plug		Every 30,000km (18,000 miles) or 24 months
– – C – – – – –	ITEM 3-1 Air cleaner filter *1		I	Every 2,500km (1,500 miles)
			R	Every 30,000km (18,000 miles) or 24 months
– B C D – – – H	ITEM 6-2’ Wheel bearings		I	Every 15,000km (9,000 miles) or 12 months
– B – D E – – H	ITEM 6-3 Propeller shafts (4WD) and drive shafts		I	Every 15,000km (9,000 miles) or 12 months
– B – – E – – H	ITEM 6-6 and 6-7 Manual transmission oil and differential oil (4WD)		R	Every 30,000km (18,000 miles) or 24 months
– B – – E – – H	ITEM 6-8 Automatic transmission fluid		R	Every 30,000km (18,000 miles) or 24 months

NOTES:

“R”: Replace or change
“I”: Inspect and correct or replace if necessary
***1 Inspect or replace more frequently if necessary.**

MAINTENANCE SERVICE

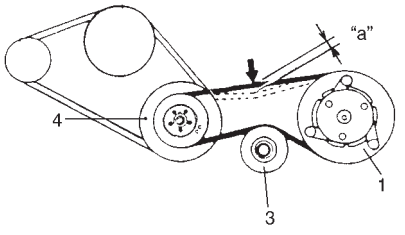
ENGINE

ITEM 1-1

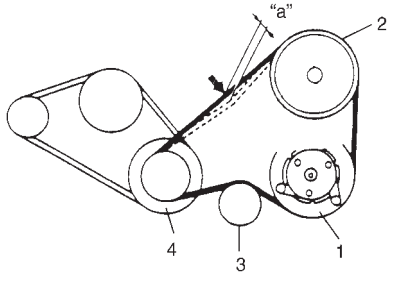
Drive Belt Inspection and Replacement

WARNING:
Disconnect negative cable at battery before checking and adjusting belt tension.

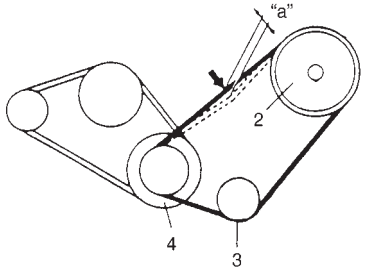
Vehicle with A/C



Vehicle with A/C and power steering



Vehicle with power steering



1. A/C compressor pulley
2. Power steering pump pulley
3. Tension pulley
4. Crankshaft pulley

1.3L, 1.6L Engine

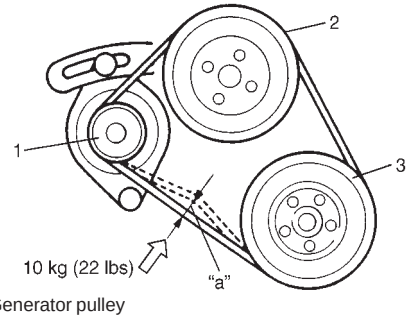
A/C Compressor and/or Power Steering Pump Drive Belt Inspection (If equipped)

1) Detach air cleaner assembly from vehicle body and shift its position.
2) Inspect belt for wear, deterioration and tension.
   Replace or adjust, if necessary.

   A/C compressor and/or power steering pump drive belt tension "a":
   7 – 9 mm (0.28 – 0.35 in.) deflection under 10 kg or 22 lb pressure

A/C Compressor and/or Power Steering Pump Drive Belt Replacement

1) Disconnect negative cable from battery.
2) Remove engine under cover of right side.
3) Loosen belt tension and replace belt with new one.
4) Adjust belt tension to specification referring to SECTION 1B or SECTION 3B1.
5) Install engine under cover and connect negative cable to battery.

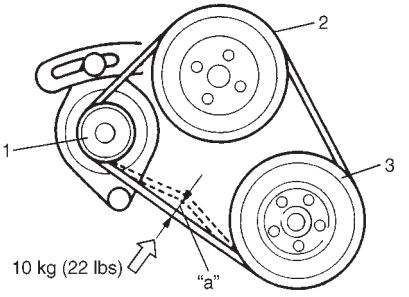


1. Generator pulley
2. Water pump pulley
3. Crankshaft pulley

Water Pump Belt Inspection

1) Remove engine under cover of right side from vehicle body.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
   Replace, if necessary.
3) Check pump belt for tension and adjust it as necessary.

   Water pump belt tension "a":
   6 – 8 mm (0.24 – 0.32 in.) deflection under 10 kg or 22 lb pressure



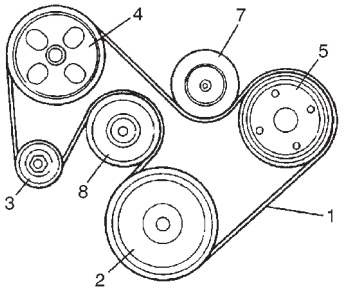
1. Generator pulley
2. Water pump pulley
3. Crankshaft pulley

Water Pump Belt Replacement

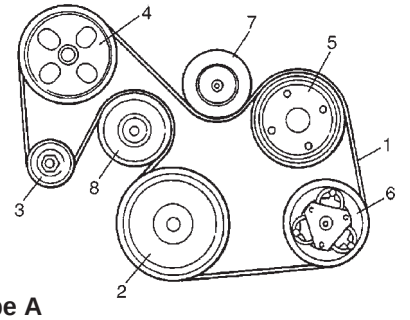
Replace belt with new one. Refer to SECTION 6B for replacement procedure of pump belt.

NOTE:
When replacing belt with a new one, adjust belt tension to 5 – 7 mm (0.20 – 0.27 in.).

Vehicle without A/C

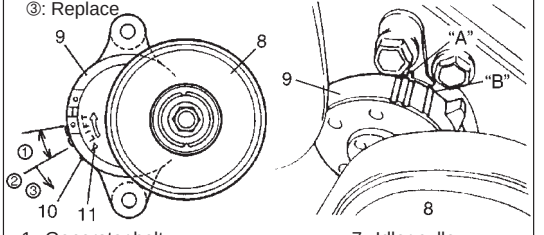


Vehicle equipped with A/C



Type A
➡: Standard
→: Limit
③: Replace

Type B



1. Generator belt
2. Crankshaft pulley
3. Generator pulley
4. Power steering pump pulley
5. Water pump pulley
6. A/C compressor pulley
7. Idler pulley
8. Tension pulley
9. Tensioner
10. Tension free point
11. Tension indicator

1.8L Engine

Generator Belt Inspection

1) Remove engine under cover of right side from vehicle body.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. Replace, if necessary.
   If any of above conditions are found replace generator belt.

Tensioner Inspection

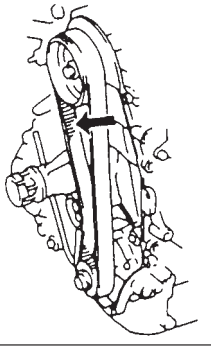
1) Remove air cleaner outlet hose.
2) Check belt for tension as follows.

[Type A]
Check to make sure that tension indicator points within ➡ of the left figure by using mirror.
If the indicator comes to ③ out of ➡ passing →, replace generator belt.

[Type B]
Tension indicator "B" should be the right of indicator "A" as shown in figure. If indicator "B" is found to the left of indicator "A", replace generator belt.

Generator Belt Replacement

Replace belt with new one. Refer to SECTION 6B for replacement procedure of generator belt.

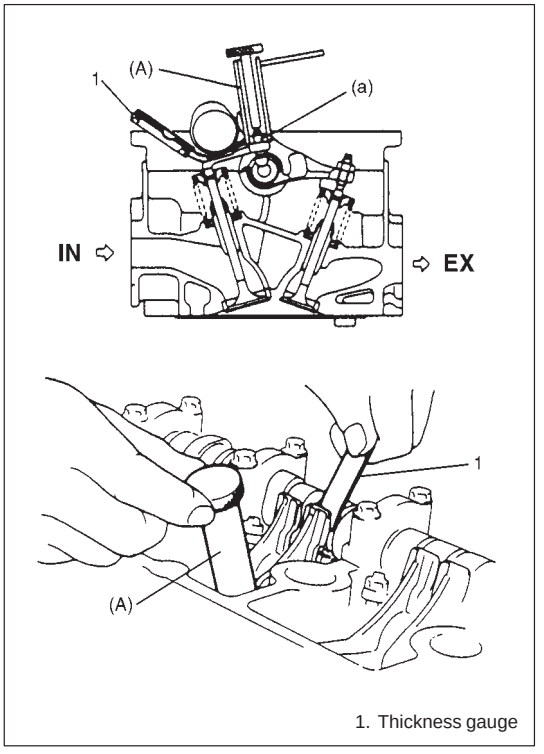


ITEM 1-2 (except 1.8L Engine model)

Camshaft Timing Belt Replacement

Replace belt with new one. Refer to SECTION 6A or 6A1 for replacement procedure.

CAUTION:
- **Do not bend or twist timing belt.**
- **Do not allow timing belt to come into contact with oil, water, etc.**



1. Thickness gauge

ITEM 1-3 (Except 1.8L Engine model)

Valve Lash Inspection

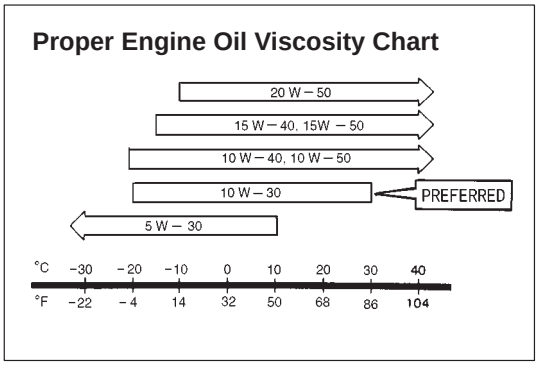
1) Remove cylinder head cover.
2) Inspect intake and exhaust valve lash and adjust as necessary. Refer to SECTION 6A1 for valve lash inspection and adjustment procedure.

		When cold (Coolant temperature is 15 – 25·C or 59 – 77·F)	When hot (Coolant temperature is 60 – 68·C or 140 – 154·F)
Valve lash specification	Intake	0.13 – 0.17mm (0.005 – 0.007 in)	0.17 – 0.21 mm (0.007 – 0.008 in)
	Exhaust	0.23 – 0.27mm (0.009 – 0.011 in)	0.28 – 0.32 mm (0.011 – 0.013 in)

Special Tool
(A): 09917-18211

Tightening Torque
(a): 12 N·m (1.2 kg-m, 8.5 lb-ft)

3) Install cylinder head cover and tighten bolts to specification.

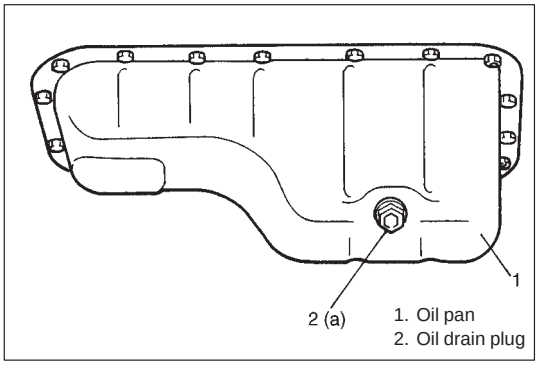


ITEM 1-4

Engine Oil and Filter Change

WARNING:
New and used engine oil can be hazardous.
Be sure to read "WARNING" in General Precaution in Section 0A and observe what in written there.

Use engine oil of SE, SF, SG, SH or SJ grade.
Select the appropriate oil viscosity according to the left chart.

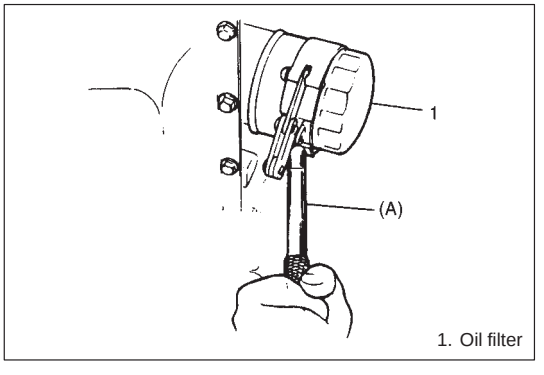


1. Oil pan
2. Oil drain plug

Before draining engine oil, check engine for oil leakage. If any evidence of leakage is found, make sure to correct defective part before proceeding to following work.

1) Drain engine oil by removing drain plug.
2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

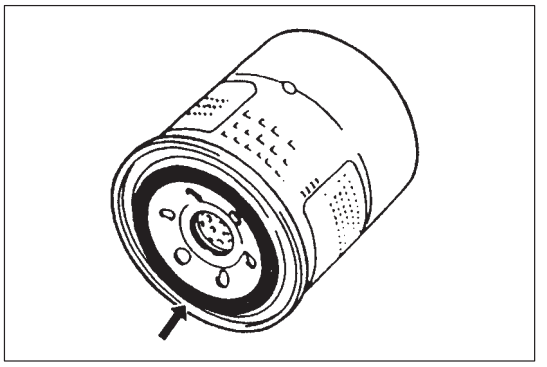
Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)



1. Oil filter

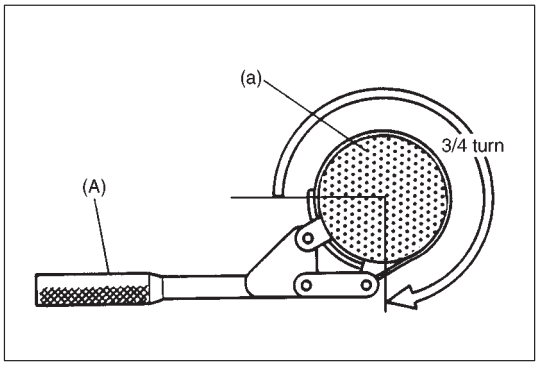
3) Loosen oil filter by using oil filter wrench (Special tool).

Special Tool
(A): 09915-47330



4) Apply engine oil to new oil filter O-ring.
5) Screw new filter on oil filter stand by hand until filter O-ring contacts mounting surface.

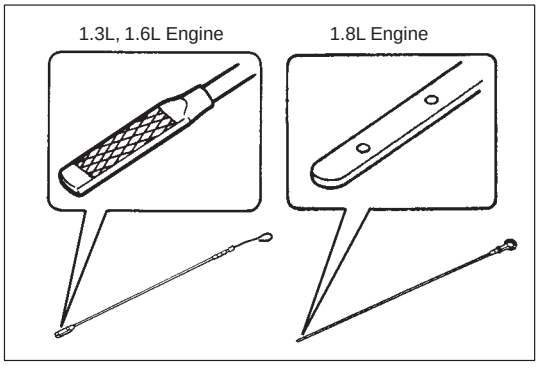
CAUTION:
To tighten oil filter properly, it is important to accurately identify the position at which filter O-ring first contacts mounting surface.



6) Tighten filter 3/4 turn from the point of contact with mounting surface using an oil filter wrench.

Special Tool
(A): 09915-47330

Tightening Torque (Reference)
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)



7) Replenish oil until oil level is brought to FULL level mark on dipstick (oil pan and oil filter capacity). Filler inlet is at the top of cylinder head cover.
8) Start engine and run it for three minutes. Stop it and wait another 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

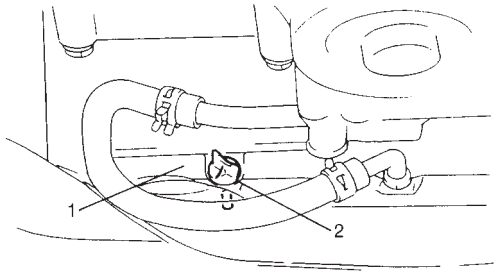
Engine oil capacity

	1.3L and 1.6L Engine model	1.8L Engine model
Oil pan capacity	about 3.1 liters (6.5/5.5 US/Imp pt.)	about 4.5 liters (9.5/7.9 US/Imp pt.)
Oil filter capacity	about 0.2 liters (0.4/0.3 US/Imp pt.)	about 0.2 liters (0.4/0.3 US/Imp pt.)
Others	about 0.3 liters (0.6/0.5 US/Imp pt.)	about 0.3 liters (0.6/0.5 US/Imp pt.)
Total	about 3.6 liters (7.5/6.3 US/Imp pt.)	about 5.0 liters (10.6/8.8 US/Imp pt.)

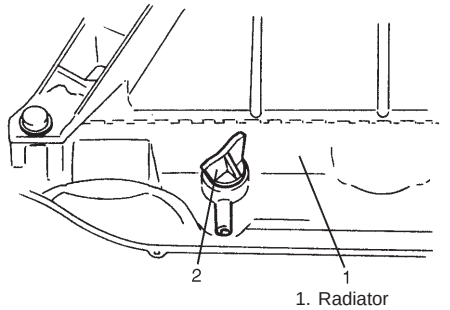
NOTE:
Engine oil capacity is specified as above table. However, note that amount of oil required when actually changing oil may somewhat differ from data in above table depending on various conditions (temperature, viscosity, etc.).

9) Check oil filter and drain plug for oil leakage.

1.3L and 1.6L Engine model



1.8L Engine model

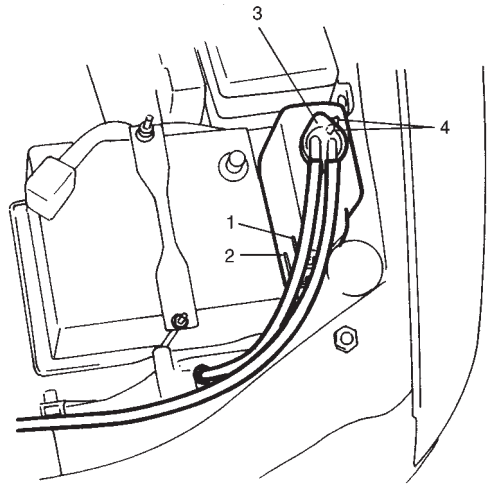


1. Radiator
2. Radiator drain plug

ITEM 1-5
Engine Coolant Change

WARNING:
To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

1) Remove radiator cap when engine is cool.
2) Loosen radiator drain plug to drain coolant.
3) Remove reservoir tank and drain.
4) Tighten drain plug securely. Also install reservoir tank.
5) Fill radiator with specified amount of coolant, and run engine for 2 or 3 minutes at idle. This drives out any air which may still be trapped within cooling system. STOP ENGINE. Add coolant as necessary until coolant level reaches filler throat of radiator. Reinstall radiator cap.



1. FULL level mark
2. LOW level mark
3. Tank cap
4. Match marks

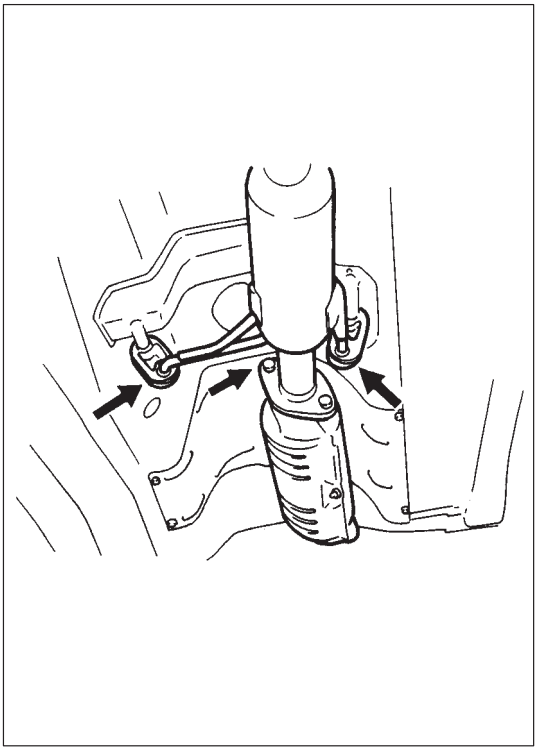
6) Add coolant to reservoir tank so that its level aligns with Full mark. Then, reinstall cap to reservoir tank aligning match marks on the tank and cap.

CAUTION:
When changing engine coolant, use mixture of 50% water and 50% ethylene-glycol base coolant (Anti-Freeze/Anti-corrosion coolant) for the market where ambient temperature falls lower than –16·C (3·F) in winter and mixture of 70% water and 30% ethylene-glycol base coolant for the market where ambient temperature doesn't fall lower than –16·C (3·F).
Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene-glycol base coolant should be used for the purpose of corrosion protection and lubrication.

Refer to SECTION 6B of this manual for COOLANT CAPACITY

ITEM 1-6
Exhaust System Inspection

WARNING:
To avoid danger of being burned, do not touch exhaust system when it is still hot.
Any service on exhaust system should be performed when it is cool.



When carrying out periodic maintenance or vehicle is raised for other service, check exhaust system as follows:

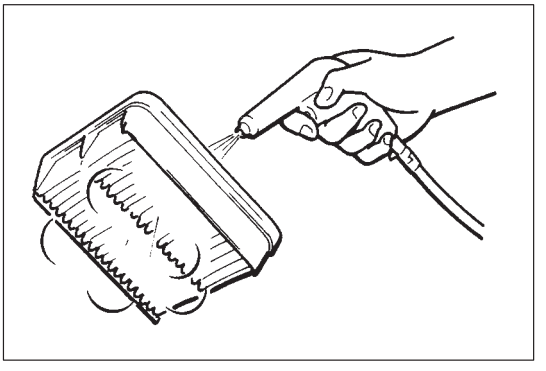
- ○ Check rubber mountings for damage and deterioration.
- ○ Check exhaust system for leakage, loose connections, dents, and damages.
  If bolts or nuts are loose, tighten them to specification. Refer to SECTION 6K for torque specification of bolts and nuts.
- ○ Check nearby body areas for damaged, missing or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into vehicle.
- ○ Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to floor carpet.
- ○ Any defects should be fixed at once.

IGNITION SYSTEM

ITEM 2-1

Spark Plugs Replacement

Replace spark plugs with new ones referring to SECTION 6F2 or 6F3.



FUEL SYSTEM

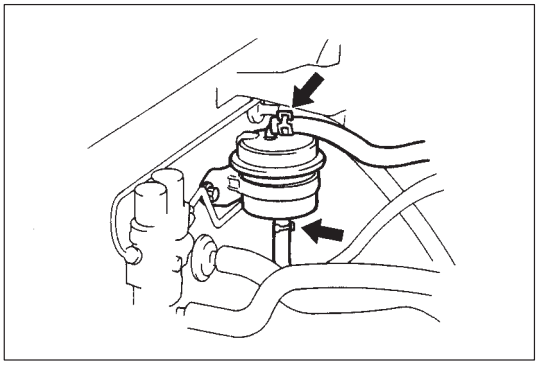
ITEM 3-1

Air Cleaner Filter Inspection

1) Visually check that air cleaner filter is not excessively dirty, damaged or oily.
2) Clean filter with compressed air from air outlet side of filter (i.e., the side facing up when installed).

Air Cleaner Filter Replacement

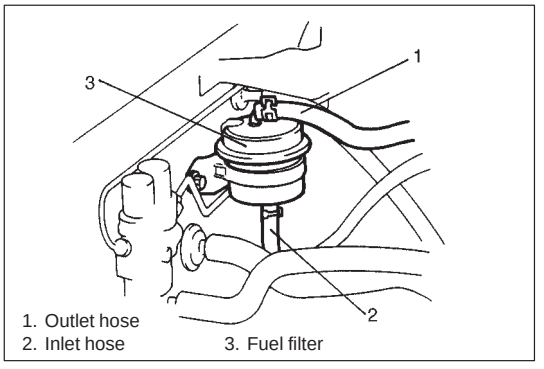
Replace air cleaner filter with new one according to procedure described in SECTION 6A1 or 6A3.



ITEM 3-2
Fuel Lines Inspection

○ Check fuel lines for loose connection, deterioration or damage which could cause leakage.
Make sure all clamps are secure.

○ Replace any damaged or deteriorate parts.
There should be no sign of fuel leakage or moisture at any fuel connection.



1. Outlet hose
2. Inlet hose
3. Fuel filter

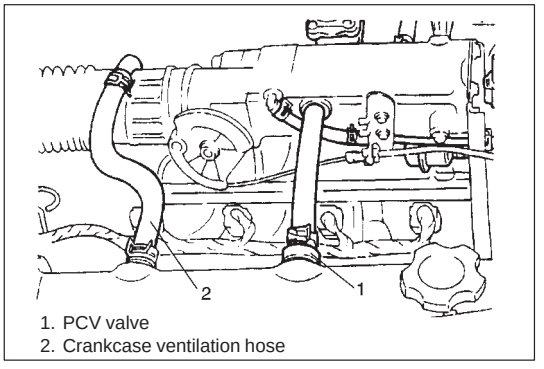
ITEM 3-3
Fuel Filter Replacement

> **WARNING:**
> **This work must be performed in a well ventilated area and away from any open flames (such as gas hot water heaters).**

Fuel filter is installed on dash panel in engine room.
Replace fuel filter with new one periodically, referring to SECTION 6C for removal and installation.

ITEM 3-4
Fuel Tank Inspection

Check fuel tank for corrosion, deterioration or damage which could cause leakage.
If a problem is found, repair or replace.



1. PCV valve
2. Crankcase ventilation hose

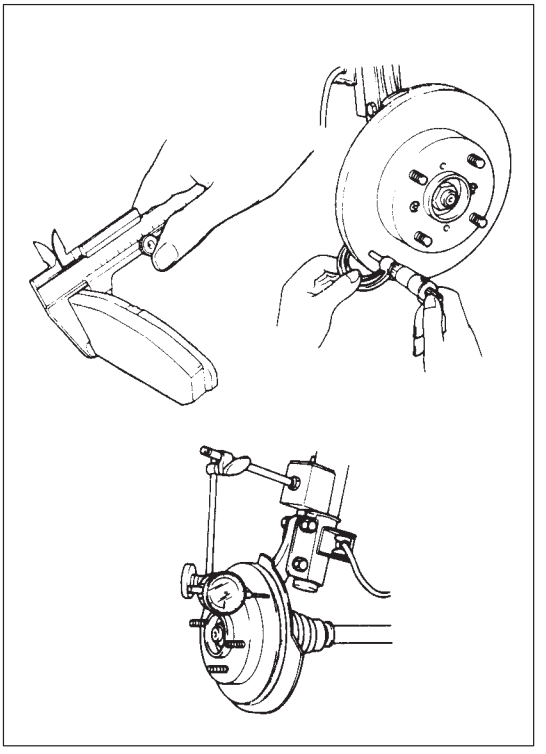
EMISSION CONTROL SYSTEM

ITEM 4-1
PCV (Positive Crankcase Ventilation) Valve Inspection

Check crankcase ventilation hoses and PCV hoses for leaks, cracks or clog, and PCV valve for stick or clog. Refer to SECTION 6E1, 6E2, 6E3 or 6E4 for PCV valve checking procedure.

ITEM 4-2
Fuel Evaporative Emission Control System Inspection (if equipped)

1) Visually inspect hoses for cracks, damage or excessive bends.
Inspect all clamps for damage and proper position.
2) Check EVAP canister for operation and clog referring to SECTION 6E1, 6E2, 6E3 or 6E4.
If any malfunction is found, repair or replace.



BRAKE

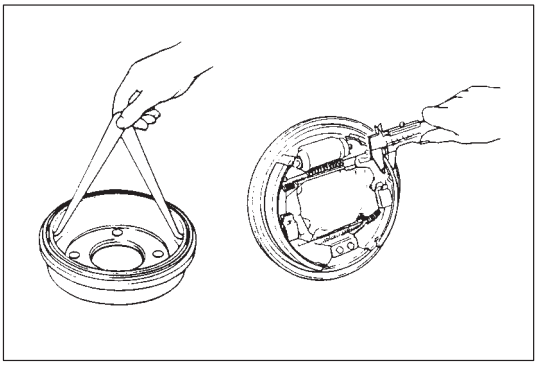
ITEM 5-1

Brake Discs, Pads, Drums and Shoes Inspection

Brake discs and pads

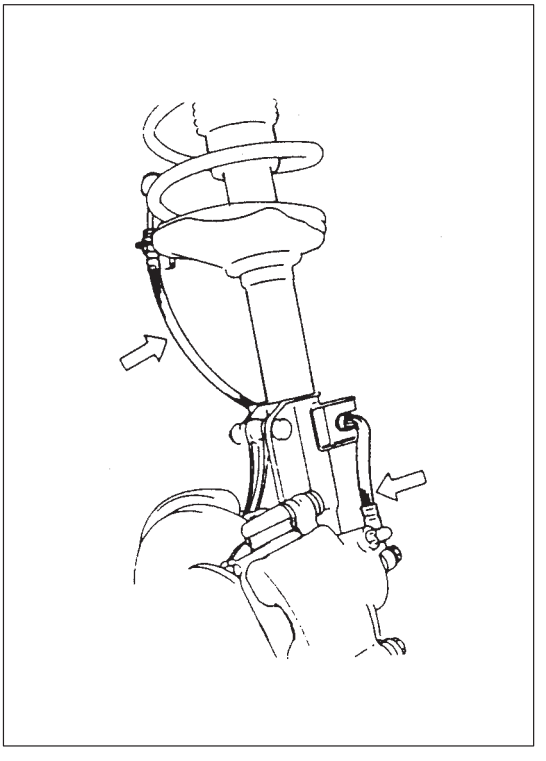
1) Remove wheel and caliper but don't disconnect brake hose from caliper.
2) Check disc brake pads and discs for excessive wear, damage and deflection. Replace parts as necessary. For the details, refer to SECTION 5.
   Be sure to torque caliper pin bolts to specification.

   NOTE:
   If noise is heard from brake when brake pedal is depressed, check brake pad lining for wear. If it is worn, both right and left brake pads should be replaced with new ones.



Brake drums and shoes

1) Remove wheel and brake drum.
2) Check rear brake drums and brake linings for excessive wear and damage, while wheels and drums are removed.
   At the same time, check wheel cylinders for leakage.
   Replace as necessary.
   For the details, refer to SECTION 5.



ITEM 5-2

Brake Hoses and Pipes Inspection

Perform this inspection where there is enough light and use a mirror as necessary.

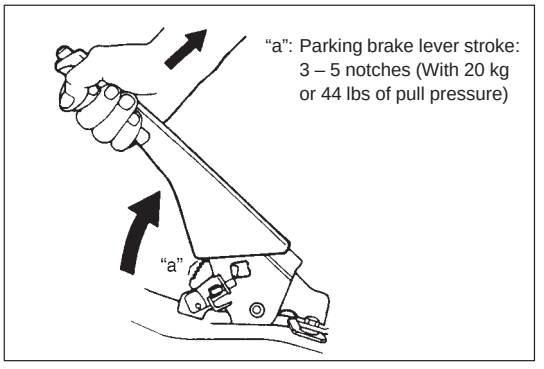
- ○ Check brake hoses and pipes for proper hook-up, leaks, cracks, chafing, wear, corrosion, bends, twists and other damage. Replace any of these parts as necessary.
- ○ Check all clamps for tightness and connections for leakage.
- ○ Check that hoses and pipes are clear of sharp edges, moving parts.

CAUTION:
After replacing any brake pipe or hose, be sure to carry out air purge operation.

ITEM 5-3

Brake Fluid Change

Change brake fluid as follows.
Drain existing fluid from brake system completely, fill system with specified fluid and carry out air purge operation.
For air purging procedure, refer to SECTION 5.

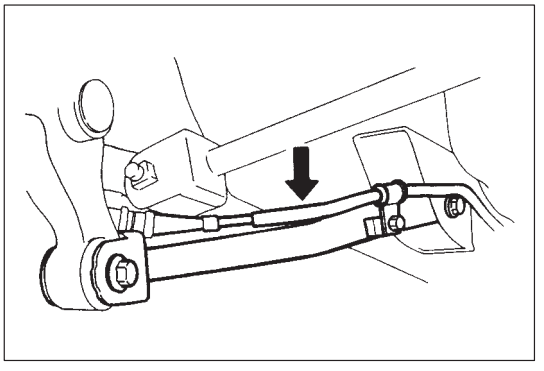


ITEM 5-4

Brake Lever and Cable Inspection

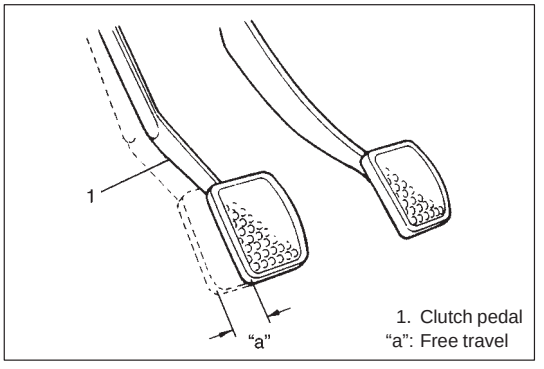
Parking brake lever

- ○ Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
- ○ Check parking brake lever for proper operation and stroke, and adjust it if necessary.
  For checking and adjusting procedures, refer to PARKING BRAKE INSPECTION AND ADJUSTMENT of SECTION 5.



Parking brake cable

Inspect brake cable for damage and smooth movement.
Replace cable if it is in deteriorated condition.



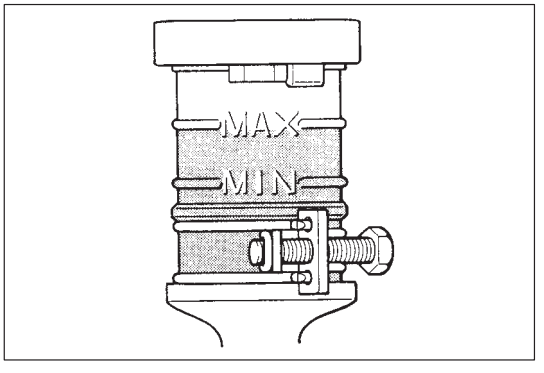
CHASSIS AND BODY

ITEM 6-1

Clutch Inspection

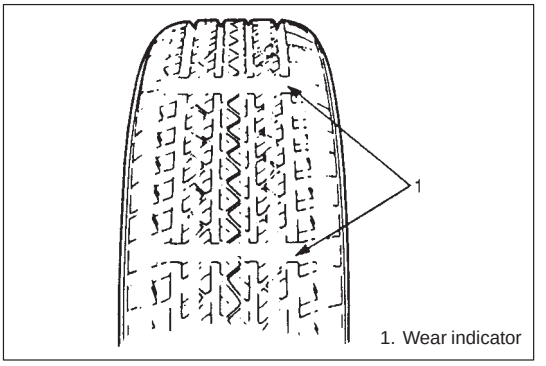
Clutch Pedal Free Travel

Check clutch pedal free travel referring to SECTION 7C or 7C1.
Adjust or correct if necessary.



Clutch Fluid (Hydraulic type only)

1) Check system for evidence of fluid leakage.
   Repair leaky point, if any.
2) Check fluid level of reservoir.
   For fluid level checking procedure, refer to ON-VEHICLE SERVICE in SECTION 7C1.



1. Wear indicator

ITEM 6-2
Tire and Wheel Disc Inspection

[Tire inspection]

1) Check tire for uneven or excessive wear, or damage. If defective, replace.

2) Check inflating pressure of each tire and adjust pressure to specification as necessary.

NOTE:
- ○ **Tire inflation pressure should be checked when tires are cool.**
- ○ **Specified tire inflation pressure should be found on tire placard or in owner's manual which came with vehicle.**

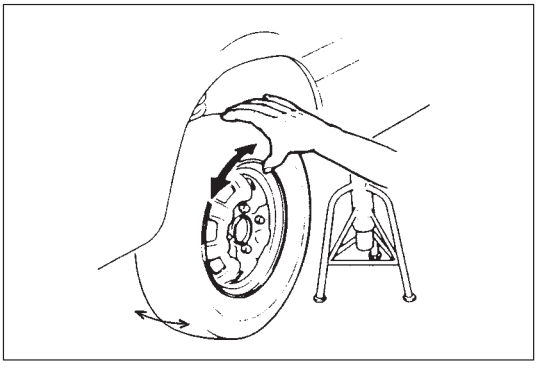
[Wheel disc inspection]

Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.

[Tire rotation]

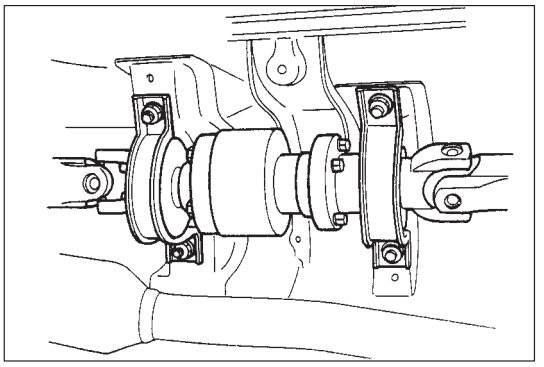
Rotate tires.

For details of the steps, refer to SECTION 3F.



ITEM 6-2'
Wheel Bearing Inspection

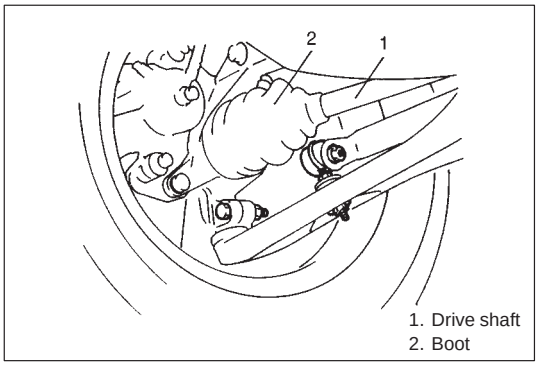
1) Check front wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to FRONT SUSPENSION INSPECTION of SECTION 3D.
2) Check rear wheel bearing for wear, damage abnormal noise or rattle. For details, refer to REAR SUSPENSION INSPECTION of SECTION 3E.



ITEM 6-3

Propeller Shaft Inspection (4WD vehicle only)

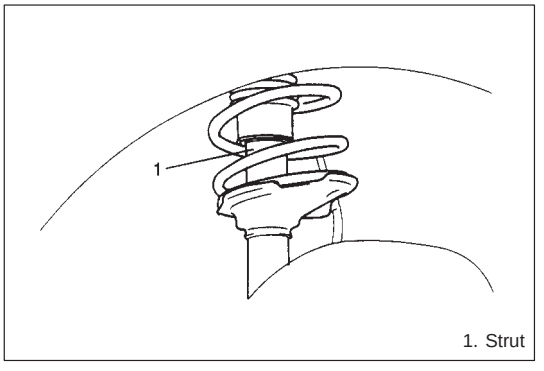
1) Check propeller shaft connecting bolts for looseness. If looseness is found, tighten to specified torque.
2) Check propeller shaft joints for wear, play and damage. If any defect is found, replace.
3) Check propeller shaft center support for biting of foreign matter, crack, abnormal noise and damage. If any defect is found, replace.



1. Drive shaft
2. Boot

Drive Shaft Boot Inspection

Check drive shaft boots (wheel side and differential side) for leakage, detachment, tear or any other damage.
Replace boot as necessary.

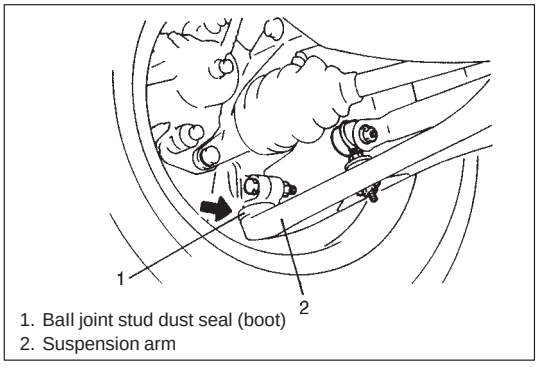


1. Strut

ITEM 6-4

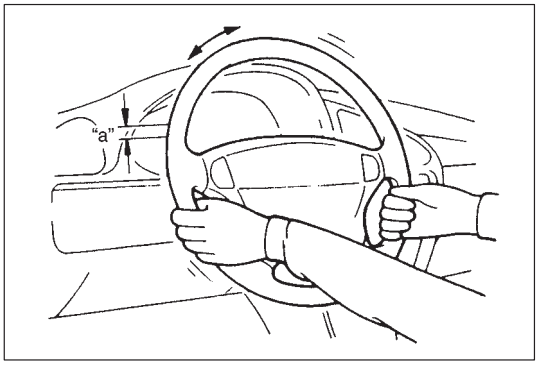
Suspension System Inspection

○ Inspect front & rear struts for evidence of oil leakage, dents or any other damage on sleeves; and inspect anchor ends for deterioration.
Replace defective parts, if any.



1. Ball joint stud dust seal (boot)
2. Suspension arm

○ Check front and rear suspension systems for damaged, loose or missing parts; also for parts showing signs of wear or lack of lubrication.
Repair or replace defective parts, if any.
○ Check front suspension arm ball joint stud dust seals for leakage, detachment, tear or any other damage.
Replace defective boot, if any.

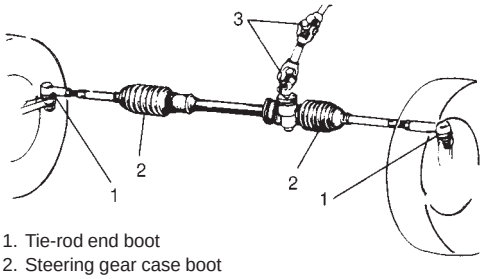


ITEM 6-5

Steering System Inspection

1) Check steering wheel for play and rattle, holding vehicle straight on ground.

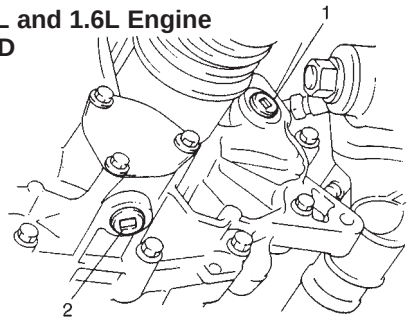
Steering wheel play "a": 0 – 30 mm (0 – 1.1 in.)



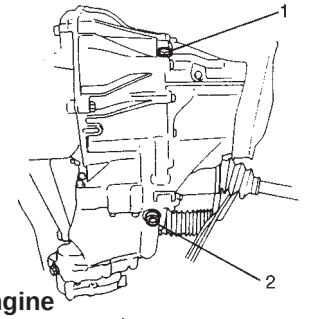
1. Tie-rod end boot
2. Steering gear case boot
3. Universal joint

2) Check steering linkage for looseness and damage. Repair or replace defective parts, if any.
3) Check boots of steering linkage and steering gear case for damage (leaks, detachment, tear, etc.). If damage is found, replace defective boot with new one.
4) Check universal joints of steering shaft for rattle and damage. If rattle or damage is found, replace defective part with a new one.

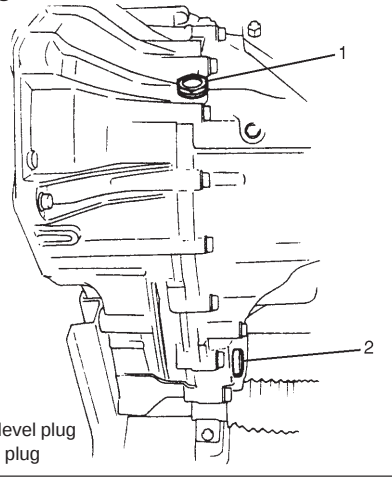
1.3L and 1.6L Engine
2WD



4WD



1.8L Engine



1. Oil filler/level plug
2. Oil drain plug

ITEM 6-6

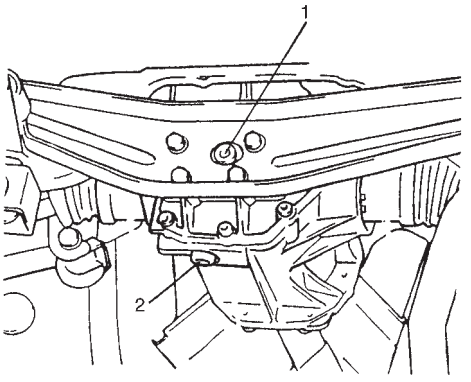
Manual Transmission Oil Inspection and Change

[Inspection]

1) Inspect transmission case for evidence of oil leakage. Repair leaky point if any.
2) Make sure that vehicle is placed level for oil level check.
3) Remove level plug of transmission.
4) Check oil level.
   Oil level can be checked roughly by means of filler/level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.
   If oil is found insufficient, pour specified oil up to level hole.
   For specified oil, refer to description of oil change under ON-VEHICLE SERVICE in SECTION 7A or 7A1.
5) Tighten level plug to specified torque.

[Change]

1) Place the vehicle level and drain oil by removing drain plug.
2) Apply sealant to drain plug and tighten drain plug to specified torque.
3) Pour specified oil up to level hole.
4) Tighten filler plug to specified torque.
   For recommended oil, its amount and tightening torque data, refer to ON-VEHICLE SERVICE of SECTION 7A or 7A1.



1. Oil level/filler plug
2. Drain plug

ITEM 6-7

Rear Differential Oil Inspection and Change (4WD vehicle only)

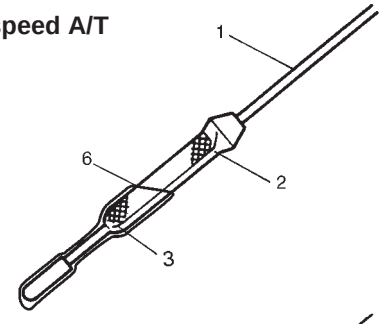
[Inspection]

1) Inspect rear differential case for evidence of oil leakage. Repair leaky point, if any.
2) Make sure that the vehicle is placed level for oil level check.
3) Remove level plug of differential. Oil level can be checked roughly by means of level plug hole.
   That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.
   If oil is found insufficient, pour specified amount of specified oil as given in SECTION 7F.
4) Apply sealant to plug thread and tighten it to specified torque.

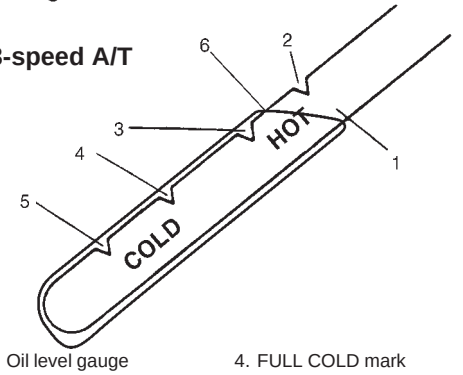
[Change]

Place the vehicle level and drain oil by removing drain plug. Pour specified amount of specified oil, apply sealant to each plug thread and tighten drain plug and filler plug to specified torque, referring to ON-VEHICLE SERVICE in SECTION 7F.

4-speed A/T



3-speed A/T



1. Oil level gauge
2. FULL HOT mark
3. LOW HOT mark
4. FULL COLD mark
5. LOW COLD mark

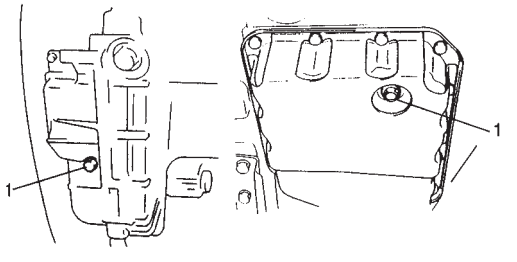
ITEM 6-8

Automatic Transmission

[Fluid level inspection]

1) Inspect transmission case for evidence of fluid leakage. Repair leaky point, if any.
2) Make sure that vehicle is placed level for fluid level check.
3) Check fluid level.
   For fluid level checking procedure, refer to ON-VEHICLE SERVICE in SECTION 7B or 7B1 and be sure to perform it under specified conditions. If the lowest fluid level (6) is lower than LOW HOT mark, replenish specified fluid.

4-speed A/T **3-speed A/T**



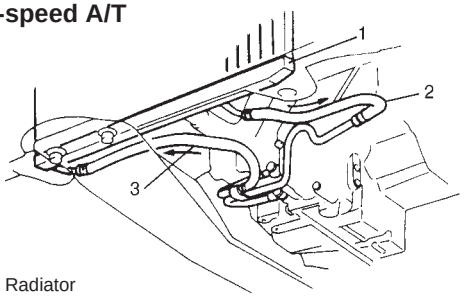
1. Drain plug

[Fluid change]

1) Perform steps 1) and 2) of above Fluid Level inspection.
2) Change fluid. For its procedure, refer to ON-VEHICLE SERVICE in SECTION 7B or 7B1.

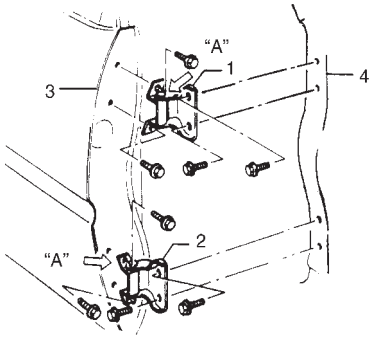
CAUTION:
Use of specified fluid is absolutely necessary.

4-speed A/T



1. Radiator
2. Inlet hose (Outlet from oil cooler)
3. Outlet hose (Inlet to oil cooler)

[Fluid cooler hose change]
Replace inlet and outlet hoses of cooler hose and their clamps.
For replacement procedure, refer to ON-VEHICLE SERVICE in SECTION 7B or 7B1.



"A": Oil point
1. Upper hinge
2. Lower hinge
3. Door
4. Body

ITEM 6-9

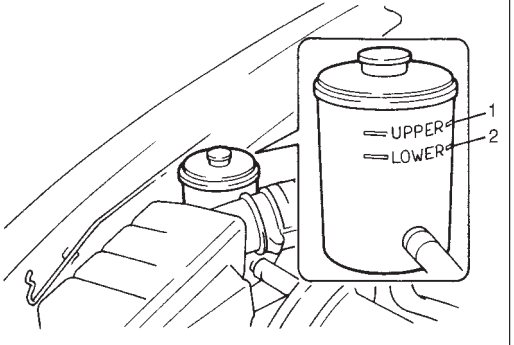
All Hinges, Latches and Locks Inspection

Doors

Check that each door of front, rear and back doors opens and closes smoothly and looks securely when closed.
If any malfunction is found, lubricate hinge and latch or repair door lock system.

Engine hood

Check that secondary latch operates properly (check that secondary latch keeps hood from opening all the way even when pulling hood release handle inside vehIcle.) Also check that hood opens and closes smoothly and properly and hood locks securely when closed.
If any malfunction is found, lubricate hinge and latch, or repair hood lock system.



1. UPPER level
2. LOWER level

ITEM 6-10

Power Steering (P/S) System Inspection (If equipped)

1) Visually check power steering system for leaks or damage.
2) Check fluid level with engine stopped.
   If it is lower than LOWER level, fill fluid up to UPPER level.

   NOTE:
   ○ **Fluid level should be checked when fluid is cool.**
   ○ **Be sure to use specified power steering fluid.**

3) Visually check pump drive belt for cracks and wear.
4) Check belt for tension, referring to ITEM 1-1 of "ENGINE" in this section. If necessary, have belt adjusted or replaced.

FINAL INSPECTION

WARNING:
When carrying out road tests, select a safe place where no man or no running vehicle is seen so as to prevent any accident.

Seats
Check that seat slides smoothly and locks securely at any position. Also check that reclining mechanism of front seat back allows it to be locked at any angle.

Seat Belt
Inspect belt system including webbing, buckles, latch plates, retractors and anchors for damage or wear.
If "REPLACE BELT" label on belt is visible, replace belt.
Check that seat belt is securely locked.

Battery Electrolyte Level Check
Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If battery is equipped with built-in indicator, check battery condition by the indicator.

Accelerator Pedal Operation
Check that pedal operates smoothly without getting caught or interfered by and other part.

Engine Start
Check engine start for readiness.

WARNING:
Before performing the following check, be sure to have enough room around the vehicle. Then, firmly apply both the parking brake and the regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition promptly. Take these precautions because the car could move without warning and possibly cause personal injury or property damage.

On automatic transmission vehicles, try to start the engine in each gear. The starter should crank only in "P" (Park) or "N" (Neutral).
On manual transmission vehicles, place the shift lever in "Neutral," depress clutch fully and try to start.

Exhaust System Check
Check for leakage, cracks or loose supports.

Clutch (For Manual transmission)
Check for the following.
- ○ Clutch is completely released when depressing clutch pedal,
- ○ No slipping clutch occurs when releasing pedal and accelerating,
- ○ Clutch itself is free from any abnormal condition.

Gearshift or Select Lever (Transmission)
Check gear shift or select lever for smooth shifting to all positions and for good performance of transmission in any position.
With automatic transmission equipped vehicle, also check that shift indicator indicates properly according to which position select lever is shifted to.

CAUTION:
With automatic transmission equipped vehicle, make sure that vehicle is at complete stop when shifting select lever to "P" range position and release all brakes.

Brake
[Foot brake]
Check the following;
- ○ that brake pedal has proper travel,
- ○ that brake works properly,
- ○ that it is free from noise,
- ○ that vehicle does not pull to one side when brake is applied,
- ○ and that brake does not drag.

[Parking brake]
Check that lever has proper travel.

WARNING:
With vehicle parked on a fairly steep slope, make sure nothing is in the way downhill to avoid any personal injury or property damage. Be prepared to apply regular brake quickly even if vehicle should start to move.

Check to ensure that parking brake is fully effective when the vehicle is stopped on the safe slope and brake lever is pulled all the way.

Steering
- ○ Check to ensure that steering wheel is free from instability, or abnormally heavy feeling.
- ○ Check that the vehicle does not wander or pull to one side.

Engine
- ○ Check that engine responds readily at all speeds.
- ○ Check that engine is free from abnormal noise and abnormal vibration.

Body, Wheels and Power Transmitting System
Check that body, wheels and power transmitting system are free from abnormal noise and abnormal vibration or any other abnormal condition.

Meters and Gauge
Check that speedometer, odometer, fuel meter, temperature gauge, etc. are operating accurately.

Lights
Check that all lights operate properly.

Windshield Defroster
Periodically check that air comes out from defroster outlet when operating heater or air conditioning.
Set fan switch lever to “HI” position and mode lever to defroster position for this check.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine oil	SE, SF, SG, SH or SJ grade (Refer to engine oil viscosity chart in item 1-4.)
Engine coolant (long life coolant)	Ethylene-glycol base coolant (“Antifreeze/Anticorrosion coolant”)
Brake fluid	DOT 3
Manual transmission oil	See oil chart on SECTION 7A or 7A1.
Rear differential oil (4WD)	See oil chart on SECTION 7F.
Automatic transmission fluid	3-speed A/T: An equivalent of DEXRON®-IIE or DEXRON®-III 4-speed A/T: An equivalent of DEXRON®-III
Power steering fluid	See material table on SECTION 3B1.
Door hinges	Engine oil
Engine hood latch	Engine oil
Key lock cylinder	Spray lubricant

SECTION 1A

HEATER AND VENTILATION

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

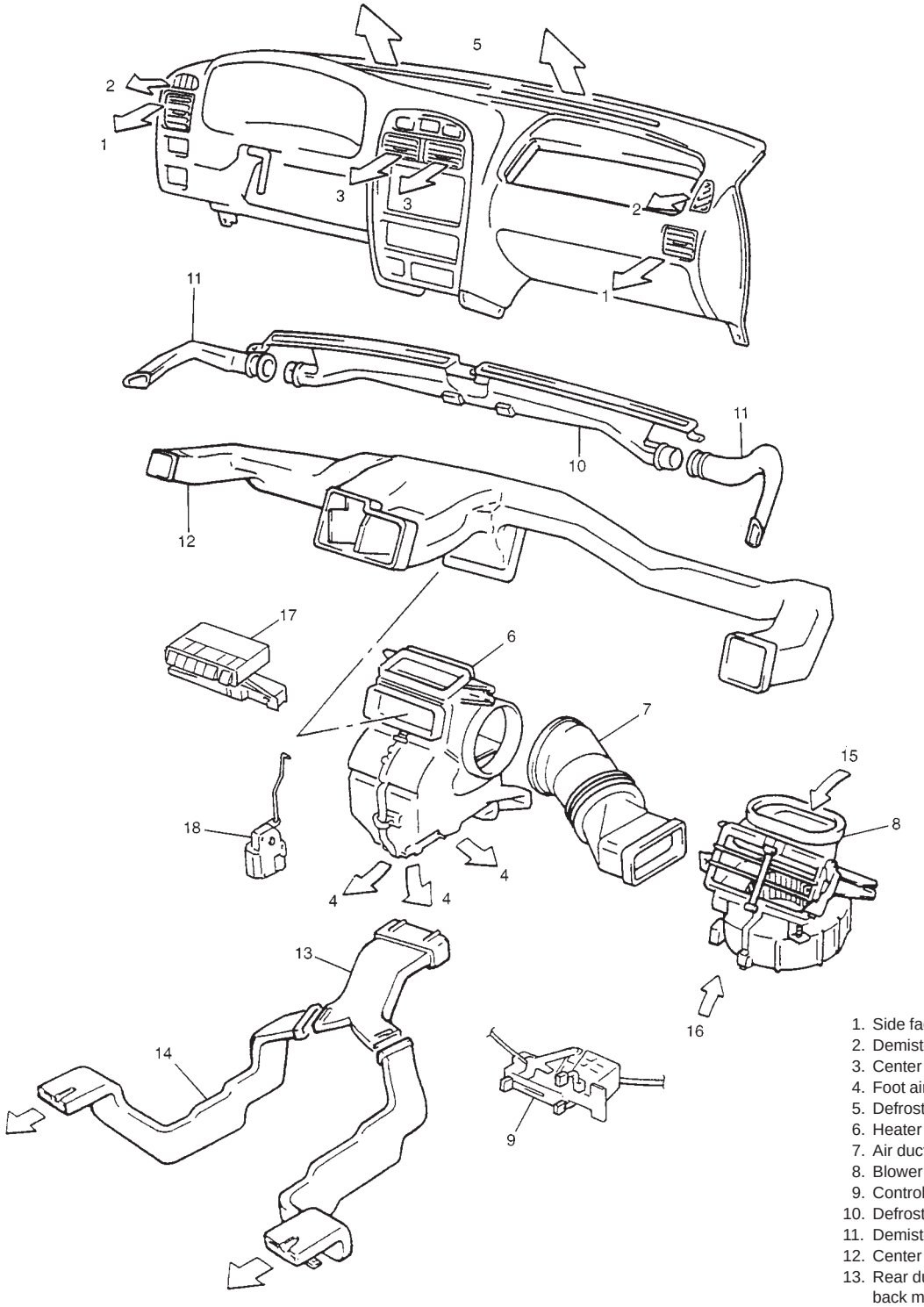
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

CONTENTS

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Heater Control Lever Assembly 1A-13
Heater Control Cables 1A-14
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Mode Actuator 1A-17
Rear Duct (except hatch-back model) 1A-18

GENERAL DESCRIPTION

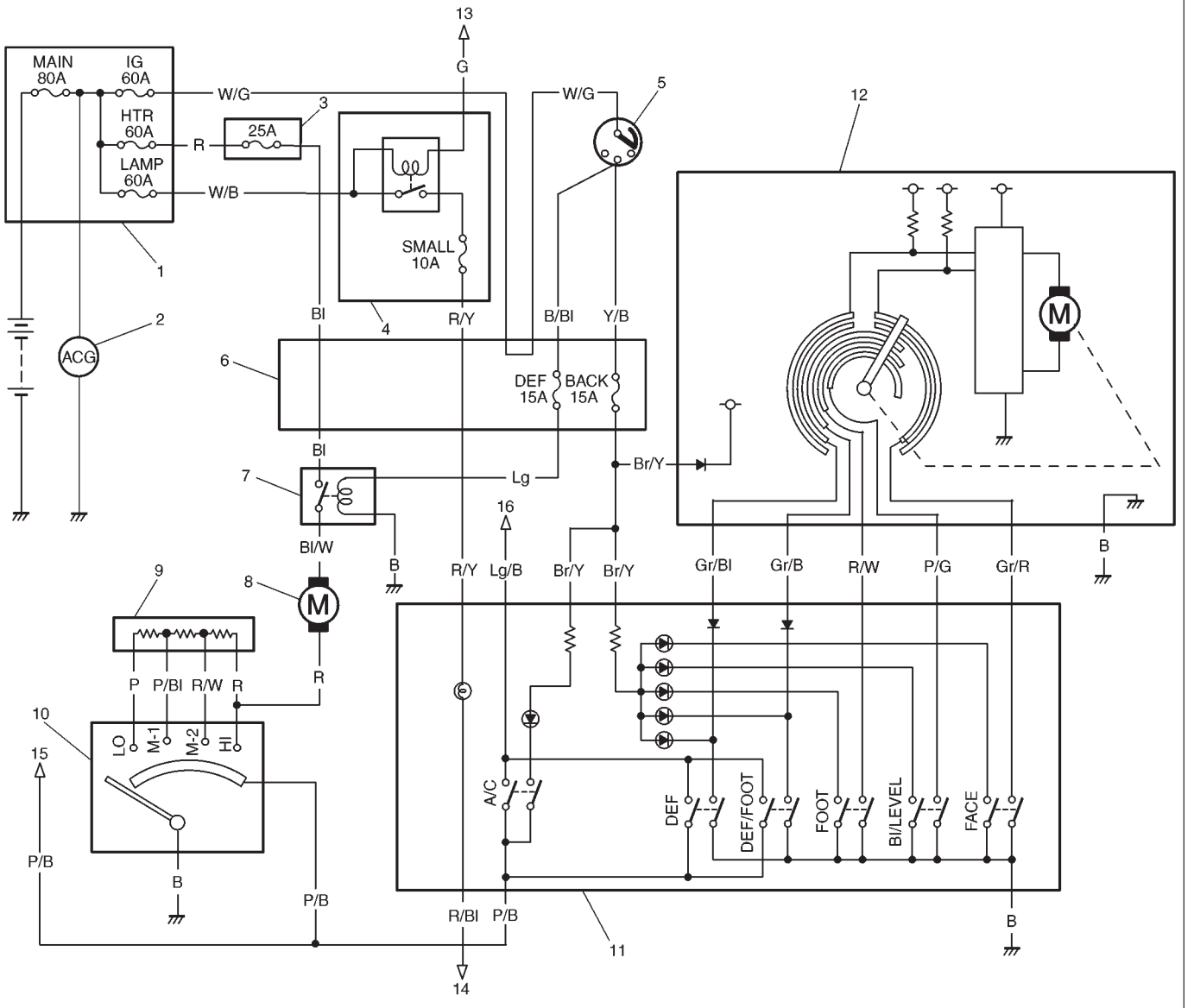
COMPONENTS



1. Side face air
2. Demister air
3. Center face air
4. Foot air
5. Defroster air
6. Heater unit
7. Air duct
8. Blower motor unit
9. Control lever assembly
10. Defroster nozzle
11. Demister duct
12. Center duct
13. Rear duct (except hatch-back model)
14. Rear hose (except hatch-back model)
15. Fresh air
16. Circulation air
17. Mode control switch
18. Mode actuator

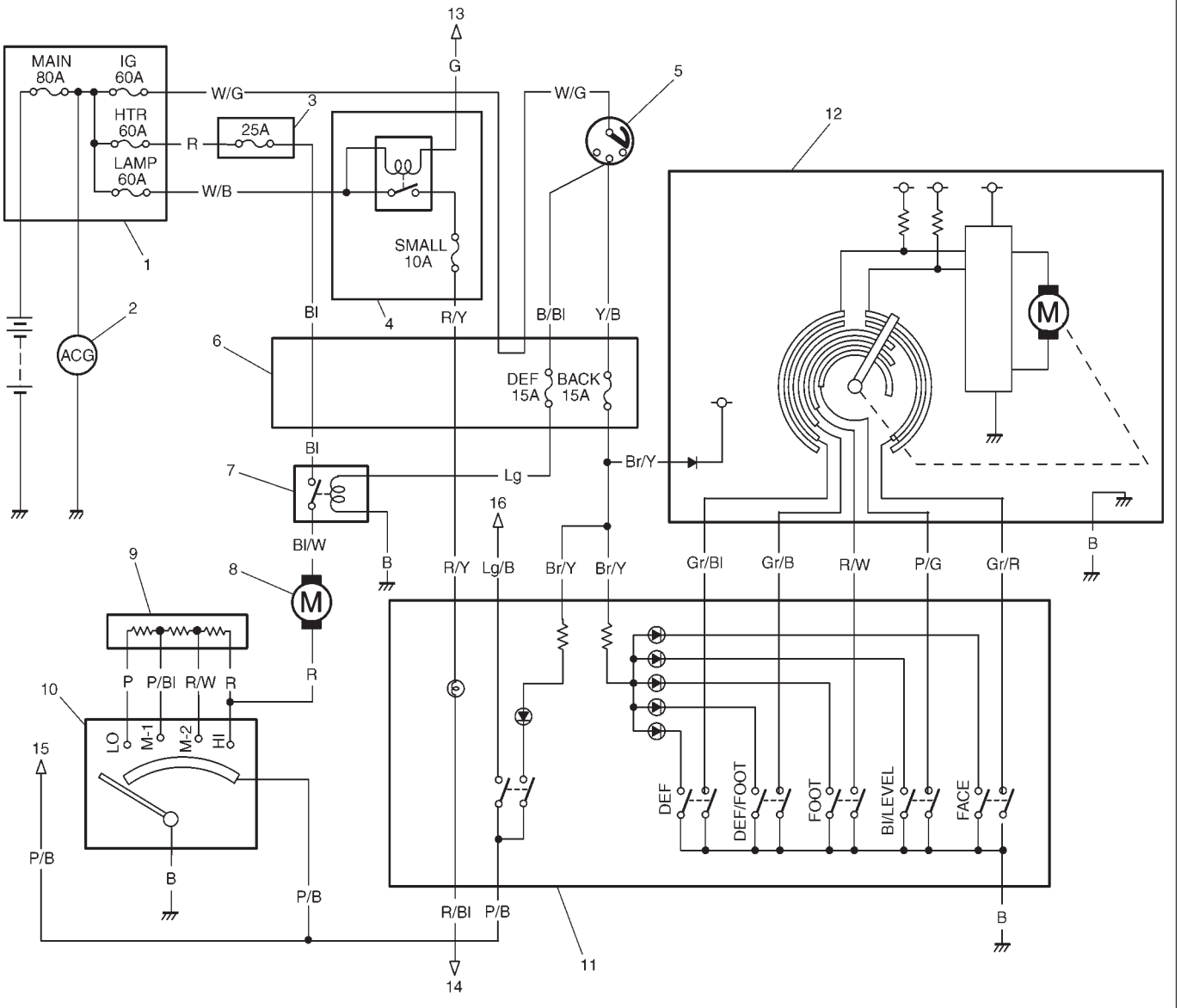
WIRING CIRCUIT

For LH vehicle



1. Main fuse box
2. Generator
3. Cassette fuse
4. Fuse and relay box
5. Ignition switch
6. Junction box (J/B)
7. Blower fan motor relay
8. Blower fan motor
9. Blower fan motor resistor
10. Blower fan motor switch
11. Mode control switch
12. Mode actuator
13. To lighting switch
14. To illumination controller
15. To ECM
16. To A/C amplifier

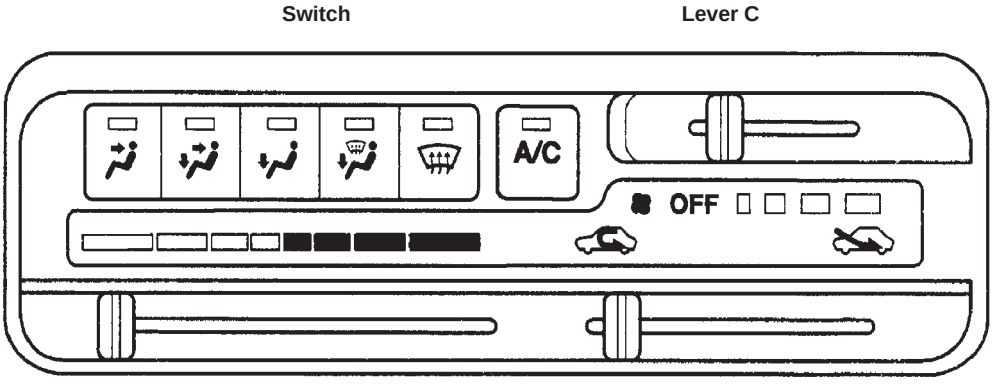
For RH vehicle



1. Main fuse box
2. Generator
3. Cassette fuse
4. Fuse and relay box
5. Ignition switch
6. Junction box (J/B)
7. Blower fan motor relay
8. Blower fan motor
9. Blower fan motor resistor
10. Blower fan motor switch
11. Mode control switch
12. Mode actuator
13. To lighting switch
14. To illumination controller
15. To ECM
16. To A/C amplifier

HEATER CONTROL OPERATION

The heater and ventilation provide temperature control, ventilation and defrosting functions. Their operation is controlled by selecting the positions of the control levers and mode select switch on the instrument panel. Each lever / switch position and function of heater and ventilation are as given below.



Switch
Mode control switch.

	FACE	Air flows from center and side face outlets	I-1
	BI-LEVEL	Air flows from center face outlet, side face outlet and foot outlets	I-2
	FOOT	Air flows from foot outlet	I-3
	FOOT/ DEFROSTER	Air flows from foot outlet, defroster and demister outlets	I-4
	DEFROSTER	Air flows from defroster and demister outlet	I-5

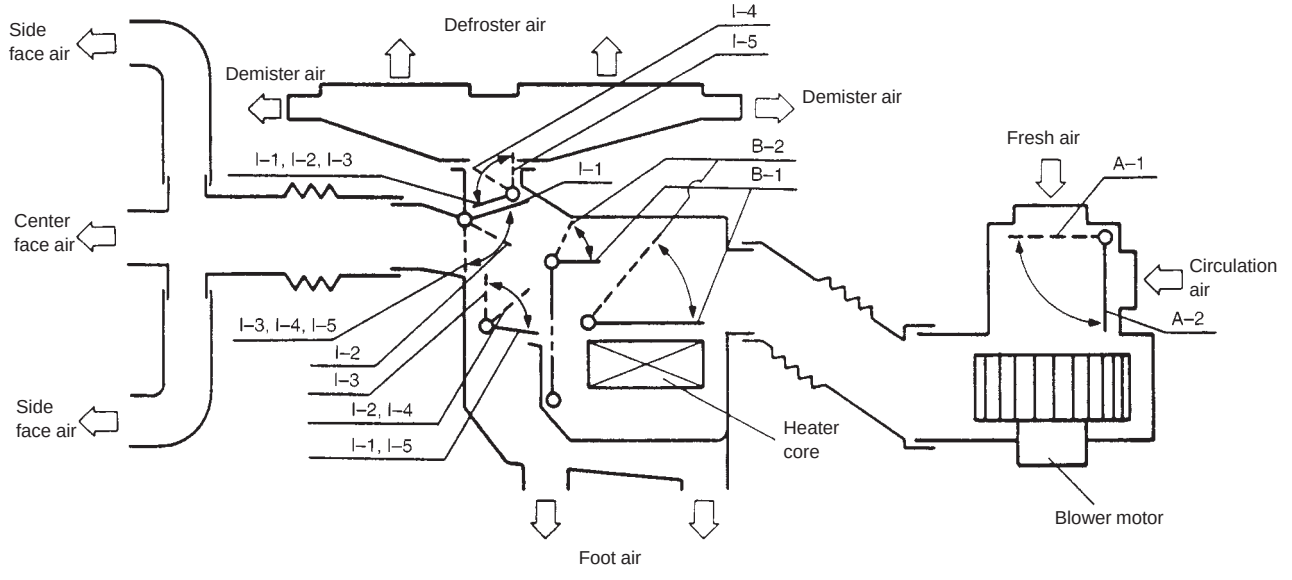
Lever A
Fresh air control lever.

	CIRCULATION	A-1
	FRESH	A-2

Lever B
Temperature control lever.

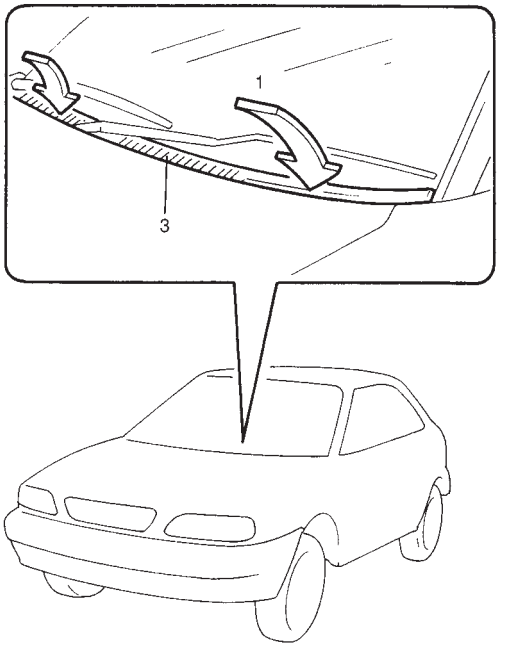
COOL	B-1
HOT	B-2

Lever C
Blower motor speed selection lever.

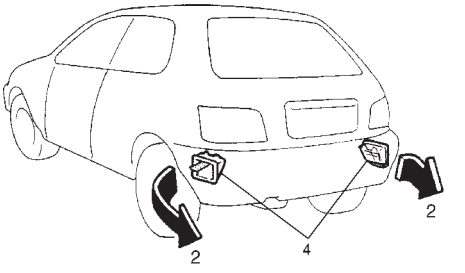


BODY VENTILATION

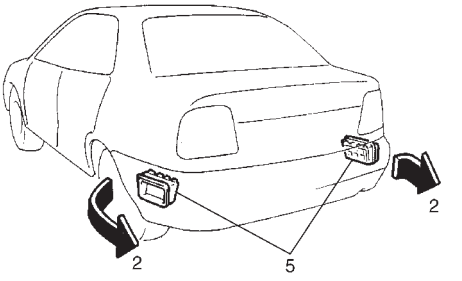
The body ventilation system of this vehicle is equipped with air conditioning that consists of a fresh air intake located at the cowl top panel. Ventilating air is drawn into the interior from the intake grille and drawn out from the ventilator outlet provided at each side of the body outer panel.



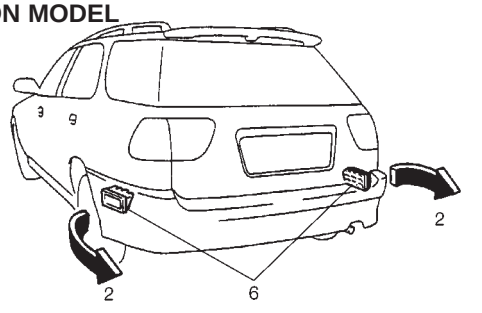
HATCH-BACK MODEL



SEDAN MODEL



WAGON MODEL



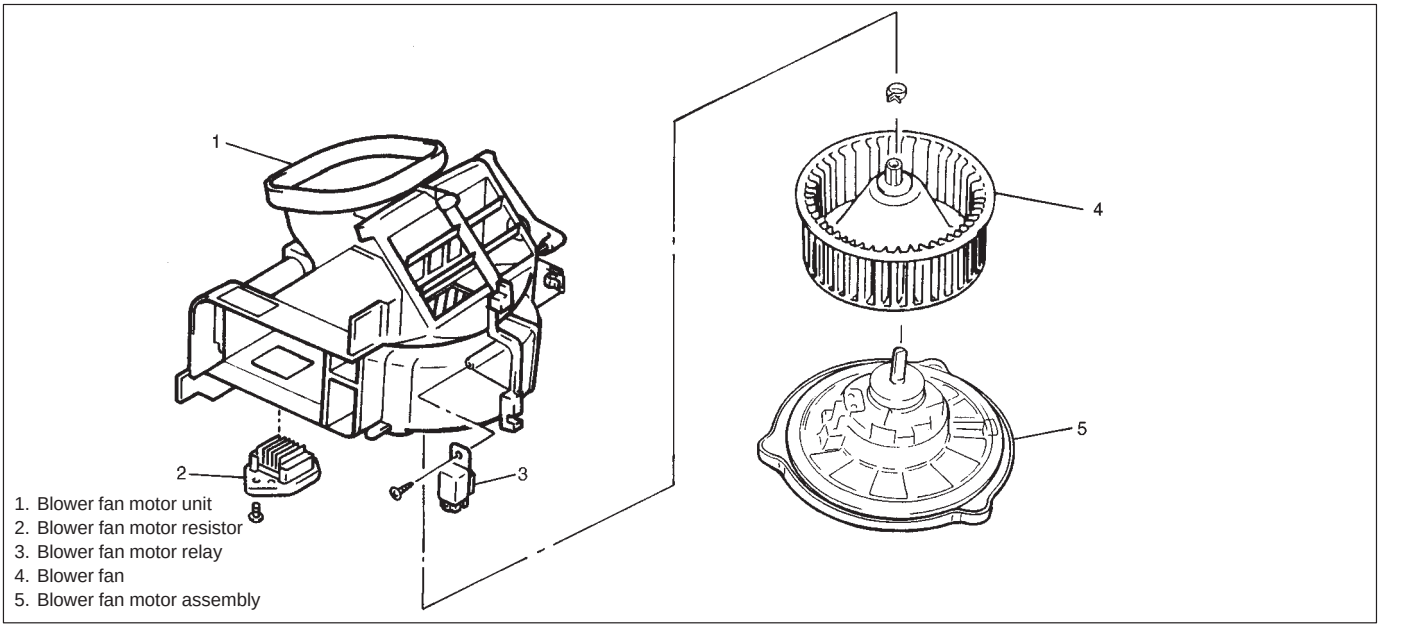
1. Fresh air
2. Ventilating air
3. Cowling ventilator garnish
4. Ventilator outlet (Hatch-Back model)
5. Ventilator outlet (Sedan model)
6. Ventilator outlet (Wagon model)

DIAGNOSIS

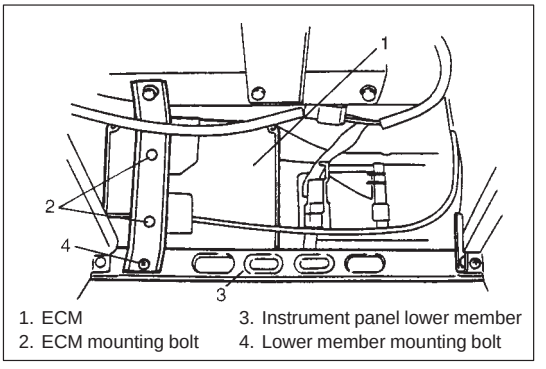
Trouble	Possible cause	Remedy
Heater blower won't work even when its switch is ON.	○ Fuse blown ○ Blower resistor faulty ○ Blower motor faulty ○ Wiring or grounding faulty	○ Replace fuse to check for short. ○ Check continuity. ○ Replace motor. ○ Repair as necessary.
Incorrect temperature output	○ Control cables broken or binding ○ Temperature control lever faulty ○ Position of control cable clamp is faulty ○ Air damper broken ○ Air ducts clogged ○ Heater radiator leaking or clogged ○ Heater hoses leaking or clogged	○ Check cables. ○ Check control lever. ○ Check and adjust clamp position. ○ Repair damper. ○ Repair air ducts. ○ Replace radiator. ○ Replace hoses.
When mode control switch is changed, air outlet port is not changed.	○ Mode control switch faulty ○ Mode actuator faulty ○ Fuse blown ○ Wiring or grounding faulty ○ Air damper broken ○ Air ducts clogged	○ Check and replace if necessary. ○ Check and replace if necessary. ○ Replace fuse to check for short. ○ Repair if necessary. ○ Repair damper. ○ Repair air ducts.

ON-VEHICLE SERVICE

BLOWER FAN MOTOR



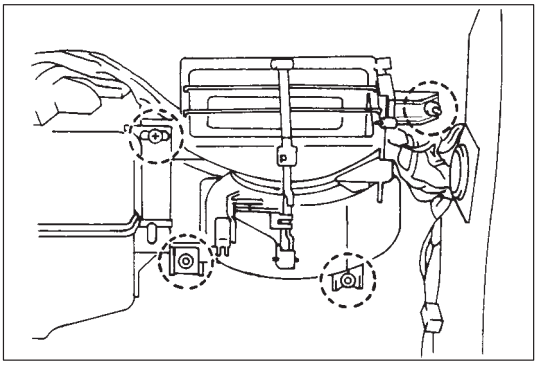
1. Blower fan motor unit
2. Blower fan motor resistor
3. Blower fan motor relay
4. Blower fan
5. Blower fan motor assembly



1. ECM
2. ECM mounting bolt
3. Instrument panel lower member
4. Lower member mounting bolt

REMOVAL

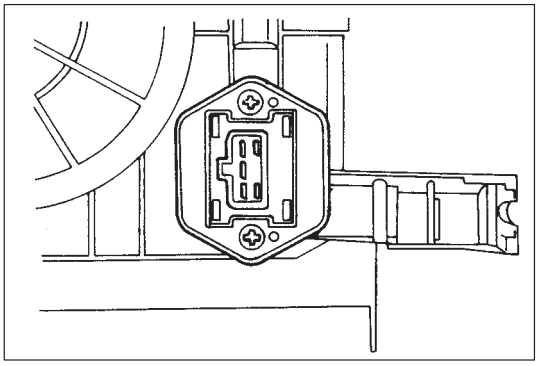
1) Disconnect negative (–) cable at battery.
2) If equipped with air bag system, disable air bag system. Refer to “Disabling Air Bag System” in SECTION 9J.
3) Remove grove box, ECM and instrument panel lower member.
4) Disconnect blower fan motor and resistor lead wires at couplers.
5) Disconnect fresh air control cable from blower fan motor unit.
6) Remove blower fan motor unit.



INSTALLATION

Reverse removal procedure for installation, and then note the following instruction.

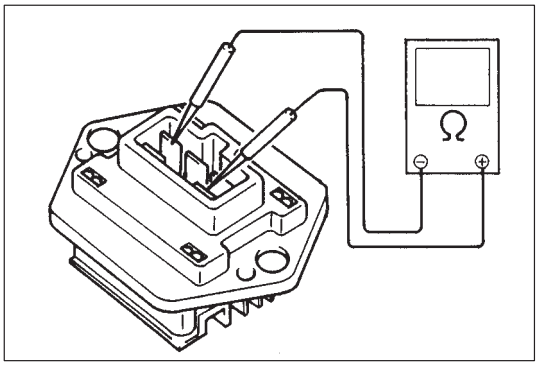
○ If equipped with air bag system, enable air bag system. Refer to “Enabling Air Bag System” in SECTION 9J.



BLOWER FAN MOTOR RESISTOR

REMOVAL

1) Disconnect resistor coupler.
2) Remove heater blower fan motor resistor.



INSPECTION

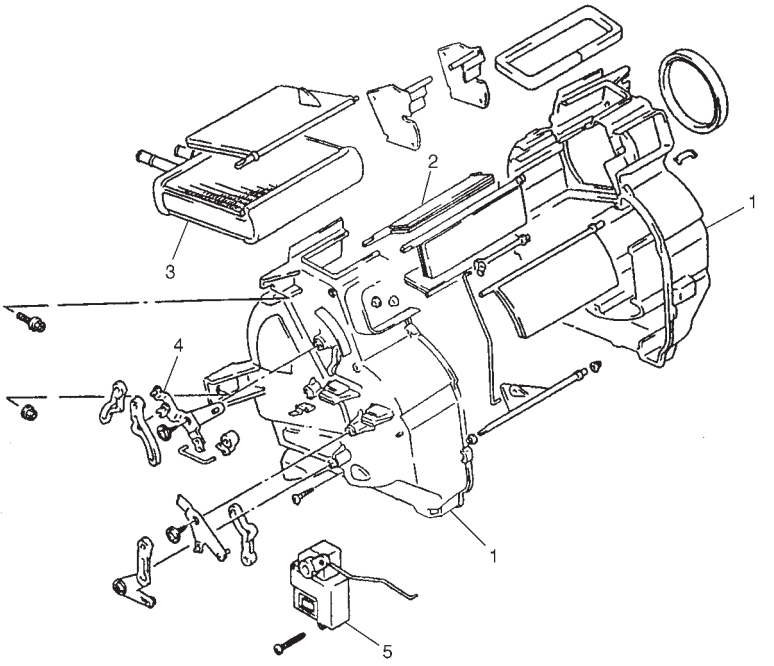
Check blower fan motor resistor for each terminal-to-terminal continuity. If there is no continuity, replace blower fan motor resistor.

INSTALLATION

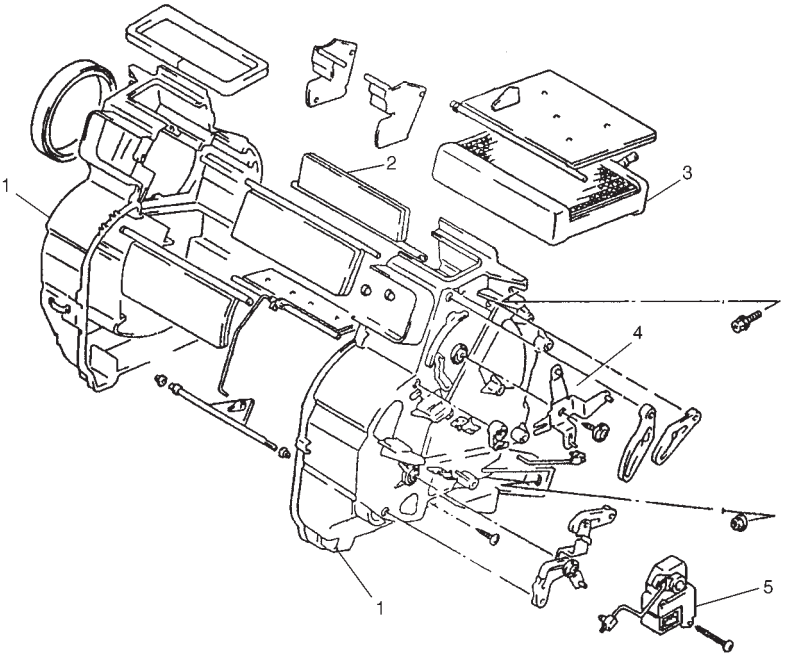
Reverse removal procedure for installation.

HEATER UNIT

For LH vehicle



For RH vehicle

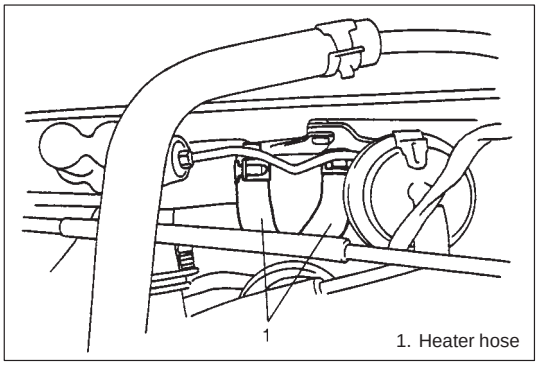


1. Heater case
2. Damper
3. Heater core
4. Control lever
5. Mode actuator

REMOVAL

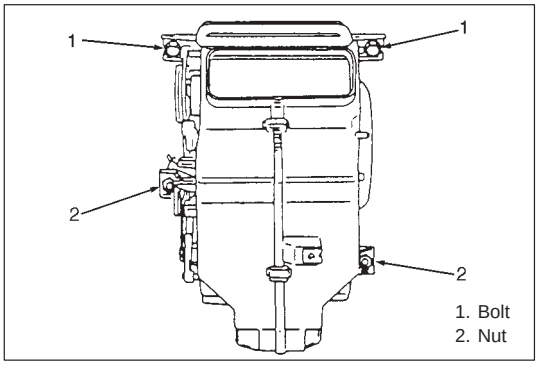
WARNING:
Failure to follow the following procedure and WARNING may cause air bag deployment, personal injury, damage to parts, or air bag being unable to deploy.
- **Never rest a steering column assembly on steering wheel with air bag (inflator) module face down and column vertical.**
- **When handling the air bag (inflator) modules (driver and passenger), be careful not to drop it or apply an impact to it. If an excessive impact was applied (e.g., dropped from a height of 91.4 cm (3 feet or more), never attempt disassembly or repair but replace it with a new one.**
- **When grease, cleaning agent. oil, water, etc. has got onto air bag (inflator) modules (driver and passenger), wipe off immediately with a dry cloth.**

1) Disconnect negative (–) cable at battery.
2) If equipped with air bag, disable air bag system. Refer to "Disabling Air Bag System" in SECTION 9J.



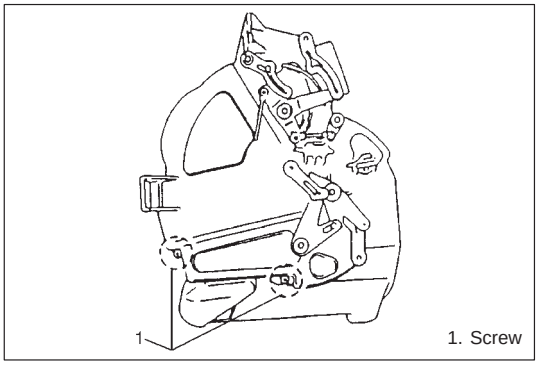
1. Heater hose

3) Drain engine coolant and disconnect water hoses from heater unit.
4) Remove instrument panel, refer to "INSTRUMENT PANEL" at SECTION 9.



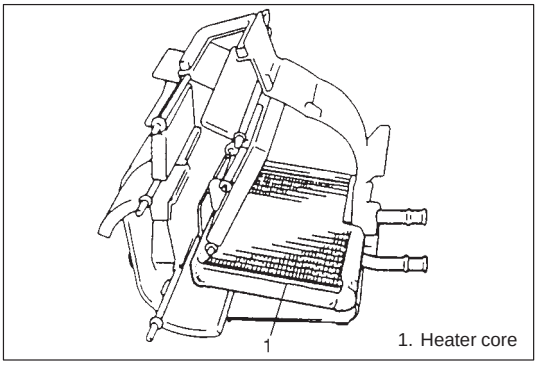
1. Bolt
2. Nut

5) Remove rear duct. (If equipped).
6) Remove heater unit.



1. Screw

7) Remove heater unit clips and screws to separate heater unit.



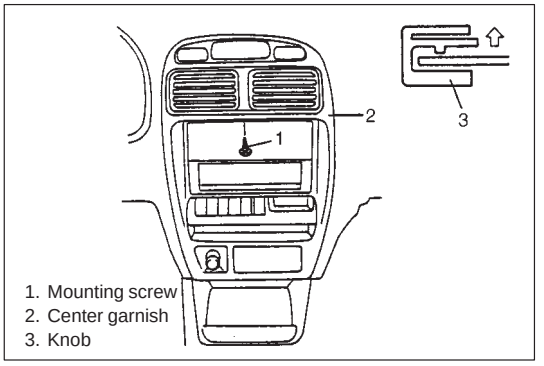
1. Heater core

8) Pull out heater core from unit.

INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.

- ○ When installing each part, be careful not to catch any cable or wiring harness.
- ○ When installing steering column assembly, refer to “Steering Column” in SECTION 3C1.
- ○ Adjust control cables. (Refer to “HEATER CONTROL CABLES” in this section.)
- ○ Fill engine coolant to radiator.
- ○ If equipped with air bag, enable air bag system. Refer to “Enabling Air Bag System” in SECTION 9J.

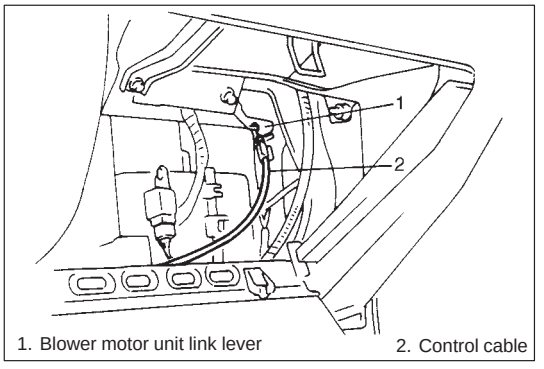


1. Mounting screw
2. Center garnish
3. Knob

HEATER CONTROL LEVER ASSEMBLY

REMOVAL

1) Disconnect negative (–) cable at battery.
2) If equipped with air bag, disable air bag system. Refer to "Disabling Air Bag System" in SECTION 9J.
3) Remove control lever knobs and center garnish mounting screw.
4) Remove center garnish with mode control switch.

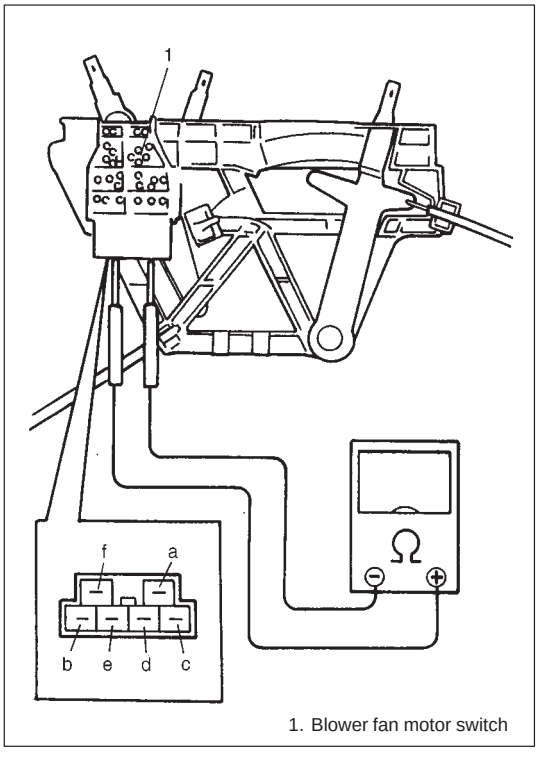


1. Blower motor unit link lever
2. Control cable

5) Disconnect control cables from blower fan motor unit and heater unit.
6) Remove control lever assembly.

INSPECTION OF BLOWER FAN MOTOR SWITCH

Check switch for each terminal-to-terminal continuity. If there is no continuity, replace heater control lever assembly.



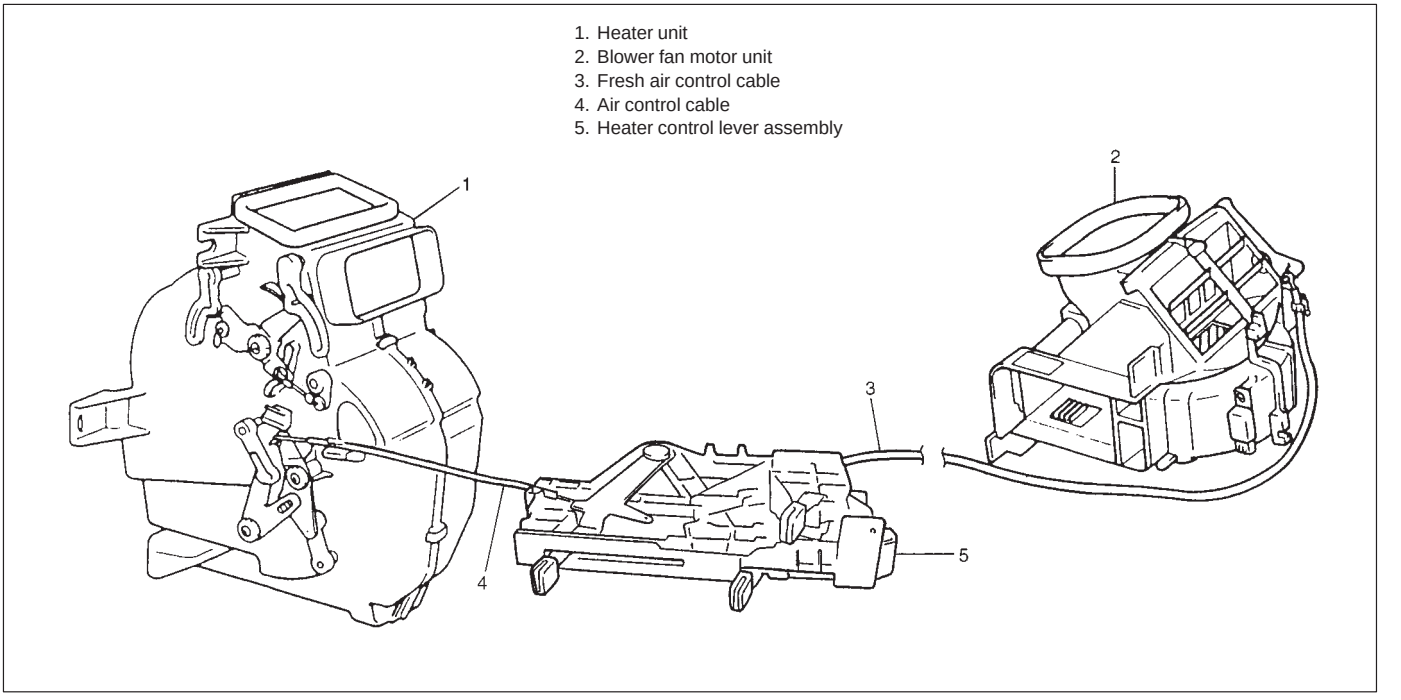
1. Blower fan motor switch

BLOWER MOTOR SWITCH POSITION \ Terminal	a	b	c	d	e	f
OFF	○					
LO	○	○	○			
M-1	○	○		○		
M-2	○	○			○	
HI	○	○				○

INSTALLATION

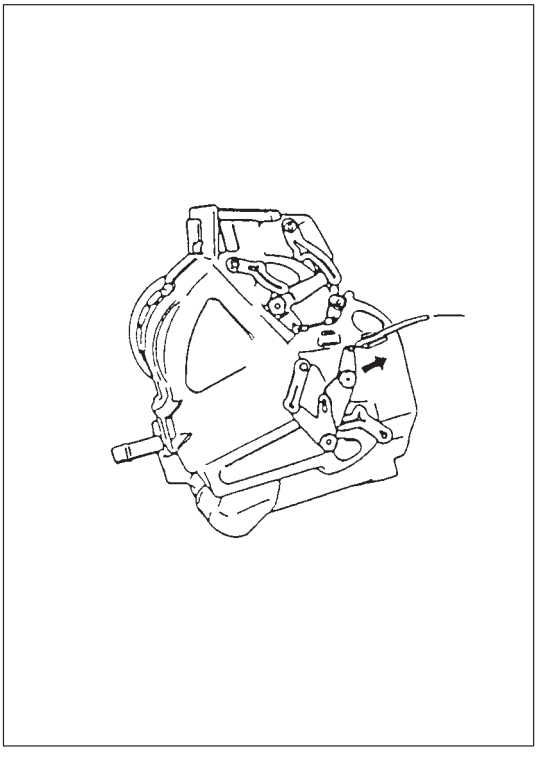
Reverse removal procedure for installation.

HEATER CONTROL CABLES



REMOVAL

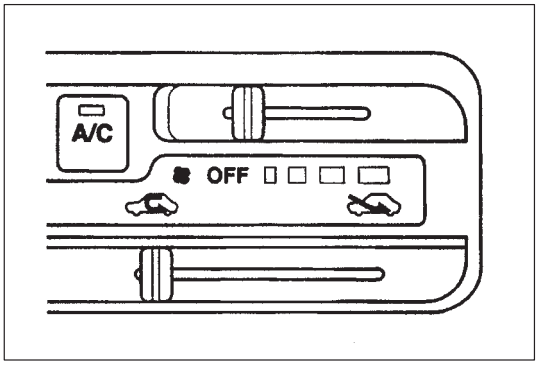
1) Remove control lever assembly. Refer to “HEATER CONTROL LEVER ASSEMBLY” in this section.
2) Remove heater control cables from control lever assembly.



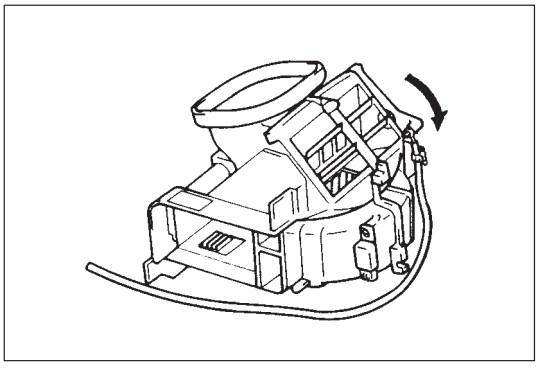
INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.

○ Heater Control (HOT-COOL Selector) Cable
- – Move control lever to “HOT” (“COOL” for RH vehicle) position as full as possible.
- – Push lever fully in arrow direction to fix cable in position, as shown.

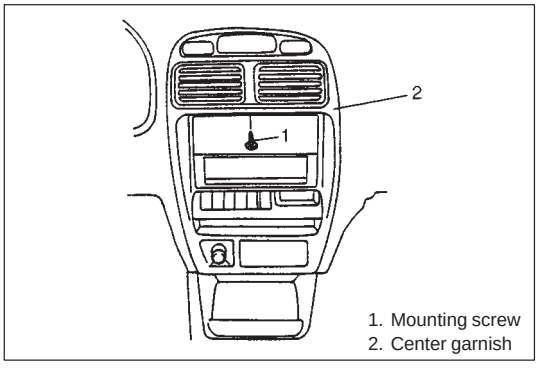


○ Fresh Air Control (FRESH-CIRC Selector) Cable
– Move control lever to “CIRCULATION” position as full as possible.



– Push lever fully in arrow direction and fix cable with clamp in position as shown.

○ After installing control cables, be sure that control knobs move smoothly and stop at proper position.

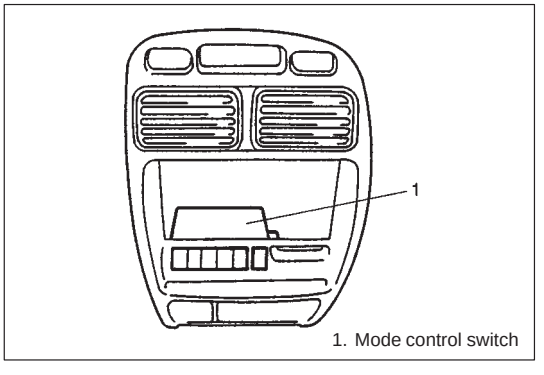


1. Mounting screw
2. Center garnish

MODE CONTROL SWITCH

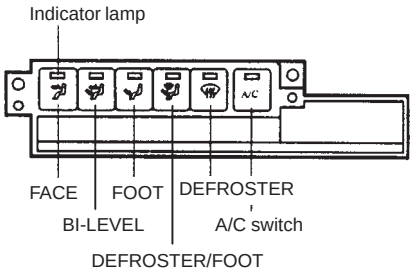
REMOVAL

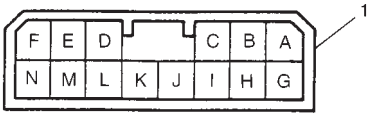
1) Disconnect negative (–) cable battery.
2) If equipped with air bag, disable air bag system.
   Refer to “Disabling Air Bag System” in SECTION 9J.
3) Pull of control lever knobs.
4) Remove center garnish mounting screw.
5) Remove center garnish with mode control switch.



1. Mode control switch

6) Remove mode control switch from center garnish.





1. Mode control switch coupler

INSPECTION

Mode Control Switch

○ Check if continuity exists between each pair of terminals listed below when mode control button is pressed.

Mode	Mode control switch terminals
FACE	F – M
BI-LEVEL	F – N
FOOT	F – E
DEFROSTER / FOOT	F – B
DEFROSTER	F – C

○ With battery voltage (+) connected to terminal "I" and (–) to terminal "F", press each mode control button and check if indicator lamp lights.

○ With battery voltage (+) connected to terminal "H" and (–) to terminal "A", check if illumination lamp lights.

A / C Switch (if equipped)

○ Press A / C button and check if there is continuity between terminals "D" and "G".

○ With battery voltage (+) connected to terminal "K" and (–) to terminal "D", press A / C button and check if indicator lamp lights.

INSTALLATION

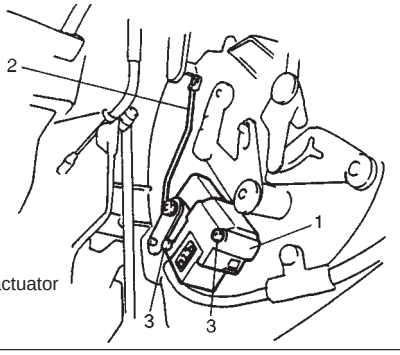
Reverse removal procedure for installation, and then note the following instruction.

○ Enable air bag system. Refer to "Enabling Air Bag System" in SECTION 9J.

MODE ACTUATOR

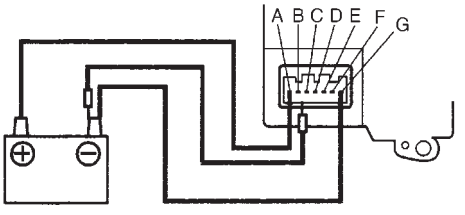
REMOVAL

1) Disconnect negative (–) cable at battery.
2) If equipped with air bag system, disable air bag system. Refer to “Disabling Air Bag System” in SECTION 9J.

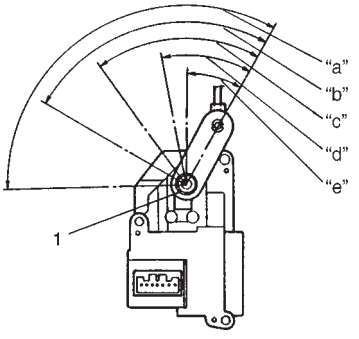


1. Mode actuator
2. Rod
3. Screw

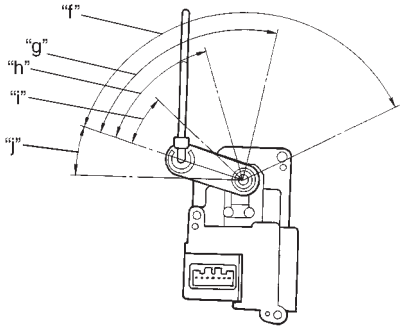
3) Disconnect mode actuator coupler.
4) Disconnect mode actuator rod from heater unit.
5) Remove mode actuator from heater unit.



For LH vehicle



For RH vehicle



1. Lever

INSPECTION

1) Connect battery voltage (+) to terminal “A” and (–) to terminal “G”.
2) Connect each terminal listed below to terminal “G” (negative (–) terminal of battery) and check if lever rotation is as specified angle.

For LH model

Mode	Terminal	Specified angle
FACE	F	“a”: 120 ∽ 2.5·
BI-LEVEL	E	“b”: 87.36 ∽ 2.5·
FOOT	D	“c”: 64 ∽ 2.5·
DEFROSTER/FOOT	C	“d”: 31 ∽ 2.5·
DEFROSTER	B	“e”: 28 ∽ 2.5·

For RH model

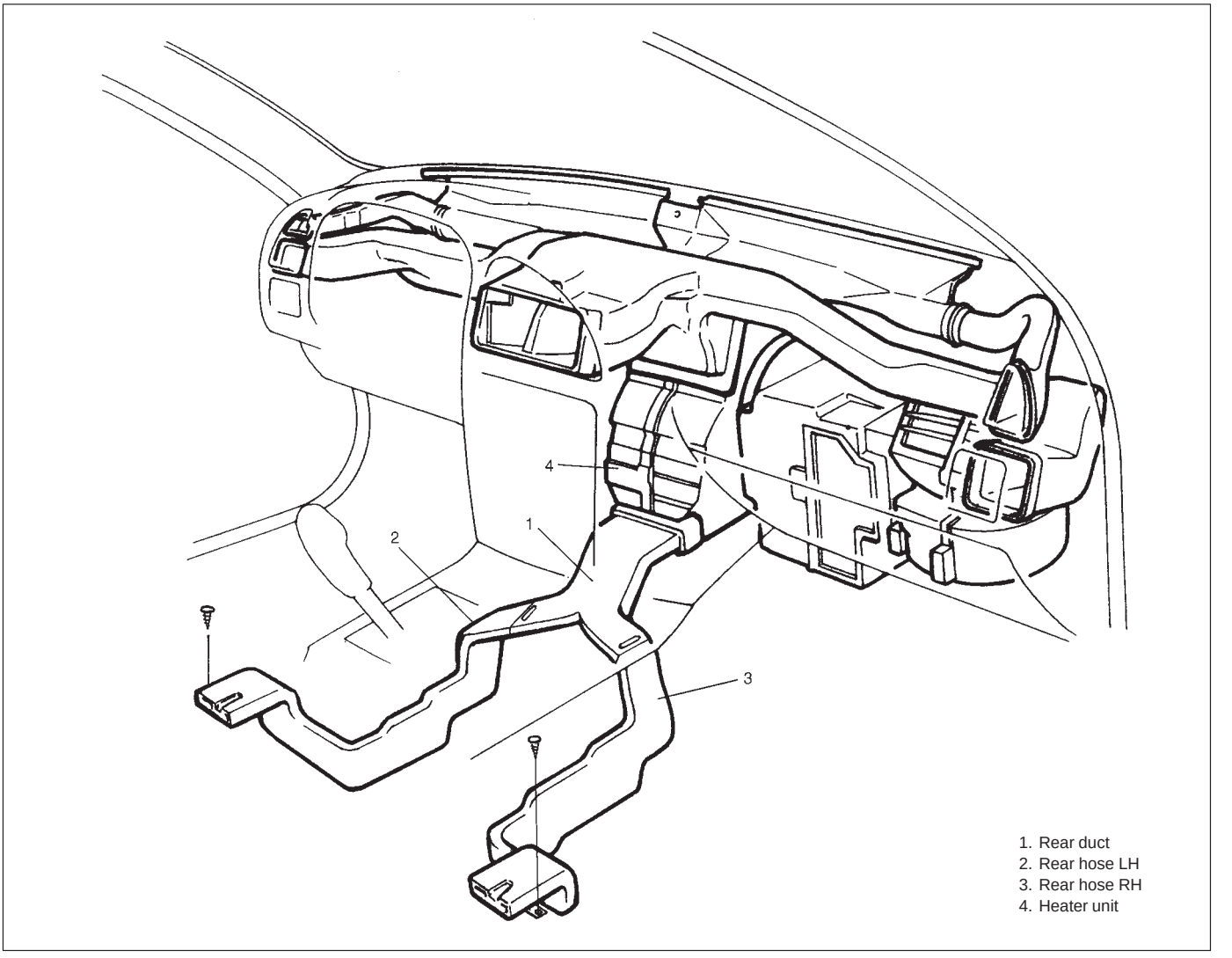
Mode	Terminal	Specified angle
FACE	F	“j”: 17·
BI-LEVEL	E	“i”: 25·
FOOT	D	“h”: 55·
DEFROSTER/FOOT	C	“g”: 84·
DEFROSTER	B	“f”: 135·

INSTALLATION

Reverse removal procedure for installation, and then note the following instruction.

○ If equipped with air bag, enable air bag system. Refer to “Enabling Air Bag system” in SECTION 9J.

REAR DUCT (EXCEPT HATCH-BACK MODEL)



REMOVAL

1) Remove front seat.
2) Remove console box, parking brake lever cover and console box front extension.
3) Take off carpet till rear duct is totally exposed.

INSTALLATION

Reverse removal procedure for installation.

SECTION 1B

AIR CONDITIONING (OPTIONAL)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

CAUTION:
The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).

NOTE:
For basic servicing method of the air conditioning system that is not described in this section, refer to AIR CONDITIONING BASIC MANUAL (Part number: 99520-02130).

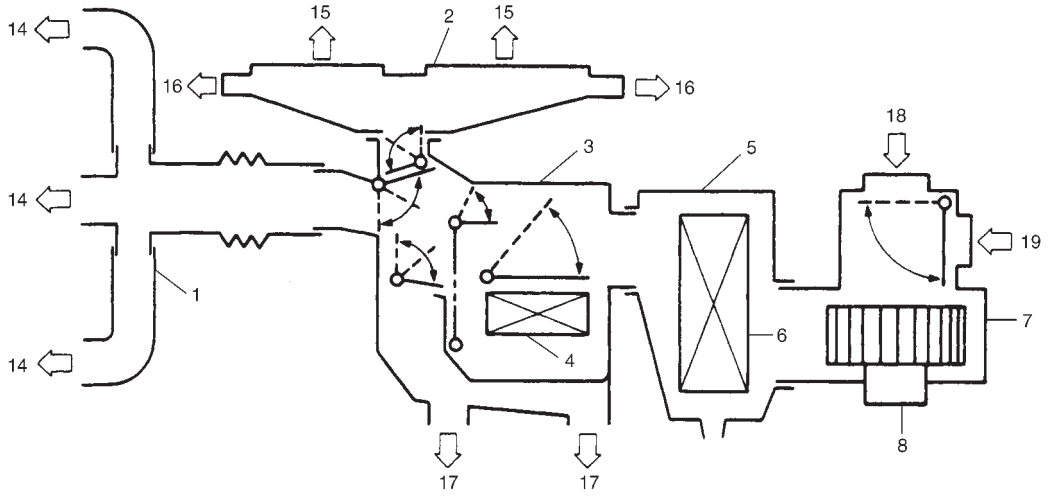
CONTENTS

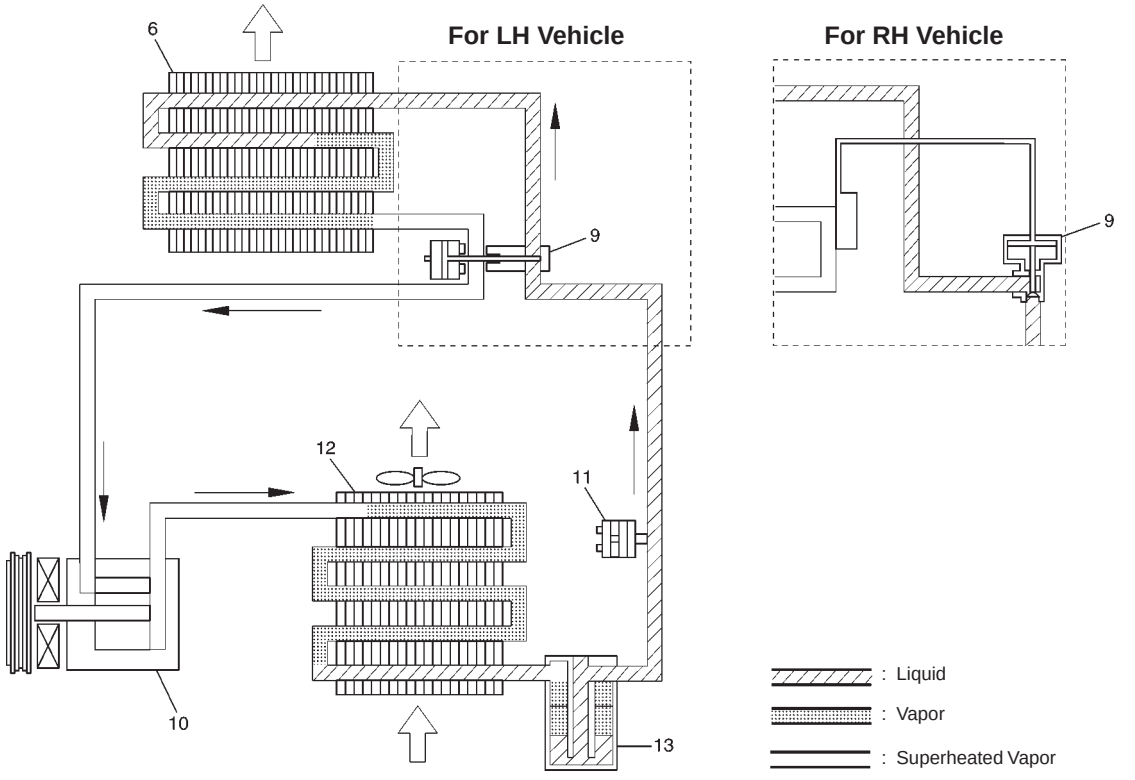
GENERAL DESCRIPTION 1B- 2
Major Components and Refrigerant Flow of Air Conditioning System 1B- 2
Function of Each Component 1B- 3
Wiring Circuit 1B- 5
Function of Each Control Component 1B- 7
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Refrigerant Recovery 1B- 8
Evacuating System 1B- 8
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Removing Manifold Gauge Set 1B-11
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C. Receiver/Dryer 1B-19
D. Evaporator (Cooling Unit) 1B-20
E. Expansion Valve 1B-21
F. Evaporator Thermistor 1B-22
G. Refrigerant Lines 1B-23
H. Electrical Circuit 1B-23
Compression System 1B-25
A. Compressor 1B-26
B. Compressor Mount 1B-27
C. Drive Belt 1B-28
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PERFORMANCE TEST 1B-34
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GENERAL DESCRIPTION

The present vehicle can be optionally provided with an air conditioning. This Section covers the description, charging of refrigerant, etc. of the air conditioning.

MAJOR COMPONENTS AND REFRIGERANT FLOW OF AIR CONDITIONING SYSTEM





1. Center duct
2. Demister and defroster duct
3. Heater unit
4. Heater core
5. A/C evaporator case
6. A/C evaporator
7. Blower motor unit
8. Blower motor
9. Expansion valve
10. Compressor
11. Dual pressure switch
12. Condenser
13. Receiver/dryer
14. Face air
15. Defroster air
16. Demister air
17. Foot air
18. Fresh air
19. Recirculation air

FUNCTION OF EACH COMPONENT

COMPRESSOR

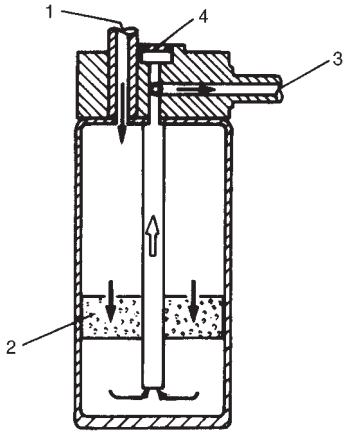
Compresses the gas vaporized in the evaporator.
Thus compressed gas is sent to the condenser where it is changed into liquid refrigerant whose heat of vaporization can be reused.
Compressors used for the air conditioning of vehicle include reciprocating-, vane rotary-, swash plate-, and wobble plate- types. This model employs the vane rotary-type less in vibration and excellent in durability.

MAGNETIC CLUTCH

A device used, with the engine running, for operating the compressor only when the air conditioning is needed and stopping it otherwise.
Employs a powerful electromagnet.

CONDENSER

Serves to change the compressor-compressed, high temperature/high pressure-obtained refrigerant into liquid refrigerant by forcibly taking heat therefrom. Constructionally the same as the radiator. Installed at the frontmost of the vehicle for increased heat radiation, and cooled compulsorily by the cooling fan.



1. Inlet
2. Desiccant
3. Outlet
4. Sight glass

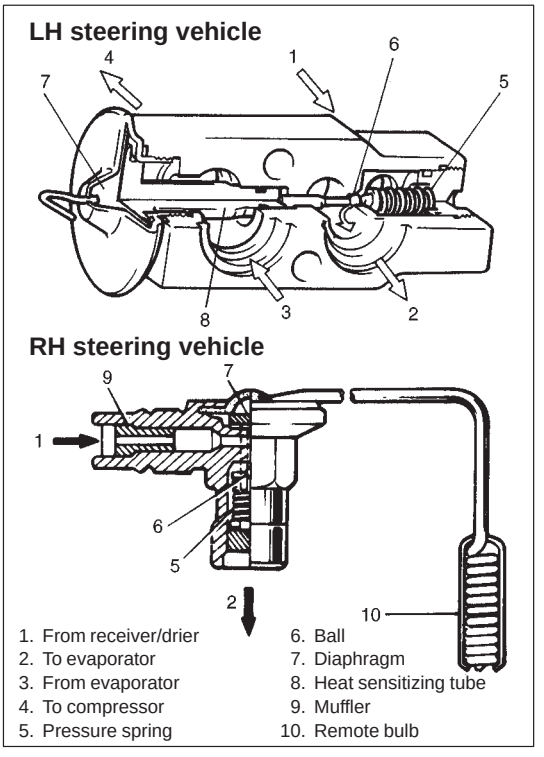
RECEIVER/DRYER

The receiver/dryer has the three roles as described below:

A) The receiver section serves as a temporary storage container of condenser-liquefied refrigerant so that it is possible to supply the evaporator with the condenser-liquefied refrigerant just conforming to the demand of the cooling load.
B) The dryer section serves to remove the dirt and water mixed in the cycling refrigerant by means of the filter and desiccant sealed therein.
C) The sight glass, installed atop the receiver, serves to look at thereby the flowing state of the refrigerant.

DUAL PRESSURE SWITCH

A control switch to stop further rotation of the compressor by turning OFF the electric circuits of the magnetic clutch and condenser cooling fan when the cycling refrigerant is abnormally dropped or risen in pressure.



EXPANSION VALVE

A device to eject the receiver/dryer-passed liquid refrigerant from fine holes for sudden expansion to produce atomized refrigerant of low temperature and low pressure.

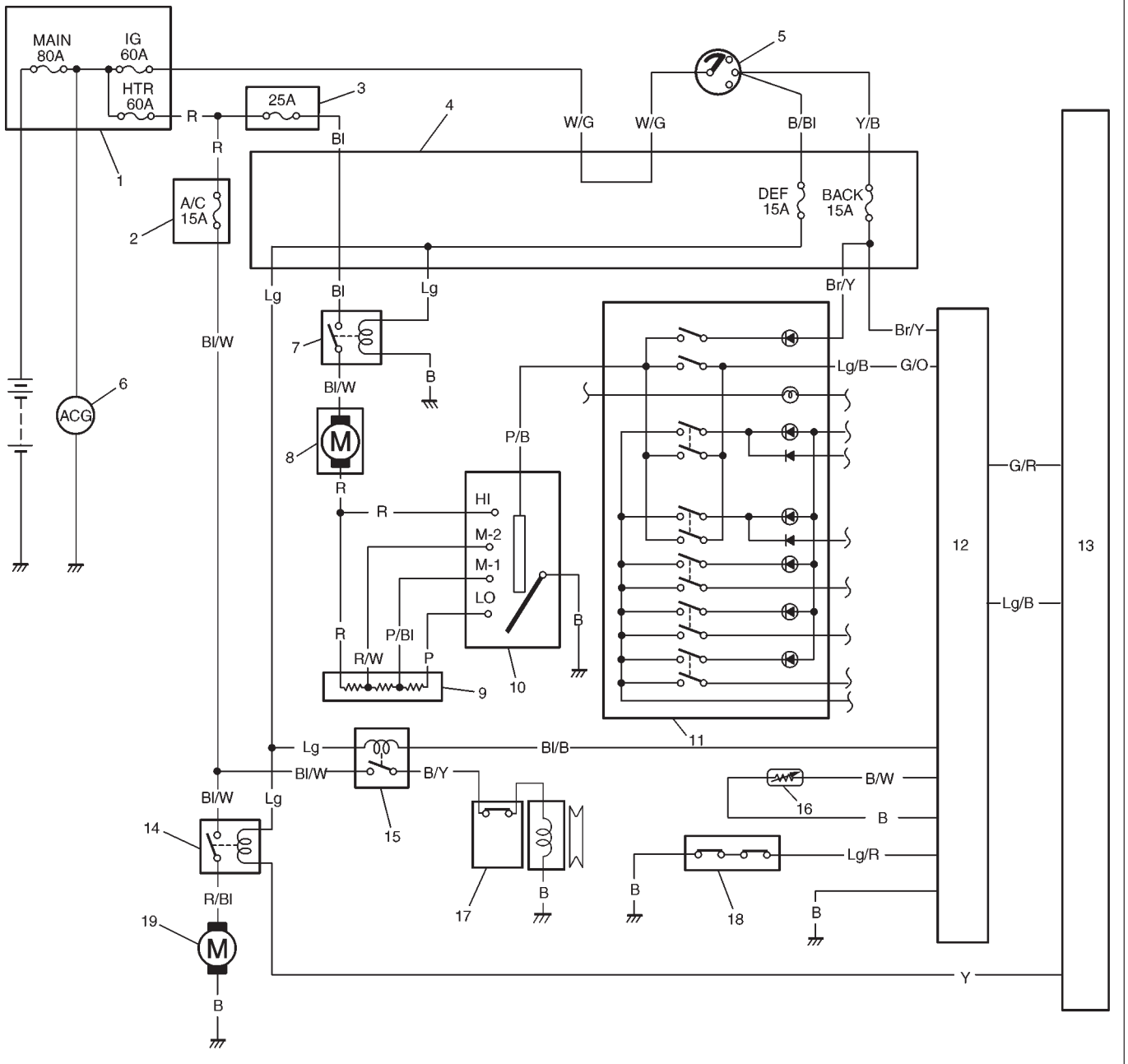
EVAPORATOR

Passes therethrough the cold atomized refrigerant to lower the ambient temperature. The refrigerant, now changed into hot gas, is sent to the compressor. Functionally, the evaporator acts just inversely to the condenser.

(The refrigerant takes a state of liquid when entering the evaporator and a state of gas when leaving therefrom.)

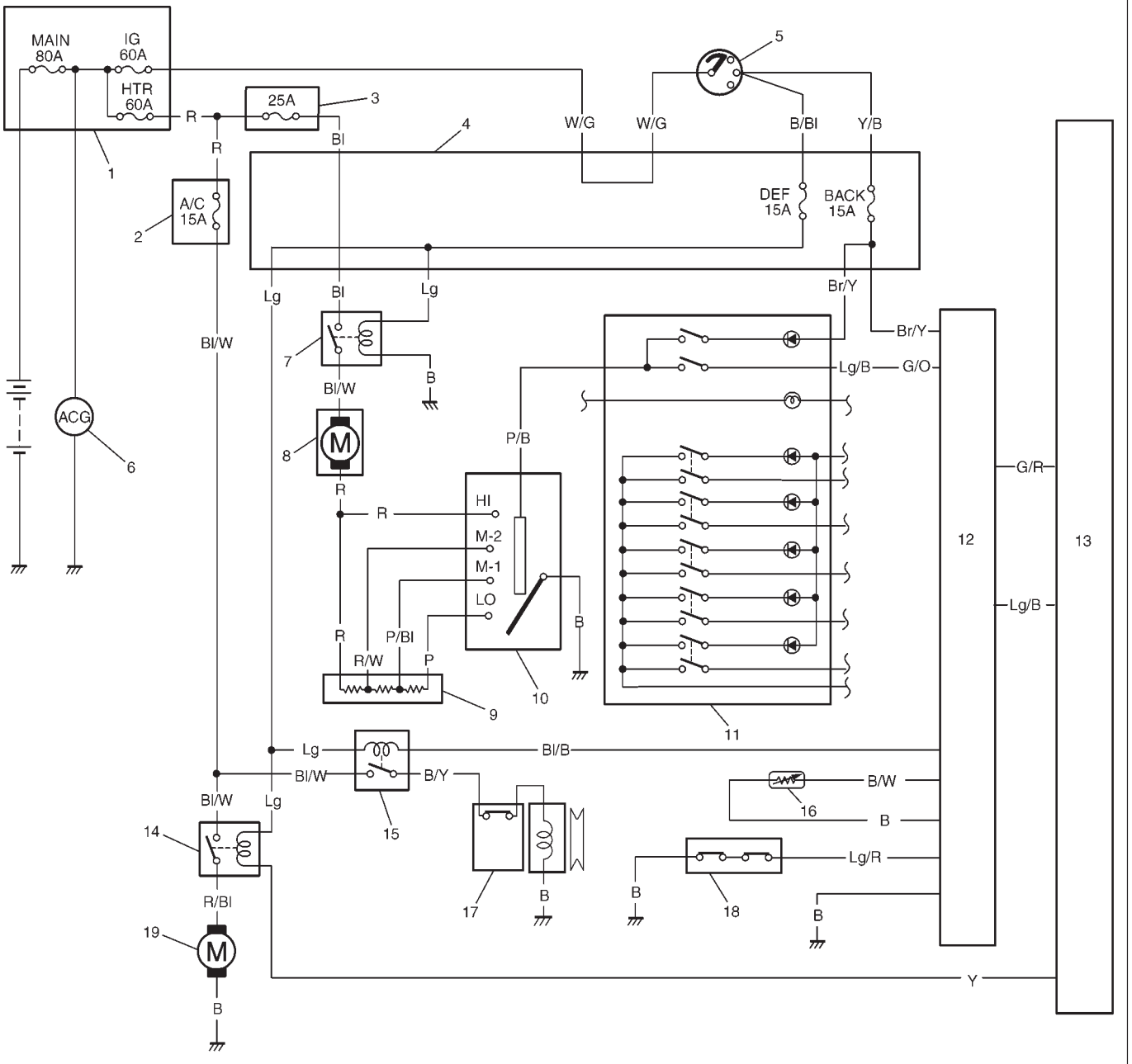
WIRING CIRCUIT

For LH model



1. Main fuse box
2. Fuse and relay box
3. Cassette fuse
4. Junction box (J/B)
5. Ignition switch
6. Generator
7. Blower fan motor relay
8. Blower fan motor
9. Blower fan motor resistor
10. Blower fan switch
11. Mode controller
12. A/C amplifier
13. ECM
14. Condenser fan motor relay
15. Compressor relay
16. A/C evaporator thermistor
17. Compressor
18. Dual pressure switch
19. Condenser fan motor

For RH model



1. Main fuse box
2. Fuse and relay box
3. Cassette fuse
4. Junction box (J/B)
5. Ignition switch
6. Generator
7. Blower fan motor relay
8. Blower fan motor
9. Blower fan motor resistor
10. Blower fan switch
11. Mode controller
12. A/C amplifier
13. ECM
14. Condenser fan motor relay
15. Compressor relay
16. A/C evaporator thermistor
17. Compressor
18. Dual pressure switch
19. Condenser fan motor

FUNCTION OF EACH CONTROL COMPONENT

RELAY (condenser fan/magnet clutch)

A relay to operate the condenser fan motor and magnetic clutch. The motor continues operation as long as the air conditioner (compressor) is under operation.

MAGNET CLUTCH

A device used, with the engine running, for operating the air conditioner only when needed, and controlled by the A/C amplifier.

EVAPORATOR THERMISTOR

When the evaporative temperature of a refrigerant drops toss to 2.5· C (36.5· F) or below, the evaporator fins get stuck with frost or ice, reducing the airflow, lowering the cooling capacity. The thermistor is a sensor which is used to prevent this frosting or icing.
The thermistor installed to evaporator converts the evaporative temperature into a resistance value and send it to A/C amplifier.

DUAL PRESSURE SWITCH

This switch sends A/C cut signal to A/C amplifier when the cycling refrigerant pressure drops due to refrigerant leakage, its amount being too little or too much.
The switch is installed at the receiver dryer.

A/C AMPLIFIER

A/C amplifier is installed to the lower evaporator case. It controls operation of the compressor magnet clutch according to the signals from the sensors and ECM which detect the state of the engine and driving conditions. Main system control functions are as follows (at A/C switch ON).

○ Magnet clutch delay control: 0.12 second
(Time since A/C signal is sent from A/C amplifier to ECM till A/C ON signal is sent back from ECM to A/C amplifier.)

○ A/C ON-OFF control:
High refrigerant pressure:
above 3140 kPa
(32 kg/cm^2, 455 psi) . . . . . OFF
below 2550 kPa
(26 kg/cm^2, 370 psi) . . . . . ON
Low refrigerant pressure:
below 196 kPa
(2.0 kg/cm^2, 28.4 psi) . . . . . OFF
above 226 kPa
(2.3 kg/cm^2, 32.7 psi) . . . . . ON

○ Evaporative temperature:
A/C switch ON
below 2.5· C (36.5· F) . . . . . OFF
above 4.0· C (39.2· F) . . . . . ON

ECM

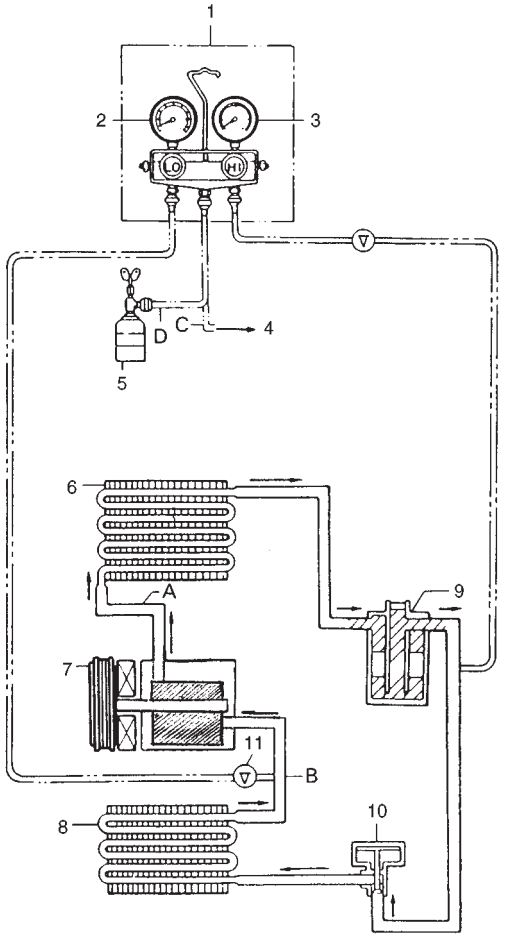
The A/C amplifier outputs A/C signal to ECM when A/C ON conditions are satisfied on the A/C amplifier side. (The air conditioning system does not turn ON in this state.) When ECM detects through the A/C signal that A/C ON conditions are satisfied on the A/C amplifier side, it uses the A/C signal as one of the factors to output A/C ON signal and to control condenser fan relay, idle air control valve and fuel injection respectively.

○ Engine coolant temperature:
above 110· C (230· F) . . . . . OFF
below 108· C (226· F) . . . . . ON

○ While engine cranking with starter on . . . . . OFF

○ Engine speed:
above 6600 r/min. . . . . OFF
below 6400 r/min. . . . . ON
above 700 r/min. . . . . ON
below 500 r/min. . . . . OFF

○ While accelerating rapidly:
(when throttle opened 80% within 3.5 seconds) . . . . . OFF



A: Compressor delivery hose
B: Suction hose
C: Recovery or evacuating
D: Charging

1. Gauge manifold set
2. Low pressure gauge
3. High pressure gauge
4. Recovery equipment or vacuum pump
5. Refrigerant container
6. Condenser
7. Compressor
8. Evaporator
9. Receiver/dryer
10. Expansion valve
11. Service valve

RECOVERY, EVACUATION AND CHARGING

REFRIGERANT RECOVERY

When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment. Discharging it into atmosphere would cause adverse effect to environments.

NOTE:
When handling recovery and recycling equipment, be sure to follow the instruction manual for the equipment.

EVACUATING SYSTEM

1) Whenever opened (exposed to atmospheric air), air conditioning system must be evacuated by using a vacuum pump. The A/C system should be attached with a manifold gauge set, and should be evacuated for approx. 15 minutes.

   NOTE:
   Do not evacuate before recovering refrigerant in system.

2) Connect high and low charging hoses of manifold gauge set respectively as follows:
   High Charging Hose ➡ Compressor Delivery Hose
   Low Charging Hose ➡ Compressor Suction Hose
3) Attach center charging hose of manifold gauge set to vacuum pump.
4) Operate vacuum pump, and then open suction-side valve (Lo) of manifold gauge set.
   If there is no blockage in the system, there will be an indication on high pressure gauge.
   When this occurs, open the other-side valve (Hi) of the set.
5) Approx. 10 minutes later, low pressure gauge should show a vacuum lower than –760 mmHg providing no leakage exists.

   NOTE:
   - **If the system does not show a vacuum below –760 mmHg, close both valves, stop vacuum pump and watch movement of low pressure gauge.**
   - **Increase in the gauge reading suggests existence of leakage. In this case, repair the system before continuing its evacuation.**
   - **If the gauge shows a stable reading (suggesting no leakage), continue evacuation.**

6) Evacuation should be carried out for a total of at least 15 minutes.
7) Continue evacuation until low pressure gauge indicates a vacuum less than –760 mmHg, and then close both valves.
8) Stop vacuum pump. Disconnect center charging hose from pump inlet. Now, the system is ready for charging refrigerant.

CHARGING SYSTEM WITH REFRIGERANT

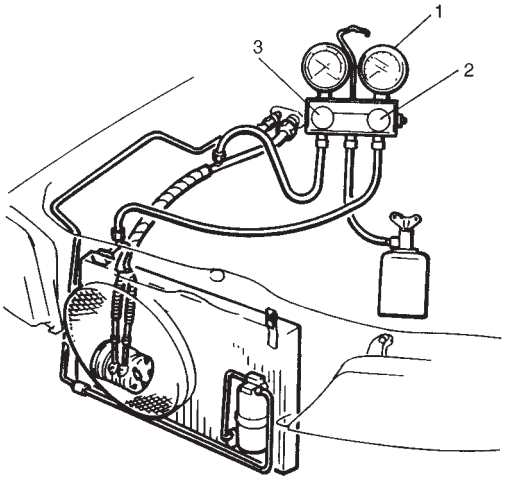
The air conditioning system contains HFC-134a (R-134a).
Described here is a method to charge the air conditioning system with refrigerant from the refrigerant service container.
When charging refrigerant recovered by using the refrigerant recovery and recycling equipment (when recycling refrigerant), follow the procedure described in the equipment manufacturer's instruction manual.

WARNING:

- **Your eyes should not be exposed to refrigerant (liquid).**
  Any liquid Refrigerant HFC-134a (R-134a) escaping by accident shows a temperature below freezing point. Should liquid HFC-134a (R-134a) get into your eyes, it may cause a serious injury. To protect your eyes against such accident, it is necessary to always wear goggles. Should it occur that HFC-134a (R-134a) strikes your eye(s), consult a doctor immediately.
  a. DO NOT USE YOUR HAND TO RUB THE AFFECTED EYE(S). INSTEAD, use quantities of fresh cold water to splash it over the affected area to gradually raise temperature of such area above freezing point.
  b. Obtain proper treatment as soon as possible from a doctor or eye specialist.
- **Should the HFC-134a (R-134a) liquid come into contact with your skin, the affected area should be treated in the same manner as when skin is frostbitten or frozen.**
- **Refrigerant must not be handled near where welding or steam cleaning is performed.**
- **Refrigerant should be kept at a cold and dark place. It should never be stored where a high temperature is anticipated, e.g. where exposed to direct sun light, close to fire or inside vehicle (including trunk room).**
- **Avoid breathing fumes produced when HFC-134a (R-134a) is burned. Such fumes may be hazardous to health.**

CAUTION:

- **ALWAYS CHARGE THROUGH LOW-SIDE of A/C system.**
- **NEVER CONNECT ON HIGH-SIDE of A/C system.**
- **Do not charge while compressor is hot.**
- **When installing tap valve to refrigerant container to make a hole therethrough, carefully follow directions given by manufacturer.**
- **A pressure gauge should always be used before and during charging.**
- **The refrigerant container should be emptied of refrigerant when discarding it.**
- **The refrigerant container should not be heated up to 40°C (100°F) or over.**
- **Refrigerant container should not be reversed in direction during charging. Reversing in direction causes liquid refrigerant to enter compressor, causing troubles, such as compression of liquid refrigerant and the like.**



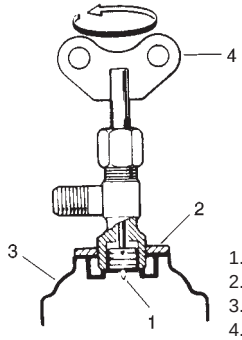
1. Manifold gauge set
2. High pressure side (Delivery side hose)
3. Low pressure side (Suction side hose)

PROCEDURE OF CHARGING

1) Check to make sure that hoses are routed properly after evacuating the system (see left figure).
2) Connect the manifold gauge set in position. Thus open refrigerant container valve to purge the charging line. Then open the low pressure-side valve.

> **WARNING:**
> **Make sure that high pressure-side valve is closed securely.**

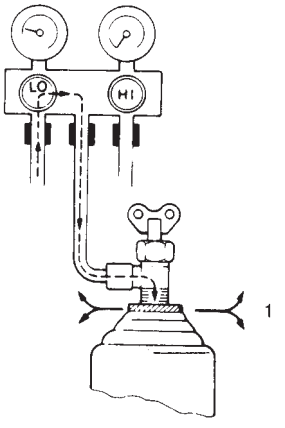
3) Start engine and keep engine speed at 1000 r/min. Then, operate air conditioning.
4) Charge A/C system with refrigerant in vapor state. At this time, refrigerant container should be held upright.



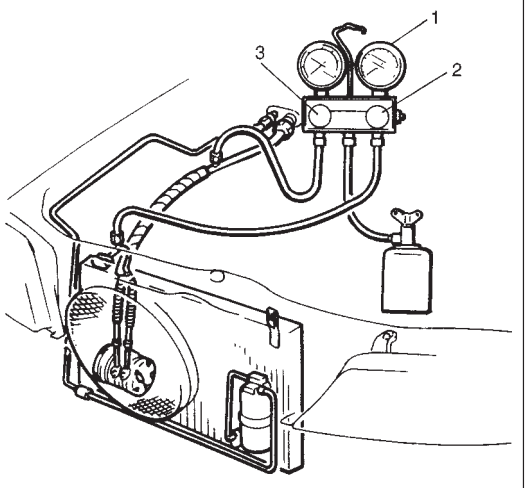
1. Needle
2. Plate nut
3. Refrigerant container
4. Handle

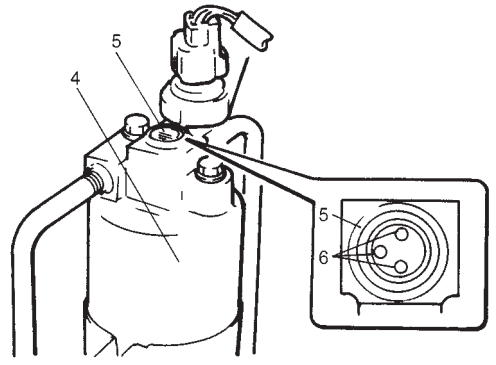
5) When refrigerant container is emptied, use the following procedure to replace it with a new refrigerant container.
   a. Close low pressure valve.
   b. Replace empty container with a refrigerant container which has been charged with refrigerant. When using refrigerant container tap valve, use the following procedure for replacement.
      i) Retract needle and remove refrigerant container tap valve by loosening its plate nut.
      ii) Install previously-removed refrigerant container tap valve to a new refrigerant container.

   c. Purge any air existing in center charging hose.
      When using refrigerant container tap valve, use the following procedure to purge air.
      i) Once fully tighten refrigerant container tap valve and then loosen (open) plate nut slightly.
      ii) Open low pressure valve of manifold gauge set a little.
      iii) As soon as refrigerant comes out with a “hiss” through a clearance between refrigerant container and tap valve, tighten plate nut as well as manifold gauge set low pressure valve.
      iv) Turn handle of tap valve clockwise so that its needle is screwed into the new container to make a hole for refrigerant flow.



1. “Hiss”





1. Manifold gauge set
2. High pressure side (Delivery side hose)
3. Low pressure side (Suction side hose)
4. Receiver/Dryer
5. Sight glass
6. Bubbles

6) After the system has been charged with specified amount (600 g, 21.0 oz) of refrigerant or when low and high pressure gauges have indicated specified value below respectively, close low pressure side valve of manifold gauge set. At this time, look into the sight glass of receiver/dryer and check that there are no bubbles in it, which means that the system is fully charged.

Low pressure gauge when charged with specified amount
About 245 kPa (2.5 kg/cm^2, 35.5 psi)

High pressure gauge when charged with specified amount
About 1470 kPa (15 kg/cm^2, 213 psi)

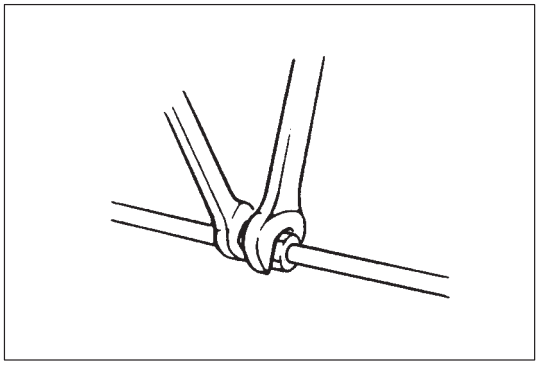
REMOVING MANIFOLD GAUGE SET

When A/C system has been charged with a specified amount of refrigerant, remove manifold gauge set as follows:

1) Close low pressure-side valve of manifold gauge set. (The high pressure-side valve is closed continuously during the process of charging.)
2) Close refrigerant container valve.
3) Stop engine.
4) Using shop rag, remove charging hoses from service valves. This operation must be performed rapidly.

> **WARNING:**
> **High pressure-side is naturally under high pressure. So, care must be used to protect your eyes and skin.**

5) Put caps on service valves.



LEAK-TESTING REFRIGERANT SYSTEM

Whenever a refrigerant leak is suspected in the system or any service operation has been performed which may result in disturbing lines or connections, it is advisable to test for leaks. Common sense should be used in performing any refrigerant leak test, since the need and extent of any such test will, in general, depend upon the nature of a complaint and the type of a service performed on the system.

LIQUID LEAK DETECTORS:

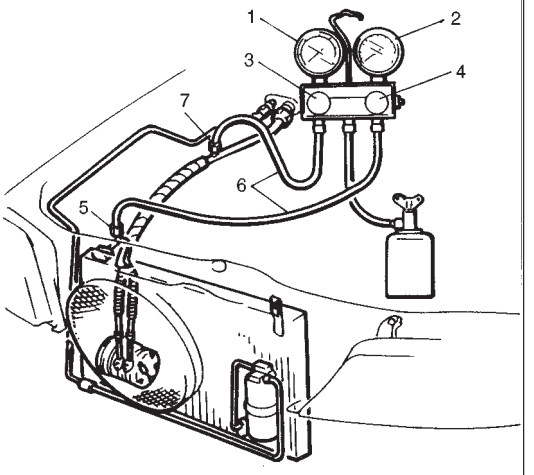
There are a number of fittings and places throughout the air conditioning system where a liquid leak detector solution may be used to pinpoint refrigerant leaks.

By merely applying the solution to the area in question with a swab, such as attached to the cap of a vial, bubbles will form within seconds if there is a leak.

For confined areas, such as sections of the evaporator and condenser, an electronic (gas) leak detector is more practical for determining leaks.

DIAGNOSIS

Condition	Possible cause	Correction
No cooling or warm air.	Magnetic clutch does not engage properly	
	a) Fuse blown	Replace fuse and check for short.
	b) Magnet clutch faulty	Check clutch.
	c) A/C switch faulty	Check switch.
	d) thermistor faulty	Check thermistor.
	e) Dual pressure switch faulty	Check switch.
	f) Wiring or grounding faulty	Repair as necessary.
	g) No refrigerant	Check A/C circuit.
	h) A/C amplifier faulty	Replace A/C amplifier.
	Compressor is not rotating properly	
	a) Drive belt loose or broken	Tighten or replace drive belt.
	b) Compressor faulty	Check compressor.
	Blower inoperative	Check blower.
	Expansion valve faulty	Check expansion valve.
	Leak in system	Check system for leaks.
	Receiver/dryer having blown fusible plug or clogged screw	Check receiver/dryer.
Cool air comes out only intermittently.	Magnetic clutch slipping	Check magnet clutch.
	A/C amplifier faulty	Replace A/C amplifier.
	Expansion valve faulty	Check expansion valve.
	Wiring connection faulty	Repair as necessary.
	Excessive moisture in system	Evacuate and charge system.
Cool air comes out only at high speeds.	Condenser clogged	Check condenser.
	Drive belt slipping	Check or replace drive belt.
	Compressor faulty	Check compressor.
	Insufficient or excessive charge of refrigerant	Check charge of refrigerant.
	Air in system	Evacuate and charge system.
Insufficient cooling.	Condenser clogged	Check condenser.
	Drive belt slipping	Check or replace drive belt.
	Magnetic clutch faulty	Check magnet clutch.
	Compressor faulty	Check compressor.
	Expansion valve faulty	Check expansion valve.
	Thermistor faulty	Check thermistor.
	Insufficient or excessive charge of refrigerant	Check charge of refrigerant.
	Air or excessive compressor oil existing in system	Evacuate and charge system.
	Receiver/dryer clogged	Check receiver/dryer.
Insufficient velocity of cooled air	Evaporator clogged or frosted	Check evaporator.
	Air leaking from cooling unit or air duct	Repair as necessary.
	Air inlet blocked	Repair as necessary.
	Blower motor faulty	Replace blower motor.



1. Low pressure gauge
2. High pressure gauge
3. Low pressure valve (closed)
4. High pressure valve (open)
5. High pressure service valve
6. Charging hoses
7. Low pressure service valve

TROUBLESHOOTING PROCEDURE USING MANIFOLD GAUGE SET

This procedure enables the technician to discover and repair cooling problems by having the pressures of both the high and low pressure sides indicated on the respective gauges of the manifold gauge set.

ATTACHING MANIFOLD GAUGE SET

1) Make sure that high pressure and low pressure valves of manifold gauge are firmly closed.
2) Connect high pressure charging hose to high pressure service valve on vehicle, and connect low pressure charging hose to low pressure service valve on vehicle.
3) Bleed the air in charging hoses by loosening their respective nuts on manifold gauge, utilizing the refrigerant pressure. When a hiss is heard, immediately tighten nut.

CAUTION:
Do not interchange high and low pressure charging hoses by mistake.
If the compressor is equipped with service valves with different thread diameters, the smaller is the high pressure side, and the larger the low pressure side.

TROUBLESHOOTING INFORMATION

1) Beginning on the next page, the manifold gauge pressure values shown have been obtained under conditions listed below. However, keep in mind that the actual on-the-vehicle readings are somewhat affected by the ambient temperature.

A/C inlet air temperature	30 – 35·C (86 – 95·F)
Engine rpm	1,500 rpm
Blower switch	Max.
Temperature control	Max. cold
Doors	All open
Air inlet damper position	Recirculation

2) Since the operating pressure for the HFC 134a refrigerant at high temperatures is higher than that of the R12, the gauge readings will be slightly higher.

CORRECTIVE MEASURES FOR MALFUNCTION SYMPTOMS

Starting on the next page, gauge readings, conditions, causes, and measures (classified according to malfunction symptoms) will be discussed.

MANIFOLD GAUGE MPa (kg/cm², psi)		CONDITION	CAUSE	CORRECTION
Lo	Hi			
0.15 – 0.25 (1.5 – 2.5, 21.3 – 35.5)	1.37 – 1.57 (14 – 16, 200 – 227)	Normal condition.	————	————
Negative pressure	0.5 – 0.6 (5 – 6, 71.2 – 85.3)	○The low pressure side reads a negative pressure, and the high pressure side reads an extremely low pressure. ○Presence of frost around tubing to and from receiver/dryer and expansion valve.	○Dust particles or water droplets are either stuck or frozen inside expansion valve, preventing the refrigerant from flowing. ○Gas leak from heat-sensitizing tube is preventing refrigerant flow.	○Clean expansion valve. Replace it if it cannot be cleaned. ○Replace receiver/dryer. Evacuate the A/C system and recharge with fresh refrigerant. ○If heat-sensitizing tube is defective, replace expansion valve.
Normal: 0.15 – 0.25 (1.5 – 2.5, 21.4 – 35.5) Abnormal: Negative pressure	Normal 1.37 – 1.57 (14 – 16, 200 – 227) Abnormal: 0.69 – 0.98 (7 – 10, 100 – 142)	○During A/C operation, the low pressure side sometimes indicates negative pressure, and sometimes normal pressure.	○Expansion valve is frozen due to moisture around in the system, and temporarily shuts off the refrigeration cycle.	○Replace expansion valve. ○Replace receiver/dryer. ○Evacuate A/C system and recharge with fresh refrigerant.
0.05 – 0.1 (0.5 – 1.0, 4.2 – 14.2)	0.69 – 0.97 (7 – 10, 100 – 142)	○Both low and high pressure sides indicate low readings. ○Continuous air bubbles are visible through sight glass. ○Output air is slightly cold.	○Insufficient refrigerant in system. (Refrigerant leaking.)	○Using a gas leak detector, check for leaks and repair as necessary. ○Recharge refrigerant to a specified amount. If the pressure reading is almost 0 when the manifold gauges are attached, check for any leaks, repair them, and evacuate the system.
0.4 – 0.6 (4 – 6, 56.9 – 85.3)		○Pressure on low pressure side is high. ○Pressure on high pressure side is low.	○Internal leak in compressor.	○Inspect compressor and repair or replace as necessary.
0.25 – 0.3 (2.5 – 3.0, 35.6 – 42.6)	19.6 – 2.45 (20 – 25, 285 – 355)	○Low pressure reading on both low and high pressure sides. ○Air bubbles are not visible even when engine rpm is lowered.	○Overcharged A/C system. ○Faulty condenser cooling operation. ○Faulty condenser fan operation.	○Adjust refrigerant to specified amount. ○Clean condenser. ○Inspect and repair condenser fan.
		○Low pressure reading on both low and high pressure sides. ○Low pressure side tubing is not cold to touch. ○Air bubbles are visible through sight glass.	○Presence of air in A/C system. (Improperly evacuated.)	○Replace receiver/dryer. ○Inspect quantity of compressor oil and presence of contaminants in oil. ○Evacuate system and recharge with fresh refrigerant.
0.3 – 0.4 (3.0 – 4.0, 42.7 – 56.8)		○High pressure reading on both low and high pressure sides. ○Large amount of frost or dew on the low pressure side tubing.	○Faulty expansion valve or improper attachment of heat-sensitizing tube. ○Refrigerant flow is not regulated properly.	○Inspect if heat-sensitizing tube is properly attached. ○Replace expansion valve.

ON-VEHICLE SERVICE

NOTE

When servicing air conditioning system, the following rules must be observed.

WIRING:

1) Disconnect battery negative (–) terminal to prevent any short circuit.
2) Connect wire connectors securely.
3) When routing a wire harness through a panel hole, previously insert a rubber bushing into the hole for its protection.
4) Use a vinyl tape or original clamps to connect air conditioner wire harness to main wire harness.
5) If original harness has been disconnected or removed while servicing, return it to a proper position.
6) During their installation, be careful not to pinch original clamps and A/C wire harness.
7) When adding lead wires to wire harness by soldering, use those lead wires which share the same diameter and tape each connection.
8) Keep wire harness away from any components moving or subjected to high temperature.
9) Keep connecting portions away from fuel lines.
10) Make sure that wire harness makes no contact to a sharp edge or corner.

REFRIGERANT LINES:

1) Never use heat for bending pipes.
   When bending a pipe, try to make a bend as slight as possible.
2) Keep internal parts of A/C free from moisture and dust.
   When disconnecting any line from system, install a blind plug or cap to fitting of such line immediately.
3) When connecting hoses and pipes to each other respectively, previously apply a few drops of refrigerating oil to seats of coupling nuts and O-ring.
4) When tightening or loosening a fitting, use two wrenches, one for turn and the other for support.
5) Receiver/dryer inlet fitting must be connected to the pipe from condenser outlet fitting.
6) Tighten flared nuts according to following specifications of Tightening Torque.

Tightening Torque for coupling nut
8 mm pipe : 12 – 15 N·m
(1.2 – 1.5 kg-m, 8.6 – 11.0 lb-ft)
1/2 inch pipe : 20 – 25 N·m
(2.0 – 2.5 kg-m, 14.5 – 18.0 lb-ft)
5/8 inch pipe : 30 – 35 N·m
(3.0 – 3.5 kg-m, 22.0 – 25.3 lb-ft)

7) Route drain hose so that drained water does not make any contact to vehicle components.

REFRIGERANT RECOVERY:

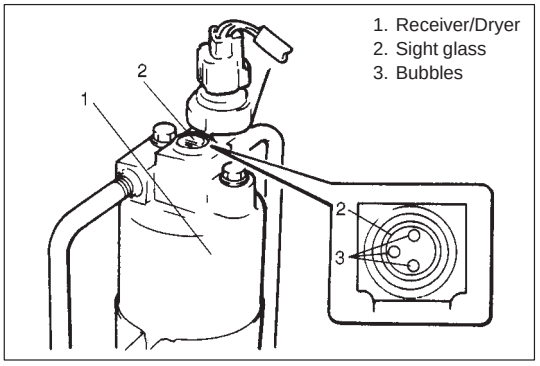
When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment. Discharging refrigerant HFC-134a (R-134a) into atmosphere would cause adverse effect to environments.

NOTE:
When handling recovery and recycling equipment, be sure to follow the instruction manual for the equipment.

HANDLING REFRIGERANT:

1) When handling refrigerant, always wear goggles to protect your eyes.
2) Avoid you direct contact to liquid refrigerant.
3) Do not heat refrigerant container higher than 40· C (100· F).
4) Do not discharge refrigerant into atmosphere.
5) Do not allow liquid refrigerant to touch bright metals. Refrigerant combined with moisture is corrosive and will tarnish surfaces of bright metals including chrome.
6) After recovering refrigerant from system, the amount of compressor oil removed must be measured and the same amount added to the system.

WARNING:
Should Refrigerant HFC-134a (R-134a) strike your eye(s), consult a doctor immediately.
- **DO NOT USE YOUR HAND TO RUB AFFECTED EYE(S). Instead, use quantities of fresh cold water to splash it over affected area to thus gradually raise its temperature above the freezing point.**
- **Obtain proper treatment as soon as possible from a doctor or eye specialist. Should liquid HFC-134a (R-134a) get on your skin, such affected part should be treated in the same manner as when skin is frostbitten or frozen.**



REFRIGERATING SYSTEM

A. CHARGE OF REFRIGERANT

The following procedure can be used for quickly checking whether the A/C system has a proper charge of refrigerant or not.
Run engine at fast idle, and operate A/C at its max. cooling capacity for a few minutes. Then, look at the sight glass on receiver/dryer to check charge of refrigerant.

Use the following table when checking charged state of refrigerant and correct it as necessary.

Item No.	Symptom	Charge of refrigerant	Correction
1	Bubbles observed in sight glass	Insufficient charge of refrigerant in system	Check system for leaks with a leak tester.
2	No bubbles observed in sight glass	No or insufficient charge of refrigerant in system	Refer to the items 3 and 4.
3	No temperature difference between compressor inlet and outlet	Empty or nearly empty system	Evacuate and charge system and then check it for leaks with a leak tester.
4	Noticeable temperature difference between compressor inlet and outlet	Proper or too much charge of refrigerant in system	Refer to the items 5 and 6.
5	When A/C is turned OFF, refrigerant in sight glass clears immediately and remains clear	Too much charge of refrigerant in system	Discharge excess charge of refrigerant to adjust it to a specified charge.
6	When A/C is turned OFF, refrigerant in sight glass once produces bubbles and then clears	Proper charge of refrigerant in system	NO CORRECTION NEEDED BECAUSE CHARGE OF REFRIGERANT IS NORMAL.

B. CONDENSER

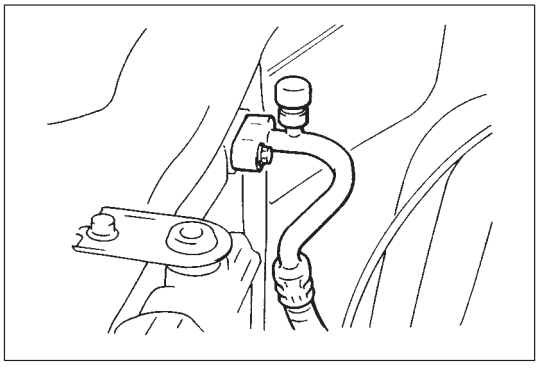
Inspection

Check a) condenser fins for blockage, b) condenser fittings for leakage, and c) condenser fins for damage.
Clogged condenser fins should be washed with water, and should be dried with compressed air.

NOTE:
Be careful not to damage condenser fins. If condenser fin is bent, straighten it by using a screwdriver or pair of pliers. If any leakage is found from fitting or tube, repair or replace condenser.

Removal

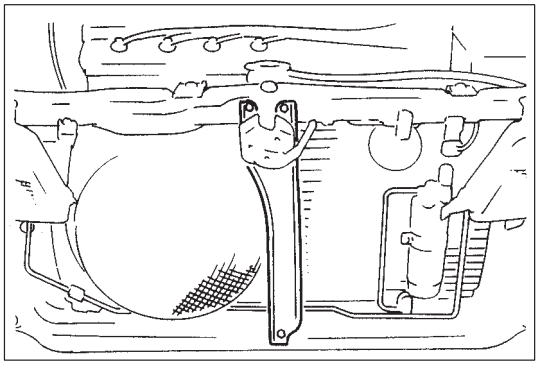
1) Disconnect negative (–) cable at battery.
2) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount added to the system.
3) Remove front bumper (Refer to Section 8 “BODY SERVICE”).



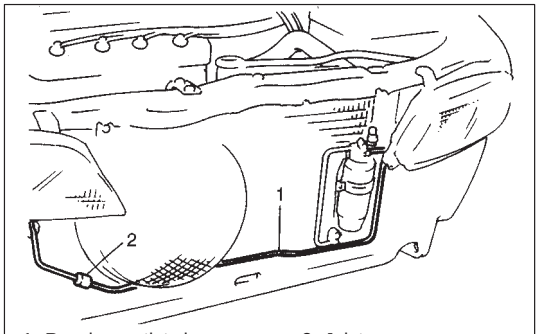
4) Disconnect compressor delivery hose from condenser inlet fittings.

   NOTE:
   As soon as above hose and pipe are disconnected, cap opened fittings so that moisture and dust do not enter condenser.

5) Remove horn.

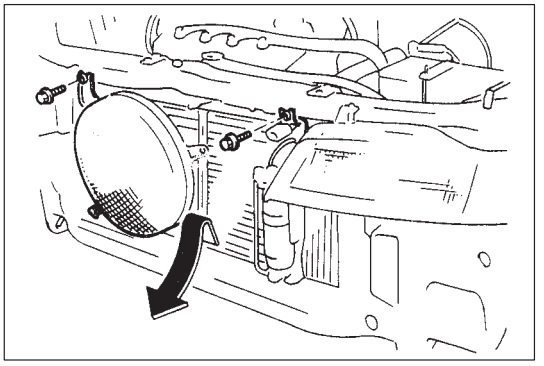


6) Remove hood latch and hood lock member.



1. Receiver outlet pipe 2. Joint

7) Disconnect coupler from dual pressure switch.
8) Remove receiver outlet pipe.



9) Disconnect fan motor wire at coupler.
10) Remove condenser together with fan and receiver/dryer.

NOTE:
Be careful not to damage fins of condenser and radiator.

11) Remove cooling fan and receiver/dryer from condenser.

Installation

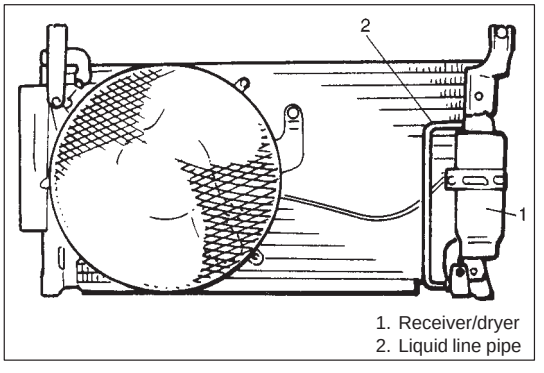
Reverse removal sequence to install condenser, noting following point.

1) When replacing condenser, add 20 to 30 cc of refrigerating oil from compressor suction-side.
2) Evacuate and charge system according to previously-described procedure.
3) Regulate hood latch. Refer to Section 9, "HOOD" in this manual.

C. RECEIVER/DRYER

Inspection

Use a leak tester to check for gas leakage, sight glass and fittings.



1. Receiver/dryer
2. Liquid line pipe

Removal

1) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount added to the system.
2) Disconnect liquid line pipes.
3) Remove receiver/dryer from its holder.

Installation

1) Reverse removal sequence to install receiver/dryer.

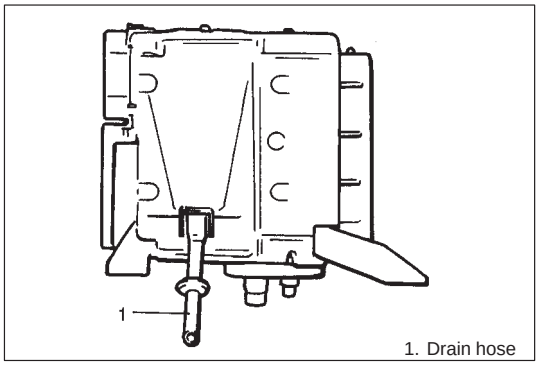
NOTE:
- **When replacing receiver/dryer, add 10 cc of refrigerating oil from compressor suction-side.**
- **Blind plugs of receiver/dryer should not be removed until just before receiver/dryer is installed.**

2) Evacuate and charge system according to previously-described procedure.

D. EVAPORATOR (COOLING UNIT)

Removal

1) Disconnect negative (–) cable at battery.
2) Disable air bag system. Refer to “Disabling Air Bag System” in Section 9J.
3) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount added to the system.
4) Remove blower motor unit. Refer to Section 1A “HEATER AND VENTILATION”.
5) Disconnect A/C amplifier and thermistor wire couplers.

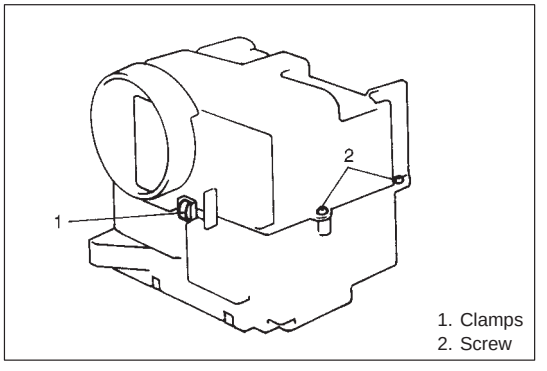


1. Drain hose

6) Disconnect compressor suction pipe, receiver/dryer outlet pipe and drain hose from evaporator (cooling unit).

   NOTE:
   As soon as above hose and pipe are disconnected, cap opened fittings so that moisture and dust may not enter cooling unit.

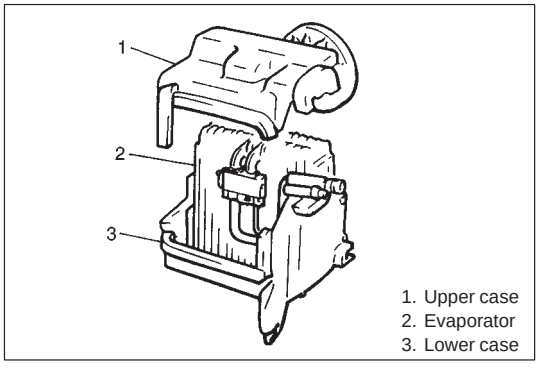
7) Remove evaporator with evaporator case.
8) Remove A/C amplifier from lower case.



1. Clamps
2. Screw

Disassembly

1) Detach clamp and remove screw to separate evaporator upper and lower cases from each other.



1. Upper case
2. Evaporator
3. Lower case

2) Take off case cover and remove evaporator out of position.
3) Remove the following components from evaporator.
   ○ Expansion valve.
   ○ Thermistor.

Inspection

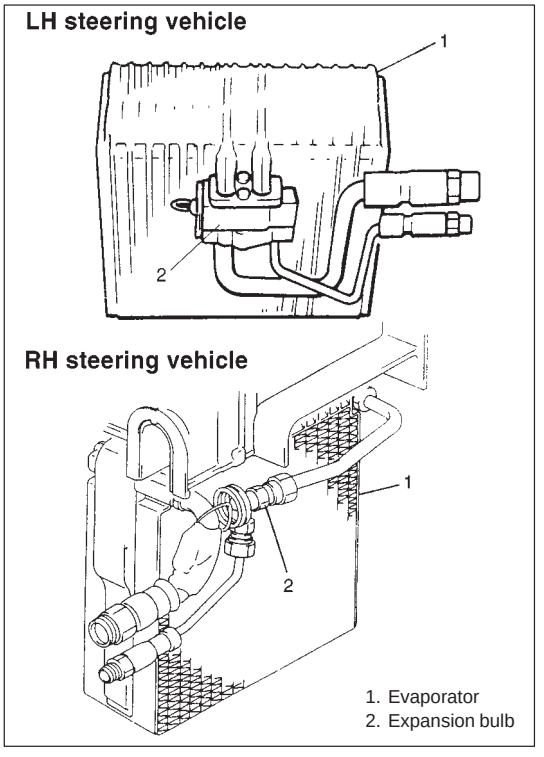
1) Check evaporator fins for blockage. If found clogged, use compressed air to clean the fins.

   NOTE:
   Do not use water for cleaning of evaporator.

2) Check inlet and outlet fittings for crack or scratch. Repair them as required.

Assembly and Installation

1) Reverse removal sequence to install thermistor.
2) Enable air bag system. Refer to “Enabling Air Bag System” in Section 9J.
3) Evacuate and charge system according to previously described procedure.



1. Evaporator
2. Expansion bulb

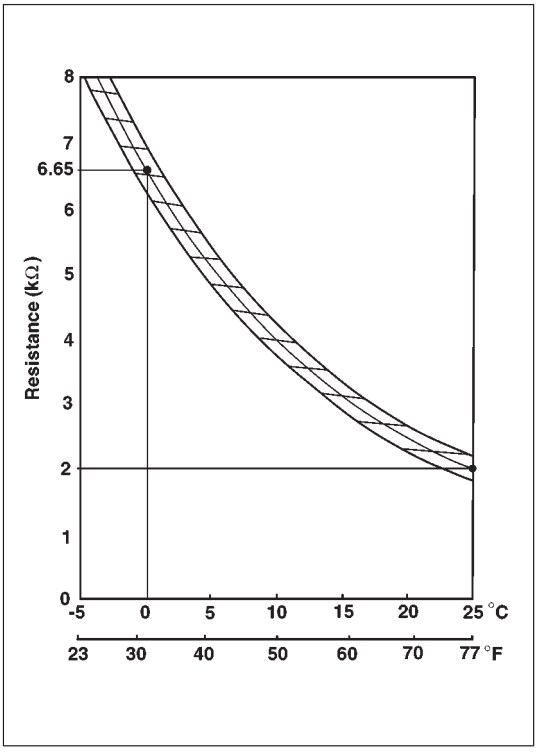
E. EXPANSION VALVE

Inspection

Refer to “Troubleshooting Procedure Using Manifold Gauge Set” in this section.

Removal and Installation

Refer to previous section EVAPORATOR (COOLING UNIT).



F. EVAPORATOR THERMISTOR

A thermistor is a temperature sensor to sense the temperature of air discharge from evaporator. The electrical characteristic is shown left.

When temperature is lower than specified, amplifier makes magnet clutch turn off to prevent evaporator from frosting.

Removal

Refer to items REMOVAL and DISASSEMBLY in the section of EVAPORATOR.

Inspection

Check resistance If it is within the shaded range of above graph.

Installation

1) Reverse removal sequence to install thermistor.
2) Enable air bag system. Refer to “Enabling Air Bag System” in Section 9J
3) Evacuate and charge system according to previously described procedure.

G. REFRIGERANT LINES

Inspection

1) Use a leak tester to check hoses and pipes for any gas leakage.
2) Check each hose or pipe clamp for tightness.
   Retighten or replace loose clamp as required, if any.

Removal

1) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount added to the system.
2) Replace defective hose or pipe.

   NOTE:
   As soon as the above hose or pipe is disconnected, cap its opened fitting to prevent moisture and dust from entering.

Installation

1) Reverse removal procedure to install refrigerant line.
2) Evacuate and charge system according to previously-described procedure.

H. ELECTRICAL CIRCUIT

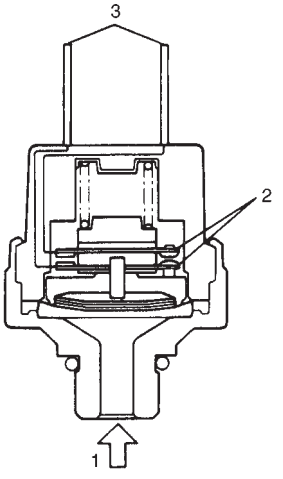
A/C SWITCH

Inspection

Refer to “MODE CONTROL SWITCH” in Section 1A.

ADJUSTMENT OF IDLE SPEED WITH A/C ON

Refer to “6E1” or “6E2” of ELECTRONIC FUEL INJECTION section.



1. Pressure
2. Movable contact
3. Pressure switch terminal

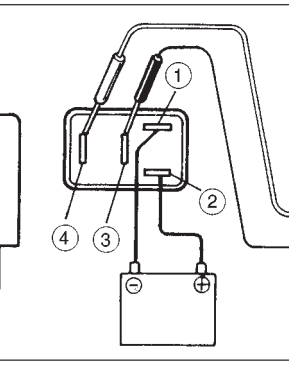
DUAL PRESSURE SWITCH

This vehicle is equipped with switch which operates according to high or low pressure.

Inspection

1) Check switches for continuity at normal temperature (approx. 25· C, 77· F) when A/C system has a proper charge of refrigerant and when A/C system (compressor) is under operation. In each of these cases, switches should show proper continuity.
2) When pressure is the following specified pressure, switch should show no continuity.

HIGH SIDE PRESSURE	SWITCH
196 kPa (2.0 kg/cm^2, 28 psi) or below	No continuity
3140 kPa (32 kg/cm^2, 455 psi) or above	



RELAY

Inspection

1) Disconnect negative (–) cable at battery.
2) Disconnect its connector to remove relay out of position.
3) Wire as shown to check whether proper continuity is obtained between terminals ➡ and →.
   If found defective with no continuity, replace relay.

COMPRESSION SYSTEM

General Information

When servicing the compressor, keep dirt or foreign material away from getting on or into the compressor parts and system. Clean tools and a clean work area are important for proper service.

The compressor connection and the outside of the compressor should be cleaned before any "On-vehicle" repair or before removal of the compressor. The parts must be kept clean at all times and any parts to be reassembled should be cleaned with trichloroethane, naphtha, kerosene or equivalent solvent and dried with dry air. Use only lint free cloths to wipe parts.

The operations described below are based on bench overhaul with compressor removed from the vehicle, except as noted. They have been prepared in order of accessibility of the components.

When compressor is removed from the vehicle for servicing, the oil remaining in the compressor should be discarded and new refrigerant oil added to the compressor.

Minor repair procedures may be done on the vehicle without discharging the system. Major repair procedures require that the system be discharged of refrigerant.

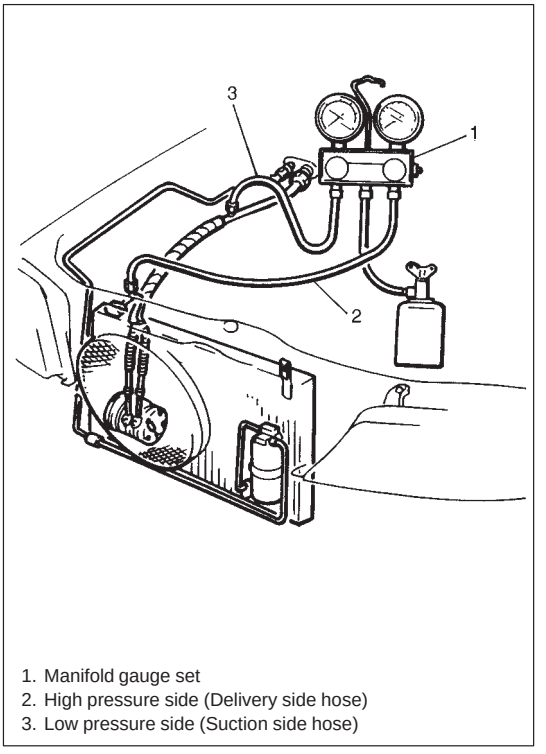
Diagnosis

Compressor troubles are mainly following three types: gas leakage, noise and insufficient pressure.

Compressor gas leakages in most cases develop from the shaft seal. When detecting gas leakage, always use a leak tester. If a small amount of oil seeps out from the shaft seal, there is no necessity of replacing the seal. The shaft seal has been designed to allow a small amount of oil to leak out for lubricating purpose. Thus, the shaft seal should be replaced only when a large amount of compressor oil is leaking out or when gas leakage is discovered by using gas tester.

In regard to noise and insufficient pressure, repairs should be made only after diagnosing the trouble properly.

ITEM	PROBLEM	POSSIBLE CAUSES	CORRECTION
1	Noise from compressor	○ Defective piston, bearing, cylinder and/or shaft	Replace
2	Noise from magnet clutch	○ Defective bearing and/or clutch face	Replace
3	Insufficient cooling	○ Defective gasket and/or reed valve	Replace
4	Not rotating	○ Locked by item 1 ○ Seized magnet clutch ○ Rotating parts seized by insufficient oil amount	Replace Replace Replace
5	Oil and/or gas leakage	○ Defective seal	Replace



1. Manifold gauge set
2. High pressure side (Delivery side hose)
3. Low pressure side (Suction side hose)

A. COMPRESSOR

Inspection

1) Install manifold gauge set, referring to “Troubleshooting procedure using manifold gauge set” in this section.
2) Run engine at fast idle.
3) Check compressor for the following:
   i) High pressure gauge reading is not low and low pressure gauge reading is not higher than normal.
   ii) Metallic sound.
   iii) Leakage from shaft seal.

   If any of the above checks indicates a defect, repair compressor.

Removal

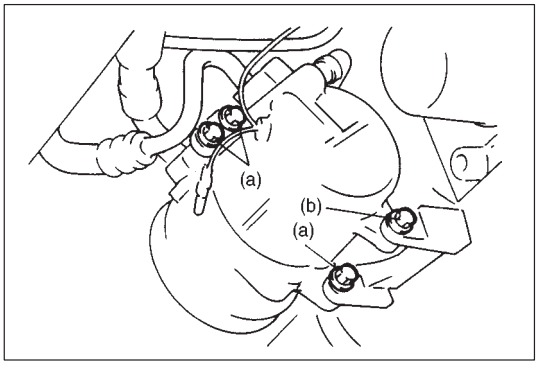
1) Run engine at idle with air conditioning on for 10 minutes.
2) Disconnect negative (–) cable at battery.
3) Recover refrigerant from refrigeration system using recovery and recycling equipment.
4) Disconnect magnet clutch lead wire from A/C wire harness.
5) Disconnect suction and discharge flexible hoses from compressor.
6) Remove O-rings from hoses.

   NOTE:
   Cap open fittings immediately to keep moisture out of system.

7) Hoist vehicle and remove engine under cover (right).
8) Remove compressor bolts as follow.
   For 1.3L and 1.6L Engine models
   Loosen compressor drive belt, then remove compressor mounting bolts.

   For 1.8L Engine model
   Remove generator belt, then remove compressor bolts. For removal of generator belt, refer to Section 6B for details.
9) Remove compressor with magnet clutch assembly from its mounts.
10) Drain oil from compressor, and measure its amount.
    The amount of compressor oil removed must be measured and the same amount of new oil must be added to the system when reinstalling.

    NOTE:
    When removing compressor, be careful not to damage fins of condenser.



Installation

Reverse removal procedure noting the following point.

1) Tighten (a) first, and then (b).

   Tightening Torque
   (a), (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

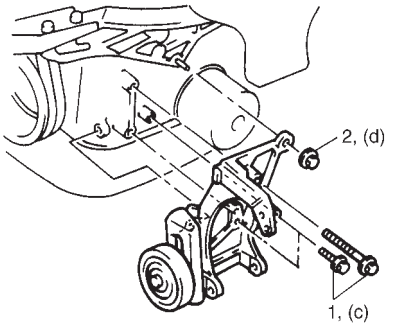
2) Pour new compressor oil by the same amount as that drained from compressor.
3) Evacuate and charge system according to previously described procedure.

CAUTION:
Be sure to use HFC-134a (R-134a) compressor oil.

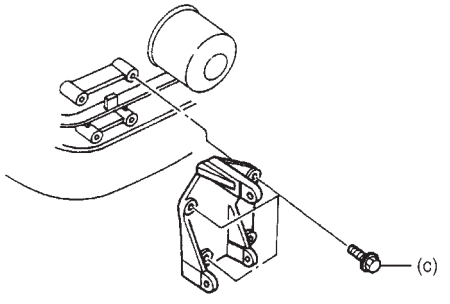
NOTE:
Compressor assembly supplied from factory is filled up with the following amount of oil.

Oil capacity in A/C system: 150 cm^3 (150 cc, 9.2 cu. in.)

For 1.3L and 1.6L engine models



For 1.8L engine model

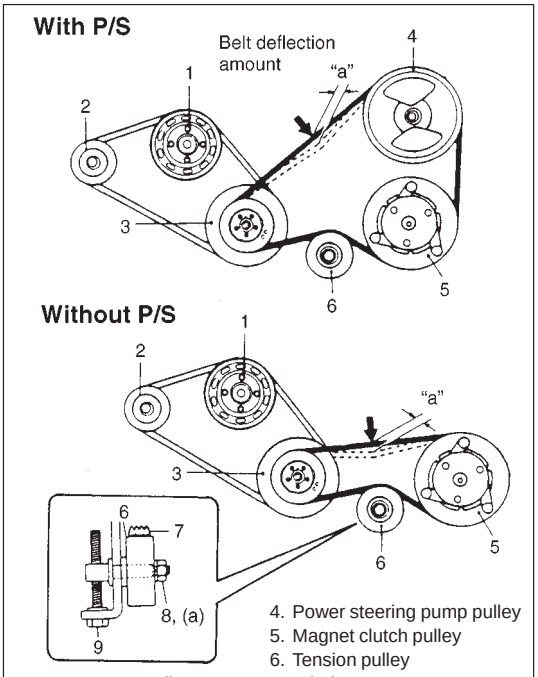


B. COMPRESSOR MOUNT

Inspection

1) Check mounting bolt for looseness.
2) Check mounting bracket for crack or fracture.
   Retighten bolts by following sequence as indicated in figure.

   Tightening Torque
   (c): 65 N·m (6.5 kg-m, 47.0 lb-ft)
   (d): 65 N·m (6.5 kg-m, 47.0 lb-ft)



1. Water pump pulley
2. Alternator pulley
3. Crankshaft pulley
4. Power steering pump pulley
5. Magnet clutch pulley
6. Tension pulley
7. V-belt
8. Tensioner nut
9. Tensioner bolt

C. DRIVE BELT (FOR 1.3L and 1.6L ENGINE MODELS)

Inspection

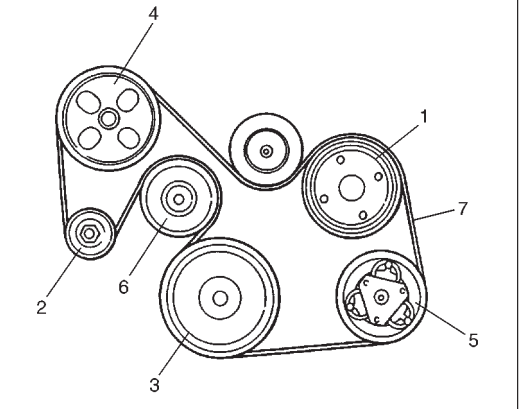
1) Check belt for wear and crack, and replace it as required.
2) Check belt tension by measuring how much it deflects when pushed at intermediate point between Power Steering (P/S) pump pulley and crank pulley with about 100 N (10 kg, 22 lb) force.

Deflection of A/C belt
"a": 7 – 9 mm (0.28 – 0.35 in.)

Tightening Torque
(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

Replacement

Refer to Section 0B MAINTENANCE SERVICE in this manual for details.



1. Water pump pulley
2. Generator pulley
3. Crankshaft pulley
4. Power steering pump pulley
5. Magnet clutch pulley
6. Tensioner pulley
7. V-belt

D. GENERATOR BELT (FOR 1.8L ENGINE MODEL)

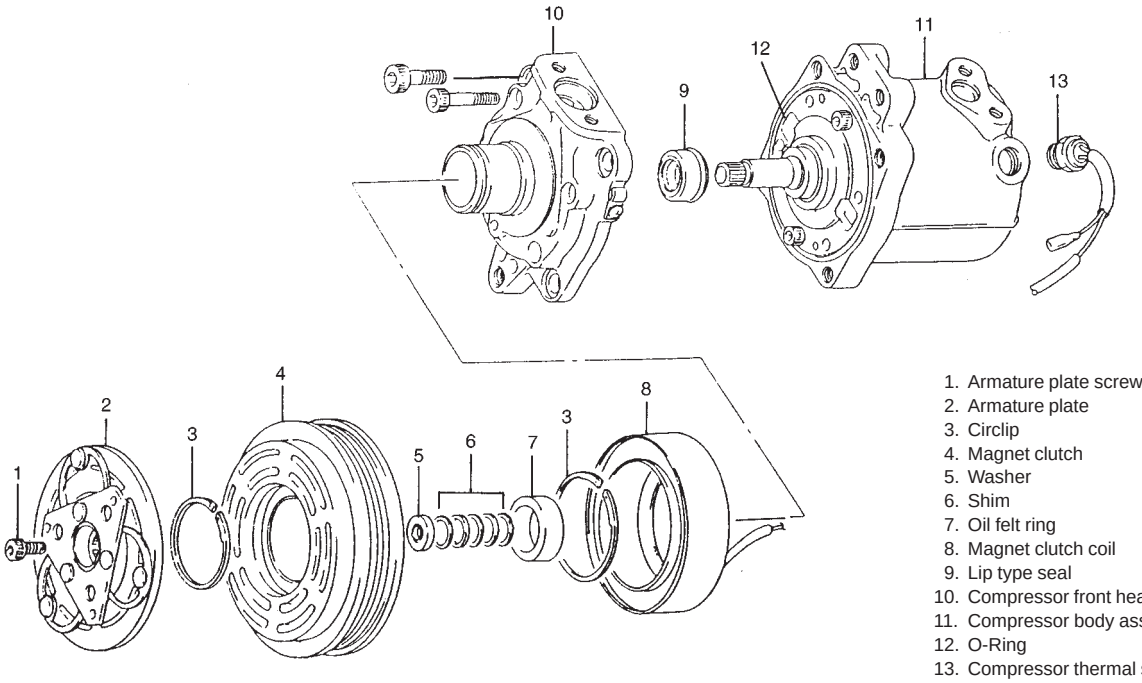
Inspection

Refer to Section 0B MAINTENANCE SERVICE in this manual for details.

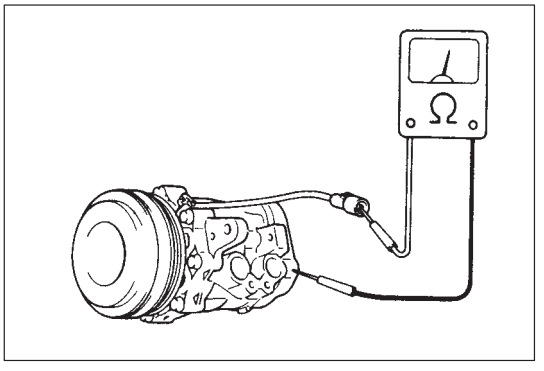
Replacement

Refer to Section 6B ENGINE COOLING in this manual for details.

E. MAGNET CLUTCH



1. Armature plate screw
2. Armature plate
3. Circlip
4. Magnet clutch
5. Washer
6. Shim
7. Oil felt ring
8. Magnet clutch coil
9. Lip type seal
10. Compressor front head
11. Compressor body assembly
12. O-Ring
13. Compressor thermal switch

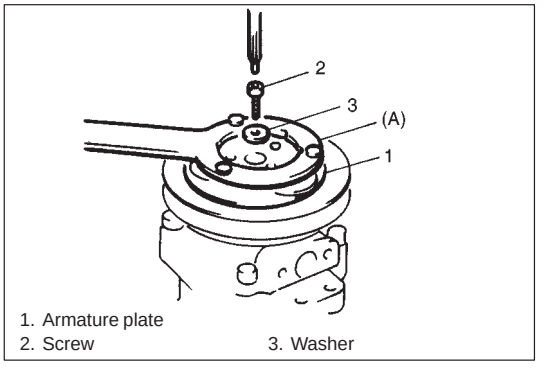


Inspection

1) Check pressure plate and rotor for wear and oil soaked conditions respectively.
2) Check clutch bearing for noise, wear and grease leakage.
3) Measure stator coil for resistance at 20· C (68· F).

Standard Resistance: 2.9 – 3.8 Ι

If the measured resistance does not remain within above tolerance, replace coil.



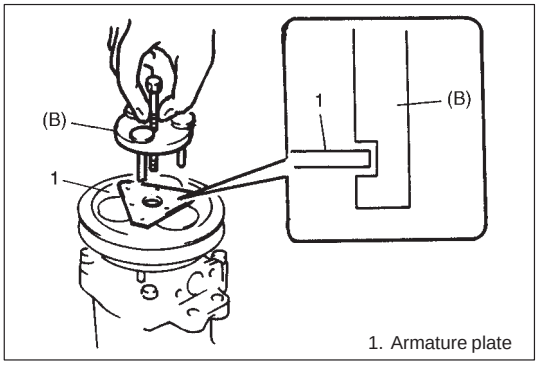
1. Armature plate
2. Screw
3. Washer

Removal

1) Remove compressor. Refer to “A. COMPRESSOR” in this section.
2) Fix armature plate with special tool (A) and remove armature plate screw.

Special Tool
(A): 09991-06020

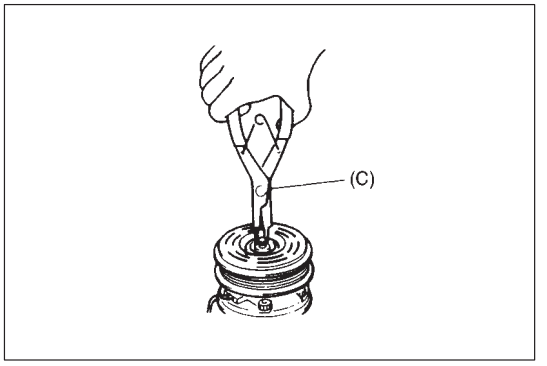
NOTE:
Do not reuse armature plate nut.



1. Armature plate

3) Using special tool (B), remove armature plate.

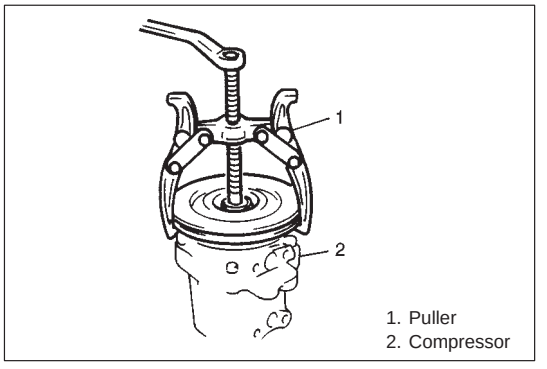
Special Tool
(B): 09991-06030



4) Remove lead wire clamp.
5) Remove felt ring and shims from shaft.
6) Using special tool (C), remove circlip.

Special Tool
(C): 09900-06107

7) Remove magnet clutch lead wire clamp screw, and disconnect magnet clutch read wire.

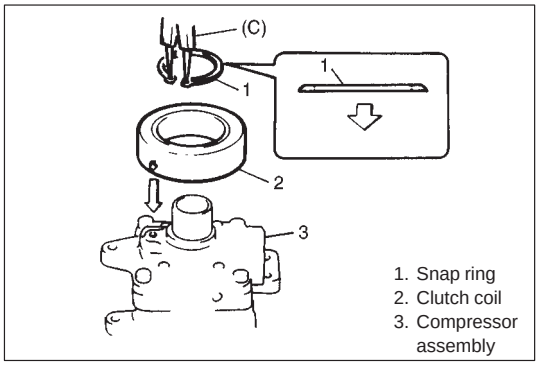


1. Puller
2. Compressor

8) Remove magnet clutch with puller.

NOTE:
Be careful not to damage pulley when tapping magnet clutch.

9) Remove magnet clutch coil.



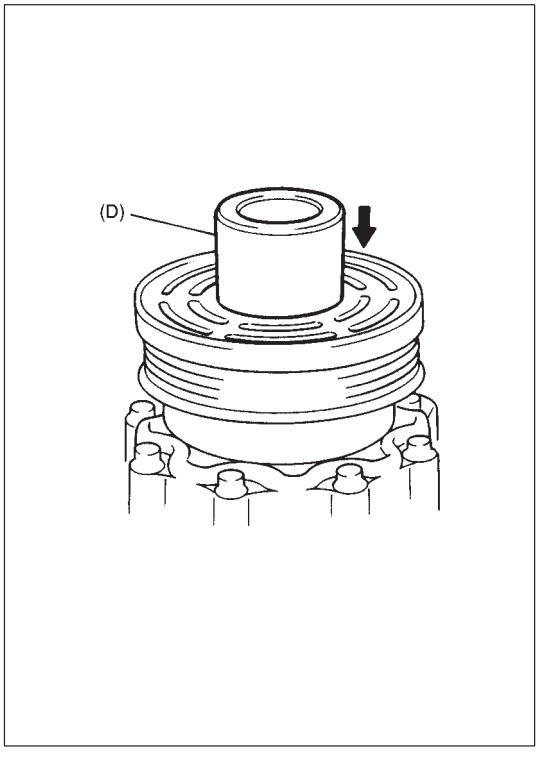
1. Snap ring
2. Clutch coil
3. Compressor assembly

Installation

1) Install magnet clutch coil.
Protrusion on under side of coil ring must match hole in compressor assembly to prevent movement and correctly locate lead wire.
2) Using special tool (C), install snap ring as shown.

Special Tool
(C): 09900-06107

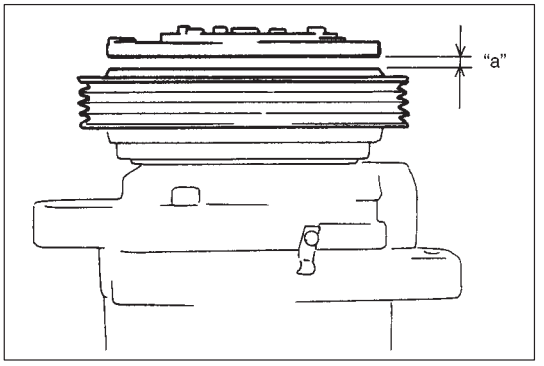
3) Clamp covering portion of read wire.



4) Install magnet clutch.
① Set magnet clutch squarely over clutch installation boss.
② Place special tool (D) onto clutch bearing.
Ensure that edge rests only on inner race of bearing.
③ Install snap ring.

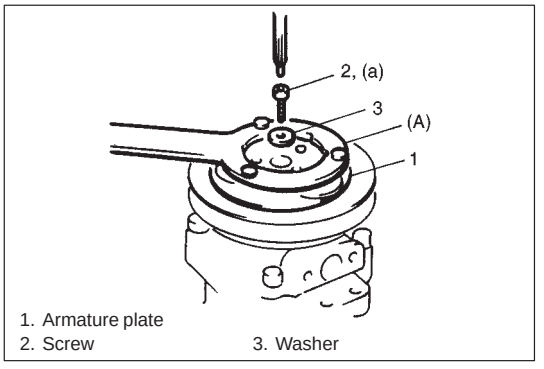
Special Tool
(D): 09991-06010

CAUTION:
Be careful not to scratch bearing seal.



5) Adjust clearance, between armature plate and magnet clutch by putting shim on compressor shaft.

Standard clearance "a": 0.3 – 0.5 mm (0.012 – 0.020 in.)

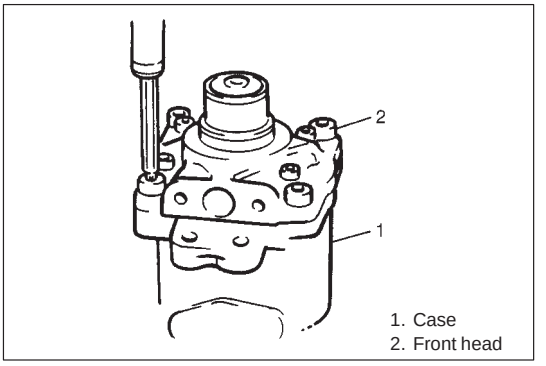


1. Armature plate
2. Screw
3. Washer

6) Tighten new armature plate screw as specified below.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

Special Tool
(A): 09991-06020

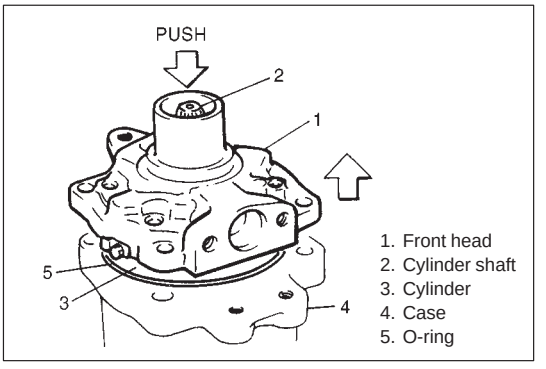


1. Case
2. Front head

F. LIP TYPE SEAL

Removal

1) Remove magnet clutch, referring to “C. MAGNET CLUTCH” in this section.
2) Remove front head mounting screw (8 pcs).

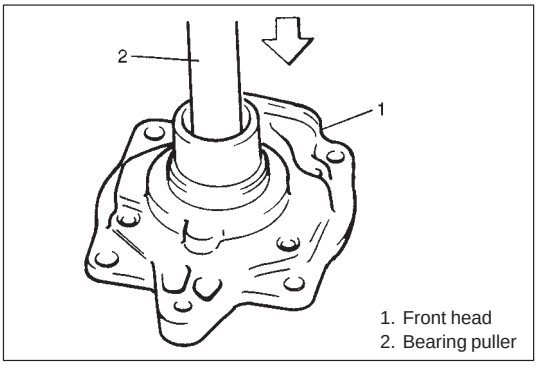


1. Front head
2. Cylinder shaft
3. Cylinder
4. Case
5. O-ring

3) Remove front head pushing cylinder shaft.

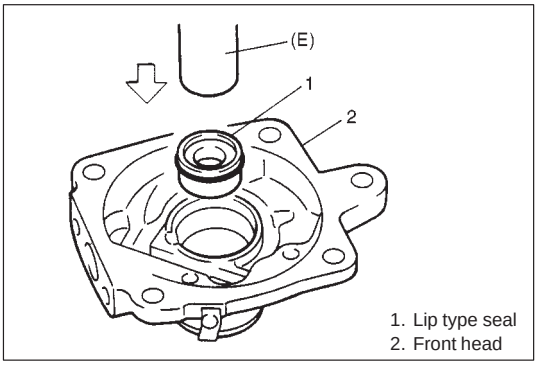
NOTE:
Be careful not to remove cylinder from case.

4) Remove O-ring.



1. Front head
2. Bearing puller

5) Remove lip seal from front head.



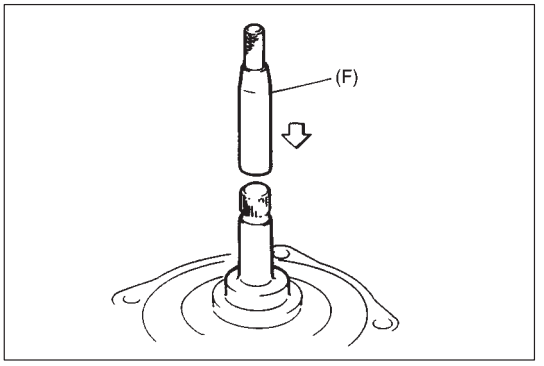
1. Lip type seal
2. Front head

Installation

1) Press-fit lip seal into front head using special tool (E).

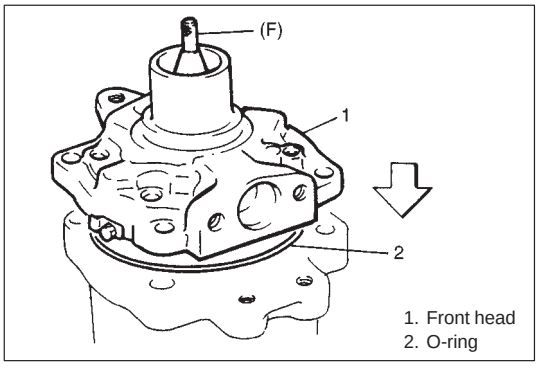
Special Tool
(E): 09991-06050

CAUTION:
Do not reuse mechanical seal once removed from compressor.



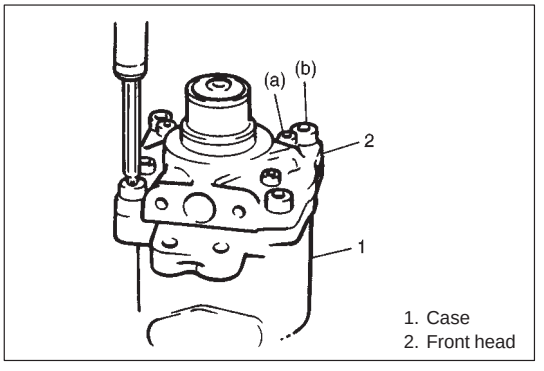
2) Coat special tool (F) surface with oil and install it to the shaft.

Special Tool
(F): 09991-06040



1. Front head
2. O-ring

3) Install O-ring to case.
4) Apply A/C oil to lip seal and O-ring.
5) Install front head assembly.

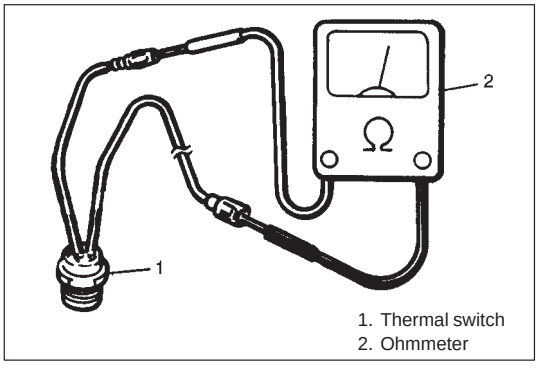


1. Case
2. Front head

6) Tighten front head bolt as specified below.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

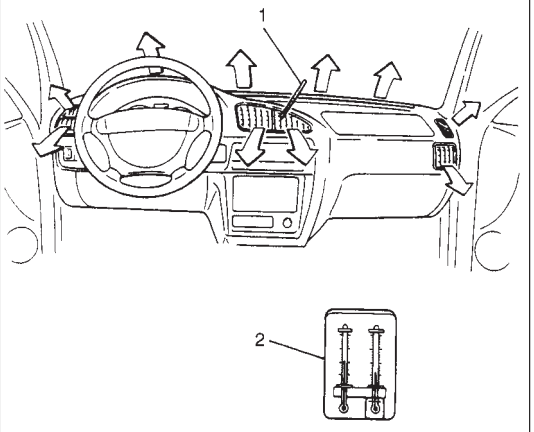
NOTE:
○ Be sure to use new front head bolt washer.
○ Tighten bolt (a) first, and next (b).



1. Thermal switch
2. Ohmmeter

G. COMPRESSOR THERMAL SWITCH

Use an ohmmeter to check thermal switch for continuity. If it is no continuity, replace it.



1. Thermometer
2. Psychrometer

PERFORMANCE TEST

After finishing all repairs, make sure to carry out performance test of air conditioning system as follows.

PROCEDURE

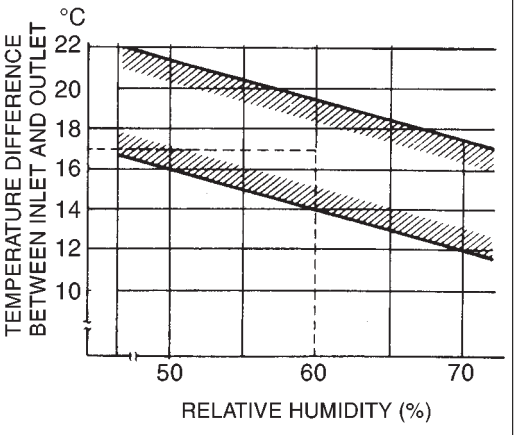
1) Connect high and low side charging hose of manifold gauge set to hose fittings of compressor.
2) Run engine, and keep compressor speed at 2,000 rpm.
3) Operate air conditioning, and set blower switch at “HI”, temperature lever at “COOL”.
4) Keep all windows and doors open.
5) Insert a dry bulb thermometer in cool air outlet, and place psychrometer (dry and wet bulb thermometer) close to inlet of cooling unit.
6) The high pressure gauge reading should be within specified pressure range.

   High pressure
   gauge reading: 1470 – 1760 kPa
   (15.0 – 18.0 kg/cm^2, 214 – 256 psi)

   NOTE:
   If the gauge indicates too high, pour water on condenser or if it is too low, cover front surface of condenser.

7) The dry bulb thermometer at air inlet should be within 25 to 35· C (77 to 95· F).

Under above conditions, operate air conditioning system until a stabilized condition on high and low pressure gauges and thermometers has been established.

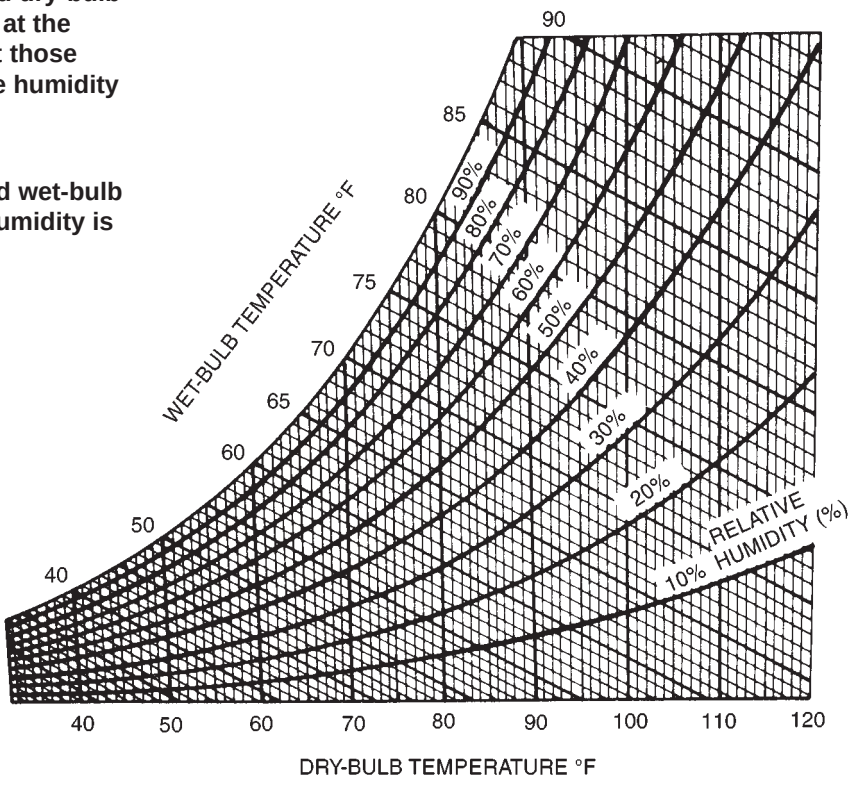


HOW TO READ THE STANDARD PERFORMANCE CURVE

1) Read psychrometer reading at the inlet, and get relative humidity from psychrometric chart. (See figures on next page.)
2) Measure dry bulb temperature at cool air outlet, then find out the difference between inlet and outlet temperatures.
3) Check the relative humidity-to-temperature difference relationship using the graph.
   As an example of 17· C (62.6· F) temperature difference and 60% relative humidity shown in it, if their crossing point falls within the area between two lines, cooling performance then is satisfactory and proper.

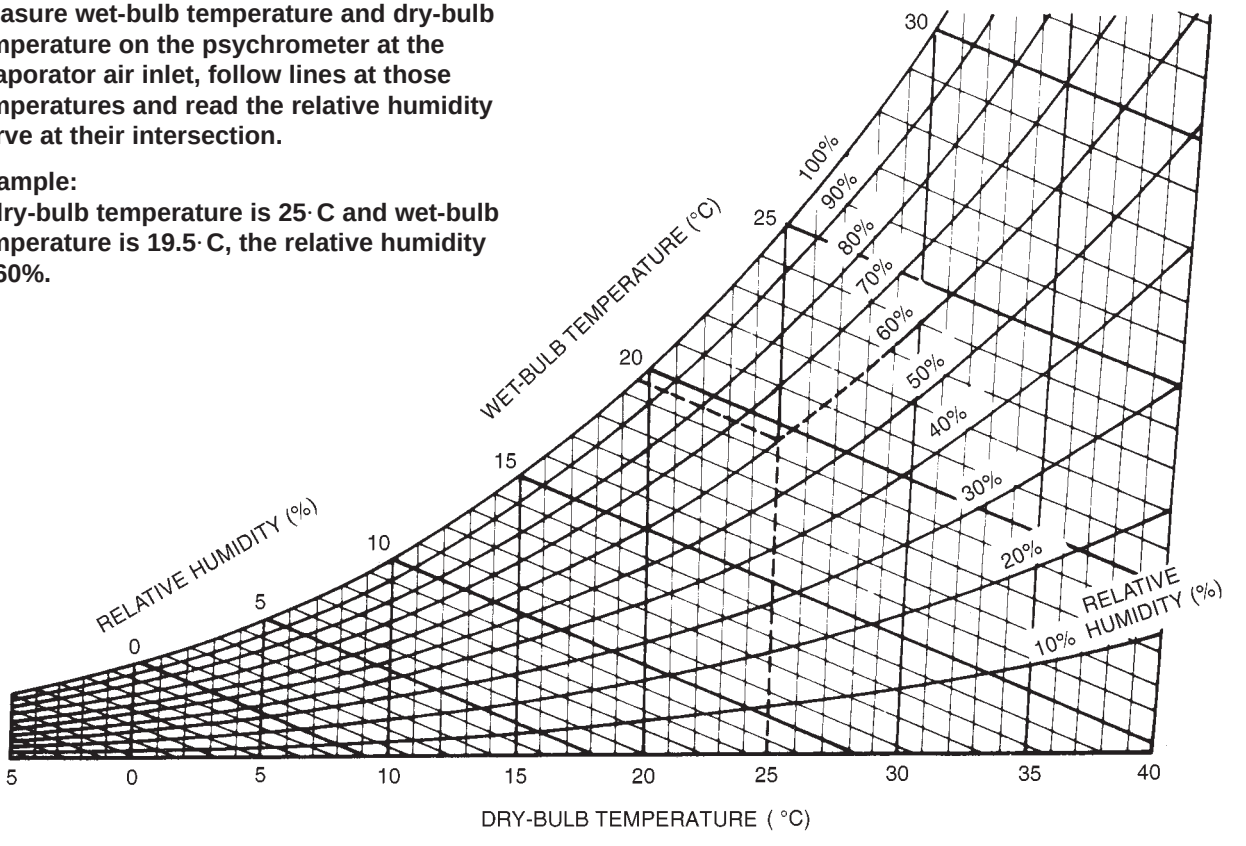
HOW TO READ RELATIVE HUMIDITY (°F)
Measure wet-bulb temperature and dry-bulb temperature on the psychrometer at the evaporator air inlet, follow lines at those temperatures and read the relative humidity curve at their intersection.

Example:
If dry-bulb temperature is 90°F and wet-bulb temperature is 78°F, the relative humidity is 60%

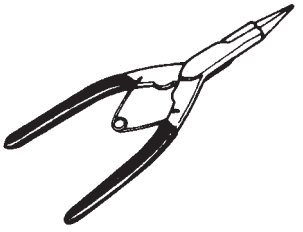
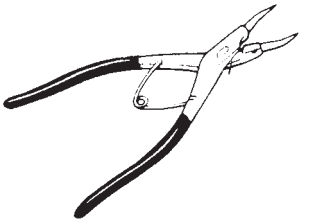
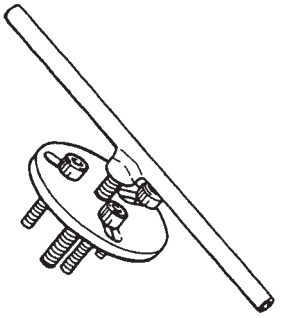
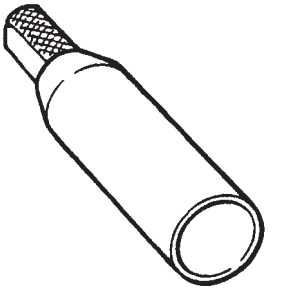
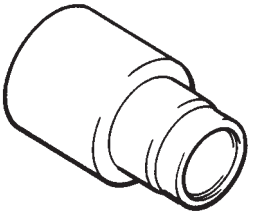
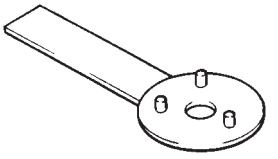
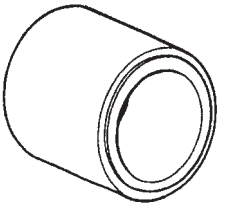


HOW TO READ RELATIVE HUMIDITY (°C)
Measure wet-bulb temperature and dry-bulb temperature on the psychrometer at the evaporator air inlet, follow lines at those temperatures and read the relative humidity curve at their intersection.

Example:
If dry-bulb temperature is 25°C and wet-bulb temperature is 19.5°C, the relative humidity is 60%.



SPECIAL TOOLS

 09900-06107 Snap ring pliers (Opening type)	 09900-06108 Snap ring pliers (Closing type)	 09991-06030 Armature plate remover	 09991-06040 Lip type seal protector
 09991-06050 Lip type seal installer	 09991-06020 Armature plate spanner	 09991-06010 Magnet clutch pulley installer	

SECTION 3

STEERING, SUSPENSION, WHEELS AND TIRES

WARNING:
For vehicles equipped with a Supplemental Inflatable Restraint Air Bag System:
- **Service on or around Air Bag System Components or Wiring must be performed only by an authorized Suzuki dealer. Please observe all WARNINGS and SERVICE PRECAUTIONS in SECTION 9J under "On-Vehicle Service" and the Air Bag System Component and Wiring Location view in SECTION 9J before performing service on or around Air Bag System Components or Wiring. Failure to follow WARNINGS could result in unintended air bag deployment or could render the air bag inoperative. Either of these two conditions may result in severe injury.**
- **SDM can maintain sufficient voltage to cause a deployment of air bags for up to 10 seconds after ignition switch is turned to "LOCK" position, battery is disconnected or fuse powering SDM is removed. Work must be started after 10 seconds from the time.**

DIAGNOSIS 3-1
FRONT END ALIGNMENT 3A-1
MANUAL RACK AND PINION 3B-1
POWER STEERING SYSTEM 3B1-1
STEERING WHEEL AND COLUMN (Not Equipped with Air Bag) 3C-1
AIR BAG STEERING WHEEL AND COLUMN 3C1-1
FRONT SUSPENSION 3D-1
REAR SUSPENSION (2WD) 3E-1
REAR SUSPENSION (4WD) 3E1-1
WHEELS AND TIRES 3F-1

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Radial Tire Lead 3-8
VIBRATION DIAGNOSIS 3-8

GENERAL DIAGNOSIS

Since the problems in steering, suspension, wheels and tires involve several systems, they must all be considered when diagnosing a complaint. To avoid using the wrong symptom, always road test the vehicle first. Proceed with the following preliminary inspection and correct any defects which are found.

1) Inspect tires for proper pressure and uneven wear.
2) Raise vehicle on a hoist and inspect front and rear suspension and rack and pinion for loose or damaged parts.
3) Spin front wheels. Inspect for out-of-round tires, out-of-balance tires, bent rims, loosen and/or rough wheel bearings.

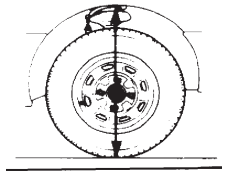
GENERAL DIAGNOSIS CHART A

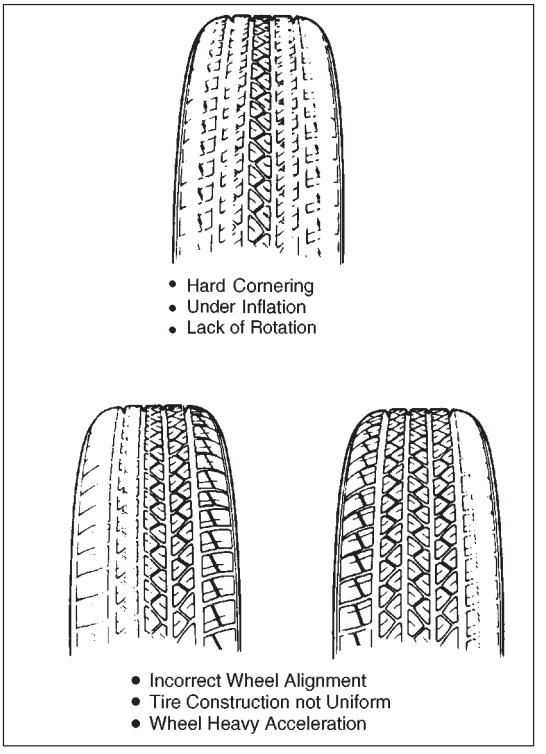
Condition	Possible Cause	Correction
Vehicle Pulls (Leads)	1. Mismatched or uneven tires.	Replace tire.
	2. Tires not adequately inflated.	Adjust tire pressure.
	3. Broken or sagging springs.	Replace spring.
	4. Radial tire lateral force.	Replace tire.
	5. Disturbed front end alignment.	Check and adjust front end alignment.
	6. Disturbed rear wheel alignment.	Check and adjust rear wheel alignment.
	7. Brake dragging in one road wheel.	Repair brake system.
	8. Loose, bent or broken front or rear suspension parts.	Tighten or replace suspension part.
Abnormal or Excessive Tire Wear	1. Sagging or broken springs.	Replace spring.
	2. Tire out of balance.	Adjust balance or replace tire.
	3. Disturbed front or rear end alignment.	Check and adjust front end alignment.
	4. Faulty strut (shock absorber).	Replace strut.
	5. Hard driving.	Replace tire.
	6. Overloaded vehicle.	Replace tire.
	7. Not rotating tire.	Replace or rotate tire.
	8. Worn or loose road wheel bearings.	Replace wheel bearing.
	9. Wobbly wheel or tires.	Replace wheel or tire.
	10. Tires not adequately inflated.	Adjust the pressure.
Wheel Tramp	1. Blister or bump on tire.	Replace tire.
	2. Improper strut (shock absorber) action.	Replace strut.

GENERAL DIAGNOSIS CHART B

Condition	Possible Cause	Correction
Shimmy, Shake or Vibration	1. Tire or wheel out of balance.	Balance wheels or replace tire and/or wheel.
	2. Loose wheel bearings.	Replace wheel bearing.
	3. Worn tie rod ends.	Replace tie rod end.
	4. Worn lower ball joints.	Replace front suspension arm.
	5. Excessive wheel runout.	Repair or replace wheel and/or tire.
	6. Blister or bump on tire.	Replace tire.
	7. Excessively loaded radial runout of tire/wheel assembly.	Replace tire or wheel.
	8. Disturbed front end alignment.	Check and adjust front end alignment.
	9. Loose or worn steering linkage.	Tighten or replace steering linkage.
	10. Loose steering gear case bolts.	Tighten case bolts.
Hard Steering	1. Tire not adequately inflated.	Inflate tires to proper pressure.
	2. Low fluid level, loosen drive belt or malfunction of power steering system. (Power steering only.)	Check and correct.
	3. Bind in tie rod end ball studs or lower ball joints.	Replace tie rod end or front suspension arm.
	4. Disturbed front end alignment.	Check and adjust front end alignment.
	5. Rack and pinion adjustment. (Manual steering only.)	Check and adjust rack & pinion torque.
	6. Bind in steering column.	Repair or replace.
Too Much Play in Steering	1. Wheel bearings worn.	Replace.
	2. Loose steering gear case bolts.	Tighten.
	3. Rack and pinion adjustments. (Manual steering only.)	Check and adjust rack & pinion torque.
	4. Worn steering shaft joints.	Replace joint.
	5. Worn tie rod ends or tie rod inside ball joints.	Replace tie rod end or tie rod.
	6. Worn lower ball joints.	Replace front suspension control arm.
Poor Returnability	1. Bind in tie rod end ball studs.	Replace tie rod end.
	2. Bind in ball joints.	Replace.
	3. Bind in steering column.	Repair or replace.
	4. Poorly lubricated rack and pinion.	Check, repair or lubricate rack & pinion.
	5. Disturbed front end alignment.	Check and adjust front end alignment.
	6. Rack and pinion adjustment. (Manual steering only.)	Check and adjust rack & pinion torque.
	7. Tires not adequately inflated.	Adjust tire pressure.

GENERAL DIAGNOSIS CHART C		
Condition	**Possible Cause**	**Correction**
Rack and Pinion Noise (Rattle or Chuckle)	1. Loose steering gear case bolts.	Tighten.
	2. Worn rack bush.	Replace.
	3. Rack and pinion adjustment. (Manual steering only.)	Check and adjust rack & pinion torque.
Abnormal Noise, Front End	1. Worn, sticky or loose tie rod ends, lower ball joints, tie rod inside ball joints or drive shaft joints.	Replace tie rod end, suspension arm, tie rod or drive shaft joint.
	2. Damaged struts or mountings.	Repair or replace.
	3. Worn suspension arm bushings.	Replace.
	4. Loose stabilizer bar.	Tighten bolts or nuts, replace bushes.
	5. Loose wheel nuts.	Tighten wheel nuts.
	6. Loose suspension bolts or nuts.	Tighten suspension bolts or nuts.
	7. Broken or otherwise damaged wheel bearings.	Replace.
	8. Broken suspension springs.	Replace.
	9. Poorly lubricated or worn strut bearings.	Replace strut bearing.
	10. Worn or sticky stabilizer joints.	Replace.
Wander or Poor Steering Stability	1. Mismatched or uneven tires.	Replace or inflate tires to proper pressure.
	2. Loose ball joints and tie rod ends.	Replace suspension arm or tie rod end.
	3. Faulty struts or mounting.	Replace struts or repair mounting.
	4. Loose stabilizer bar.	Tighten or replace stabilizer bar or bush.
	5. Broken or sagging springs.	Replace spring.
	6. Rack and pinion adjustment. (Manual steering only.)	Check and adjust rack and pinion torque.
	7. Front end alignment.	Check and adjust front end alignment.
	8. Loose stabilizer joints.	Replace joint.
Erratic Steering When Braking	1. Worn wheel bearings.	Replace.
	2. Broken or sagging springs.	Replace coil spring.
	3. Wheel tires are inflated unequally.	Inflate tires to proper pressure.
	4. Disturbed front end alignment.	Check and adjust front end alignment.
	5. Brakes not working in unison.	Refer to SECTION 5.

GENERAL DIAGNOSIS CHART D		
Condition	**Possible Cause**	**Correction**
Low or Uneven Trim Height Right-to-left trim height (H) difference should be within 15 mm (0.6 in) with curb weight.  *Same with rear side.	1. Broken or sagging springs. 2. Over loaded. 3. Incorrect springs.	Replace. Check loading. Replace.
Ride Too Soft	1. Faulty struts (shock absorber).	Replace struts.
Suspension Bottoms	1. Overloaded. 2. Faulty struts (shocks absorber). 3. Incorrect broken or sagging springs.	Check loading. Replace struts. Replace.
Body Leans or Sways in Corners	1. Loose stabilizer bar. 2. Faulty struts (shocks absorbers) or mounting. 3. Broken or sagging springs. 4. Overloaded.	Tighten stabilizer bar bolts or nuts, or replace bushes or joint. Replace strut or tighten mounting. Replace. Check loading.
Cupped Tires	1. Front struts defective. 2. Worn wheel bearings. 3. Excessive tire or wheel run-out. 4. Worn ball joints. 5. Tire out of balance.	Replace. Replace. Replace tire or wheel disc. Replace front suspension arm. Adjust tire balance.



TIRE DIAGNOSIS

IRREGULAR AND/OR PREMATURE WEAR

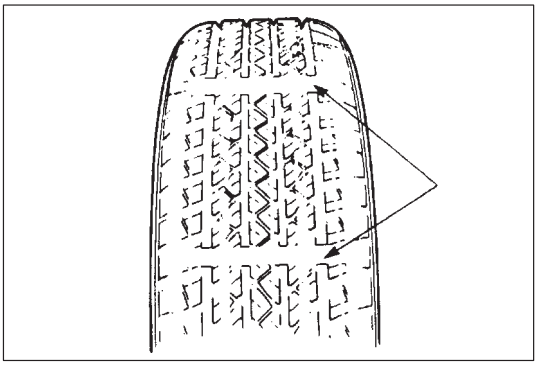
Irregular and premature wear has many causes. Some of them are: incorrect inflation pressures, lack of tire rotation, driving habits, improper alignment.

If the following conditions are noted, rotation is necessary:

1) Front tire wear is different from rear.
2) Uneven wear exists across the tread of any tire.
3) Front tire wear is unequal between the right and left.
4) Rear tire wear is unequal between the right and left.
5) There is cupping, flat spotting, etc.

A wheel alignment check is necessary if following conditions are noted:

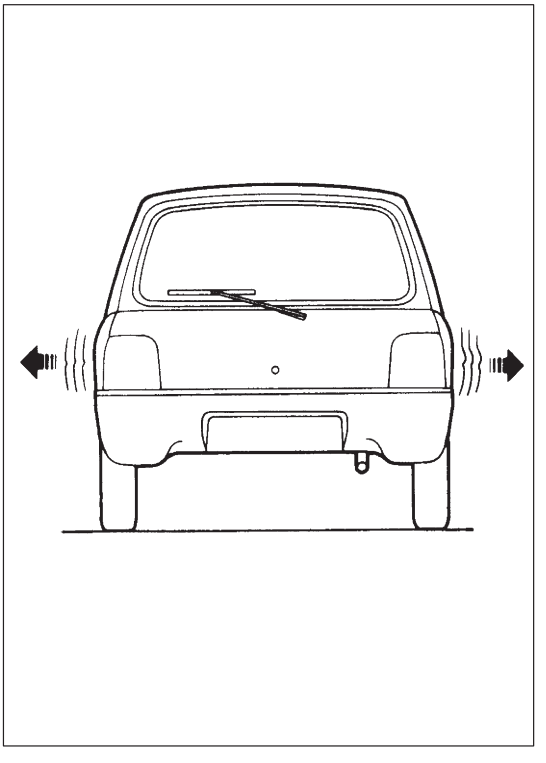
1) Front tire wear is unequal between the right and left.
2) Wear is uneven across the tread of any front tire.
3) Front tire treads have scuffed appearance with “feather” edges on one side of tread ribs or blocks.



WEAR INDICATORS

Original equipment tires have built-in tread wear indicators to show when they need replacement.

These indicators will appear as 12 mm (0.47 inch) wide bands when the tire tread depth becomes 1.6 mm (0.063 inch). When the indicators appear in 3 or more grooves at 6 locations, tire replacement is recommended.



RADIAL TIRE WADDLE

Waddle is side to side movement at the front and/or rear of the vehicle. It is caused by the steel belt not being straight within the tire. It is most noticeable at a low speed, 5 to 30 mph.

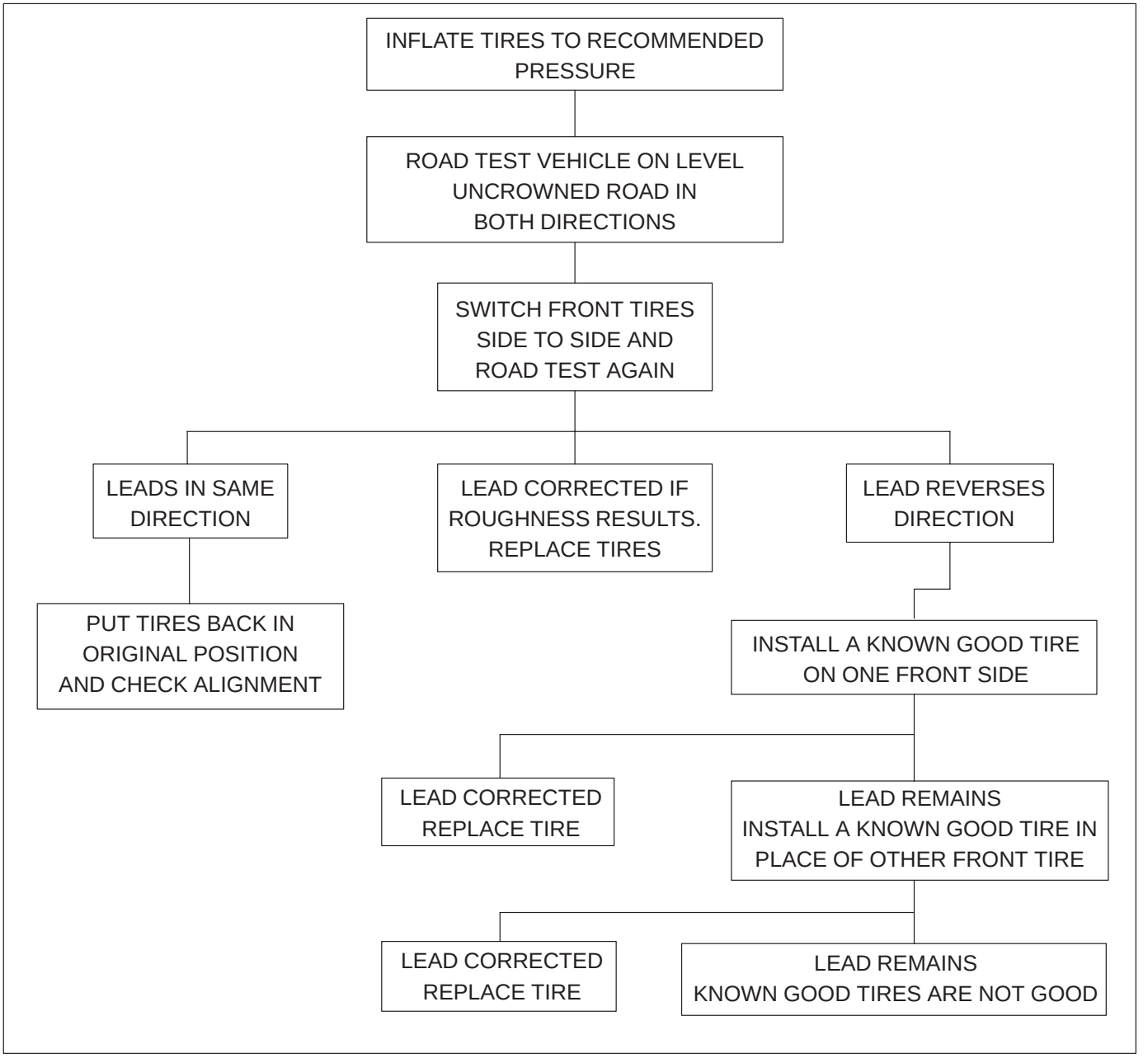
It is possible to locate the faulty tire by road testing the vehicle. If it is on the rear, the rear end of the vehicle shakes from side to side or “waddles”. To the driver in his seat, it feels as though someone is pushing on the side of vehicle.

If the faulty tire is on the front, waddling is more visual. The front sheet metal appears to be moving back and forth and the driver feels as though he is at the pivot point in vehicle.

Waddle can be quickly diagnosed by using Tire Problem Detector (TPD) and following the equipment manufacture’s recommendations.

If TPD is not available, an alternative method of substituting known good tire/wheel assemblies can be used as follows, although it takes a longer time.

1) Ride vehicle to determine whether the front or rear waddles.
2) Install tires and wheels that are known to be good (on similar vehicle) in place of those on waddling end of vehicle. If waddling end cannot be identified, substitute rear ones.
3) Road test again. If improvement is noted, reinstall originals one at a time till waddle causal tire is found. If no improvement is noted, install known good tires in place of all four. Then reinstall originals in the same manner as above.



RADIAL TIRE LEAD

"Lead" is the deviation of the vehicle from a straight path on a level rod even with no pressure on the steering wheel.

Lead is usually caused by:

1) Incorrect alignment.
2) Uneven brake adjustment.
3) Tire construction.

The way in which a tire is built can produce lead in a vehicle. An example of this is placement of the belt. Off center belts on radial tires can cause the tire to develop a side force while rolling straight down the road. If one side of the tire has a little larger diameter than the other, the tire will tend to roll to one side. This will develop a side force which can produce vehicle lead.

The procedure in above figure (Lead Diagnosis) should be used to make sure that front alignment is not mistaken for tire lead.

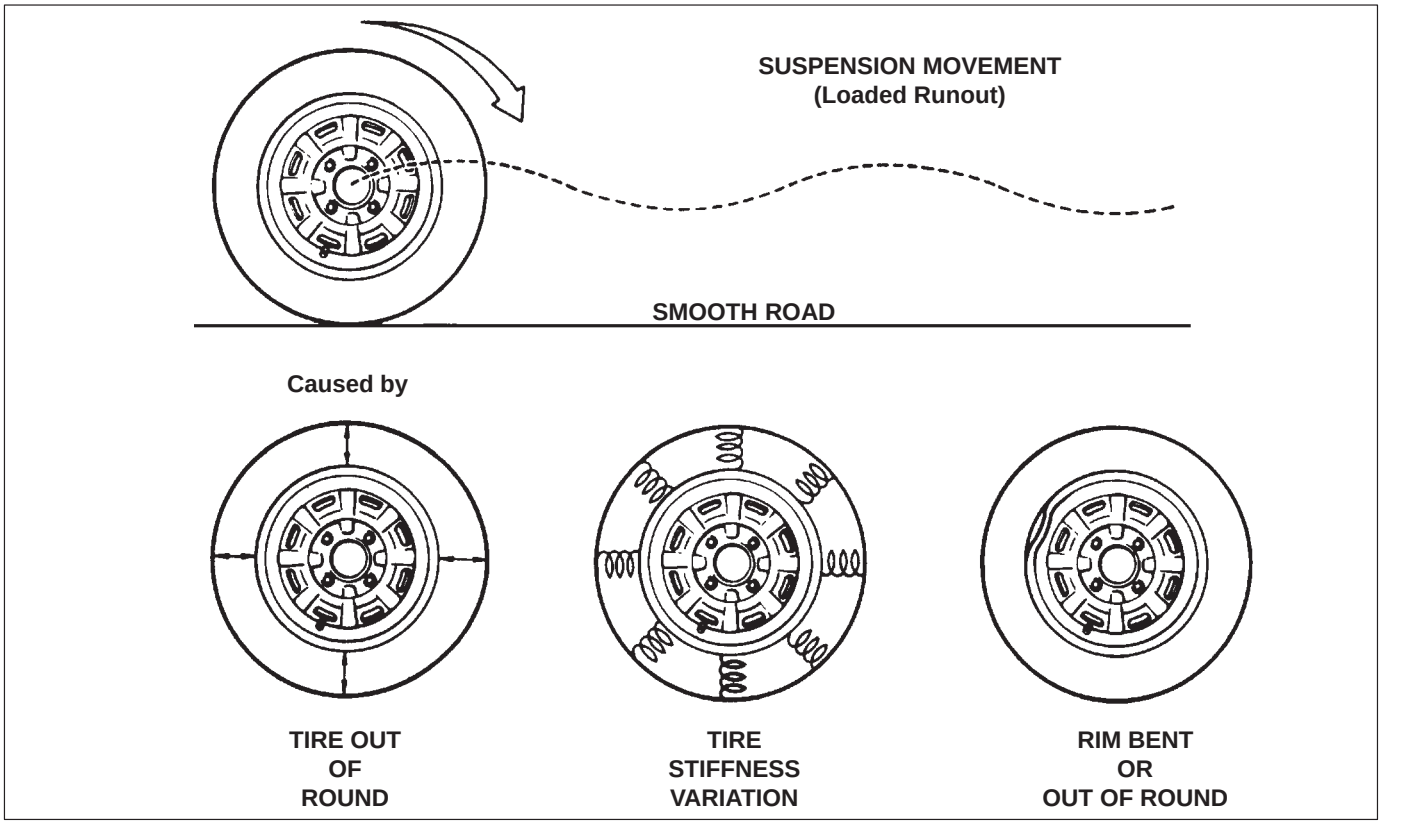
1) Part of the lead diagnosis procedure is different from the proper tire rotation pattern currently in the owner and service manuals. If a medium to high mileage tire is moved to the other side of the vehicle, be sure to check that ride roughness has not developed.
2) Rear tires will not cause lead.

VIBRATION DIAGNOSIS

Wheel unbalance causes most of the highway speed vibration problems. If a vibration remains after dynamic balancing, its possible causes are as follows.

1) Tire runout.
2) Wheel runout.
3) Tire stiffness variation.

Measuring tire and/or wheel free runout will uncover only part of the problem. All three causes, known as loaded radial runout, must be checked by using a Tire Problem Detector (TPD). If TPD is not available, alternative method of substituting known good tire and wheel assemblies on the problem vehicle can be used, although it takes a longer time.



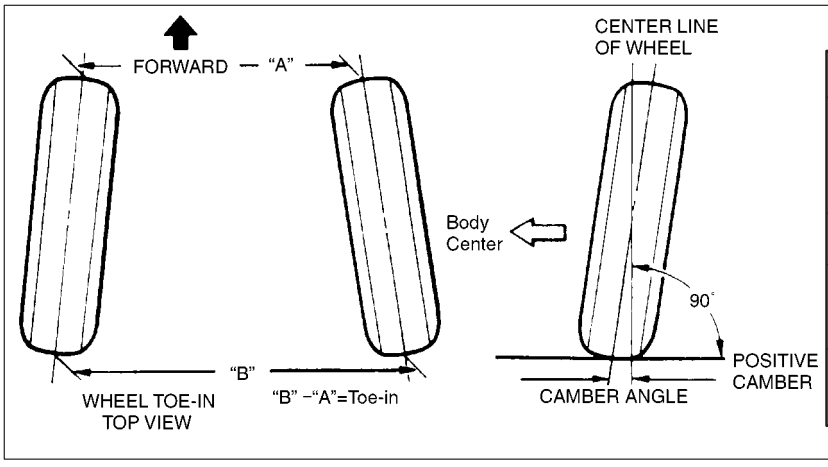
SECTION 3A

FRONT END ALIGNMENT

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GENERAL DESCRIPTION



Alignment service data	
Toe-in (Toe-in gauge measurement)	0 ∽ 2 mm (0 ∽ 0.079 in.)
Camber	0· ∽ 1·
Caster	2.7· ∽ 2· (24.7 mm, 0.97 in.)
Kingpin inclination	12·36' ∽ 3·

Front alignment refers to the angular relationship between the front wheels, the front suspension attaching parts and the ground. Generally, the only adjustment required for front alignment is toe setting. Camber and caster can't be adjusted. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in body or in suspension should be determined. If the body is damaged, it should be repaired and if suspension is damaged, it should be replaced.

TOE SETTING

Toe is the turning in or out of the front wheels. The purpose of a toe specification is to ensure parallel rolling of the front wheels (Excessive toe-in or toe-out may increase tire wear).
Amount of toe can be obtained by subtracting "A" from "B" as shown in above figure and therefore is given in mm (in.).

CAMBER

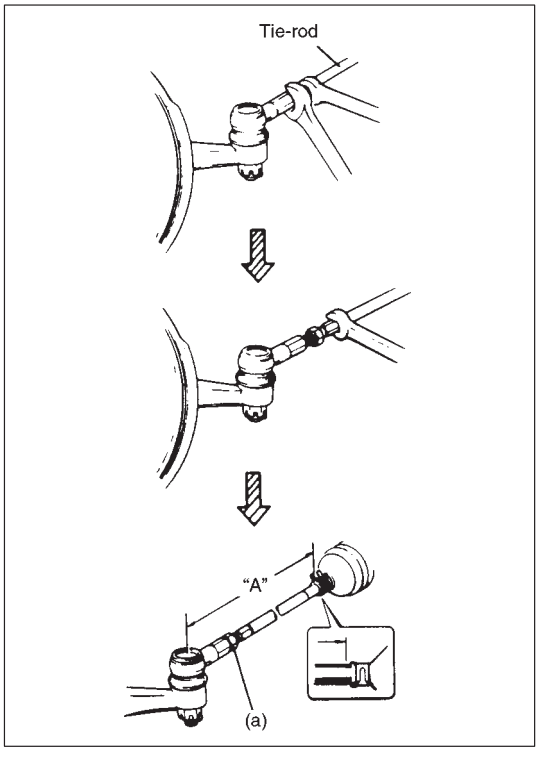
Camber is the tilting of the front wheels from the vertical, as viewed from the front of the vehicle. When the wheels tilt outward at the top, the camber is positive. When the wheels tilt inward at the top, the camber is negative. The amount of tilt is measured in degrees.

PRELIMINARY CHECKS PRIOR TO ADJUSTING FRONT ALIGNMENT

Steering and vibration complaints are not always the result of improper alignment. An additional item to be checked is the possibility of tire lead due to worn or improperly manufactured tires. "Lead" is the deviation of the vehicle from a straight path on a level road without hand pressure on the steering wheel. Section 3 of this manual contains a procedure for determining the presence of a tire lead problem.

Before making any adjustment affecting toe setting, the following checks and inspections should be made to ensure correctness of alignment readings and alignment adjustments:

1) Check all tires for proper inflation pressures and approximately the same tread wear.
2) Check for loose of ball joints. Check tie rod ends; if excessive looseness is noted, it must be corrected before adjusting.
3) Check for run-out of wheels and tires.
4) Check vehicle trim heights; if out of limits and a correction is to be made, it must be made before adjusting toe.
5) Check for loose of suspension arms.
6) Check for loose or missing stabilizer bar attachments.
7) Consideration must be given to excess loads, such as tool boxes. If this excess load is normally carried in vehicle, it should remain in vehicle during alignment checks.
8) Consider condition of equipment being used to check alignment and follow manufacturer's instructions.
9) Regardless of equipment used to check alignment, vehicle must be on a level surface both fore and aft and transversely.



TOE ADJUSTMENT

Toe is adjusted by changing the tie rod length. Loosen right and left tie rod end lock nuts first and then rotate right and left tie rods by the same amount to align toe-in to specification. In this adjustment, right and left tie rods should become equal in length ("A" in left figure).

Before rotating tie rods, apply grease between tie rods and rack boots so that boots won't be twisted.

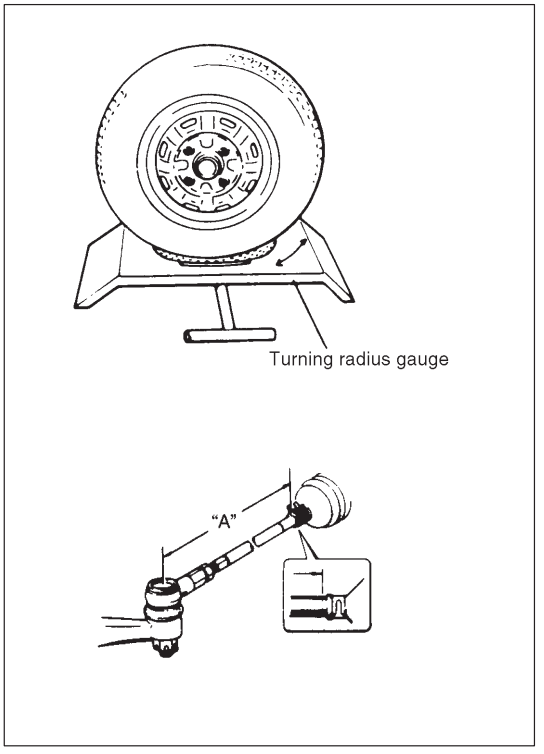
After adjustment, tighten lock nuts to specified torque and make sure that rack boots are not twisted.

Tightening Torque
(a): 45 N·m (4.5 kg-m, 33.0 lb-ft)

CAMBER AND CASTER ADJUSTMENT

Should camber or caster be found out of specifications upon inspection, locate its cause first. If it is in damaged, loose, bent, dented or worn suspension parts, they should be replaced. If it is in vehicle body, repair it so as to attain specifications.

To prevent possible incorrect reading of camber or caster, vehicle front end must be moved up and down a few times before inspection.



STEERING ANGLE

When tie rod or tie rod end was replaced, check toe and then also steering angle with turning radius gauge.
If steering angle is not correct, check if right and left tie rods are equal in length ("A").

NOTE:
If tie rod lengths were changed to adjust steering angle, reinspect toe-in.

Steering angle	**inside**	**: 39· ∽ 3·**
	outside	**: 34· ∽ 3·**

Reference Information:
Side slip:
For inspecting front wheel side slip with side slip tester:

Side slip limit : Less than 3 mm/m
(Less than 0.118 in/3.3 ft)

If side slip exceeds above limit, toe-in or front wheel alignment may not be correct.

SECTION 3B

MANUAL RACK AND PINION

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:

- **All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.**
- **Although the figures in this section show only the left-hand steering vehicle, the same work procedure and data apply to the right-hand steering vehicle.**

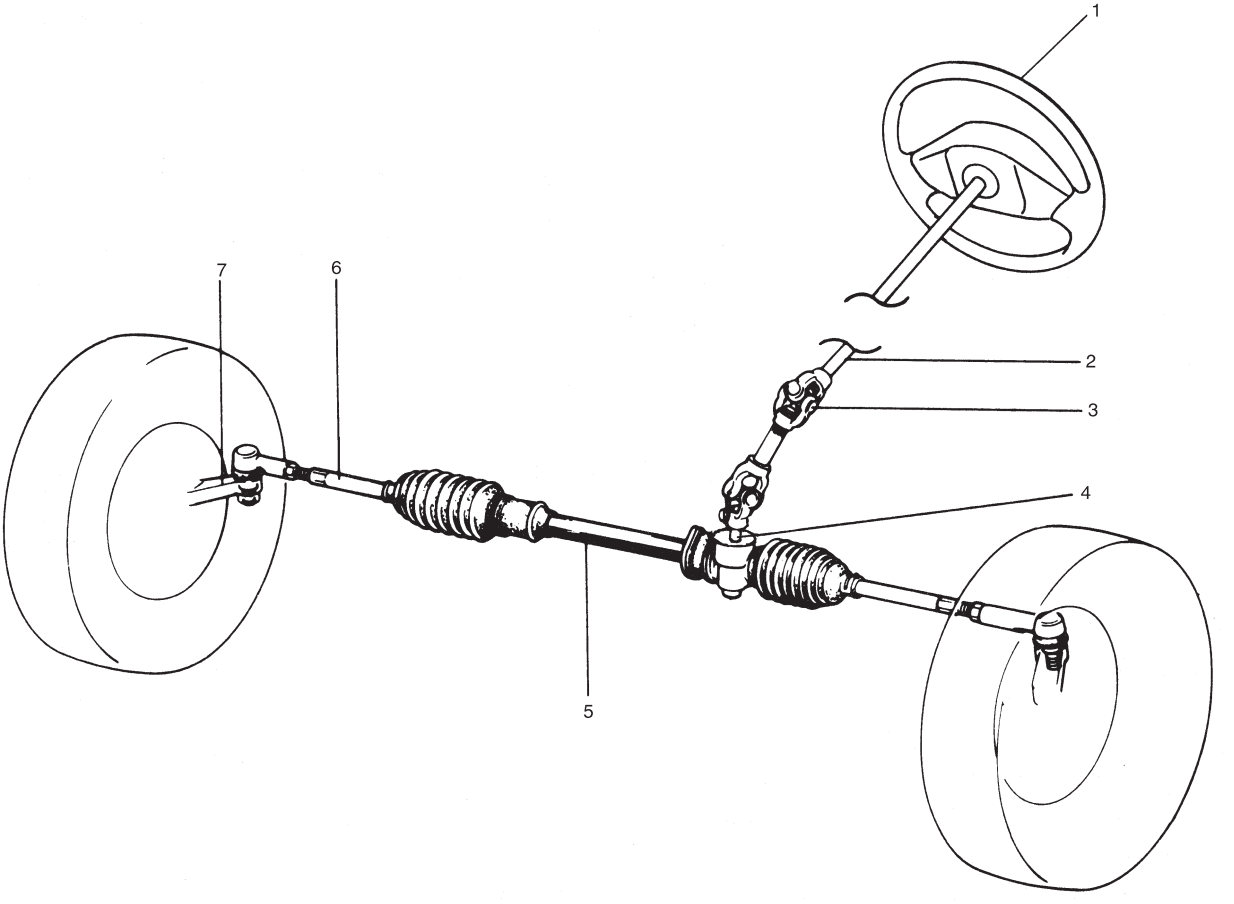
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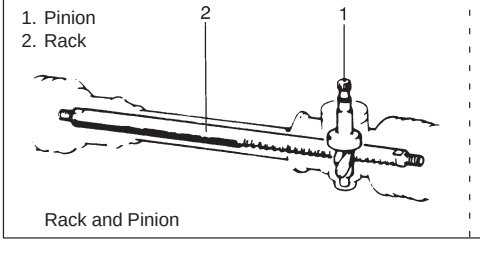
GENERAL DESCRIPTION

The rack and pinion steering system consists of two main components, the rack and the pinion. When the steering wheel is turned, the motion is transmitted to the steering shaft, shaft joint and then to the pinion.
Since the pinion teeth mesh with teeth on rack, the motion is further transferred to the rack and changed to linear motion. The force is then transmitted through the tie rods to the steering knuckles which turn wheels.

NOTE:
Although the figure below shows only the left-hand steering vehicle, the same work procedure and data apply to the right-hand steering vehicle.



1. Steering wheel
2. Steering shaft
3. Steering shaft joint
4. Steering pinion
5. Steering gear case
6. Tie rod
7. Steering knuckle



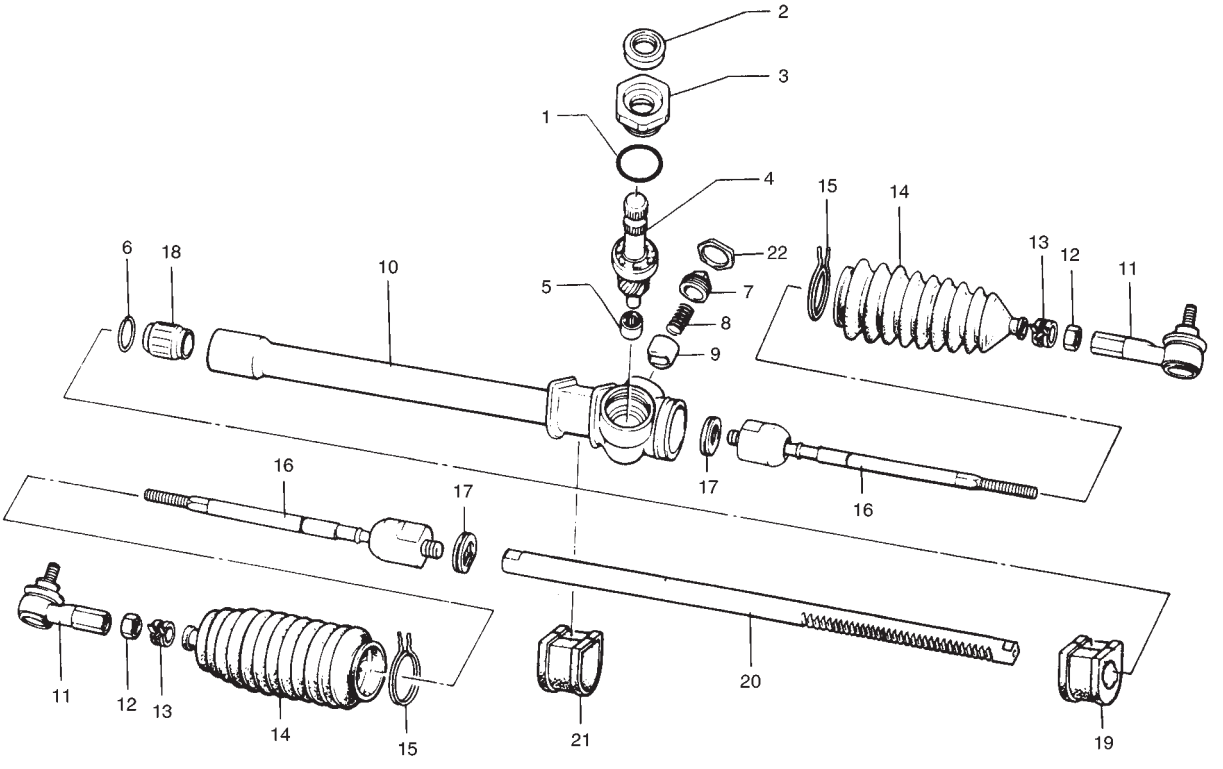
Rack and Pinion

ON-VEHICLE SERVICE

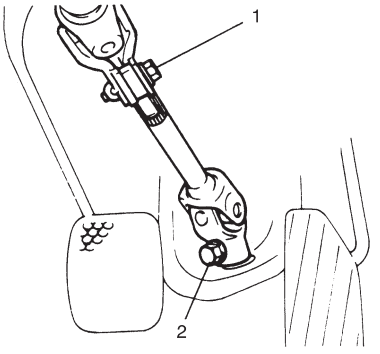
LUBRICATION

When inner parts of the steering gear case were disassembled, they should be washed clean before reassembly. It is recommended to use the grease as given at the right where grease application is indicated in the text.

*SUZUKI SUPER GREASE (E) 99000-25050, or Lithium grease (applicable for -40· C × 130· C or -40· F × 266· F)



1. Steering gear case seal
2. Steering gear case oil seal
3. Pinion bearing plug
4. Steering pinion
5. Steering pinion needle bearing
6. Snap ring
7. Rack damper screw
8. Rack plunger spring
9. Steering rack plunger
10. Steering rack housing & gear case
11. Tie-rod end
12. Tie-rod end lock nut
13. Rack boot clip
14. Boot
15. Wire
16. Steering tie-rod
17. Tie-rod lock washer
18. Steering rack bushing
19. Steering rack side mount
20. Steering rack
21. Steering pinion side mount
22. Rack damper screw lock nut



1. Steering shaft upper joint bolt
2. Steering shaft lower joint bolt

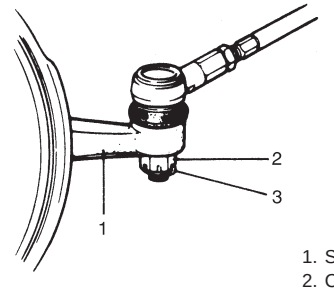
REMOVE AND INSTALL MANUAL RACK AND PINION ASSEMBLY (STEERING GEAR CASE)

REMOVAL

1) Slide driver's seat as far back as possible.
2) Pull off front part of floor mat on driver's side and remove steering shaft joint covers.
3) Loosen steering shaft upper joint bolt but don't remove, and remove lower joint bolt.

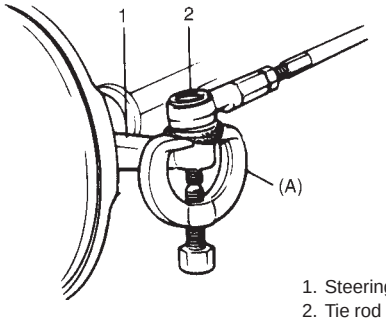
CAUTION:
For vehicle equipped with air bag system, be sure to set front wheels in straight direction and remove ignition key from key cylinder before following steps, otherwise contact coil of air bag system may get damaged.

4) With front wheels in straight-ahead position, disconnect lower joint from pinion.



1. Steering knuckle
2. Castle nut
3. Split pin

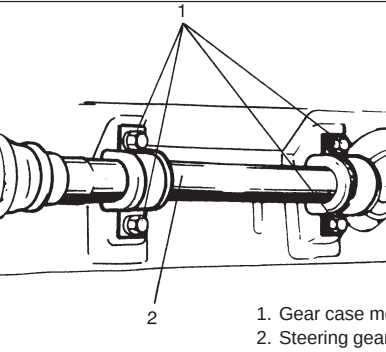
5) Hoist vehicle and remove both wheels.
6) Remove split pins and tie rod castle nuts from both knuckles.



1. Steering knuckle
2. Tie rod end

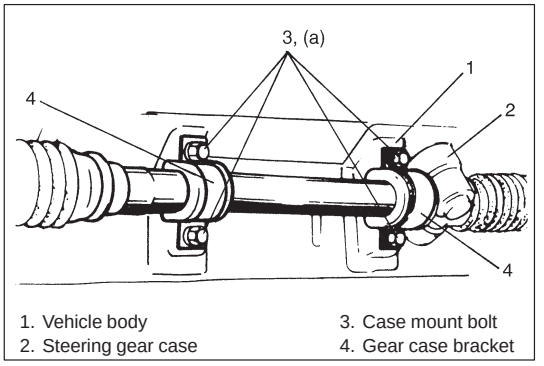
7) Disconnect both tie rod ends from knuckles, using special tool (A).

Special Tool
(A): 09913-65210



1. Gear case mount bolt
2. Steering gear case

8) Remove steering gear case mount bolts, gear case brackets and then gear case.

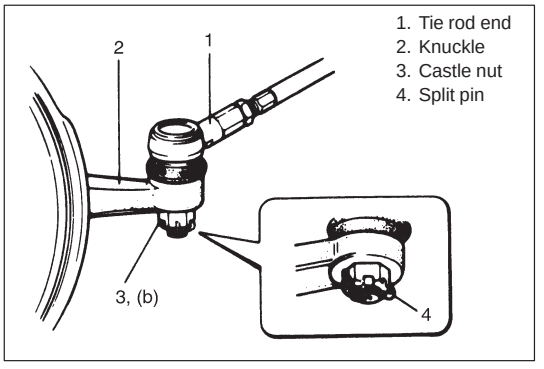


1. Vehicle body
2. Steering gear case
3. Case mount bolt
4. Gear case bracket

INSTALLATION

1) Mount steering gear case to body and tighten gear case mount bolts to specified torque.

Tightening Torque
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

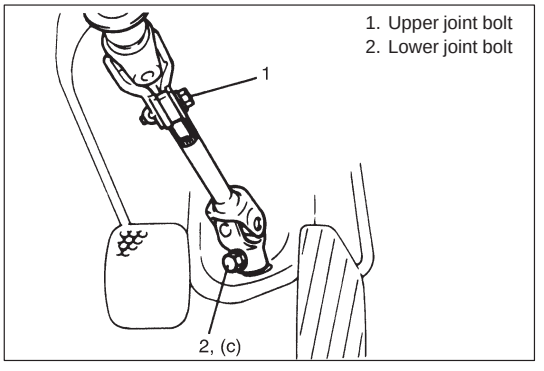


1. Tie rod end
2. Knuckle
3. Castle nut
4. Split pin

2) Install tie rod ends to knuckles (R & L). Tighten each castle nut until holes for split pin align but within specified torque and then bend split pin as shown.

Tightening Torque
(b): 35 – 55 N·m (3.5 – 5.5 kg-m, 25.5 – 39.5 lb-ft)

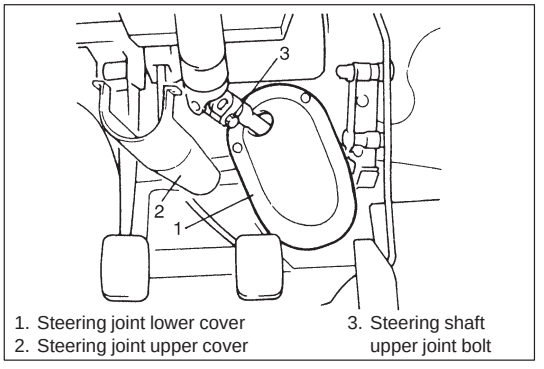
NOTE:
Removed split pin should be replaced with new one.



1. Upper joint bolt
2. Lower joint bolt

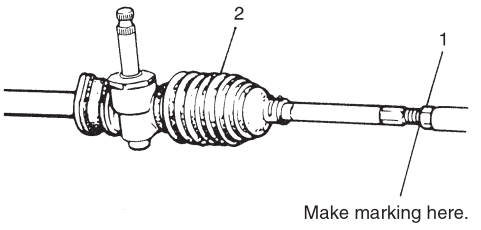
3) Be sure that steering wheel and brake discs (R & L) are all straight ahead driving state and then insert steering lower joint into steering pinion shaft.
4) Tighten steering shaft joint bolts to specified torque (Lower side first and then upper side).

Tightening Torque
(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)



1. Steering joint lower cover
2. Steering joint upper cover
3. Steering shaft upper joint bolt

5) Install steering shaft joint covers.
6) Put back floor mat as it was.
7) Install both wheels and tighten wheel nuts to specified torque.
8) Lower hoist.
9) Check toe setting. Adjust as required (Refer to FRONT END ALIGNMENT).

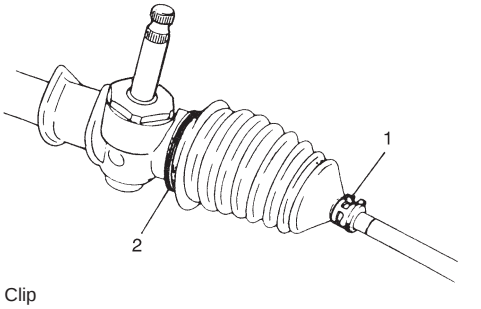


1. Lock nut
2. Boot

REMOVE AND INSTALL RACK BOOT/TIE ROD

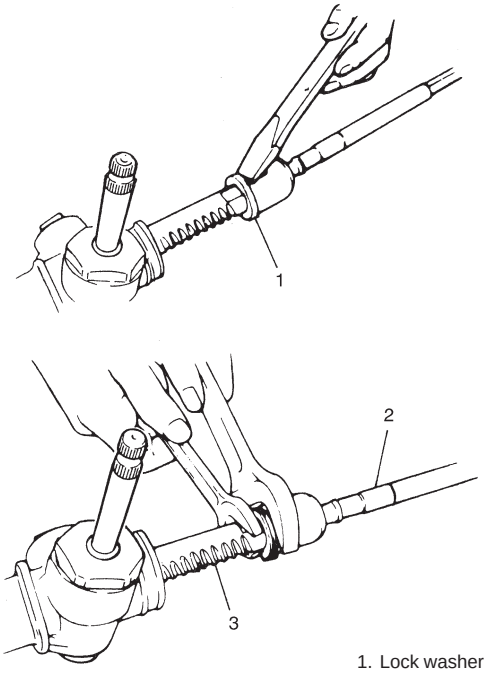
REMOVAL

1) Remove steering gear case by performing Steps 1) to 8) in STEERING GEAR CASE REMOVAL of this section.
2) For ease of adjustment after installation, make marking of tie rod end lock nut position of tie rod thread.
3) Loosen tie rod end lock nut and remove tie rod end.



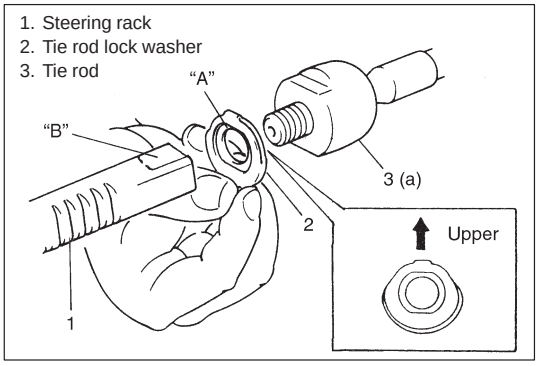
1. Clip
2. Wire

4) Remove boot wire and clip.
5) Remove boot from tie rod.



1. Lock washer
2. Tie rod
3. Steering rack

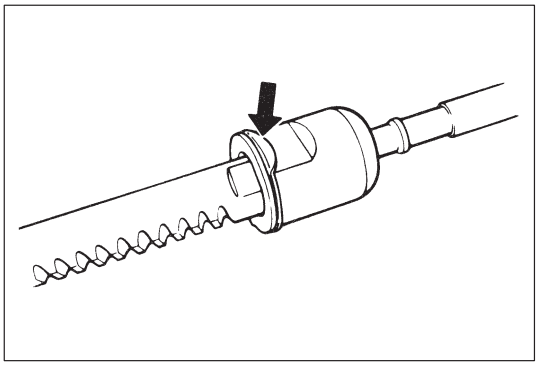
6) Unbend bent part of tie rod lock washer and remove tie rod from rack.



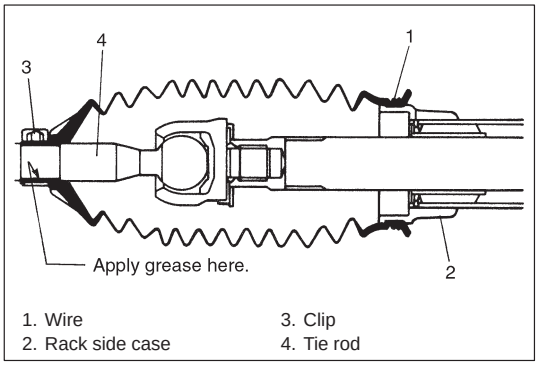
INSTALLATION

1) Install new tie rod lock washer as shown and tie rod to rack. Align straight part "A" of washer with flat part "B" of rack.
2) Tighten tie rod inside ball to specified torque.

   Tightening Torque
   (a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

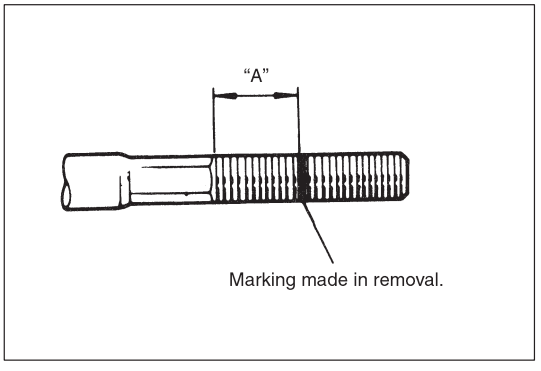


3) Bend lock washer to tie rod side as shown.



1. Wire
2. Rack side case
3. Clip
4. Tie rod

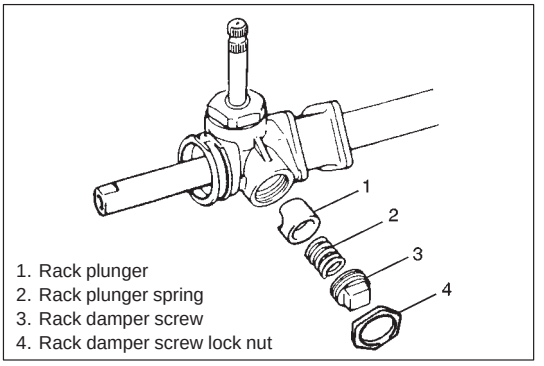
4) Position boot properly in grooves of gear case and tie rod and clamp it with wire and clip.
   Wire should be new and should go around twice and be tightened with its both ends twisted together. The twisted ends should be bent in the circumferential direction. After this, check to ensure that boot is free from twist and dent.



5) Install tie rod end lock nut and tie rod end to tie rod. Position lock nut to marking made in removal.

   NOTE:
   When tie rod was replaced, measure length "A" on removed tie rod and use it on new replacement tie rod so as to position lock nut properly.

6) For installation procedures following the above, use Steps 1) to 9) in STEERING GEAR CASE INSTALLATION of this section.

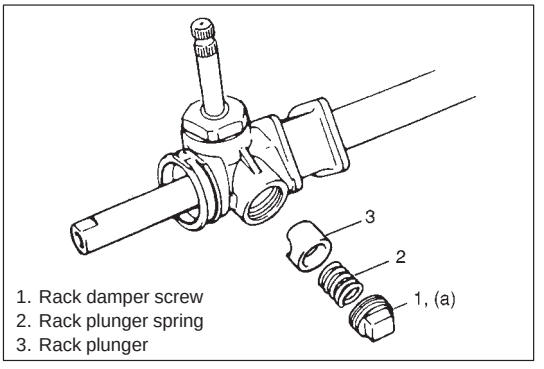


1. Rack plunger
2. Rack plunger spring
3. Rack damper screw
4. Rack damper screw lock nut

REMOVE AND INSTALL STEERING RACK PLUNGER

REMOVAL

1) Remove rack boots and tie rods.
2) Remove rack damper screw lock nut, rack damper screw, rack damper spring and rack plunger.



1. Rack damper screw
2. Rack plunger spring
3. Rack plunger

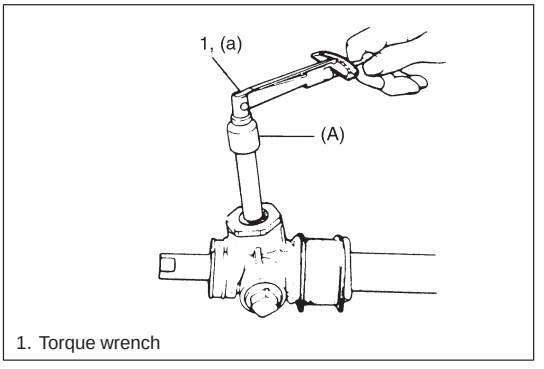
INSTALLATION

1) Apply grease lightly to sliding part of plunger against rack.

   Grease: SUZUKI SUPER GREASE E (99000-25050)

2) Install rack plunger, rack plunger spring, rack damper screw to steering case in direction shown. Tighten rack damper screw to specified torque.

   Tightening Torque
   (a): 15 N·m (1.5 kg-m, 10.8 lb-ft)



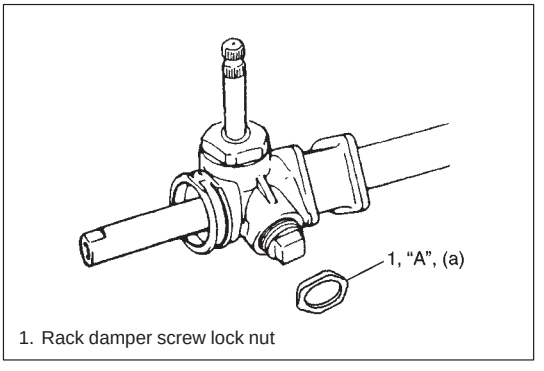
1. Torque wrench

3) After tightening rack damper screw to above specified torque, turn it back by 80· – 90· and check for rotation torque of pinion. If it is not as specified below, adjust so that it will be within specified torque range.

   Special Tool
   (A): 09944-18220

   Rotation Torque of pinion
   (a): 1.0 – 1.8 N·m (0.10 – 0.18 kg-m, 0.75 – 1.30 lb-ft)

   Also, check if rack as a whole moves smoothly.



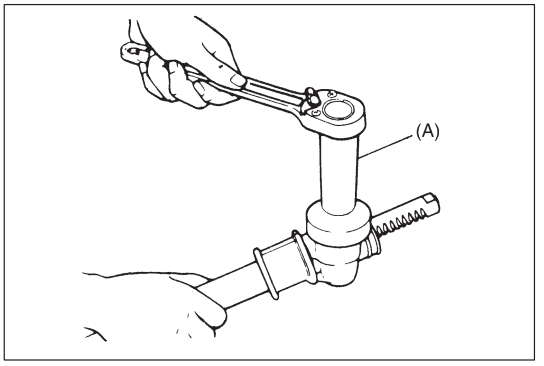
1. Rack damper screw lock nut

4) Apply sealant to thread part of rack damper screw lock nut and tighten it to specified torque by not turning damper screw position adjusted in step 3).

   "A": Sealant 99000-31150

   Tightening Torque
   (a): 40 N·m (4.0 kg-m, 29.0 lb-ft)

5) Follow Steps 1) to 6) of RACK BOOT/TIE ROD INSTALLATION of this section.

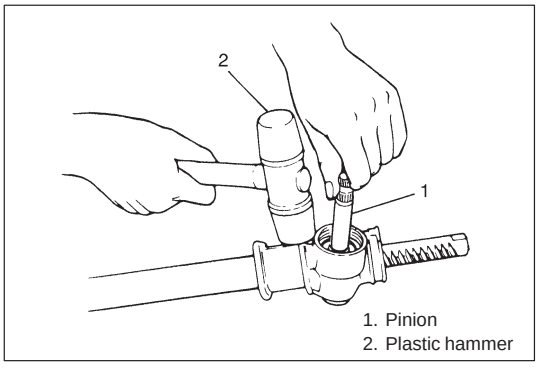


REMOVE AND INSTALL STEERING PINION

REMOVAL

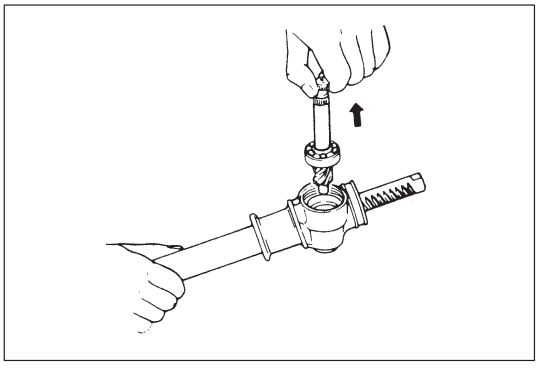
1) Remove rack plunger.
2) Remove bearing plug with special tool (A).

Special Tool (43 mm socket)
(A): 09944-26011

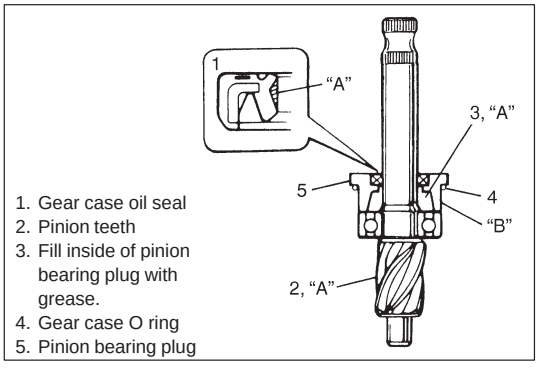


1. Pinion
2. Plastic hammer

3) Tap on position as shown with plastic hammer to separate pinion assembly from housing.



4) Remove pinion assembly.



1. Gear case oil seal
2. Pinion teeth
3. Fill inside of pinion bearing plug with grease.
4. Gear case O ring
5. Pinion bearing plug

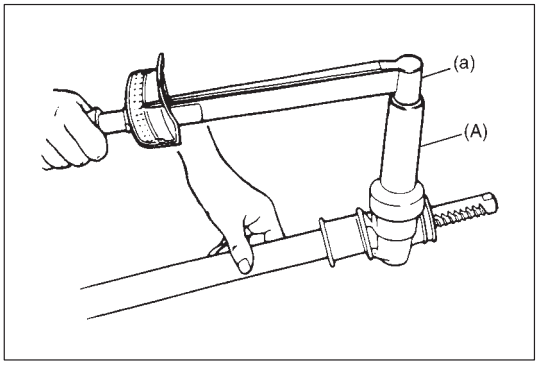
INSTALLATION

1) Apply grease to all around pinion teeth, pinion needle bearing and gear case oil seal lip.

"A": Grease 99000-25050

2) Apply lock cement to pinion bearing plug thread.

"B": Lock Cement 99000-32050

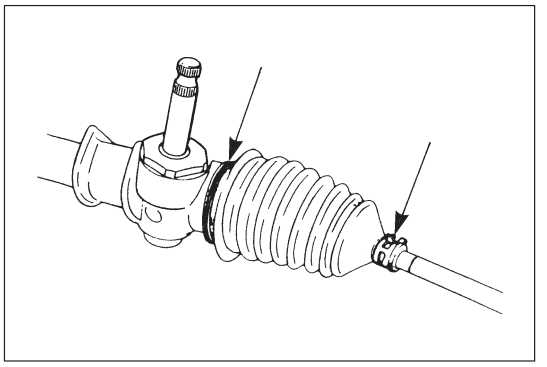


3) Install pinion assembly.
4) Tighten pinion bearing plug to specified torque.

Special Tool (43 mm socket)
(A): 09944-26011

Tightening Torque
(a): 100 N·m (10.0 kg-m, 75.0 lb-ft)

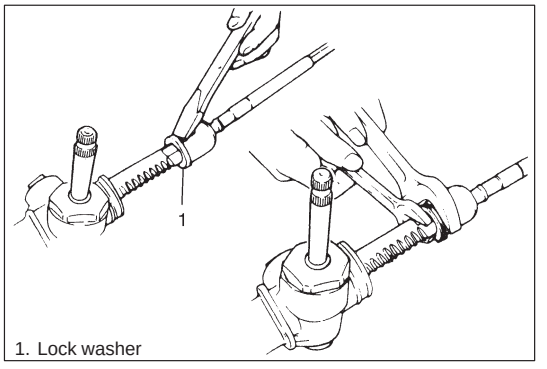
5) Install rack plunger by performing Steps 1) to 5) in STEERING RACK PLUNGER INSTALLATION of this section.



REMOVE AND INSTALL STEERING RACK

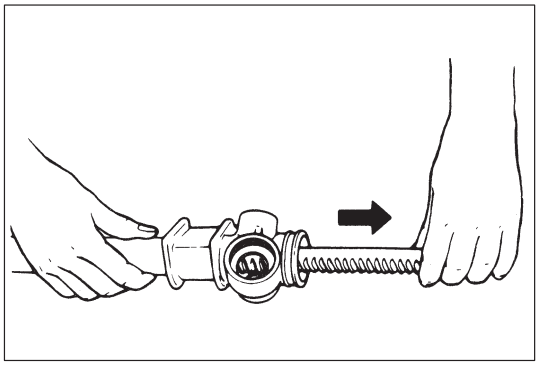
REMOVAL

1) Remove steering gear case.
2) Remove boot wires and clips.
3) Move both boots toward tie rod end.

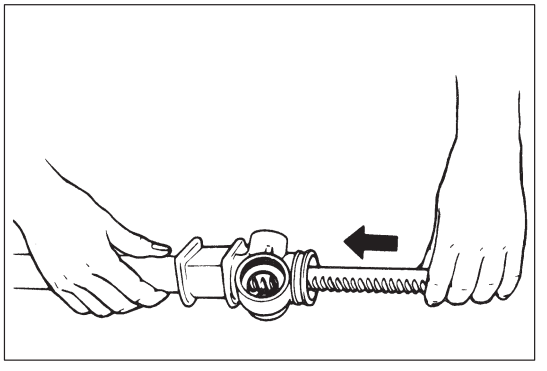


1. Lock washer

4) Unbend bent part of tie rod lock washers and remove tie rods from right and left sides of steering rack.
5) Mark left and right tie rods accordingly.
6) Remove rack plunger and pinion assembly from gear case by performing Steps 1) to 4) in STEERING PINION REMOVAL of this section.



7) Remove rack from gear case. Direction for rack removal is as shown.

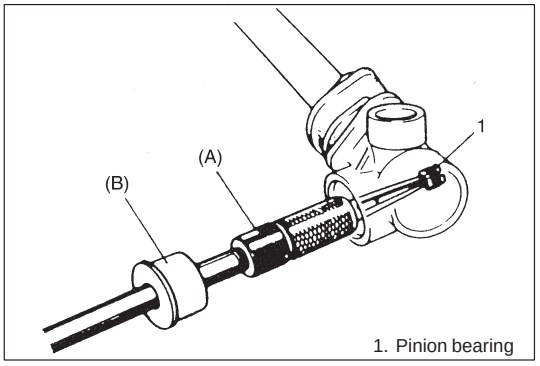


INSTALLATION

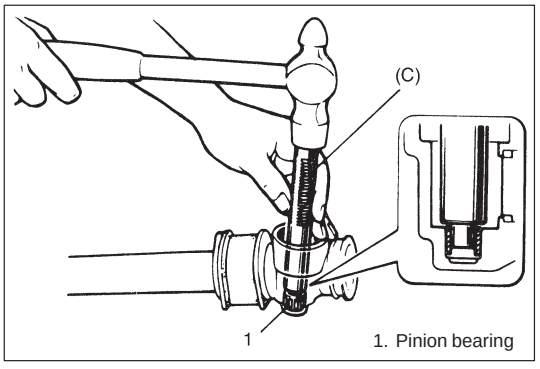
1) Apply grease to entire teeth surface of rack and its periphery.
2) Slide rack into steering gear case in the direction as shown.

CAUTION:
Inside of steering rack bushing is coated with special coating. As it is damageable, be very careful not to cause damage to it when inserting rack into steering gear case.

3) Install pinion assembly to gear case by performing Steps 1) to 4) in STEERING PINION INSTALLATION of this section.
4) Perform Steps 1) to 4) in STEERING RACK PLUNGER INSTALLATION of this section.
5) Follow Steps 1) to 6) in RACK BOOT/TIE ROD INSTALLATION of this section.



1. Pinion bearing



1. Pinion bearing

REMOVE AND INSTALL PINION BEARING

REMOVAL

1) Remove rack from steering gear case, referring to STEERING RACK REMOVAL of this section.
2) Pull out pinion bearing from gear case with special tools (A)and (B) as shown.

Special Tools
(A): 09921-20200
(B): 09930-30104

INSTALLATION

1) Apply grease to rollers of pinion bearing.
2) Press-fit pinion bearing into gear case with special tool (C) as shown.
   After press-fitting, make sure that bearing rollers are in- stalled properly.

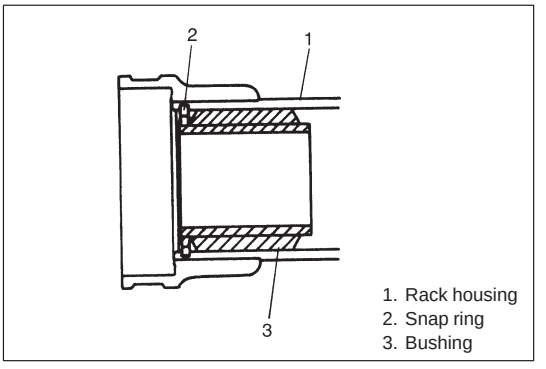
Special Tool
(C): 09943-88211

3) Follow Steps 1) to 5) in STEERING RACK INSTALLATION of this section to complete installation.

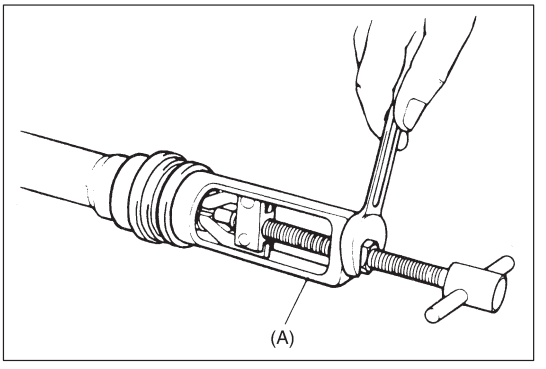
REMOVE AND INSTALL RACK BUSHING

REMOVAL

NOTE:
When removing rack bushing, be careful not to pull out bushing by holding gear case in a vise. Or housing (pipe) may come off gear case. For this work, be sure to use the specified special tool.



1) Remove rack from steering gear case, referring to STEERING RACK REMOVAL of this section.
2) Remove snap ring.

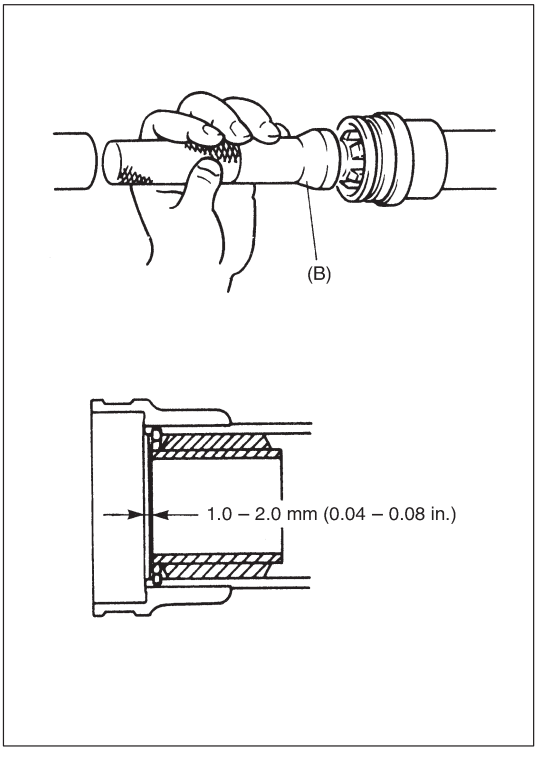


3) Pull out bushing from rack housing with special tool (A) as shown.

Special Tool
(A): 09944-48210

INSTALLATION

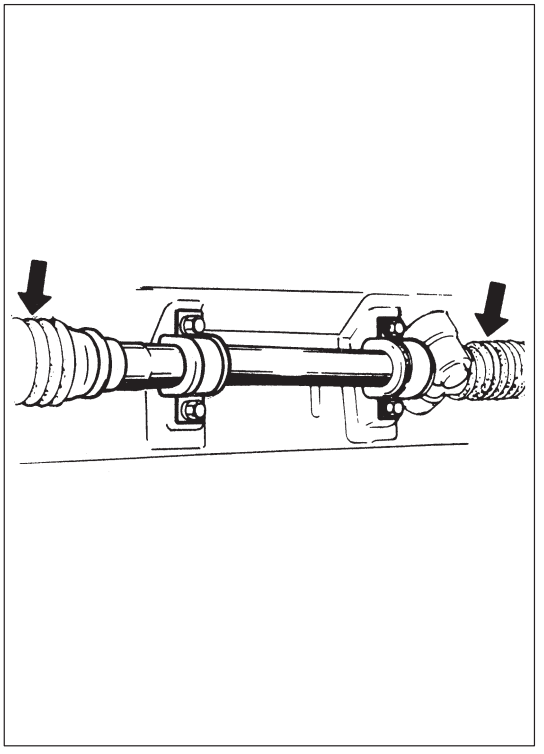
1) Apply grease lightly to entire inner surface of bushing and confirm that it is free from any damage or scratch.
2) Press-fit bushing as far into rack housing as shown by using special tool (B).



CAUTION:
Inside of bushing is coated with special coating. As it is damageable, be sure to use special tool and special care not to cause damage to inside of bushing when press-fitting it.

Special Tool
(B): 09943-78210

3) Install new snap ring.
4) Follow Steps 1) to 5) in STEERING RACK INSTALLATION of this section to complete installation.



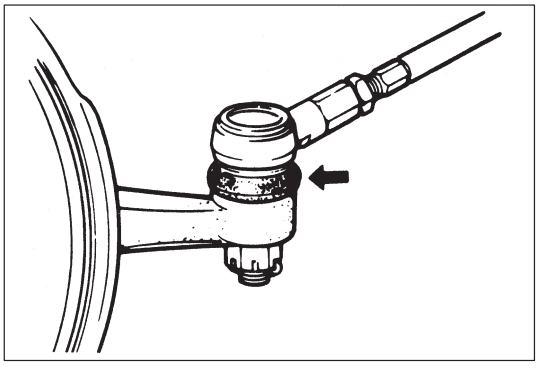
RACK AND PINION INSPECTION

STEERING RACK BOOT

Hoist vehicle.

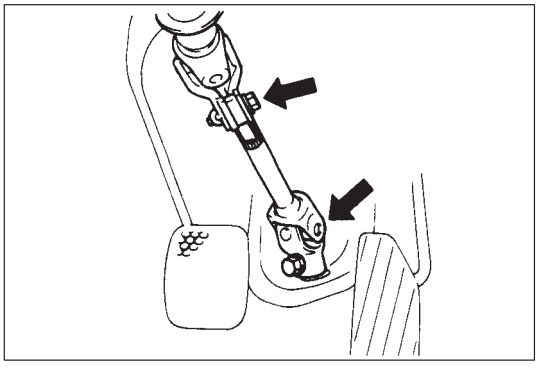
Inspect each boot for tear. A torn boot allows entry of dust and water which can cause wear to steering rack and pinion to produce noise as well as rust to result in malfunction of steering system. If even a small tear is noted, replace with new one.

Boots should be visually inspected for any damage and tear during every periodical inspection at specified intervals and whenever car is hoisted for any other purpose.



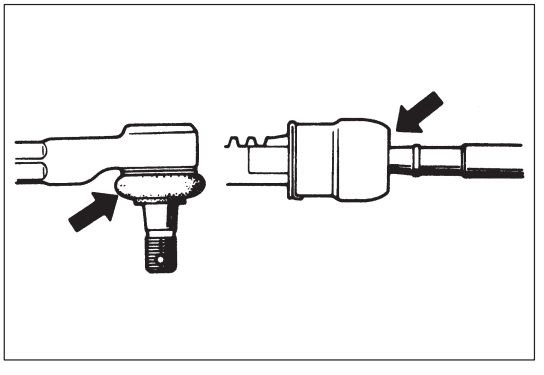
TIE ROD END BOOTS

Inspect each boot for tear. If even a small tear is noted, replace with new one.



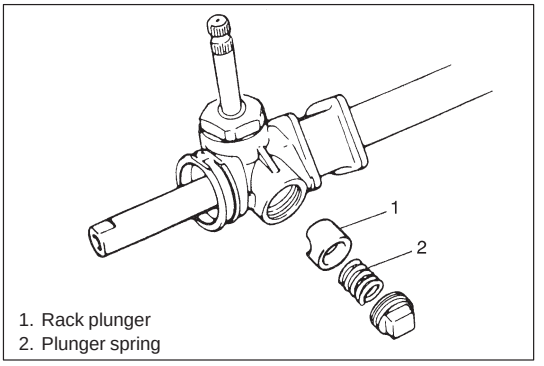
STEERING SHAFT JOINT

Check shaft joint for wear, breakage and other damage and replace if any defect exists.



TIE ROD END

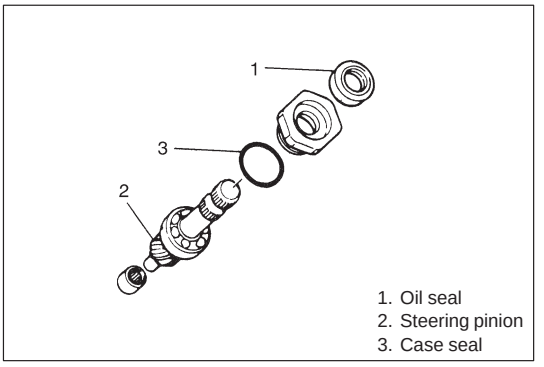
1) Inspect for play in ball joint.
2) Inspect for play in rack end ball joint.
   In either case, if found defective, replace.



1. Rack plunger
2. Plunger spring

RACK PLUNGER

1) Inspect rack plunger for wear or damage.
2) Inspect rack plunger spring for deterioration.
   In either case, if found defective, replace.



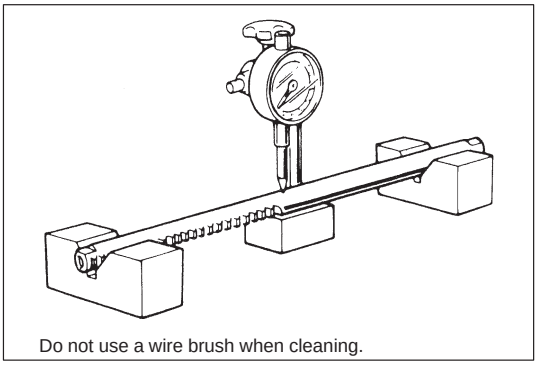
1. Oil seal
2. Steering pinion
3. Case seal

STEERING PINION

1) Inspect pinion teeth surface for wear or damage.
2) Inspect oil seal for damage.
3) Inspect gear case packing for damage.
   Replace any part found defective.

STEERING PINION BEARING

Check rotation condition of bearing and inspect for wear.
If found defective, replace.



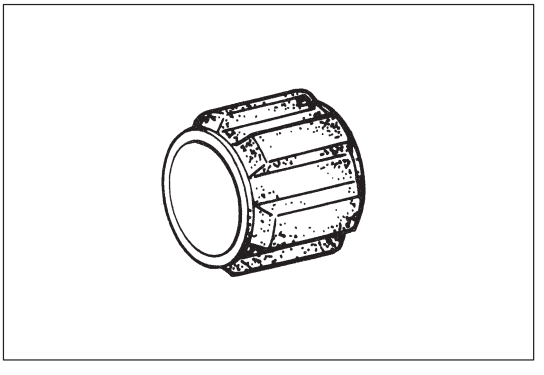
Do not use a wire brush when cleaning.

STEERING RACK

Inspect for deflection, teeth wear, or damage, back surface wear or damage.

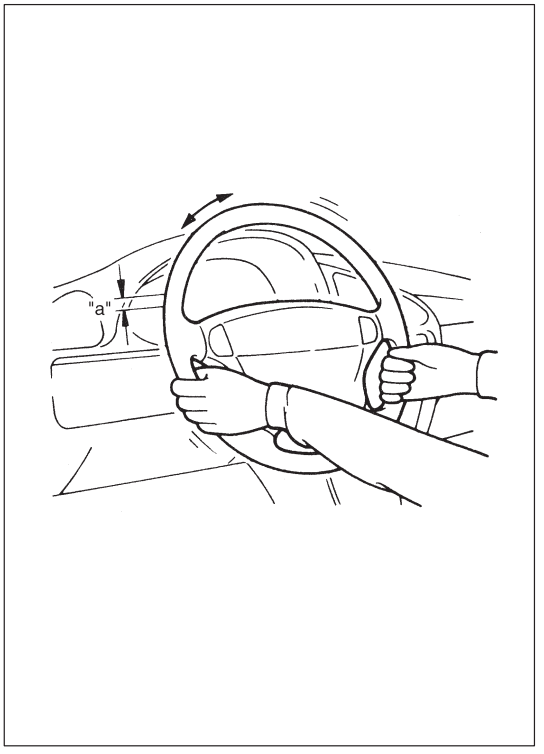
Limit of rack deflection: 0.40 mm (0.016 in.)

If deflection exceeds limit, replace rack.



STEERING RACK BUSHING

Inspect rack bushing for wear or damage.
If found defective, replace.



STEERING WHEEL

Check steering wheel for play and rattle, holding car in straight forward condition on the ground.

Steering wheel play "a": 0 – 30 mm (0 – 1.2 in.)

If steering wheel play is not within specification, inspect as follows and replace if found defective.

- ○ Tie-rod end ball stud for wear
- ○ Lower ball joint for wear
- ○ Steering shaft joint for wear
- ○ Steering pinion or rack gear for wear or breakage
- ○ Each part for looseness

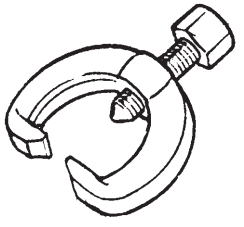
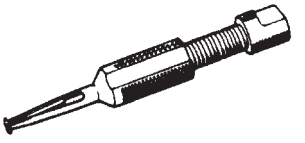
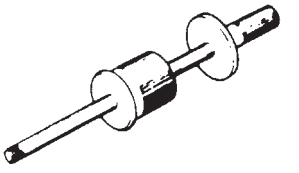
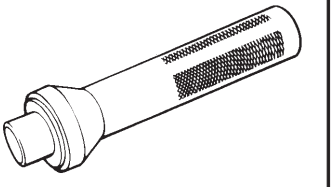
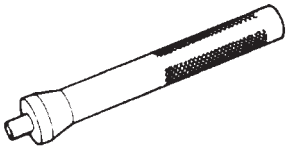
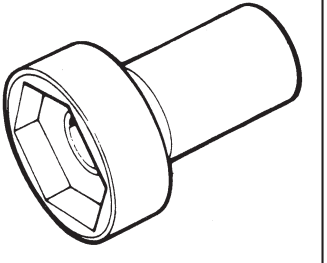
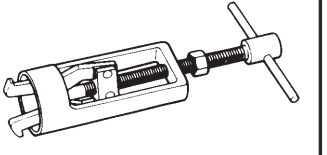
TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Steering shaft joint bolts	25	2.5	18.0
Steering gear case bolts	55	5.5	40.0
Tie-rod end castle nuts	35 – 55	3.5 – 5.5	25.5 – 39.5
Tie-rod end lock nuts	45	4.5	32.5
Steering pinion bearing plug	100	10.0	75.0
Tie-rod	85	8.5	61.5
Wheel nut			

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease (should be applicable for –40· C ∽ 130· C)	SUPER GREASE (E) (99000-25050)	○ Sliding part of rack against steering housing (All around rack plunger, rack bushing and rack) ○ Sliding part against steering pinion (Oil seal lip, needle bearing) ○ Steering rack and pinion gear teeth ○ Filled into pinion bearing cap ○ Contacting parts of tie-rod and rack side boots ○ Rack end ball joint
Sealant	BOND NO.1215 (99000-31110)	○ Rack damper screw thread

SPECIAL TOOLS

 09913-65210 Tie-rod end remover	 09921-20200 Pinion bearing remover	 09930-30104 Sliding shaft	 09943-78210 Rack bush installer
 09943-88211 Pinion bearing installer	 09944-18220 Pinion torque checking socket	 09944-26011 43 mm Socket (Pinion bearing plug remover)	 09944-48210 Rack bush remover

SECTION 3B1

POWER STEERING (P/S) SYSTEM

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System:
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
- **Some parts in the Power Steering Gear Box cannot be disassembled or adjusted. For detailed information, refer to the description of POWER STEERING GEAR BOX COMPONENTS under REMOVE AND INSTALL POWER STEERING GEAR BOX.**
- **All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.**
- **Although the figures in this section show only the left-hand steering vehicle, the same work procedure and data apply to the right-hand steering vehicle.**

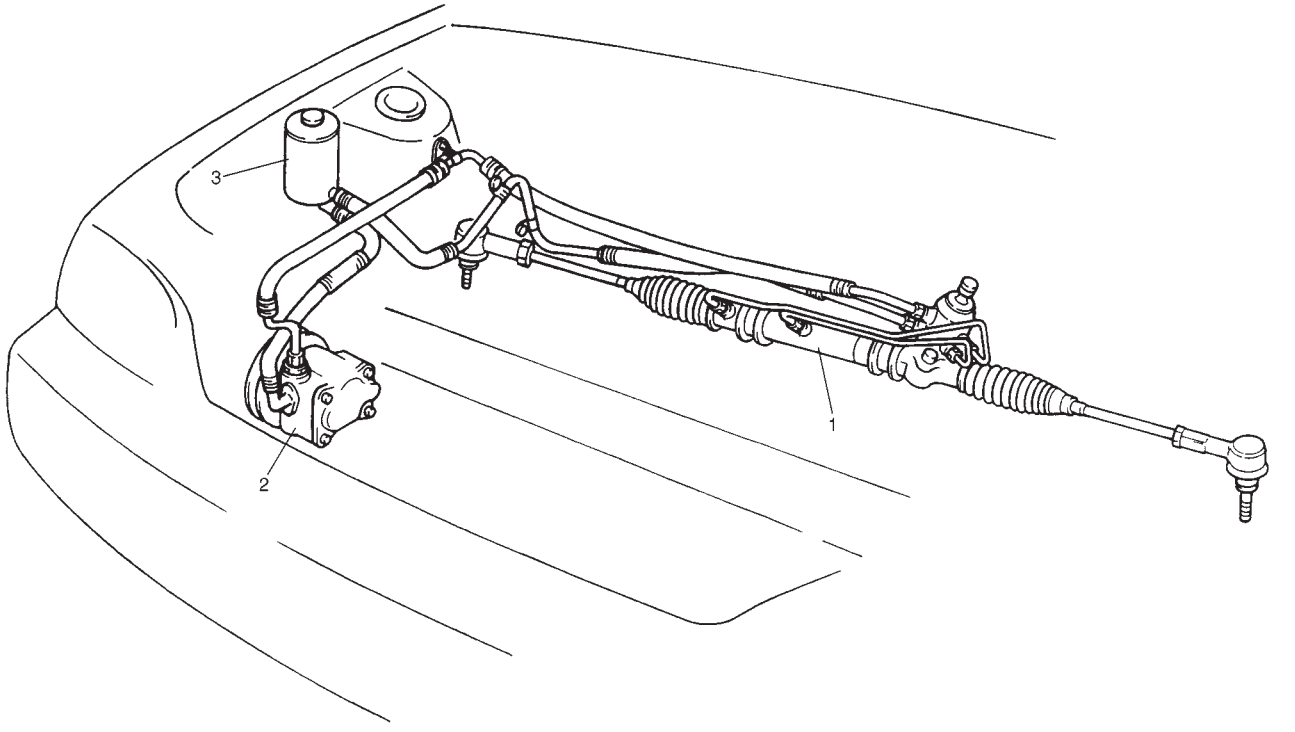
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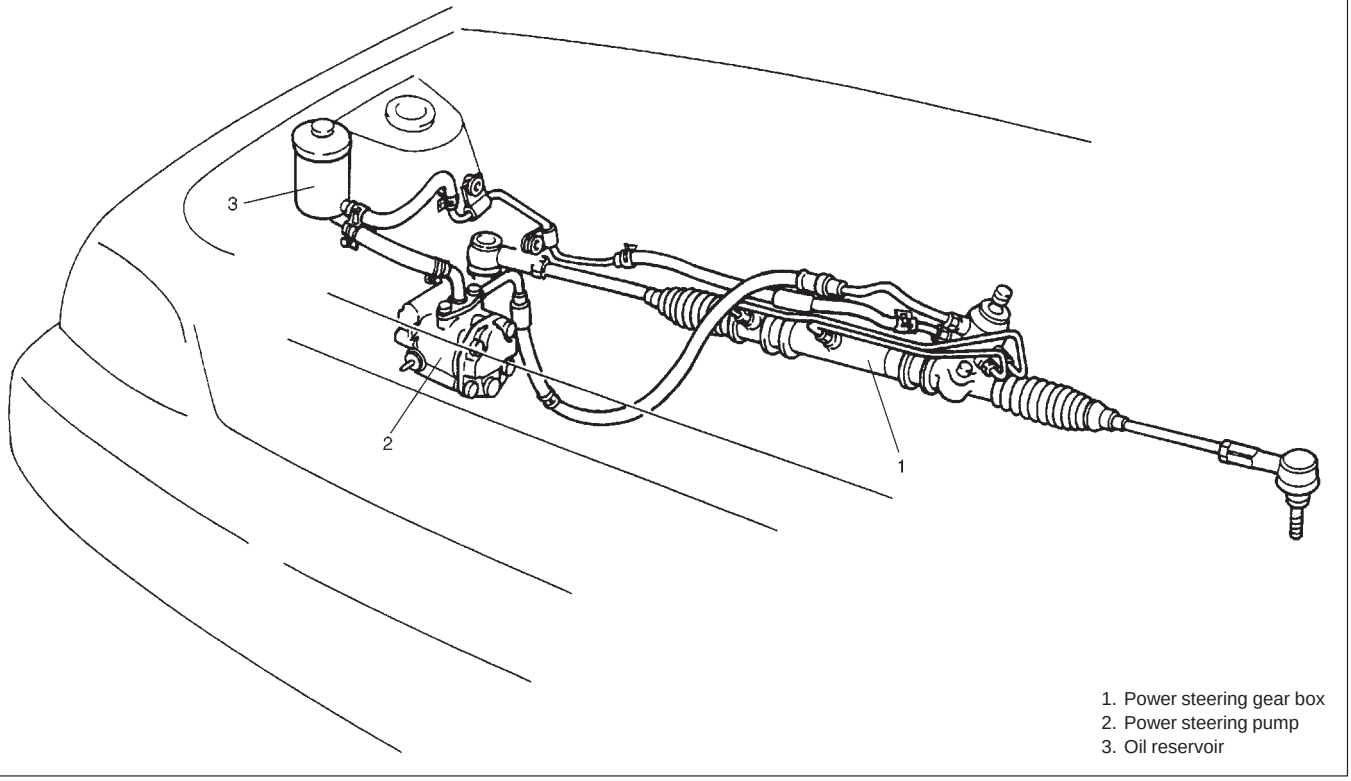
GENERAL DESCRIPTION

The power steering (P/S) system in this vehicle reduces the driver's effort needed in turning the steering wheel by utilizing the hydraulic pressure generated by the power steering (P/S) pump which is driven by the engine. It is an integral type with the rack and pinion gears and the control valve unit, hydraulic pressure cylinder unit all built in the steering gear box.

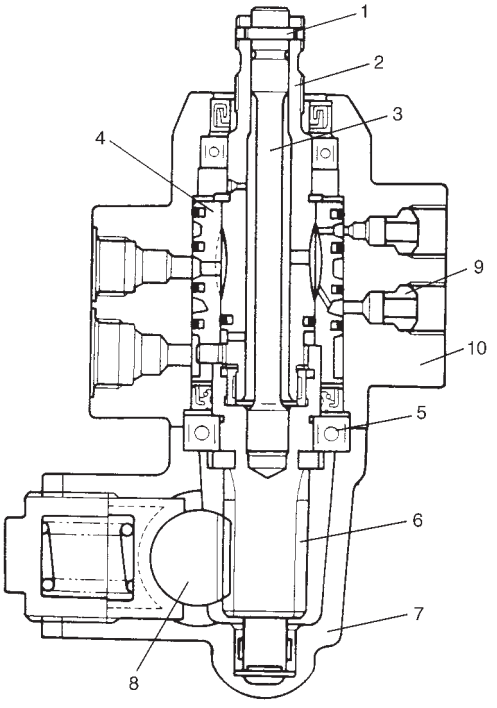
[1.3 L and 1.6 L engine models]



[1.8 L engine model]



1. Power steering gear box
2. Power steering pump
3. Oil reservoir



1. Pin
2. Stub shaft (Rotor)
3. Torsion bar
4. Sleeve
5. Bearing
6. Pinion
7. Gear box
8. Rack
9. Ferrule
10. Valve case

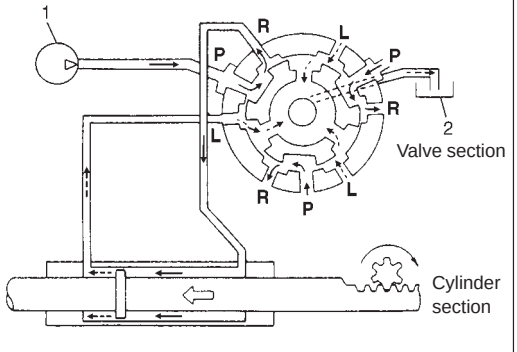
STEERING GEAR BOX

The steering gear box consists of two sections: one including a cylinder and the other a valve. Main components of the cylinder section are a gear box, a rack and a tube and those of the valve section are a valve case, a sleeve and a stub shaft. The sleeve is linked with the pinion through a pin and the valve and stub shaft are integrated into one unit. Then the pinion and the stub shaft are linked to each other by means of the torsion bar.

Thus, when the stub shaft moves, the valve changes its position, thereby switching the hydraulic passage from the pump to the cylinder to help steering operation.

When turning the steering wheel feels heavy due to P/S fluid leakage or for some other reason (i.e., when in the manual steering mode), the stub shaft and pinion are in direct linkage and the force is output directly through the pinion and rack.

Fluid flow when steering turned to the right.



P : Pump port
T : Tank port
R : Right cylinder port
L : Left cylinder port

1. Pump
2. Tank

OPERATION

When Steering Wheel Held at Straight Position

When the steering wheel is not turned, the valve is held at the neutral position by the torsion bar and the fluid from the pump flow through the valve back to the tank. (See page 3B1-2.)

When Steering Wheel Turned (to the right)

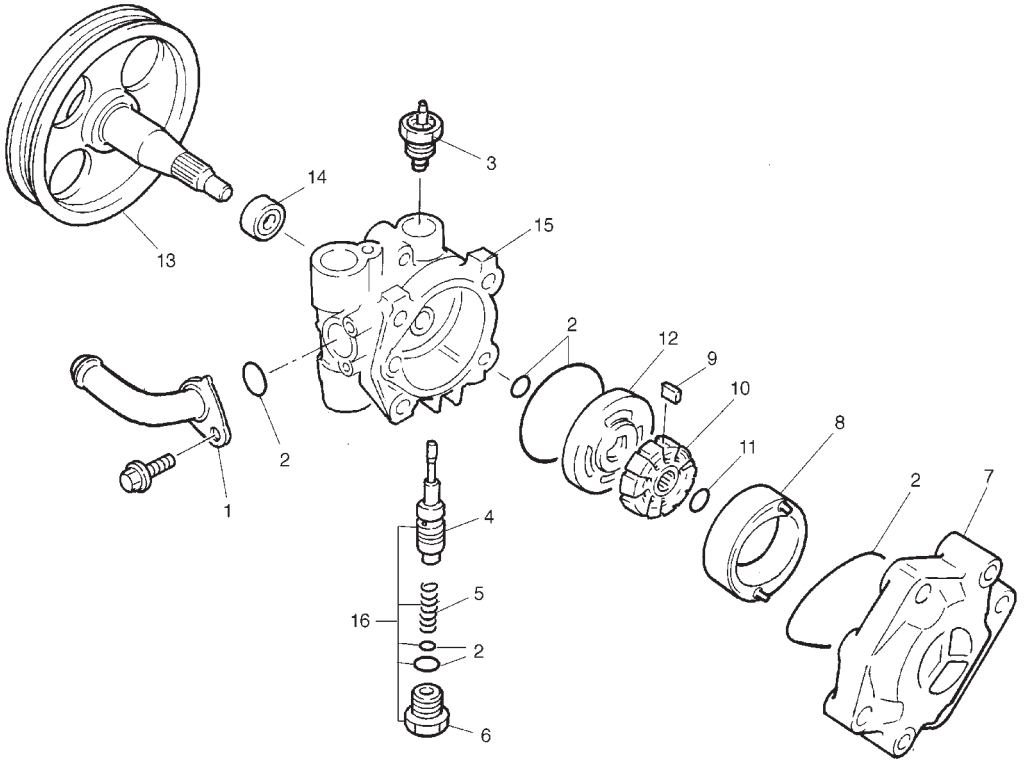
Turning the steering wheel clockwise will cause the stub shaft to turn clockwise, twisting the torsion bar.

Then the valve is switched to allow the fluid pressure to be applied to the cylinder which then pushes the rack.

As the rack moves, the pinion turns clockwise to actuate the torsion bar which then causes the valve to return to the neutral position. This is called the feed back operation of the power steering system.

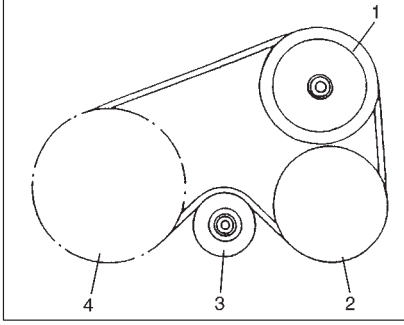
POWER STEERING (P/S) PUMP

The power steering pump is a vane type and is driven by the V-ribbed belt from the crankshaft.

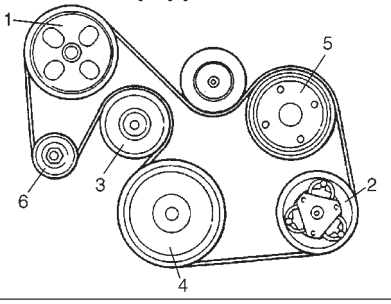


1. Suction connector
2. O-ring
3. Pressure switch
4. Flow control valve (Relief valve)
5. Spring
6. Plug
7. Pump cover
8. Cam ring
9. Vane
10. Rotor
11. Snap ring
12. Side plate
13. Pulley (pump shaft)
14. Oil seal
15. Pump body
16. Flow control valve assembly

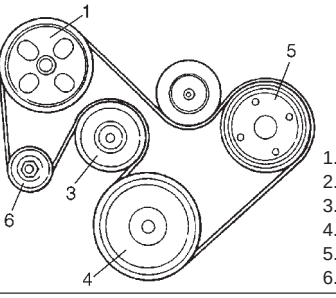
[1.3 L and 1.6 L engine models]



[1.8 L engine model]
Vehicle equipped with A/C



Vehicle without A/C

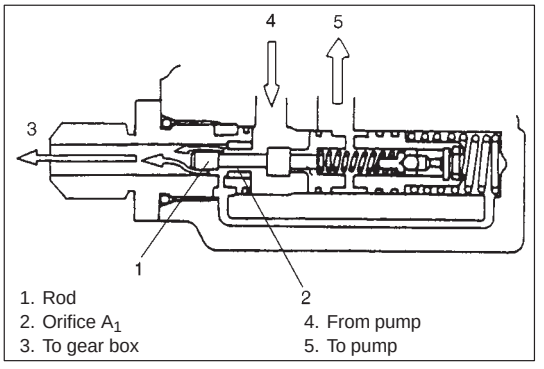


1. P/S pump pulley
2. A/C compressor pulley
3. Tensioner pulley
4. Crankshaft pulley
5. Water pump pulley
6. Generator pulley

Model		Vane type
Hydraulic pressure control	Relieved pressure	[1.3 L and 1.6 L engine models] 7500 kPa (75 kg/cm^2 or 1067 psi) [1.8 L engine model] 8500 kPa (85 kg/cm^2 or 1209 psi)
	Control device	Flow control valve
		Relief valve
Power steering pressure switch		Switch turns on (closes) when the pressure is higher than 3100 – 3900 kPa (31 – 39 kg/cm^2, 441 – 554 psi). ECM uses this signal for idle speed control.

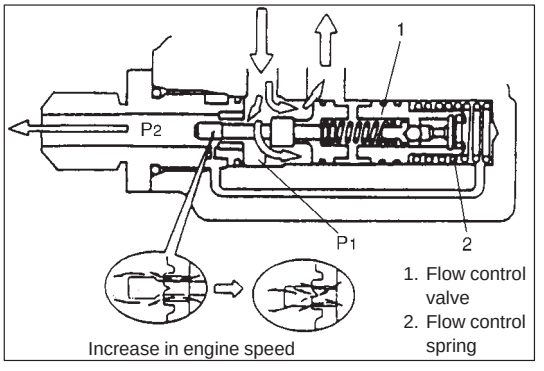
FLOW CONTROL VALVE

As the discharge rate of the P/S pump increases in proportion to the pump revolution speed, a flow control valve is added to control it so that the optimum amount of fluid for steering operation is supplied according to the engine speed (driving condition).
Described below is its operation at different engine speed.



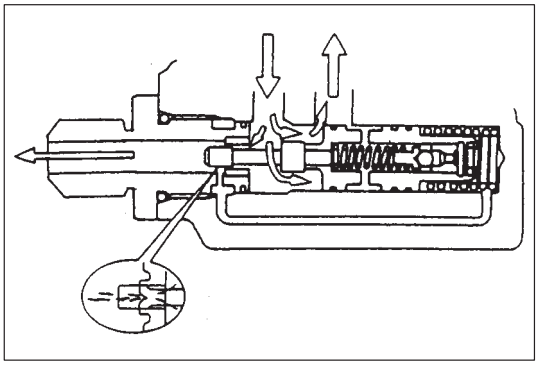
When Idling

The fluid discharged from the pump is supplied through the clearance around the rod in orifice A_1 to the gear box.



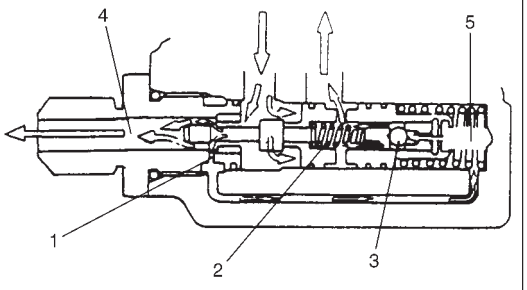
When Running at Low Speed

As the engine speed rises, the pump discharge rate increases and causes a pressure difference to occur between both ends of the orifice ($P_1 - P_2$). Thus the pressure exceeding the flow control spring force pushes the flow control valve to the right in left figure, making the opening in the orifice narrower through which only a necessary amount of fluid is fed to the gear box and the excess fluid is returned to the pump.



When Running at High Speed

As the engine speed rises higher, opening in the orifice is made narrower and fluid flow to the gear box reduces. As a result, hydraulic pressure application is slow at the start of the steering wheel turn. This provides straight-ahead stability to suit the driving condition with the steering wheel operated near its neutral position.



1. Orifice A_2
2. Relief valve spring
3. Steel ball
4. Chamber A
5. Chamber B

RELIEF VALVE

The relief valve located in the flow control valve controls the maximum hydraulic pressure.

The steel ball in the relief valve is under the hydraulic pressure in the circuit coming through orifice A_2. When the steering wheel is turned and the hydraulic pressure increases higher than 8000 kPa (80 kg/cm^2, 1137 psi), it compresses the relief spring to push the steel ball which then allows the fluid to flow to the P/S pump.

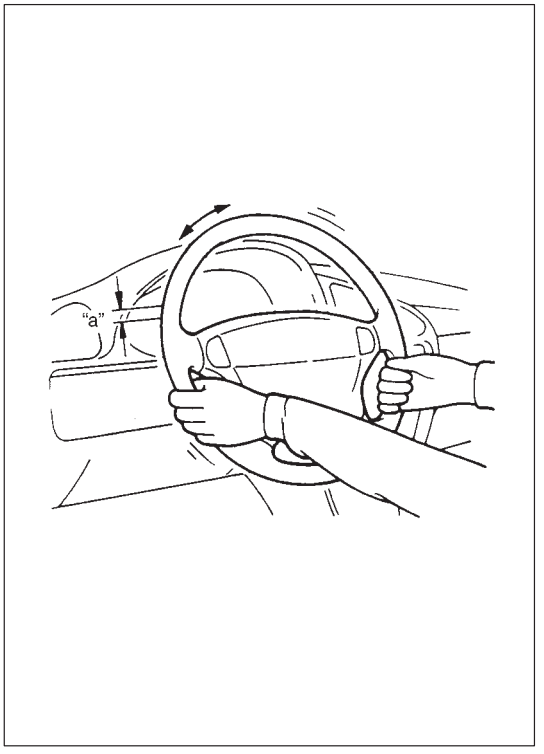
Such relief valve operation causes a pressure difference to occur between chambers A and B.

Then the flow control valve moves to the right to make opening in orifice A_1 narrower, maintaining the hydraulic pressure constant.

DIAGNOSIS

Condition	Possible Cause	Correction
Steering wheel feels heavy (at low speed)	○Fluid deteriorated, low viscosity, different type of fluid mixed	Replace fluid.
	○Pipes or hoses deformed, air entering through joint	Replace defective part.
	○Insufficient air purging from P/S circuit	Purge air.
	○P/S belt worn, lacking in tension	Adjust belt tension or replace belt as necessary.
	○Tire inflation pressure excessively low	Inflate tire.
	○Front end alignment out of order	Check and adjust front end alignment.
	○Steering wheel installed improperly (twisted)	Install steering wheel correctly.
	○Bind in tie rod or tie rod end ball joint	Replace defective part.
	○P/S pump hydraulic pressure fails to increase	Check pressure and repair or replace defective part.
	○P/S pump hydraulic pressure increases but slowly	Check pressure and repair or replace defective part.
	○Steering gear box malfunction	Replace gear box.
Steering wheel feels heavy momentarily when turning it to the left or right	○Air drawn in due to insufficient amount of fluid	Add fluid and purge air.
	○Slipping P/S belt	Adjust belt tension or replace belt as necessary.
	○P/S pump hydraulic pressure fails to increase	Check pressure and repair or replace defective part.
	○P/S pump hydraulic pressure increases but slowly	Check pressure and repair or replace defective part.
	○Steering gear box malfunction	Replace gear box.
Poor recovery from turns	**NOTE:** **To check steering wheel for recovery, with vehicle running at 22 mile/h (35 km/h), turn steering wheel 90· and let it free. If should return more than 60· .**	
	○Deformed pipes or hoses	Replace defective part.
	○Steering column installed improperly	Install steering column correctly.
	○Front end alignment out of order	Check and adjust front end alignment.
	○Ball joints binding	Replace defective part.
	○P/S pump hydraulic pressure fails to increase	Check pressure and repair or replace defective part.
	○P/S pump hydraulic pressure increases but slowly	Check pressure and repair or replace defective part.
	○Steering gear box malfunction	Replace gear box.

Condition	Possible Cause	Correction
Vehicle pulls to one side during straight driving	○Mismatched or uneven tire	Replace tire.
	○Low or uneven tire inflation pressure	Inflate tires to proper pressure or adjust right & left tires inflation pressure.
	○Brake dragging in one wheel	Repair.
	○Front end alignment out of order	Check and adjust front end alignment.
	○Rear end alignment out of order	Check and adjust rear end alignment.
	○Malfunction of control valve in gear box	Replace gear box.
Steering wheel play is large and vehicle wanders	○Refer to “Diagnosis” in Section 3.	
Fluid leakage	○Loose joints of (hydraulic pressure) pipes and hoses	Retighten.
	○Deformed or damaged pipes or hoses	Replace defective part.
Abnormal noise	○Air drawn in due to insufficient amount of fluid	Add fluid and purge air.
	○Air mixed into fluid from pipes or hoses	Replace pipes or hoses.
	○Slipping (loose) P/S belt	Adjust belt tension.
	○Worn P/S belt	Replace belt.
	○Loose gear box fastening bolt	Retighten bolts.
	○Loose linkage or joints	Retighten.
	○Pipes or hoses in contact with part of vehicle body	Install pipes and hoses correctly.
	○Vanes of P/S pump defective	Replace defective part.
	○Malfunction of control valve in gear box	Replace gear box.
	○Bearing of P/S pump shaft defective	Replace bearing.



ON-VEHICLE SERVICE

INSPECTION

STEERING WHEEL PLAY

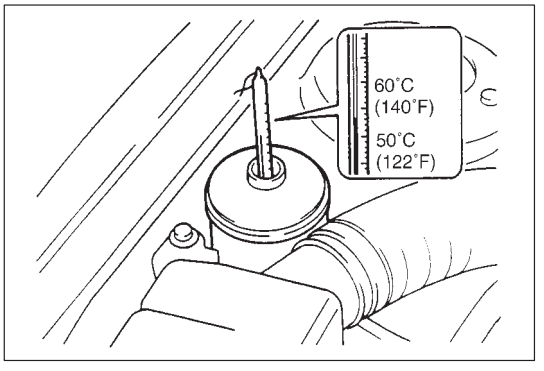
Check steering wheel for looseness or rattle by trying to move it in its shaft direction and lateral direction.
If found defective, repair or replace.

Check steering wheel for play, holding car in straight forward condition on the ground and with engine stopped.

Steering wheel play "a": 0 – 30 mm (0 – 1.2 in.)

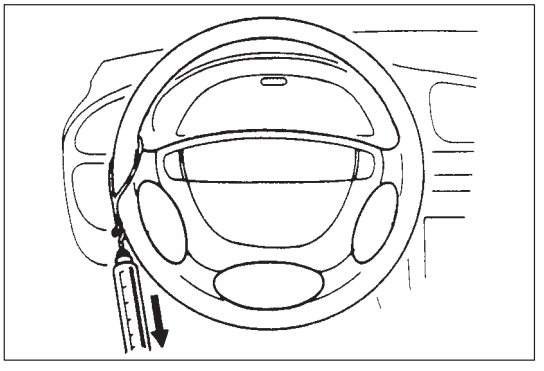
If steering wheel play is not within specification, inspect as follows and replace if found defective.

- ○ Tie-rod end ball stud for wear
- ○ Lower ball joint for wear
- ○ Steering shaft joint for wear
- ○ Steering pinion or rack gear for wear or breakage
- ○ Each part for looseness



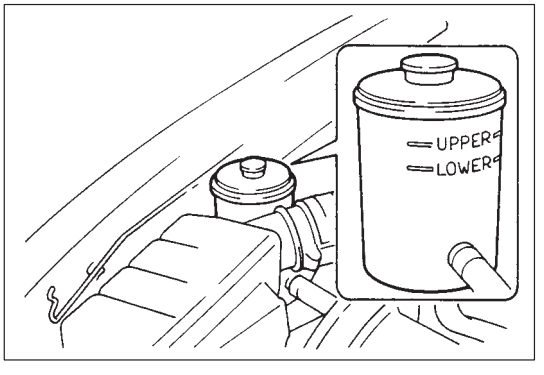
STEERING FORCE

1) Place vehicle on level road and set steering wheel at straight-ahead position.
2) Check that tire inflation pressure is as specified. (Refer to tire placard.)
3) Start engine and keep it running till power steering fluid is warmed to 50 – 60· C (122 – 140· F).



4) With engine idling, measure steering force by pulling spring balancer hooked on steering wheel in tangential direction.

   Steering force: Less than 40 N (4.0 kg, 8.8 lb)



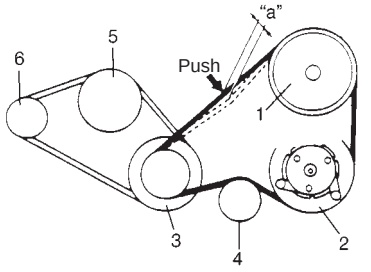
POWER STEERING FLUID LEVEL

With engine stopped, check fluid level indicated on P/S fluid reservoir, which should be between "UPPER" and "LOWER" marks.
If it is lower than "LOWER" mark, fill fluid up to "UPPER" mark.

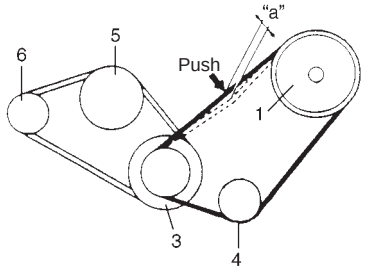
NOTE:

- ○ **Be sure to use an specified power steering fluid.**
- ○ **Fluid level should be checked when fluid is cool.**

For vehicle equipped with A/C



For vehicle not equipped with A/C



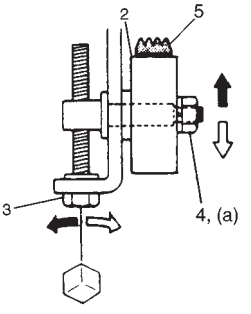
1. P/S pump pulley
2. A/C compressor pulley
3. Crankshaft pulley
4. Tension pulley
5. Water pump pulley
6. Generator

POWER STEERING BELT (1.3 L and 1.6 L engine models)

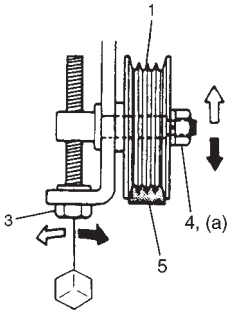
1) Detach air cleaner assembly from body and shift its position.
2) Check that belt is free from any damage and properly fitted in pulley groove.
3) Check belt tension by measuring how much it deflects when pushed at intermediate point between P/S pump pulley and crank pulley with about 10 kg (22 lb) force.

Deflection of P/S belt "a": 8 – 10 mm (0.32 – 0.39 in.)

For vehicle equipped with A/C



For vehicle not equipped with A/C



1. Tension pulley (with groove)
2. Tension pulley (without groove)
3. Tension bolt
4. Tension nut
5. Belt

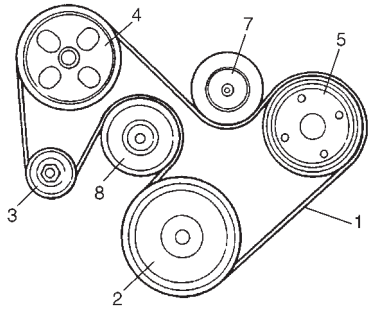
: Tension
: Loosen

POWER STEERING BELT TENSION ADJUSTMENT (1.3 L and 1.6 L engine models)

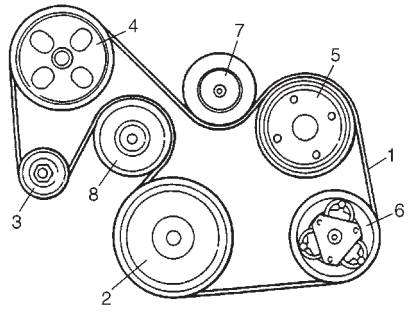
1) Remove engine under cover of right side and loosen tension nut.
2) Adjust belt tension.
   With A/C equipped vehicles, turning tension bolt counterclockwise causes pulley to rise, increasing belt tension.
   With A/C non-equipped vehicles, turning tension bolt clockwise causes pulley to lower, increasing belt tension.
   In both cases, turning tension bolt in the other way decreases belt tension.
   Be sure to tighten tension nut after adjusting belt tension.

Tightening Torque
(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

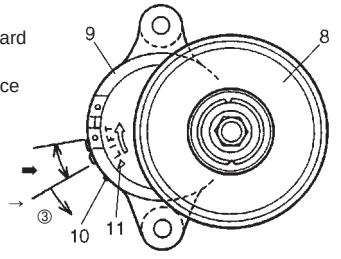
Vehicle without A/C



Vehicle equipped with A/C



➡: Standard
→: Limit
③: Replace



1. Generator belt
2. Crankshaft pulley
3. Generator pulley
4. Power steering pump pulley
5. Water pump pulley
6. A/C compressor pulley
7. Idler pulley
8. Tension pulley
9. Tensioner
10. Tension free point
11. Tension indicator

GENERATOR BELT (1.8 L engine model)

1) Remove engine under cover of right side from vehicle body.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
   If any of above conditions are found replace generator belt by referring to “GENERATOR BELT” in Section 6B.
3) Remove air cleaner outlet hose.
4) Check to make sure that tension indicator points within ➡ of the left figure by using mirror.
   If the indicator comes to ③ out of ➡ passing →, replace generator belt by referring to “GENERATOR BELT” in Section 6B.

IDLE UP SYSTEM

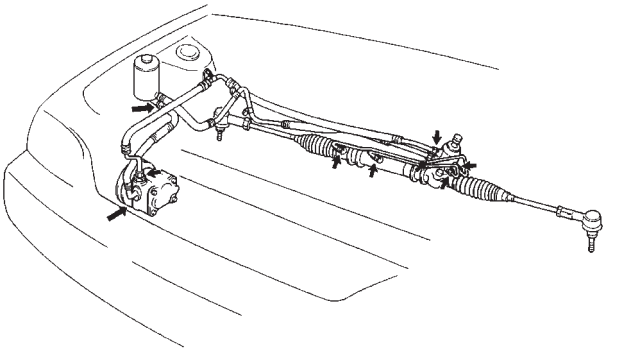
1) Warm up engine to normal operating temperature.
2) Turn A/C switch OFF, if equipped.
3) Turn steering wheel fully and check idle speed.
   Engine idle speed drops a little momentarily when steering wheel is turned fully but returns to its specified level immediately. If power steering pressure switch connector is connected, check the same with that connector disconnected. Momentary drop of engine idle speed should be less when it is connected than when disconnected.

FLUID LEAKAGE

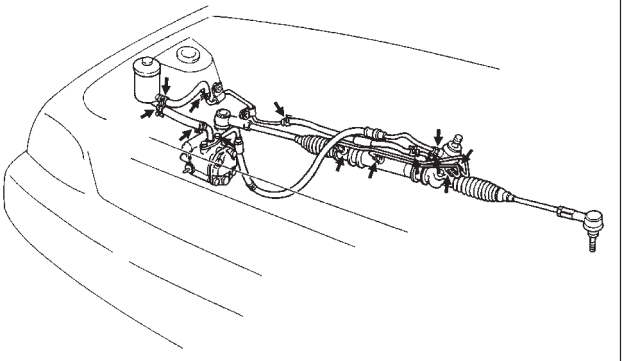
Start engine and turn steering wheel fully to the right and left so that maximum hydraulic pressure is provided. Then visually check gear box, P/S pump and P/S fluid reservoir themselves and each joint of their connecting pipes for leakage.

CAUTION:
Never keep steering wheel turned fully for longer than 10 seconds.

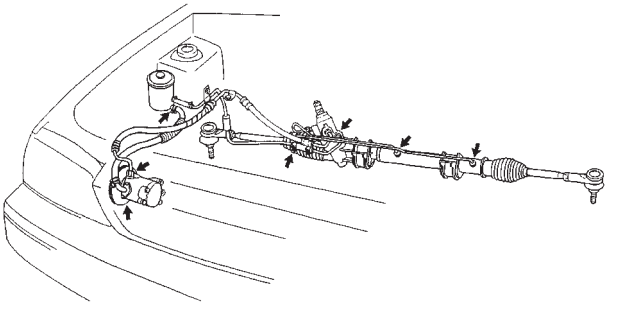
[1.3 L and 1.6 L engine models]
Left-Hand Steering Vehicle



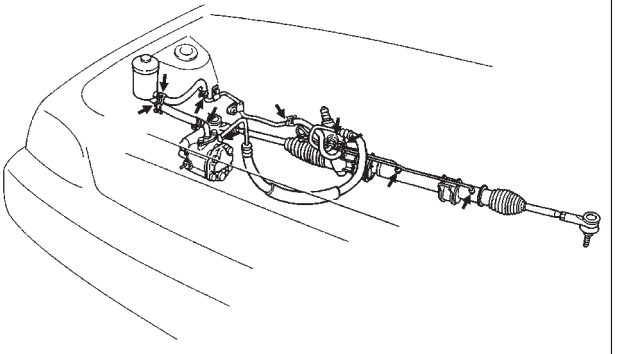
[1.8 L engine model]
Left-Hand Steering Vehicle



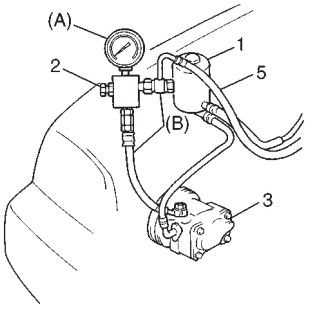
Right-Hand Steering Vehicle



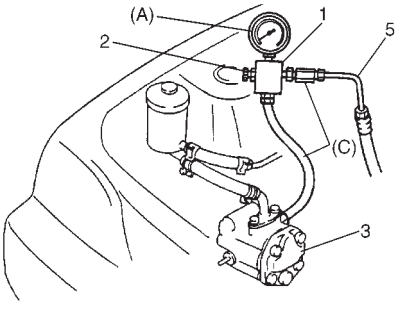
Right-Hand Steering Vehicle

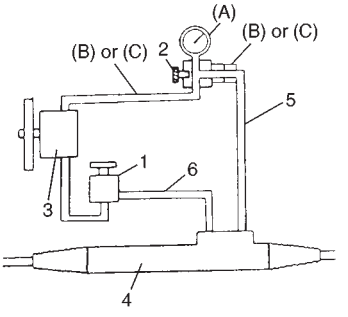


[1.3 L and 1.6 L engine models]



[1.8 L engine model]





1. P/S fluid reservoir
2. Gauge valve (open)
3. P/S pump
4. P/S gear box
5 High pressure side
6 Low pressure side

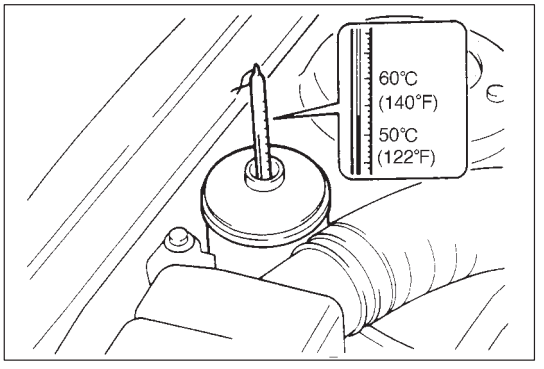
HYDRAULIC PRESSURE IN P/S CIRCUIT

1) After cleaning joint of high pressure hose and P/S pump thoroughly, disconnect hose from pump and install special tool (oil pressure gauge, attachment and hose).
Tighten each flare nut to specified torque.

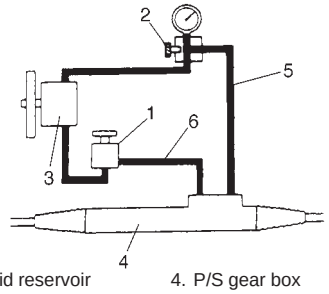
CAUTION:
Take care not to causes damage to A/C condenser during service operation, if equipped.

Special Tool
(A):09915-77410 (Oil pressure gauge)
(B):09915-77420 (Attachment & hose) (For 1.3 L and 1.6 L engine models)
(C):09945-36010 (Attachment & hose) (For 1.8 L engine model)

2) Check each connection for fluid leakage and bleed air.
(Refer to AIR BLEEDING PROCEDURE.)



3) With engine idling, turn steering wheel and warm up engine till temperature of fluid in tank rises to 50 – 60· C (122 – 140· F).

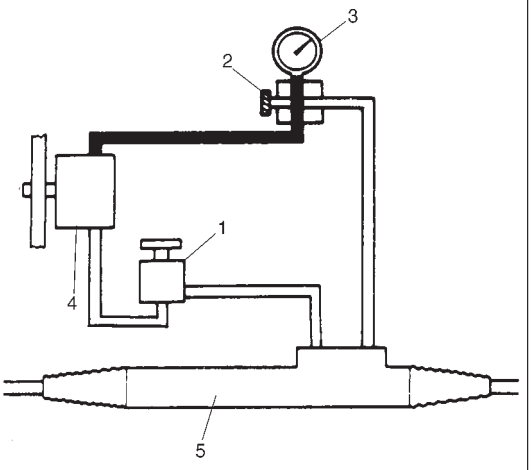


1. P/S fluid reservoir
2. Gauge valve (open)
3. P/S pump
4. P/S gear box
5. High pressure side
6. Low pressure side

4) Check back pressure by measuring hydraulic pressure with engine idling and hands off steering wheel.

Back pressure: Lower than 1000 kPa (10 kg/cm^2, 142 psi)

When back pressure is higher than specified values, check control valve and piping for clogging.



1. P/S fluid reservoir
2. Gauge valve (shut)
3. Oil pressure gauge
4. P/S pump
5. P/S gear box

5) Check relief pressure

○ Increase engine speed to about 1,500 r/min (rpm). Close gauge valve gradually while watching pressure increase indicated by gauge and take reading of relief pressure (maximum hydraulic pressure).

Relief pressure:
7200 – 7900 kPa
(72 – 79 kg/cm^2, 1024 – 1123 psi) . . 1.3 L and 1.6 L engine models
8200 – 8900 kPa
(82 – 89 kg/cm^2, 1166 – 1265 psi) . . 1.8 L engine model

○ When it is higher than specified values, possible cause is malfunction of relief valve.

○ When it is lower than specified values, possible cause is either failure of P/S pump or setting of relief valve spring.

CAUTION:
Be sure not to close gauge valve for longer than 10 seconds.

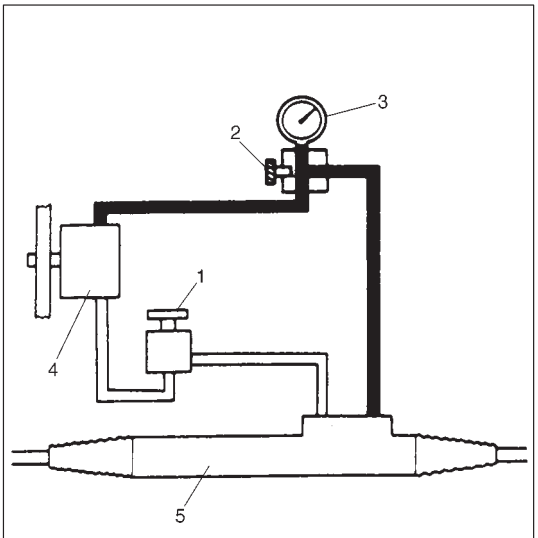
○ Next, open gauge valve fully and increase engine speed to about 1,500 r/min. Then turn steering wheel to the left or right fully and take reading of relief pressure.

Relief pressure:
7200 – 7900 kPa
(72 – 79 kg/cm^2, 1024 – 1123 psi) . . 1.3 L and 1.6 L engine models
8200 – 8900 kPa
(82 – 89 kg/cm^2, 1166 – 1265 psi) . . 1.8 L engine model

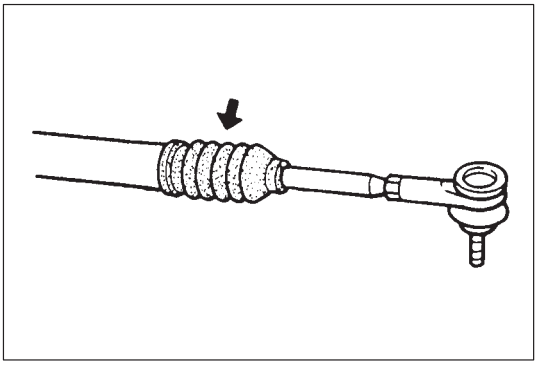
○ When it is higher than specified values, possible cause is malfunction of relief valve.

○ When it is lower than specified values, possible cause is failure in steering gear box. Replace gear box.

CAUTION:
Be sure not to hold steering wheel at fully turned position for longer than 10 seconds.

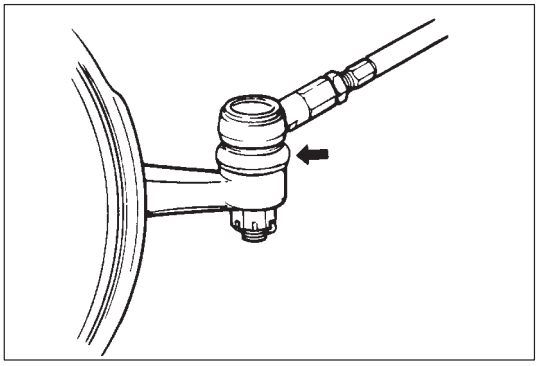


1.P/S fluid reservoir
2. Gauge valve (open)
3. Oil pressure gauge
4. P/S pump
5. P/S gear box



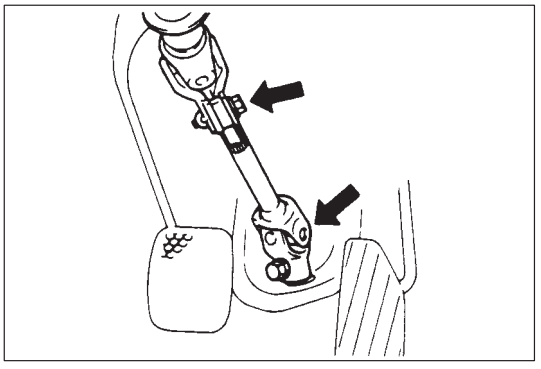
STEERING RACK BOOT

Check boot for crack and damage which, if any, means possibility of rusty gear, entry of dust or lack of grease. Also, check if any of such faulty conditions exists.



TIE ROD END BOOT

Check boot for crack and damage and if any, replace it with a new one.



STEERING SHAFT JOINT

Check each shaft joint for wear, breakage and any other damage and if any, replace it with a new one.

AIR BLEEDING PROCEDURE

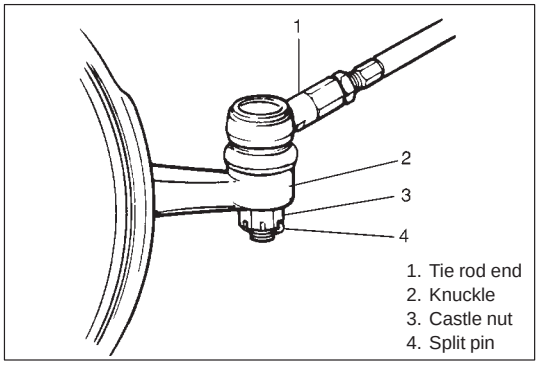
1) Jack up the front end of vehicle and apply safety stands.
2) Fill P/S fluid reservoir with fluid up to specified level.

   NOTE:
   Before starting engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake.

3) After running engine at idling speed for 3 to 5 seconds, stop it and add fluid to satisfy specification.
4) With engine stopped, turn steering wheel to the right and left as far as it stops, repeat it a few times and fill fluid to specified level.
5) With engine running at idling speed, repeat stop-to-stop turn of steering wheel till all foams in P/S fluid reservoir are gone.

   NOTE:
   Make sure to bleed air completely. If air remains in fluid, P/S pump may make humming noise or steering wheel may feel heavy.

6) Finally check to make sure that fluid is filled to specified level.

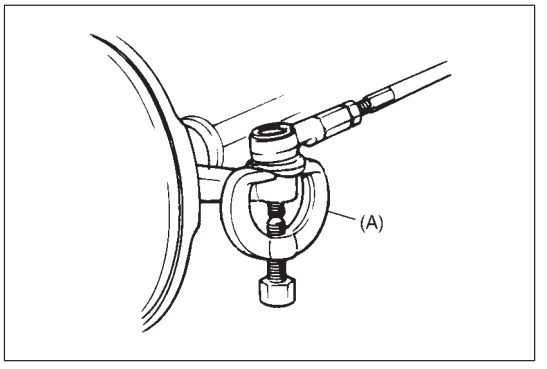


1. Tie rod end
2. Knuckle
3. Castle nut
4. Split pin

REMOVE, INSPECT AND INSTALL TIE ROD END

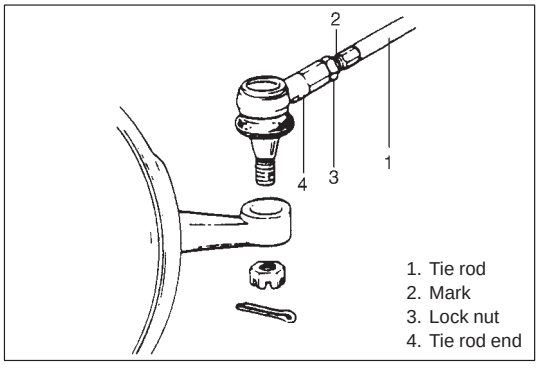
REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove split pin and tie rod end castle nut.



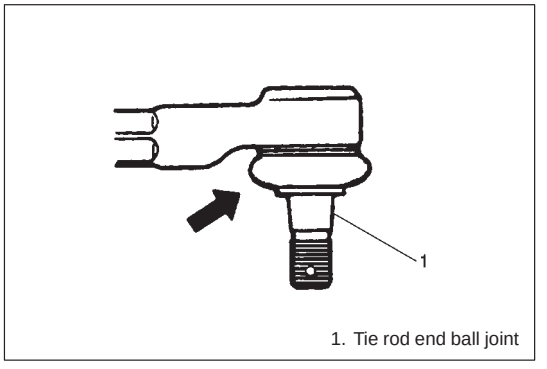
3) Using special tool, remove tie rod end from knuckle.

Special Tool:
(A): 09913-65210



1. Tie rod
2. Mark
3. Lock nut
4. Tie rod end

4) To facilitate adjustment after installation, put a mark on tie rod thread indicating position of tie rod end lock nut.
Then loosen lock nut and remove tie rod end from tie rod.

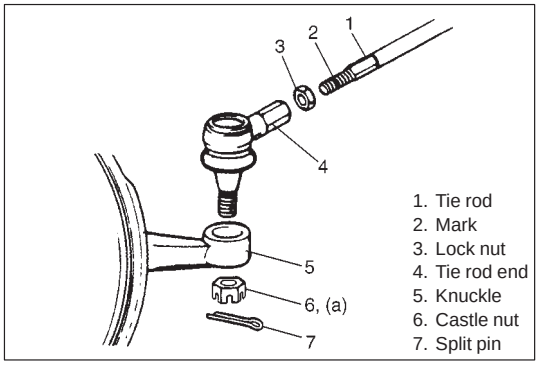


1. Tie rod end ball joint

INSPECTION

Tie-rod End Ball Joint

Inspect for play in tie-rod end ball joint. If found defective, replace.

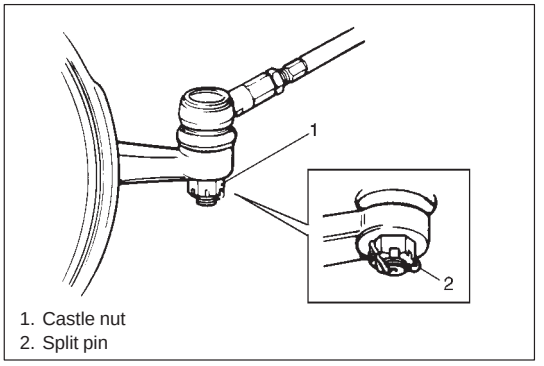


1. Tie rod
2. Mark
3. Lock nut
4. Tie rod end
5. Knuckle
6. Castle nut
7. Split pin

INSTALLATION

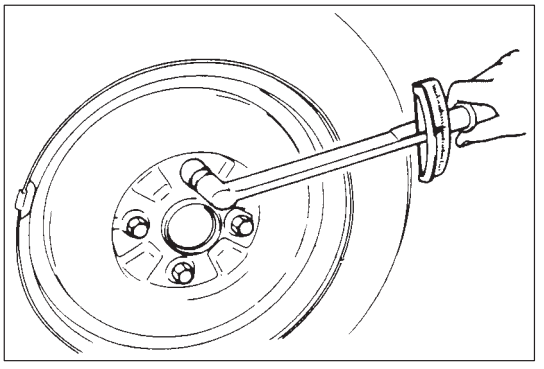
1) Install tie rod end lock nut and tie rod end to tie rod. Tighten lock nut to mark on tie rod thread.
2) Install tie rod end to knuckle. Tighten castle nut till holes for split pin are aligned but within specified torque range.

Tightening Torque
(a): 35 – 55 N·m (3.5 – 5.5 kg-m, 25.5 – 39.5 lb-ft)

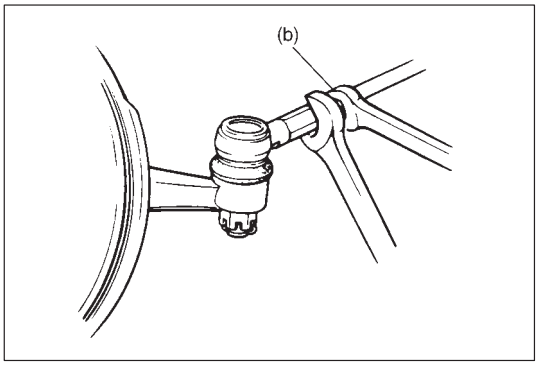


1. Castle nut
2. Split pin

3) Bend split pin as shown in figure.



4) After installing wheels, lower vehicle and tighten wheel nuts to specified torque.

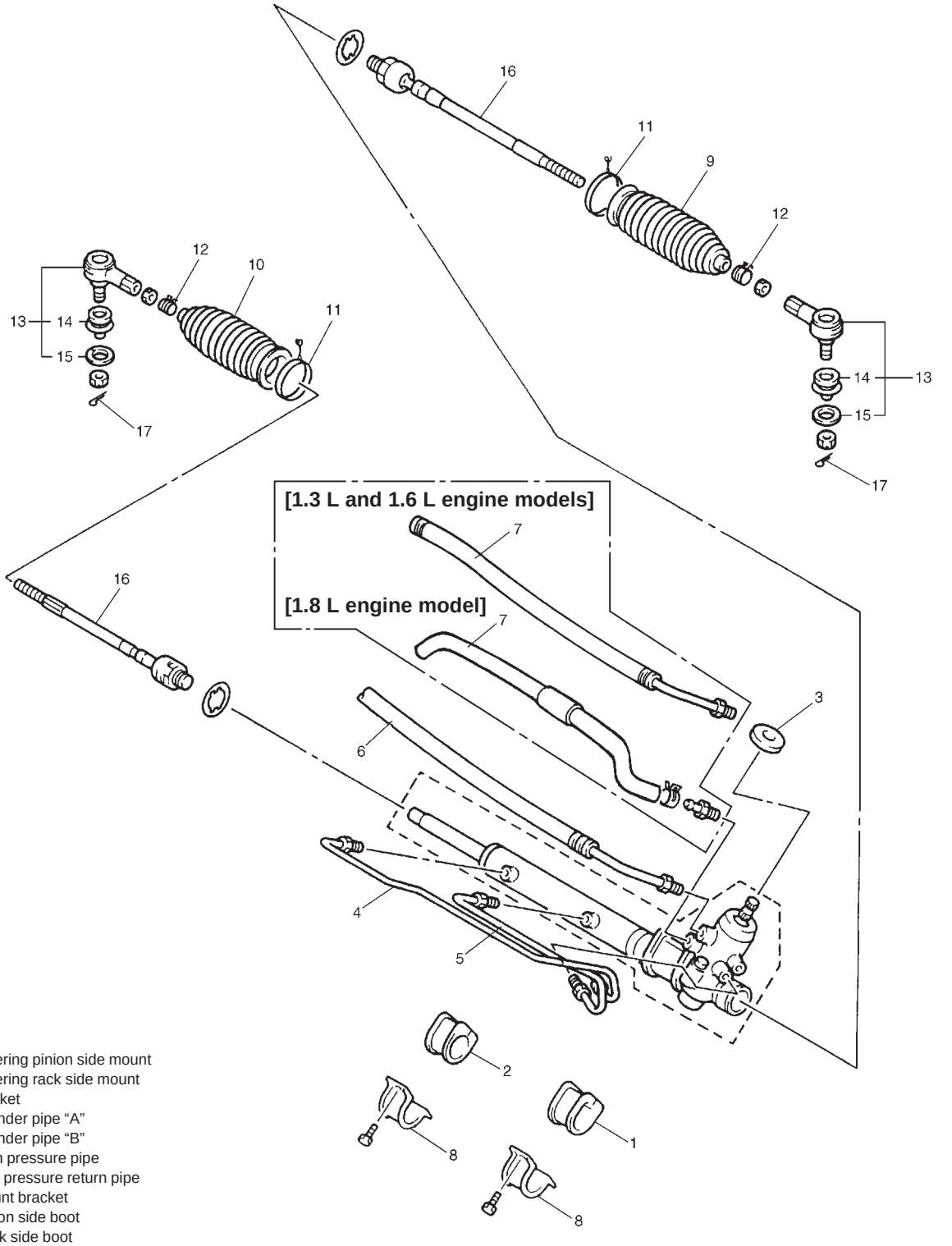


5) Check that proper amount of toe-in is obtained. (Refer to FRONT WHEEL ALIGNMENT.)
6) After confirming proper amount of toe-in, tighten tie rod end lock nut to specified torque.

Tightening Torque
(b): 45 N·m (4.5 kg-m, 32.5 lb-ft)

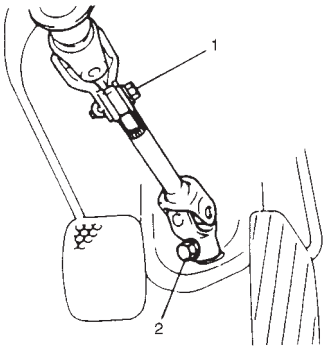
REMOVE AND INSTALL POWER STEERING GEAR BOX

POWER STEERING GEAR BOX COMPONENTS



1. Steering pinion side mount
2. Steering rack side mount
3. Gasket
4. Cylinder pipe “A”
5. Cylinder pipe “B”
6. High pressure pipe
7. Low pressure return pipe
8. Mount bracket
9. Pinion side boot
10. Rack side boot
11. Rack boot wire
12. Rack boot clip
13. Steering tie rod end
14. Boot
15. Clip
16. Tie rod
17. Split pin

NOTE:
Component enclosed in broken line cannot be disassembled and adjusted.



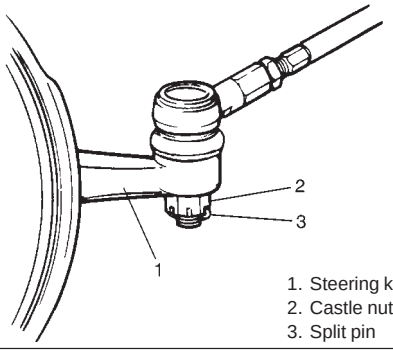
1. Steering shaft upper joint bolt
2. Steering shaft lower joint bolt

REMOVAL

1) Take out fluid in P/S fluid reservoir with syringe or such.
2) After removing joint covers, loosen steering shaft upper joint bolt (but it must not be removed) and remove lower joint bolt.

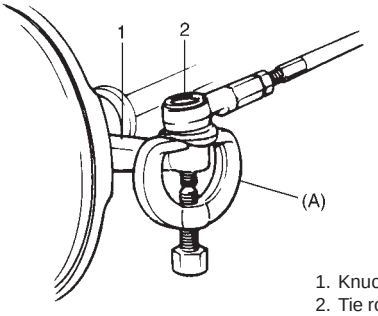
CAUTION:
Be sure to set front wheels (tires) in straight direction and remove ignition key from key cylinder before the following steps, otherwise contact coil of airbag system may get damaged.

3) With front wheels in straight-ahead position, separate pinion and lower joint.



1. Steering knuckle
2. Castle nut
3. Split pin

4) Hoist vehicle and remove both right and left front wheels.
5) Remove split pin and then remove tie rod castle nut from steering knuckle.

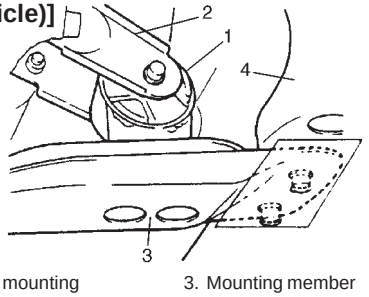


1. Knuckle
2. Tie rod end

6) Using special tool, remove tie rod end from knuckle.

Special Tool
(A): 09913-65210

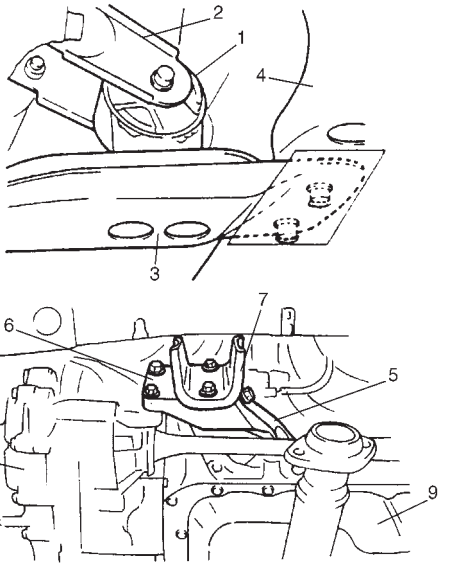
[1.3 L and 1.6 L engine models (2WD Vehicle)]



1. Engine rear mounting
2. Mounting bracket
3. Mounting member
4. Suspension frame

7) [1.3 L and 1.6 L engine models]
For 2WD M/T vehicle, disconnect gear shift control shaft and extension rod from transmission.
For 2WD vehicle, remove engine rear mounting together with its bracket from engine and member, and remove engine mounting member.
For 4WD vehicle, remove exhaust pipe No.2, engine rear torque bush and bracket, disconnect suspension arm (right side) from knuckle and then right side drive shaft joint from center bearing support.

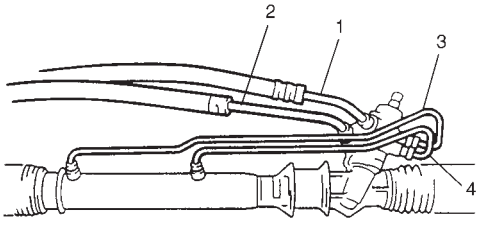
[1.8 L engine model]



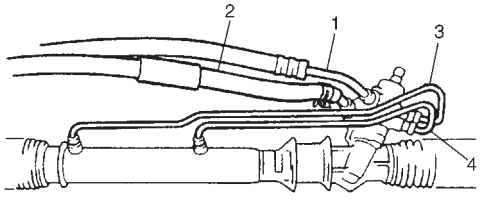
1. Engine rear mounting
2. Mounting bracket
3. Mounting member
4. Suspension frame
5. Exhaust pipe rear stiffener
6. Rear mounting bracket No.2
7. Rear mounting bracket
8. Transmission case
9. Engine oil pan

8) [1.8 L engine model]
   i) Remove engine under cover (both sides), exhaust pipe No.2 and mounting member.
   ii) Remove exhaust pipe rear stiffener.
   iii) Remove engine rear mounting bracket No.2 with engine rear mounting bracket from engine block and transmission case.

[1.3 L and 1.6 L engine models]



[1.8 L engine model]



1. High pressure pipe
2. Low pressure hose
3. Cylinder pipe “A”
4. Cylinder pipe “B”

9) Remove cylinder pipe “A” and “B” from steering gear box, using flare nut wrench.

   NOTE:
   As fluid flows out of disconnected joints, put a receptacle under joints or a plug to pipe.

10) Disconnect high and low pressure pipes from steering gear box, using flare nut wrench.

    NOTE:
    As fluid flows out of disconnected joints, have a container under joints or a plug to pipe.

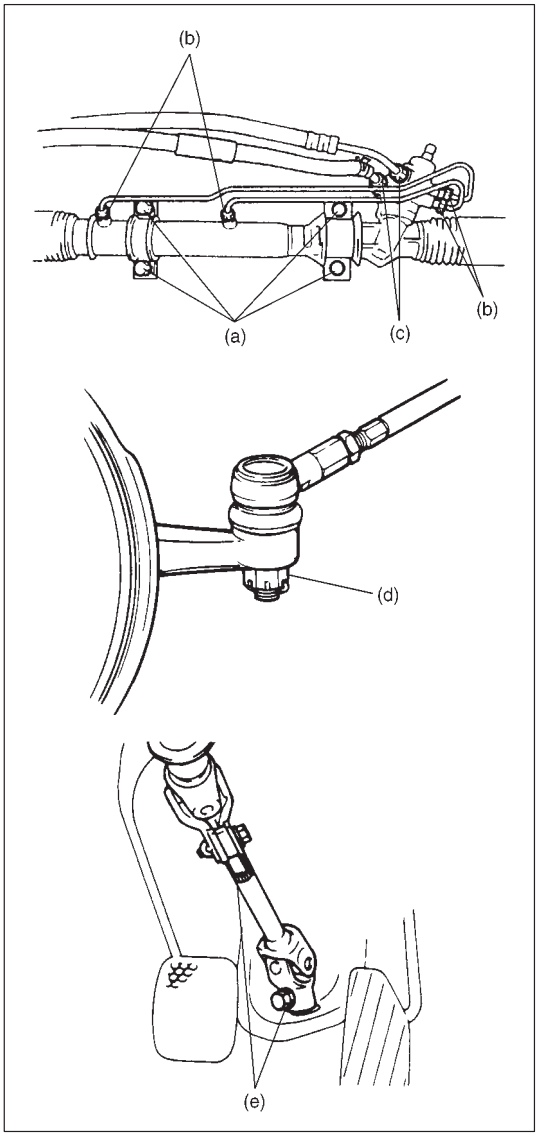
11) Remove steering gear box mounting bolts and then remove steering gear box from vehicle.

INSTALLATION

Reverse removal procedure for installation of steering gear box noting the following points.

CAUTION:
Be sure to confirm that steering wheel and front tires (wheels) are in straight position when inserting steering lower joint into steering pinion shaft.

○ If a plug was put to disconnected pipe when removing steering gear box, remove that plug before reconnecting pipe.



○ Use specified torque as given below.

Tightening Torque
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(b): 20 N·m (2.0 kg-m, 14.5 lb-ft)
(c): 33 N·m (3.3 kg-m, 24.0 lb-ft)
(d): 35 – 55 N·m (3.5 – 5.5 kg-m, 25.5 – 39.5 lb-ft)
(e): 25 N·m (2.5 kg-m, 18.0 lb-ft)

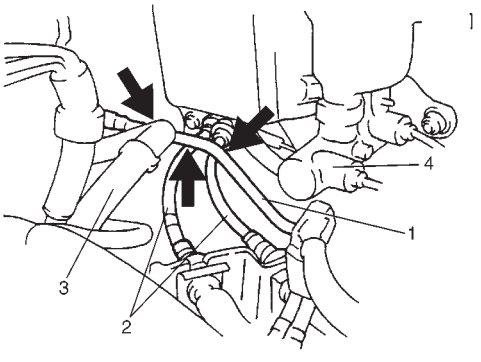
○ For installing each part, refer to respective section as indicated below.

[1.3 L, 1.6 L engine and 1.8 L engine RH models]
– Drive shaft ——— SECTION 4
– Exhaust pipe No.2 ——— SECTION 6K
– Mounting member
– Engine rear mounting bracket (2WD) — SECTION 6A1
– Engine rear torque bush/bracket (4WD)
– Gear shift control shaft [For M/T model only] — SECTION 7A
– Extension rod [For M/T model only] — SECTION 7A

[1.8 L engine model]
– Exhaust pipe No.2 ——— SECTION 6K
– Mounting member — SECTION 6A3
– Engine rear mounting bracket — SECTION 6A3

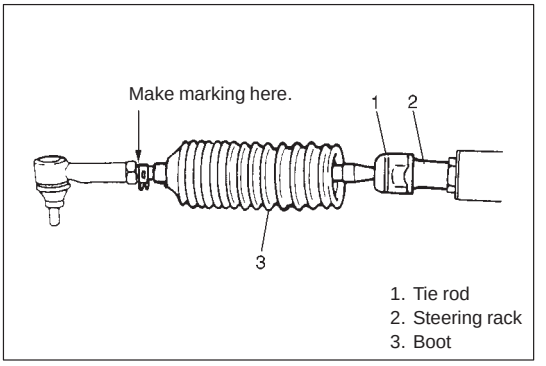
○ After installation, be sure to fill specified power steering fluid and bleed air.

○ Check toe setting. Adjust as required. (Refer to Front End Alignment.)



1. High pressure hose
2. Gear shift linkage
3. Heater hose
4. Brake master cylinder

○ [1.8 L engine LH model]
When installing high pressure hose to steering gear box, make sure that the high pressure hose (pipe) does not contact any object around it, especially the gear shift linkages, and heater hoses.

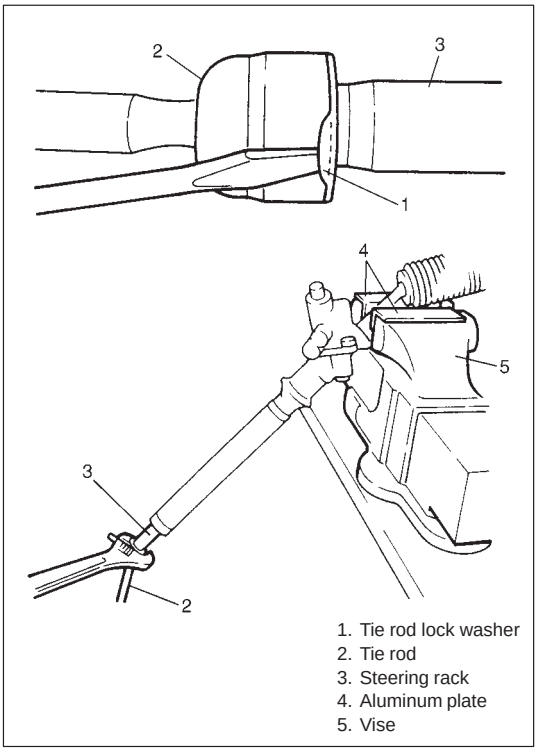


1. Tie rod
2. Steering rack
3. Boot

REMOVE AND INSTALL TIE ROD/RACK BOOT

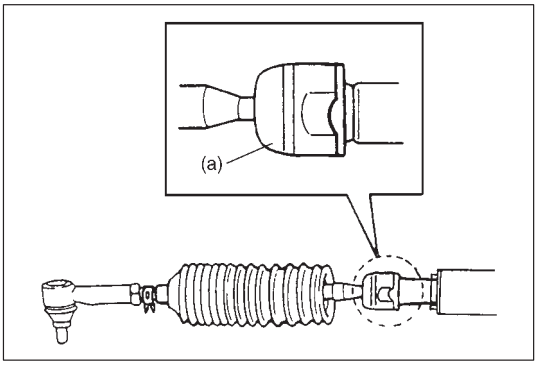
REMOVAL

1) Remove steering gear box from vehicle referring to STEERING GEAR BOX REMOVAL in this section.
2) For ease of adjustment after installation, make marking of tie rod end lock nut position of tie rod thread.
3) Loosen tie rod end lock nut and remove tie rod end.
4) Remove boot wire and clip.
5) Remove boot from tie rod.



1. Tie rod lock washer
2. Tie rod
3. Steering rack
4. Aluminum plate
5. Vise

6) Unbend bent parts (2 places) of tie rod lock washer and remove tie rod from rack.

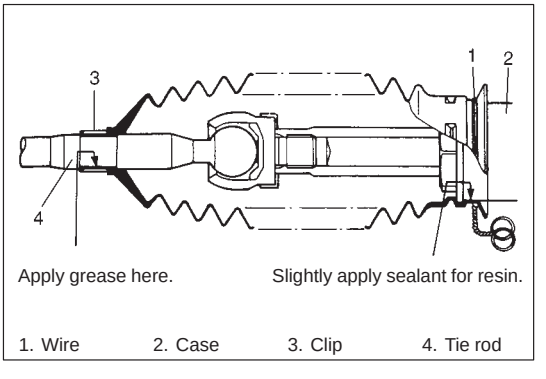


INSTALLATION

1) Install new tie rod lock washer and tie rod to rack.
2) Tighten tie rod ball nut to specified torque.

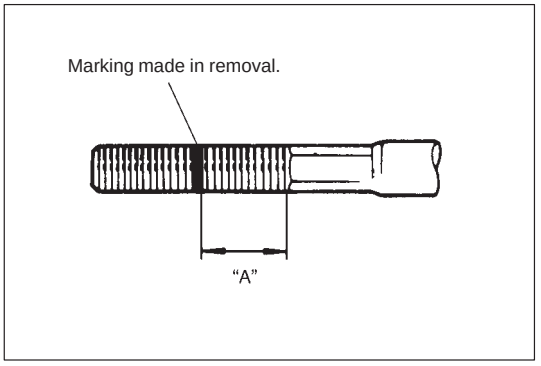
   Tightening Torque
   (a): 90 N·m (9.0 kg-m, 65.5 lb-ft)

3) Bend lock washer at 2 places to tie rod side.



1. Wire
2. Case
3. Clip
4. Tie rod

4) Position boot properly in grooves of gear case and tie rod and clamp it with wire and clip.
   Wire should be new and should go around twice and be tightened with its both ends twisted together. The twisted ends should be bent in the circumferential direction.
   After this, check to ensure that boot is free from twist and dent.



5) Install tie rod end lock nut and tie rod end to tie rod.
   Position lock nut to marking made in removal.

   NOTE:
   When tie rod was replaced, measure length "A" on removed tie rod and use it on new replacement tie rod so as to position lock nut properly.

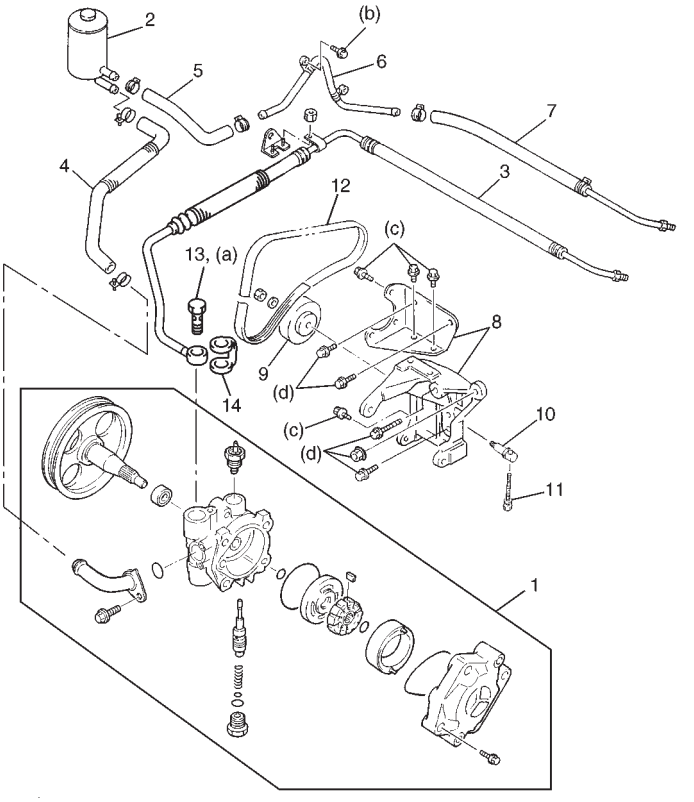
6) Install steering gear box to vehicle referring to STEERING GEAR BOX INSTALLATION in this section.

REMOVE AND INSTALL POWER STEERING PUMP

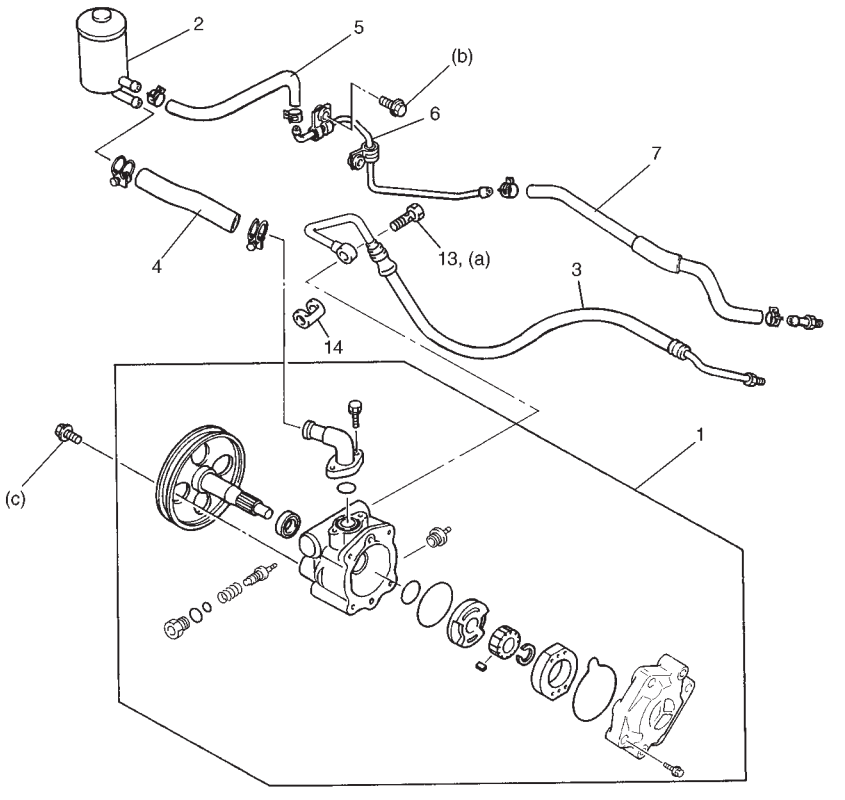
COMPONENTS

[1.3 L and 1.6 L engine models]

Tightening Torque
(a) : 55 N·m (5.5 kg-m, 40.0 lb-ft)
(b) : 10 N·m (1.0 kg-m, 7.5 lb-ft)
(c) : 35 N·m (3.5 kg-m, 25.5 lb-ft)
(d) : 65 N·m (6.5 kg-m, 47.5 lb-ft)



[1.8 L engine model]



1. Power steering pump assembly
2. Power steering fluid reservoir tank
3. High pressure hoses & pipe
4. Suction hose
5. Low pressure return hose (Reservoir side)
6. Low pressure return pipe
7. Low pressure return hose & pipe (Gear box side)
8. Bracket
9. Belt tension pulley
10. Belt tension pulley bolt
11. Belt tension bolt
12. Power steering belt
13. Bolt
14. High pressure pipe gasket

REMOVAL (1.3 L and 1.6 L engine models)

NOTE:
Be sure to clean each joint of suction and discharge sides thoroughly before removal.

1) Remove engine under cover of right side, loosen belt tension pulley and remove P/S V-ribbed belt.
2) Disconnect high pressure hose and suction hose from pump. As fluid flows out of disconnected joints, put a container under joints or a plug to hose.

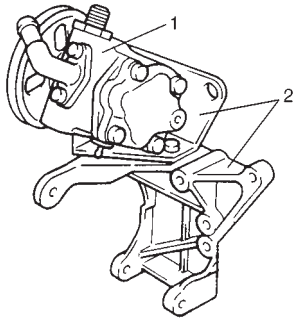
> **CAUTION:**
> **When disconnecting, take care not to cause damage to A/C condenser, if equipped.**

3) Disconnect pressure switch lead harness.
4) Remove A/C compressor from bracket with A/C hose still attached (if equipped).

   NOTE:
   Hang removal A/C compressor with a wire hook or the like so as to prevent A/C hose from bending and twisting excessively or being pulled.

5) Remove oil pump together with its bracket, then remove oil pump from bracket.

   NOTE:
   Plug each port of removed pump to prevent dust or any other foreign matter from entering.

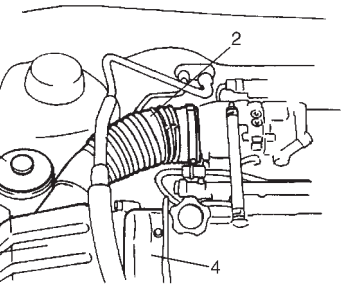


1. Oil pump
2. Bracket

REMOVAL (1.8 L engine model)

NOTE:
Be sure to clean each joint of suction and discharge sides thoroughly before removal.

1) Remove engine under cover (right side only) and loosen generator belt tensioner pulley then remove generator belt. Refer to Section 6B for details of its removal.

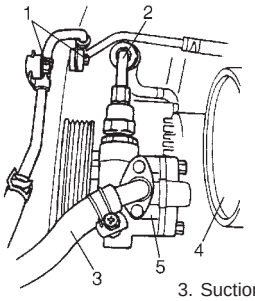


1. Power steering fluid reservoir
2. Air cleaner outlet hose
3. Air cleaner case
4. Camshaft cover

2) Remove air cleaner outlet hose.

   NOTE:
   Do not forget to remove the coupler from air cleaner outlet hose.

3) Empty power steering fluid reservoir with syringe or such.

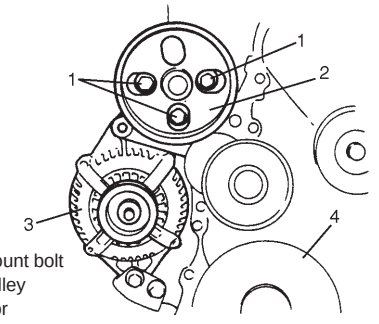


1. Pipe bracket bolt
2. High pressure hose
3. Suction hose
4. Throttle body
5. Power steering pump

4) Disconnect high pressure hose and suction hose from power steering pump. As fluid flows out of disconnected joints, put a container under joints or a plug to hose.

CAUTION:
When disconnecting, take care not to cause damage to generator.

5) Remove pipe bracket bolts.



1. Pump mount bolt
2. Pump pulley
3. Generator
4. Crankshaft pulley

6) Remove pump mount bolts and detach power steering pump from bracket, while detaching, do not forget to disconnect lead wire from the pump.

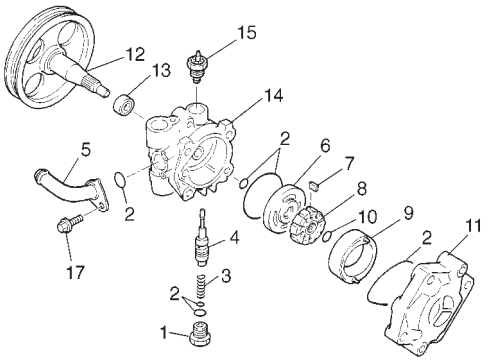
NOTE:
Plug each port of removed pump to prevent dust or any other foreign matter from entering.

INSTALLATION

Reverse removal procedure.

NOTE:

- **Fill specified power steering fluid after installation and bleed air without failure.**
- **For tightening torques, refer to structural diagram on previous page.**
- **[1.3 L and 1.6 L engine models]**
  Adjust power steering belt tension, refer to POWER STEERING BELT (1.3 L AND 1.6 L ENGINE MODELS).
- **[1.8 engine model]**
  Adjust generator belt tension, refer to GENERATOR BELT (1.8 L ENGINE MODEL).
- **Bleed air from P/S system by referring to AIR BLEEDING PROCEDURE in this section.**

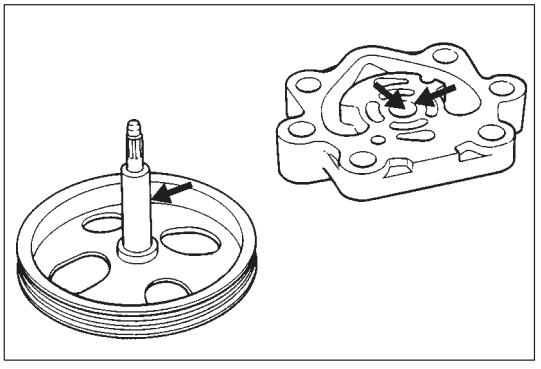


1. Plug
2. O-ring
3. Flow control spring
4. Relief valve
5. Suction connector
6. Side plate
7. Vane
8. Rotor
9. Cam ring
10. Snap ring
11. Pump cover
12. Pulley (Shaft)
13. Oil seal
14. Pump body
15. Terminal set
16. Blank
17. Suction connector bolt

DISASSEMBLY AND ASSEMBLY POWER STEERING PUMP

DISASSEMBLY

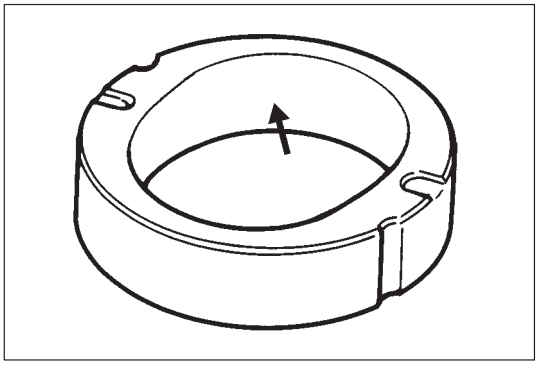
1) Clean its exterior thoroughly.
2) With aluminum plates placed on vise first, grip pump body with it.
3) Remove suction connector bolt, suction connector and O-ring from pump body.
4) Remove power steering pressure switch (terminal set) from pump body.
5) Remove plug, flow control spring and relief valve (flow control valve) from pump body.
6) Remove cover bolts, pump cover and O-ring from pump body.
7) Remove snap ring from pump shaft.
8) Remove vanes from rotor.
9) Remove cam ring, rotor, side plate and O-rings from pump body.
10) Pull out pulley from pump body.
11) Remove oil seal from pump body.



INSPECTION

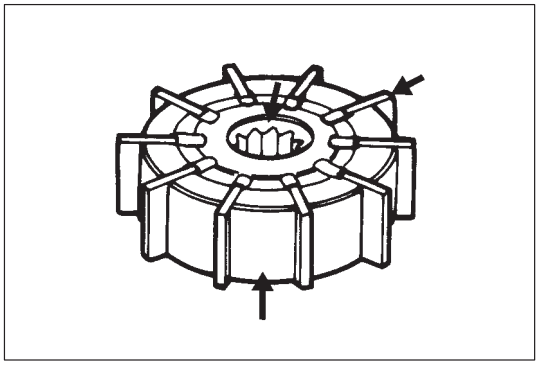
Pump Body, Cover, Side Plate and Shaft

Check sliding surfaces of each part for wear and damage.
If any defect is found, replace pump assembly.



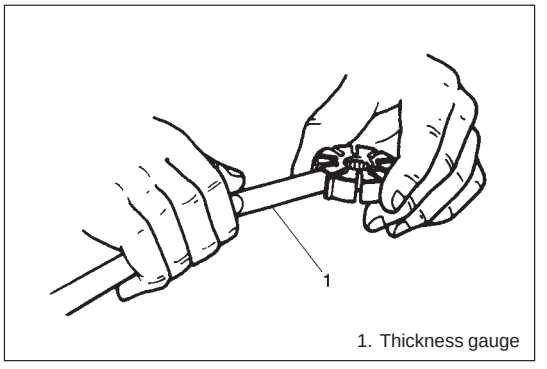
Cam Ring

Check vane sliding surface of cam ring for wear and damage.
If any defect is found, replace pump assembly.



Rotor and Vane

○ Check sliding surfaces of rotor and vane for wear and damage.

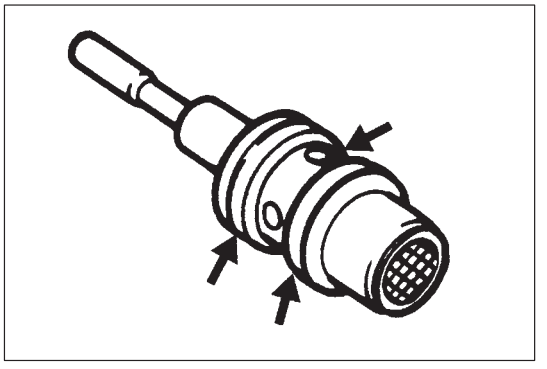


1. Thickness gauge

○ Check clearance between rotor and vane.

Clearance: Standard 0.01 mm (0.0004 in.)
Limit 0.06 mm (0.0023 in.)

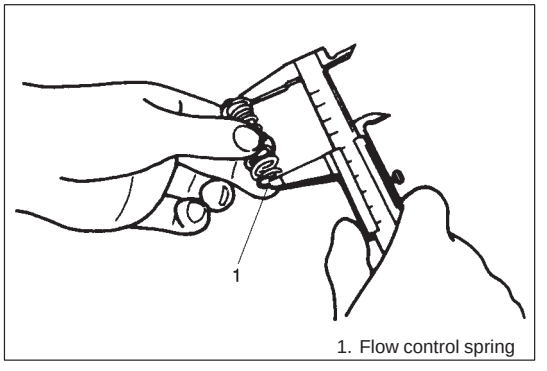
Replace pump assembly if any defect is found in above checks.



Relief Valve (Flow Control Valve) and Its Spring

○ Check fluid passage of relief valve and orifice of connector for obstruction (clogged).

○ Check sliding surface of relief valve for wear and damage.

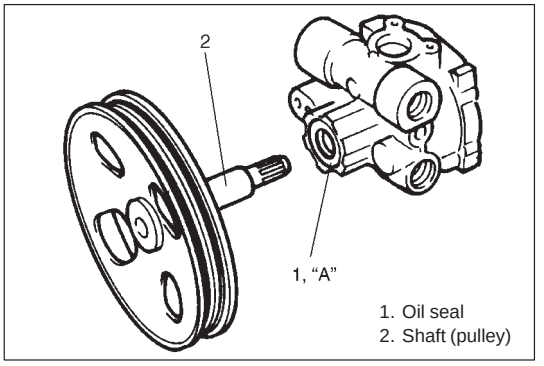


1. Flow control spring

○ Check free length of relief valve spring.

Free length: Standard 22.0 mm (0.866 in.)
Limit 19.0 mm (0.748 in.)

Replace if any defective is found.



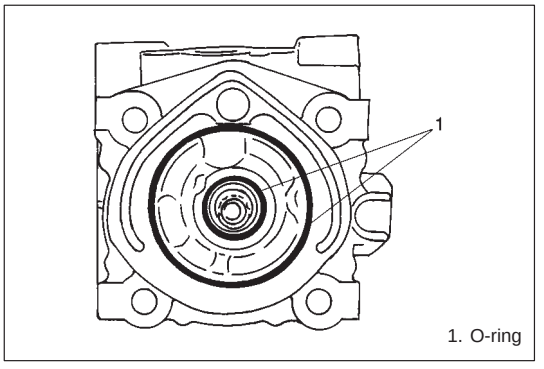
1. Oil seal
2. Shaft (pulley)

REASSEMBLY

Reverse disassembly procedure for assembly, noting the following.

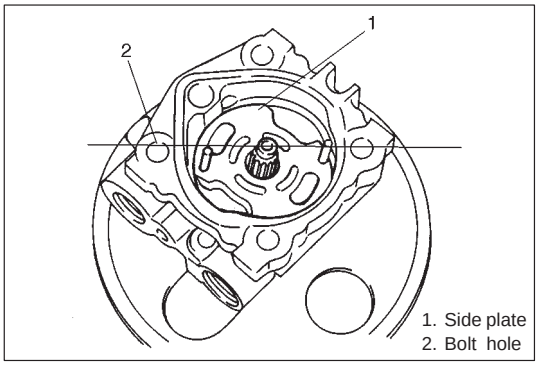
1) Apply grease to oil seal lip and apply power steering fluid to sliding surface of the shaft then insert pulley's shaft from oil seal side of the pump body.

   "A": Grease 99000-25010



1. O-ring

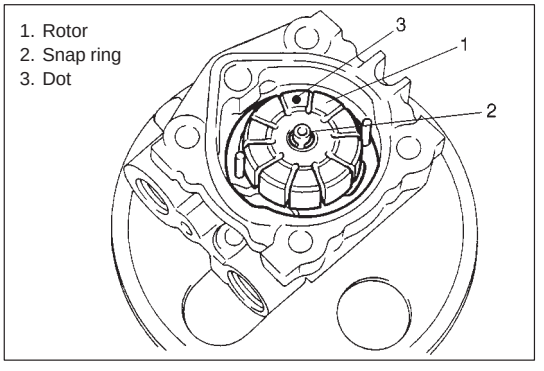
2) Apply power steering fluid to O-rings and fit them to pump body.



1. Side plate
2. Bolt hole

3) Install side plate to pump body.

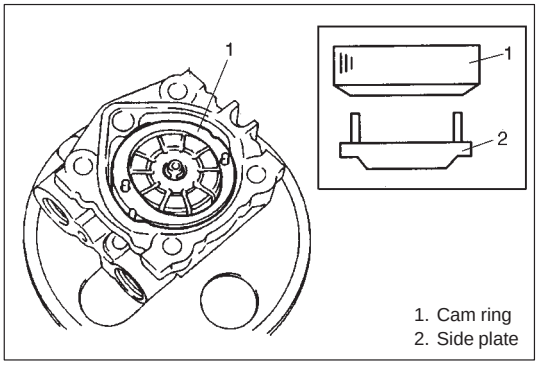
   NOTE:
   Carefully align the dowel pins on the side plate at bolt hole as shown in figure.



1. Rotor
2. Snap ring
3. Dot

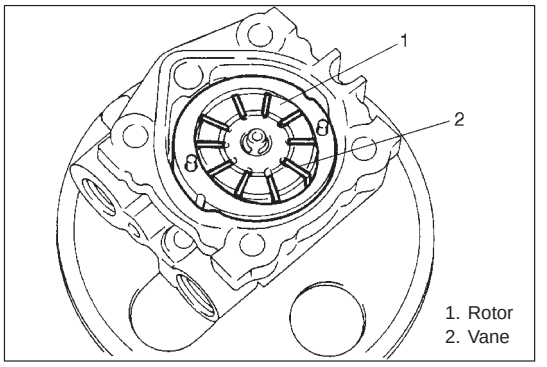
4) Apply power steering fluid to sliding surface of rotor.
5) Install rotor to shaft, directing dot marked side of rotor facing up.
6) Install new snap ring to shaft, then make sure to fit snap into shaft groove securely.

   NOTE:
   Never reuse the removed snap ring.



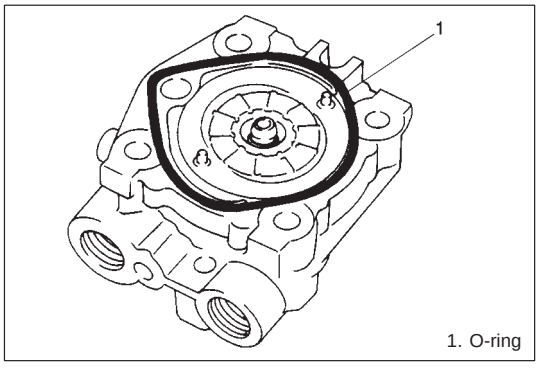
1. Cam ring
2. Side plate

7) Apply power steering fluid to sliding surface of cam ring.
8) Install cam ring to pump body. The tapered end of cam ring should face the side plate.



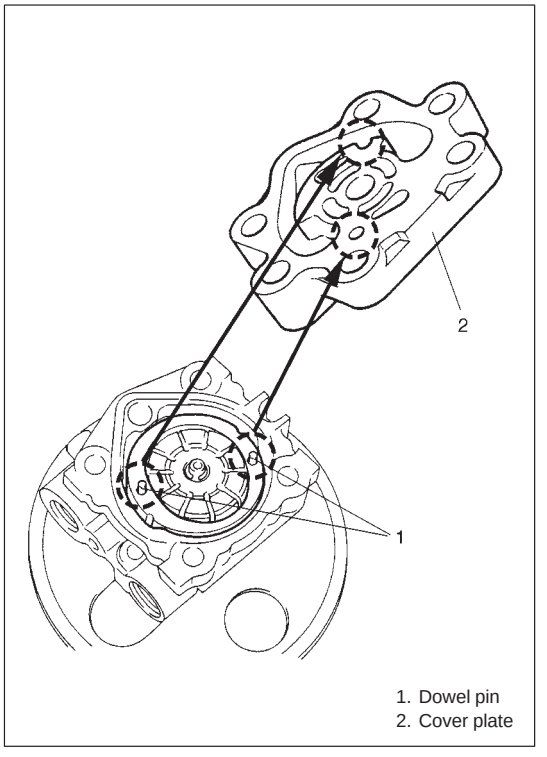
1. Rotor
2. Vane

9) Apply power steering fluid to each vane.
10) Install vanes (10 pieces) to rotor.



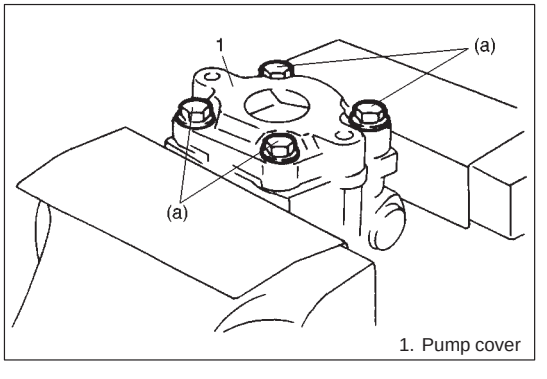
1. O-ring

11) Apply power steering fluid to O-ring.
12) Install O-ring to pump body.



1. Dowel pin
2. Cover plate

13) Apply power steering fluid to sliding surface of pump cover and rotor.
14) Match the dowel pins to the holes of the cover plate as shown and install pump cover to pump body.

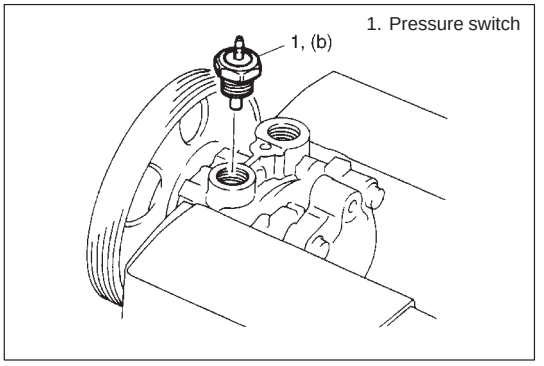


1. Pump cover

15) Gradually tighten pump cover bolts to specified torque.

NOTE:
After installing pump cover, check to make sure that shaft can be turned by hand.

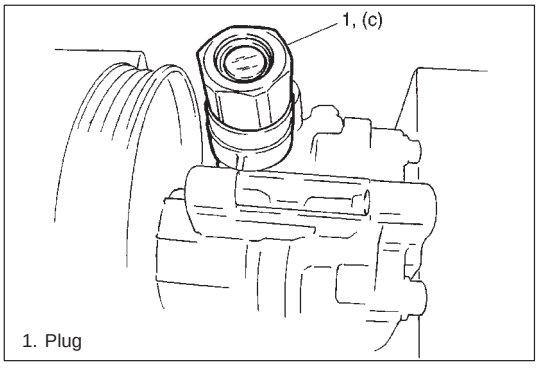
Tightening Torque
(a): 28 N·m (2.8 kg-m, 20.0 lb-ft)



1. Pressure switch

16) Apply power steering fluid to O-ring of terminal switch.
17) Install pressure switch to pump body.

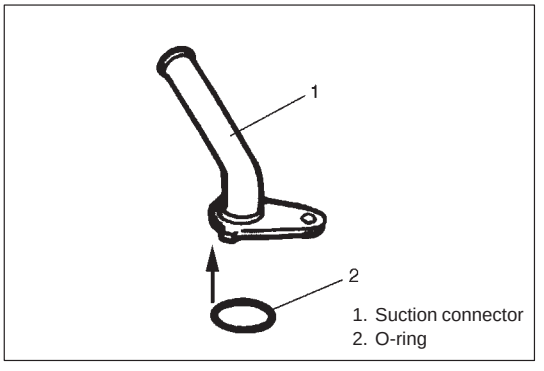
Tightening Torque
(b): 28 N·m (2.8 kg-m, 20.0 lb-ft)



1. Plug

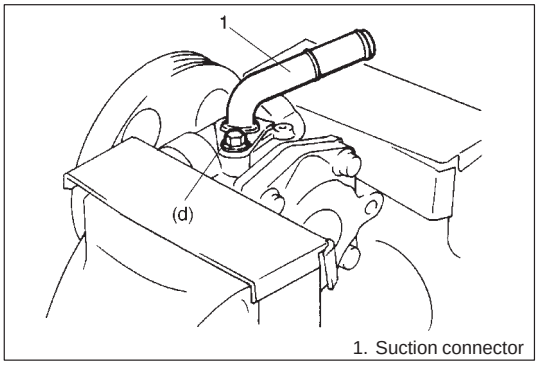
18) Apply power steering fluid to relief valve (flow control valve).
19) Install relief valve (flow control valve) to pump body.
20) Install flow control spring.
21) Apply power steering fluid to O-rings of plug.
22) Install O-rings to plug.
23) Tighten plug to specified torque.

Tightening Torque
(c): 60 N·m (6.0 kg-m, 43.5 lb-ft)



1. Suction connector
2. O-ring

24) Apply power steering fluid to O-ring of suction connector.
25) Install O-ring to suction connector.



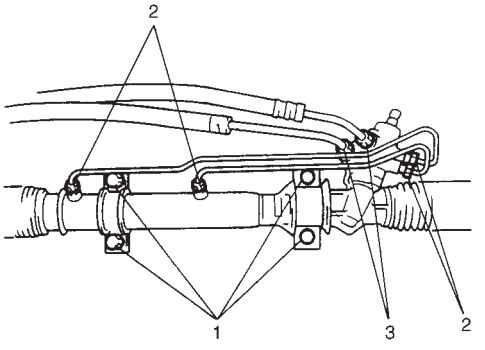
1. Suction connector

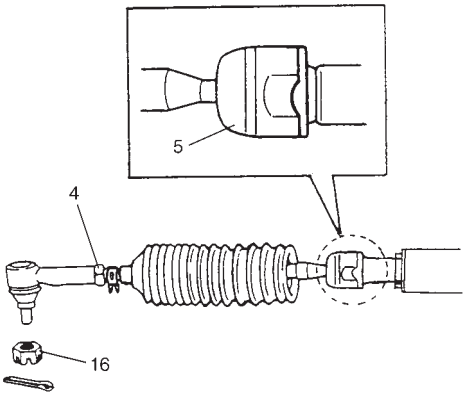
26) Install suction connector to pump body as shown in figure. Tighten suction connector bolts to specified torque.

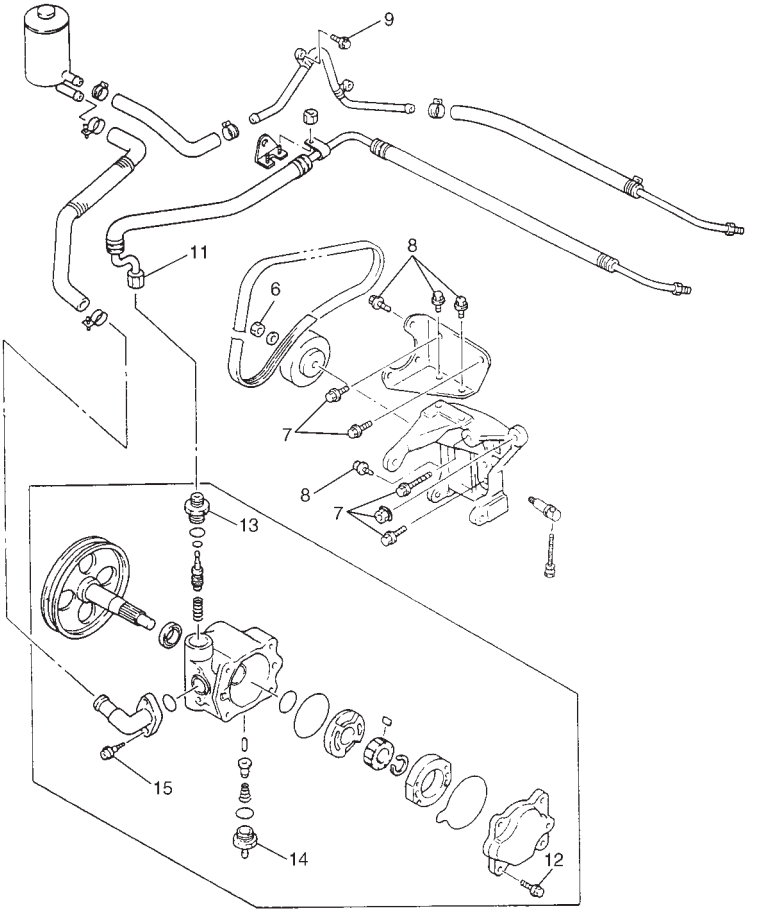
Tightening Torque
(d): 12 N·m (1.2 kg-m, 8.5 lb-ft)

TORQUE SPECIFICATIONS

Fastening Parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Gear box mounting bolts	55	5.5	40.0
2. Gear box cylinder pipe flare nuts	20	2.0	14.5
3. Gear box high & low pressure pipe flare nuts	33	3.3	24.0
4. Tie rod end lock nut	45	4.5	32.5
5. Tie rod ball nut	90	9.0	65.5
6. Belt tension pulley nut	45	4.5	32.5
7. Compressor bracket bolt (M10)	65	6.5	47.5
8. Oil pump mount bolts and bracket bolt (M8)	35	3.5	25.5
9. Pipe clamp bolt	10	1.0	7.5
10. Blank			
11. High pressure flare nuts (Pipe to pump)	44	4.4	32.0
12. Pump cover bolts	28	2.8	20.0
13. Plug	60	6.0	43.5
14. Pressure switch (Terminal)	28	2.8	20.0
15. Suction connector bolts	12	1.2	8.5
16. Tie rod end castle nut	45	4.5	32.5



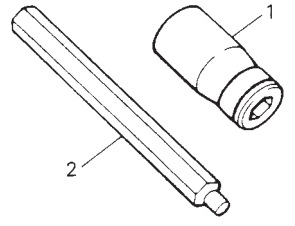




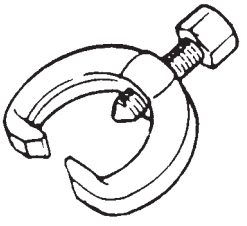
REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUPER GREASE (A) (99000-25010)	○ Oil seal lip of P/S pump pulley shaft
Lithium grease (Should be applicable for –40°C ∽ 130°C)	SUPER GREASE (E) (99000-25050)	○ Sliding part of rack against steering housing ○ Steering rack and pinion gear teeth ○ Contacting parts of tie-rod and boot ○ Rack end ball joint
Power steering fluid	An equivalent of DEXRON®-II or DEXRON®-III	○ To fill fluid reservoir ○ Parts lubrication when installing
Sealant for resin	SILICONE SEALANT (99000-31120)	○ Between steering boot and housing (case)

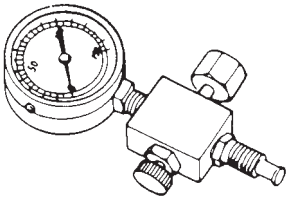
SPECIAL TOOLS



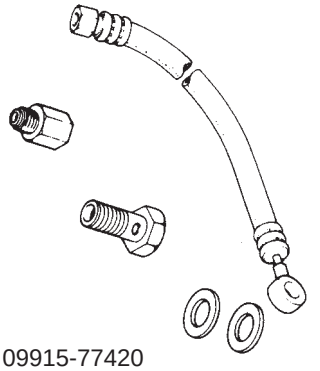
1. 09900-00411
   Hexagon wrench socket
2. 09900-00413
   Hexagon wrench bit
   (5 mm)



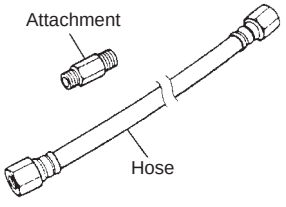
09913-65210
Tie-rod end remover



09915-77410
Oil pressure gauge



09915-77420
Oil pressure gauge
attachment and hose set



09945-36010
Attachment & hose

SECTION 3C

STEERING WHEEL AND COLUMN
(NOT EQUIPPED WITH AIR BAG)

NOTE:

- **All steering wheel and column fasteners are important parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality of substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.**
- **Although the figures in this section show only the left-hand steering vehicle, the same work procedure and data apply to the right-hand steering vehicle.**

CONTENTS

GENERAL DESCRIPTION 3C- 2

ON-VEHICLE SERVICE 3C- 4
- Steering Wheel 3C- 4
  - For 3-spoke type 3C- 4
  - For 4-spoke type 3C- 5
- Combination Switch 3C- 6
- Steering Column 3C- 8
- Steering Lock (Ignition Switch) 3C-13
- Steering Shaft Lower Joint 3C-14
- Checking Steering Column for Accident Damage 3C-16
- Checking Tilt Steering Column (If equipped) 3C-16

TORQUE SPECIFICATIONS 3C-17

SPECIAL TOOL 3C-17

GENERAL DESCRIPTION

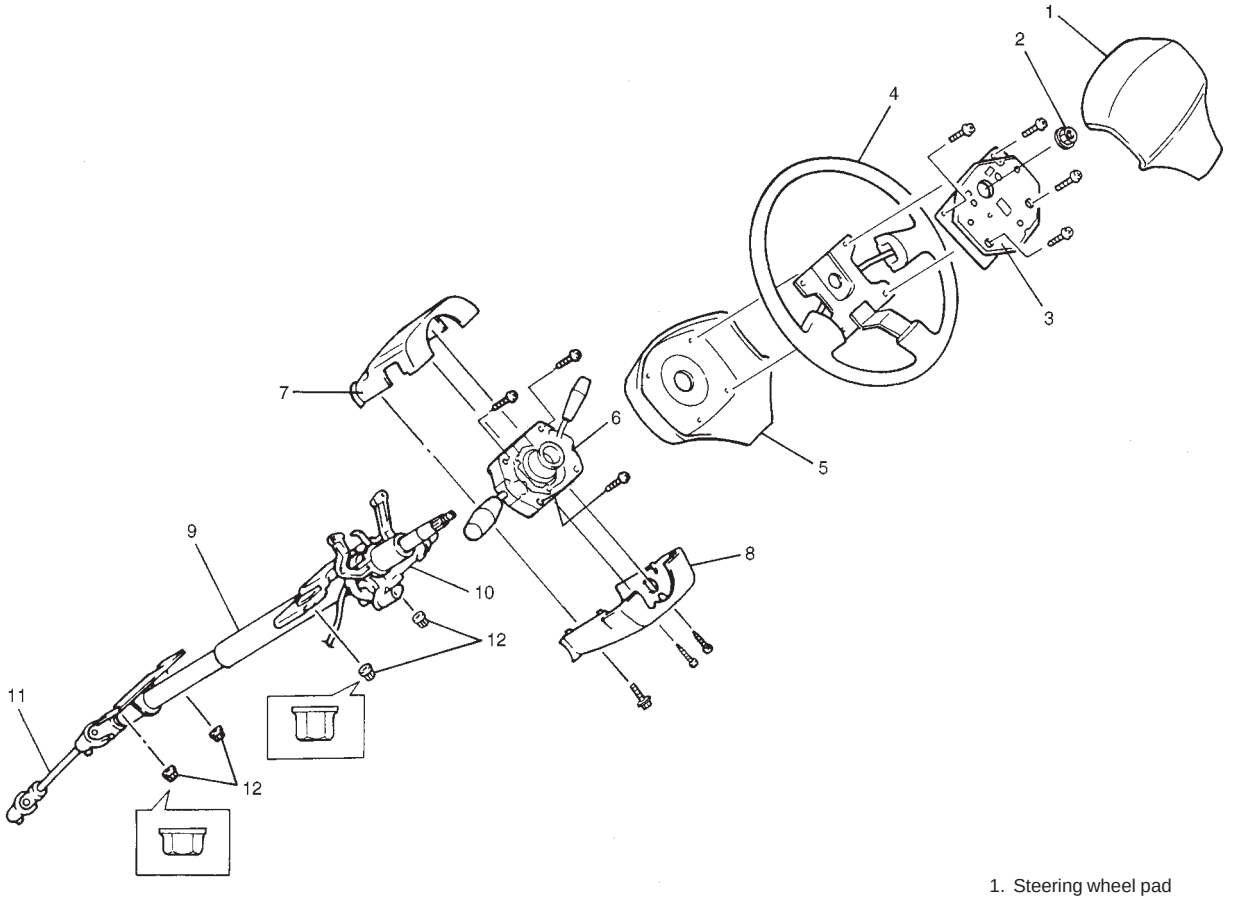
The double tube type steering column has three important features in addition to the steering function:

1) The column is energy absorbing, designed to compress in a front-end collision to minimize the possibility of an injury to the driver of the vehicle.
2) The ignition switch and lock are mounted conveniently on this column.
3) With the column mounted lock, the ignition and steering operations can be locked to inhibit theft of the vehicle.

This column may be easily removed and installed. To insure the energy absorbing action, it is important that only the specified screws, bolts, and nuts be used as designated and that they are tightened to the specified torque.

When the column assembly is removed from the vehicle, special care must be taken in handling it. Use of a steering wheel puller other than the one recommended in this manual or a sharp blow on the end of the steering shaft, leaning on the assembly, or dropping the assembly could shear the plastic shear pins which maintain column length.

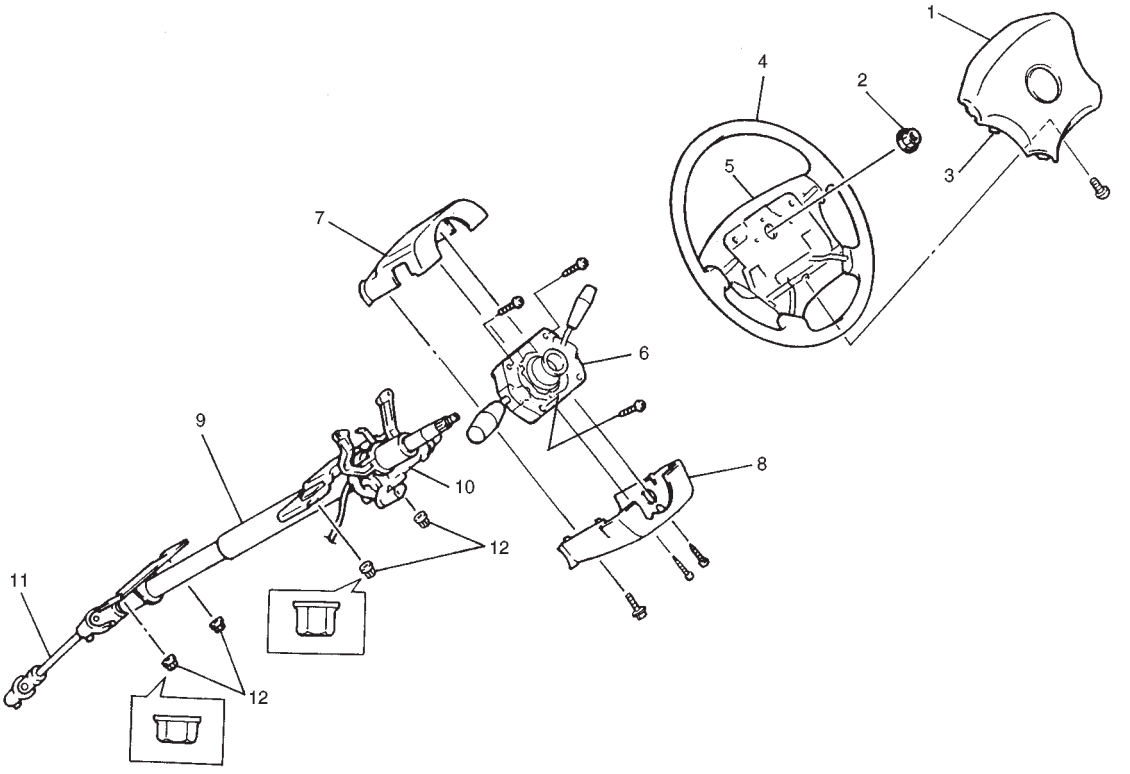
For 3-spoke type



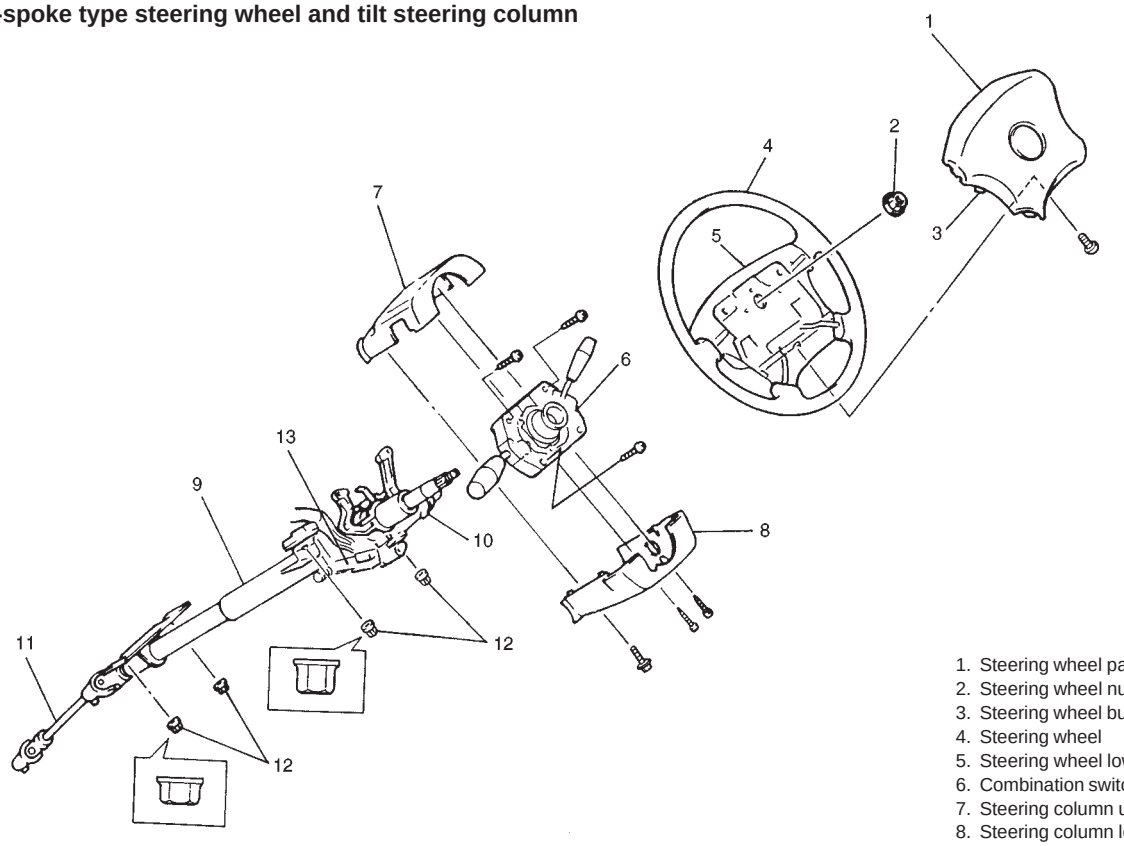
1. Steering wheel pad
2. Steering wheel nut
3. Steering wheel bumper
4. Steering wheel
5. Steering wheel lower cover
6. Combination switch
7. Steering column upper cover
8. Steering column lower cover
9. Steering column assembly
10. Steering lock assembly
11. Steering shaft lower joint
12. Steering column mounting nut

NOTE:
Use of steering column mounting nuts is different between key cylinder side and lower joint side.
Refer to above figure for proper installation.

For 4-spoke type

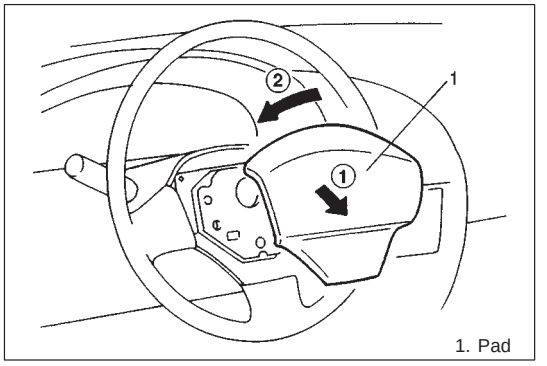


For 4-spoke type steering wheel and tilt steering column



1. Steering wheel pad
2. Steering wheel nut
3. Steering wheel bumper
4. Steering wheel
5. Steering wheel lower cover
6. Combination switch
7. Steering column upper cover
8. Steering column lower cover
9. Steering column assembly
10. Steering lock assembly
11. Steering shaft lower joint
12. Steering column mounting nut
13. Tilt lever

NOTE:
Use of steering column mounting nuts is different between key cylinder side and lower joint side.
Refer to above figure for proper installation.



1. Pad

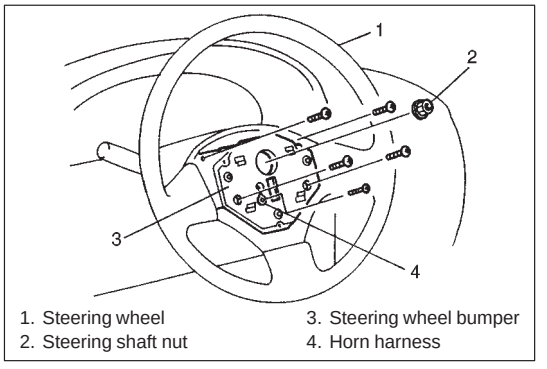
ON-VEHICLE SERVICE

STEERING WHEEL

For 3-spoke type

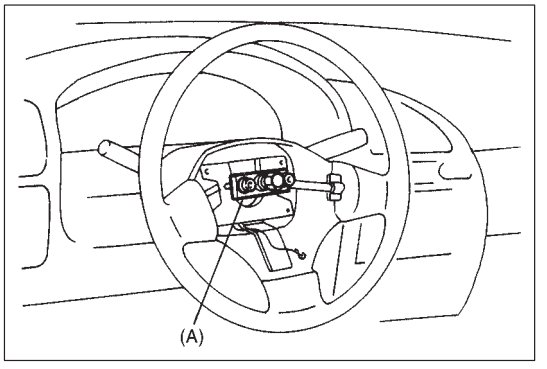
REMOVAL

1) Disconnect negative battery cable.
2) Pull out steering wheel pad, and then remove it by turning it counterclockwise.



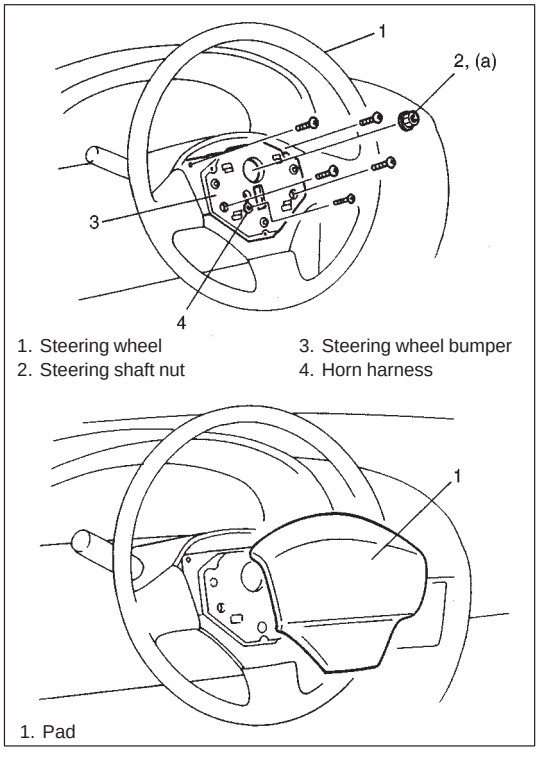
1. Steering wheel
2. Steering shaft nut
3. Steering wheel bumper
4. Horn harness

3) Remove screw of horn harness.
4) Remove steering wheel bumper from Steering wheel.
5) Remove steering shaft nut.
6) Make alignment marks on steering wheel and shaft for a guide during reinstallation.



7) Remove SteerIng wheel with special tool.

Special Tool
(A): 09944-36011

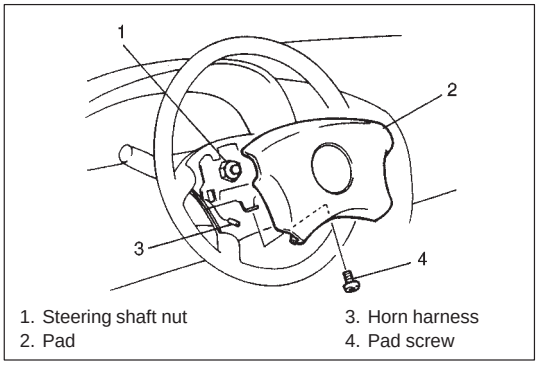


INSTALLATION

1) Install steering wheel bumper to steering wheel.
2) Install screw of horn harness.
3) Install steering wheel onto shaft, aligning alignment marks on them.
4) Tighten steering shaft nut to specified torque.

Tightening Torque
(a): 33 N·m (3.3 kg-m, 23.5 lb-ft)

5) Install steering wheel pad.
6) Connect battery negative cable.

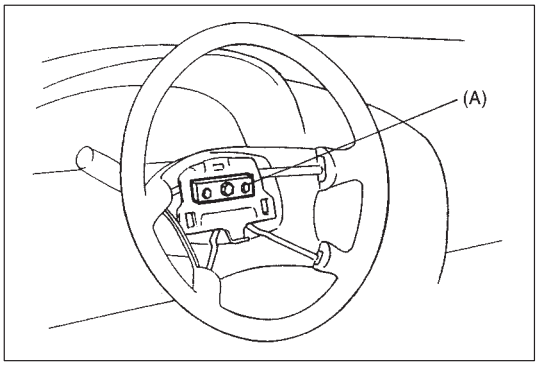


1. Steering shaft nut
2. Pad
3. Horn harness
4. Pad screw

For 4-spoke type

REMOVAL

1) Disconnect negative battery cable.
2) Remove pad screw.
3) Remove pad by pulling it upward and disconnect horn harness.
4) Remove steering shaft nut.
5) Make alignment marks on steering wheel and shaft for a guide during reinstallation.



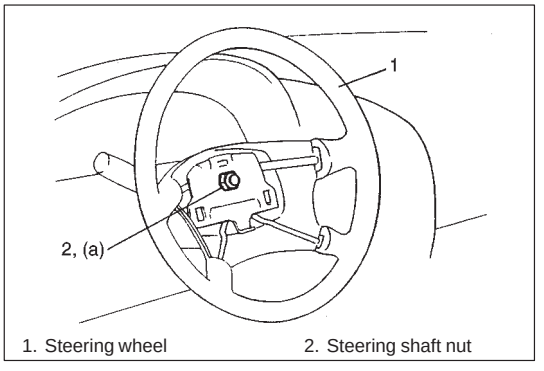
6) Remove steering wheel with special tool.

Special Tool
(A): 09944-36011

INSTALLATION

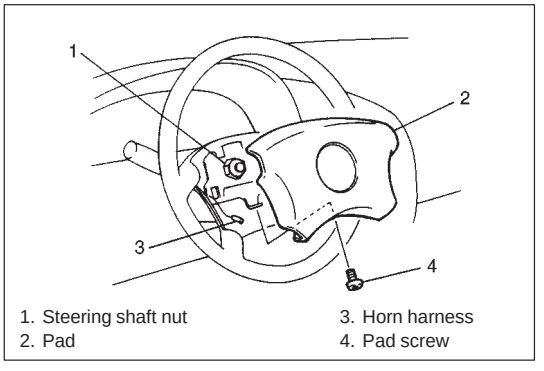
1) Install steering wheel onto shaft, aligning alignment marks on them.
2) Tighten steering shaft nut to specified torque.

Tightening Torque
(a): 33 N·m (3.3 kg-m, 23.5 lb-ft)



1. Steering wheel
2. Steering shaft nut

3) Connect horn harness and install pad.
4) Tighten pad screw.



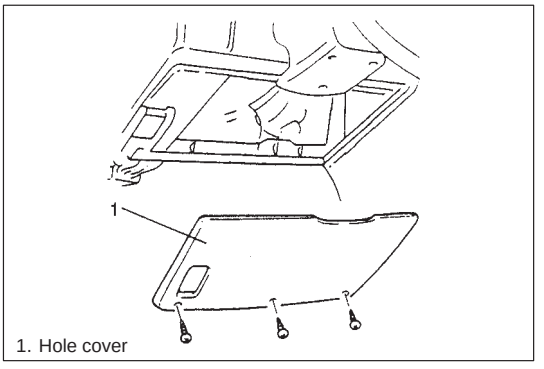
1. Steering shaft nut
2. Pad
3. Horn harness
4. Pad screw

5) Connect battery negative cable.

COMBINATION SWITCH

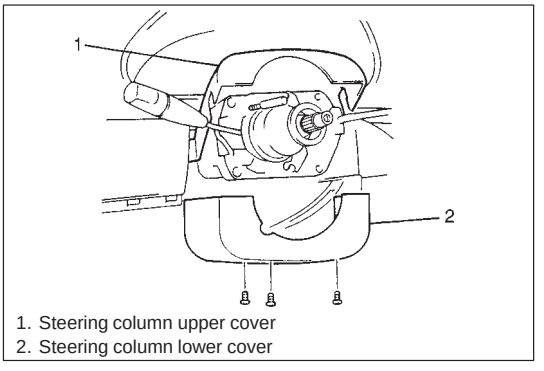
REMOVAL

1) Disconnect negative battery cable.
2) Before removing this switch, remove steering wheel. Refer to "STEERING WHEEL" earlier in this section.



1. Hole cover

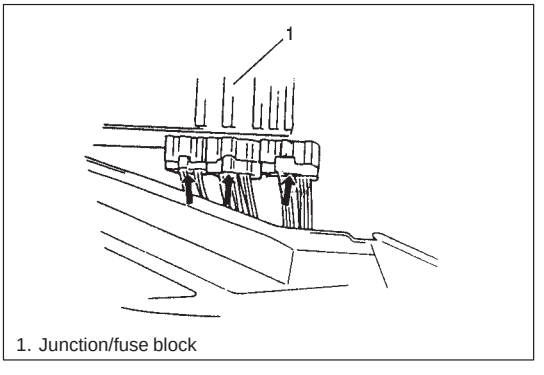
3) Remove hole cover.



1. Steering column upper cover
2. Steering column lower cover

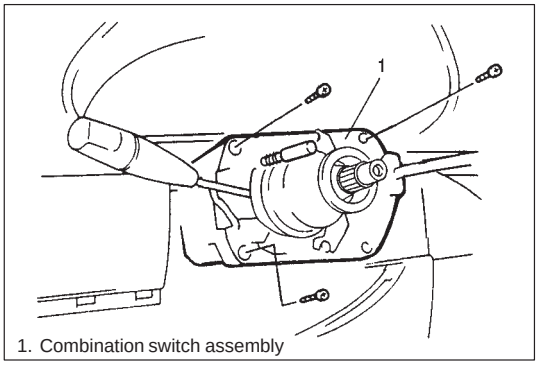
4) Remove steering column cover screws (3 pcs).
5) Separate upper cover and lower cover, then remove them.

6) Loosen clamp.
7) Remove band binding steering column and harness (for contact coil and combination switch assembly).
8) Disconnect white 4-P connector (for auto cruise, optional).



1. Junction/fuse block

9) Disconnect three connectors for combination switch wire harness from junction/fuse block.

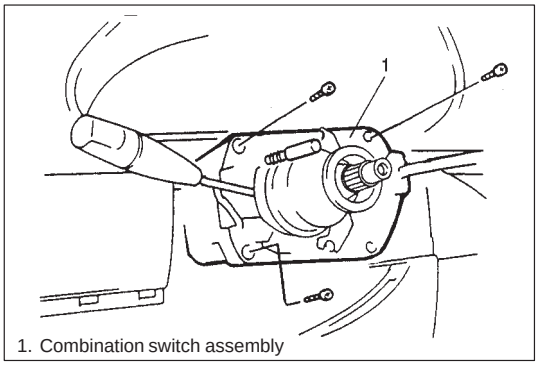


1. Combination switch assembly

10) Remove combination switch from steering column.

INSPECTION

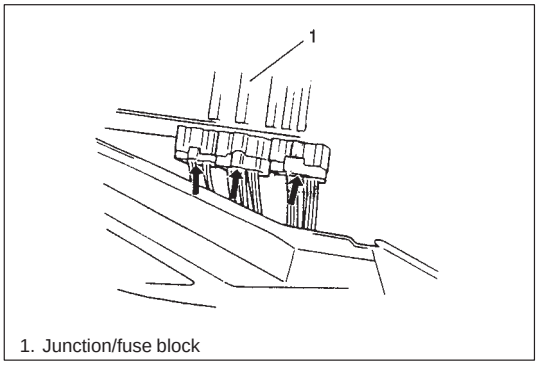
Check combination switch wire harness for any signs of scorching, melting or other damage. If it is damaged, replace.



1. Combination switch assembly

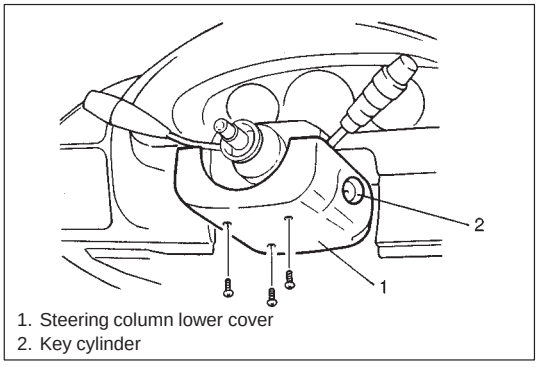
INSTALLATION

1) Install combination switch to steering column.



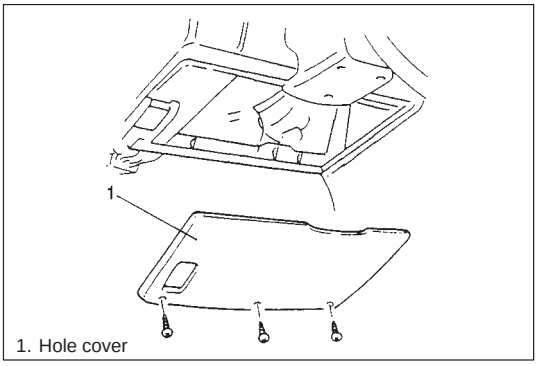
1. Junction/fuse block

2) Connect three connectors for combination switch wire harness to junction/fuse block.
3) Connect white connector (for auto cruise, optional).
4) Tighten clamp and band for combination switch wire harness.



1. Steering column lower cover
2. Key cylinder

5) Install lower cover to key cylinder.
6) Tighten steering column lower cover screws, and then install upper cover to lower cover.



1. Hole cover

7) Install hole cover.

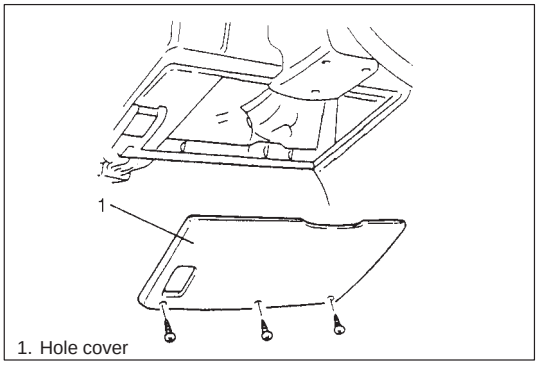
8) Install steering wheel to its shaft. Refer to “STEERING WHEEL” earlier in this section.
9) Connect battery negative cable.

STEERING COLUMN

CAUTION:
- **Once the steering column is removed from the vehicle, the column is extremely susceptible to damage.**
- **Dropping the column assembly on its end could collapse the steering shaft.**
- **Loosen the plastic shear pins which maintain column length.**
- **Leaning on the column assembly could cause it to bend or deform.**
- **Any of the above damage could impair the column’s collapsible design.**
- **Steering column mounting nuts should not be loosened with steering shaft joint upper side bolt tightened as this could cause damage to shaft joint bearing.**

NOTE:
When servicing steering column or any column-mounted component, remove steering wheel. But when removing steering column simply to gain access to instrument panel components, leave steering wheel installed on steering column.

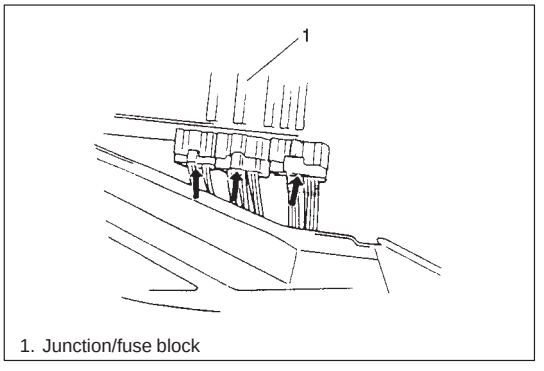
REMOVAL
1) Disconnect negative battery cable.
2) Remove steering wheel and combination switch, if necessary. Refer to “STEERING WHEEL” and “COMBINATION SWITCH” earlier in this section.



1. Hole cover

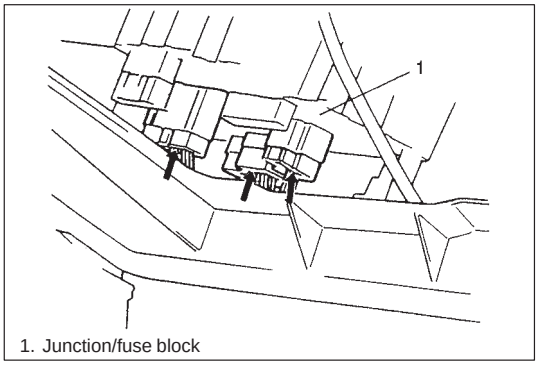
3) Remove hole cover.

4) Loosen clamp.
5) Remove band binding steering column and harness (for combination switch).
6) Disconnect white 4-P connector (for auto cruise, optional).



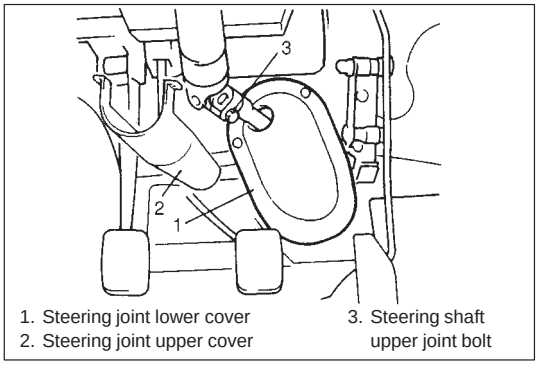
1. Junction/fuse block

7) Disconnect three connectors for combination switch wire harness from junction/fuse block.



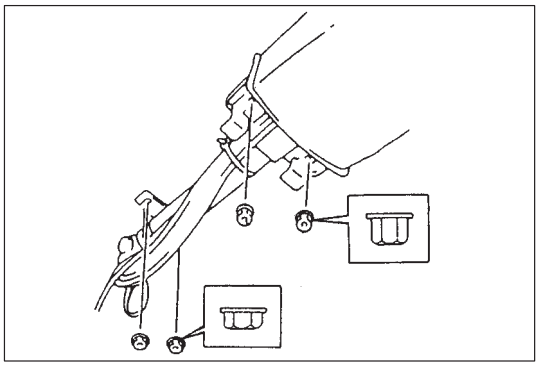
1. Junction/fuse block

8) Disconnect three connectors for ignition switch wire harness from junction/fuse block.

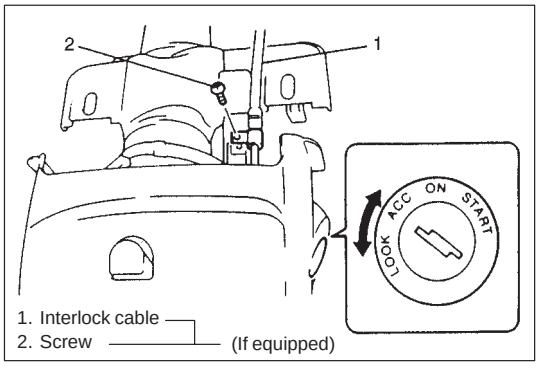


1. Steering joint lower cover
2. Steering joint upper cover
3. Steering shaft upper joint bolt

9) Remove steering joint upper cover.
10) Remove steering shaft upper joint bolt.



11) Remove steering column mounting nuts (4 pcs).



1. Interlock cable
2. Screw (If equipped)

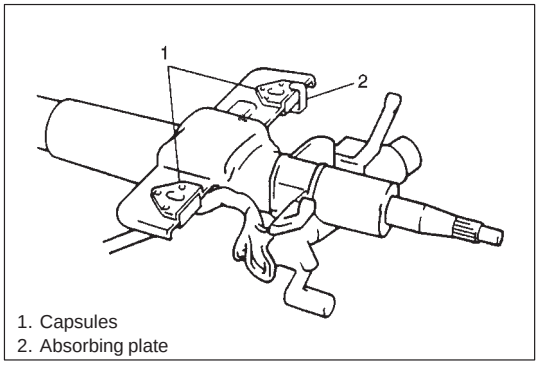
12) If equipped with shift (key) interlock cable, remove shift (key) interlock cable screw and then disconnect its cable from ignition switch with ignition switch turned at “ACC” position. After disconnecting, turn ignition switch to “LOCK” position.

13) Remove steering column from vehicle.

WARNING:
Never rest a steering column assembly on the steering wheel with the air bag (inflator) module face down and column vertical. Otherwise, personal injury may result.

INSPECTION

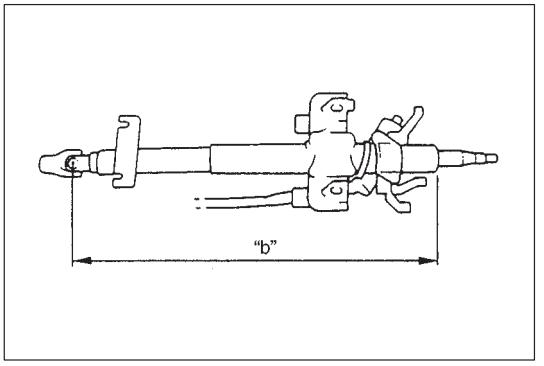
NOTE:
Vehicles involved in accidents resulting in body damage, where steering column has been impacted, may have a damaged or misaligned steering column.



1. Capsules
2. Absorbing plate

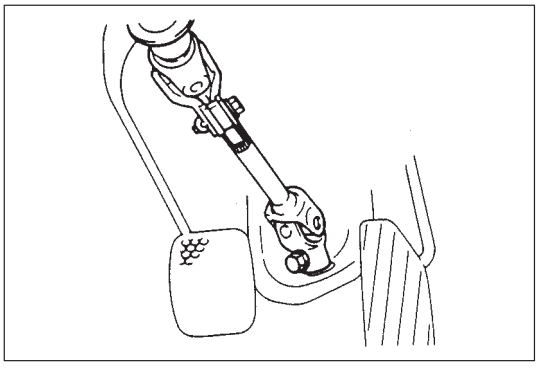
CHECKING PROCEDURE

1) Check that two capsules are attached to steering column bracket securely. If found loose, replace steering column assembly. Check absorbing plate for crack. If found defective, replace.



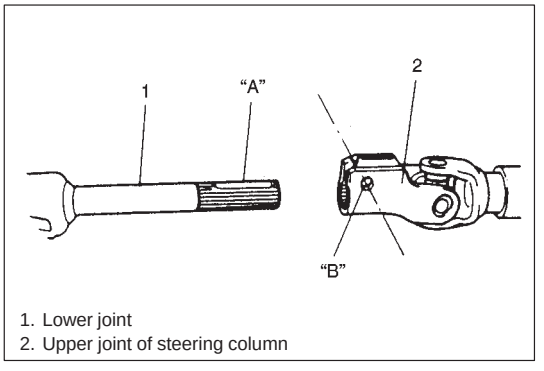
2) Take measurement "b" as shown. If it is shorter than specified length, replace column assembly with new one.

Length "b": 513 mm (20.20 in.)



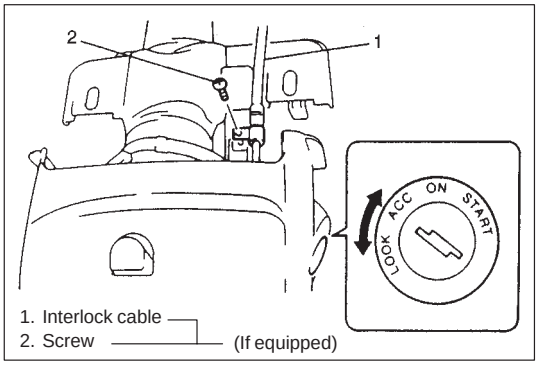
3) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play.
   If anything is found faulty, replace as joint assembly.
4) Check steering shaft for smooth rotation.
   If found defective, replace as column assembly.
5) Check steering shaft and column for bend, cracks or deformation.
   If found defective, replace.

INSTALLATION



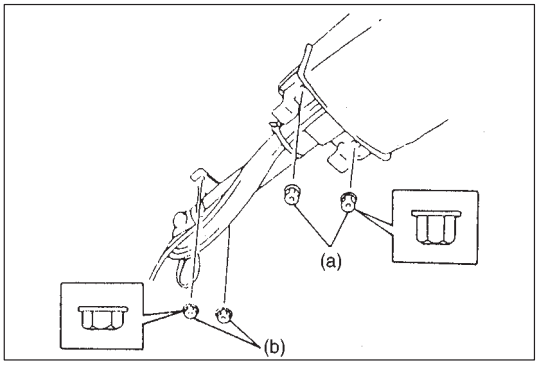
1. Lower joint
2. Upper joint of steering column

1) Align flat part "A" of lower joint shaft with bolt hole "B" of upper side joint of steering column as shown. Then insert upper side joint of steering column into lower joint shaft.



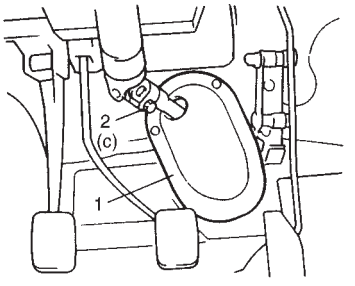
1. Interlock cable
2. Screw (If equipped)

2) If equipped with shift (key) interlock cable, connect shift (key) interlock cable to ignition switch with ignition switch turned at "ACC" position. And then turn ignition switch to "LOCK" position.
3) Tighten its cable screw.



4) Install steering column assembly to lower and upper brackets. Torque steering column upper nuts first and then lower nuts to specifications as given below.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 14 N·m (1.4 kg-m, 10.5 lb-ft)

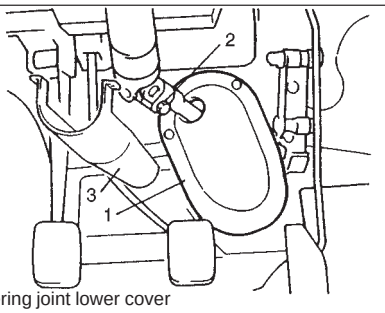


1. Steering joint lower cover
2. Steering shaft upper joint bolt

5) Install bolt to steering shaft upper joint and tighten it to specified torque.

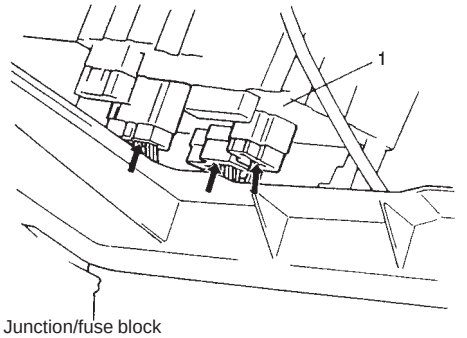
NOTE:
After tightening column nuts, bolt to steering shaft upper joint should be tightened.

Tightening Torque
(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)



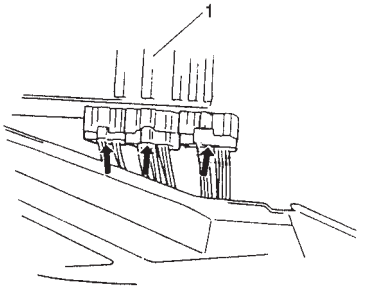
1. Steering joint lower cover
2. Steering shaft upper joint bolt
3. Steering joint upper cover

6) Install steering joint upper cover.



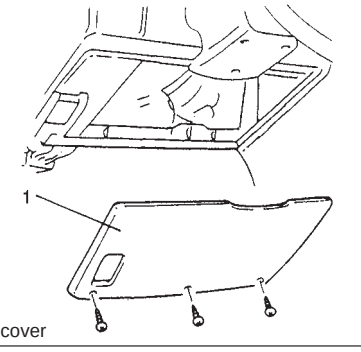
1. Junction/fuse block

7) Connect three connectors for ignition switch wire harness from junction/fuse block.
8) If combination switch is removed, install combination switch. Refer to “COMBINATION SWITCH” earlier in this section.



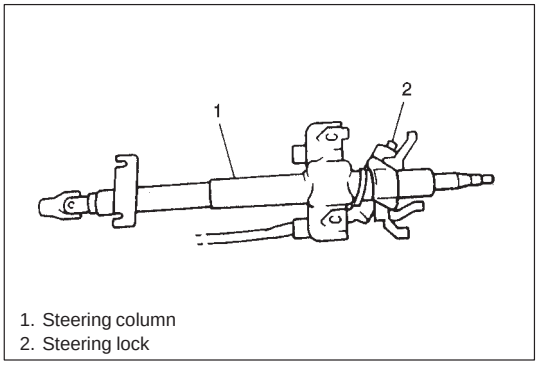
1. Junction/fuse block

9) If combination switch is not removed, follow the procedures below.
   ○ Connect three connectors for combination switch wire harness to junction/fuse block.
   ○ Disconnect white 4-P connector (for auto cruise, optional).
   ○ Fix wire harness with clamp and band.



1. Hole cover

10) Install hole cover.
11) If steering wheel is removed, install steering wheel. Refer to “STEERING WHEEL” earlier in this section.
12) Connect negative battery cable.

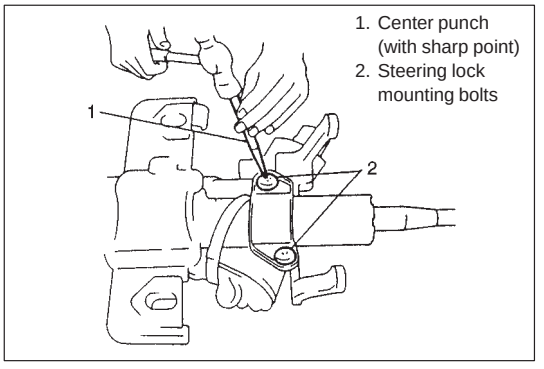


1. Steering column
2. Steering lock

STEERING LOCK (IGNITION SWITCH)

REMOVAL

1) Disconnect negative battery cable.
2) Remove steering column. Refer to “STEERING COLUMN” earlier in this section.



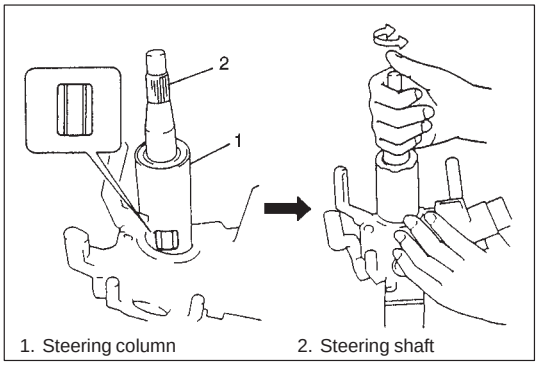
1. Center punch (with sharp point)
2. Steering lock mounting bolts

3) Using center punch as shown, loosen and remove steering lock mounting bolts.

NOTE:
Use care not to damage aluminum part of steering lock body with center punch.

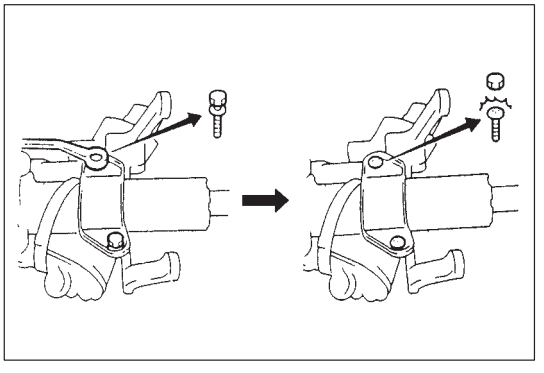
4) Turn ignition key to “ACC” or “ON” position and remove steering lock assembly from steering column.

INSTALLATION



1. Steering column
2. Steering shaft

1) Position oblong hole of steering shaft in the center of hole in column.
2) Turn ignition key to “ACC” or “ON” position and install steering lock assembly onto column.
3) Now turn ignition key to “LOCK” position and pull it out.
4) Align hub on lock with oblong hole of steering shaft and rotate shaft to assure that steering shaft is locked.



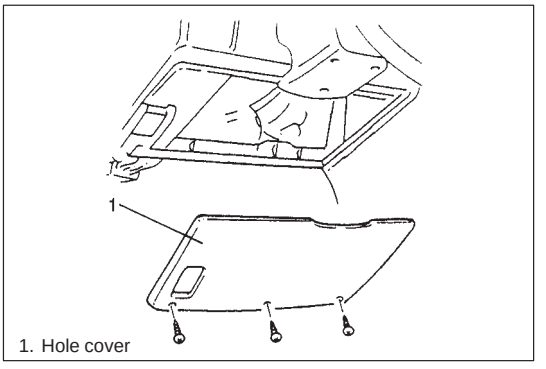
5) Tighten two new bolts until head of each bolt is broken off.
6) Turn ignition key to “ACC” or “ON” position and check to be sure that steering shaft rotates smoothly. Also check for lock operation.

7) Install steering column. Refer to “STEERING COLUMN” earlier in this section.
8) Connect negative battery cable.

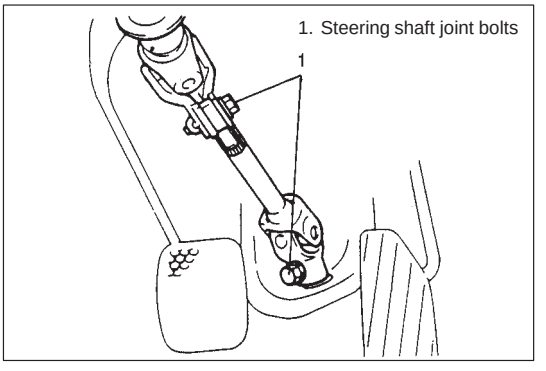
STEERING SHAFT LOWER JOINT

REMOVAL

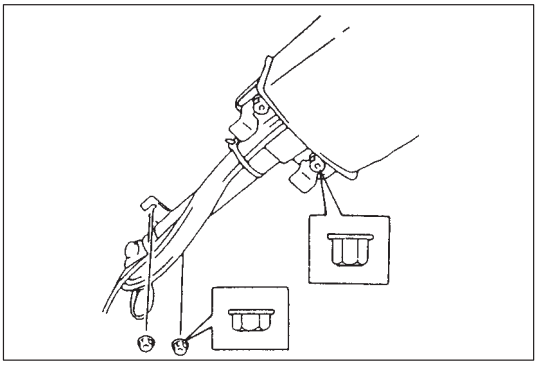
1) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
2) Turn ignition switch to "LOCK" position and remove key.



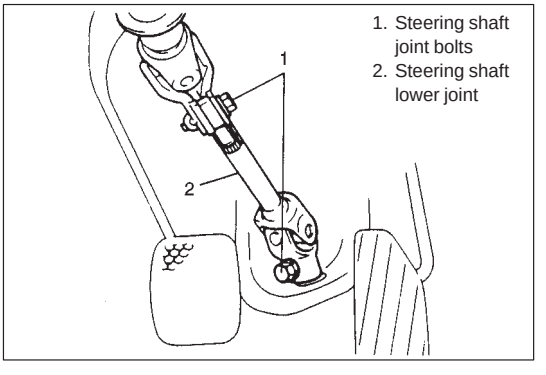
3) Remove hole cover.



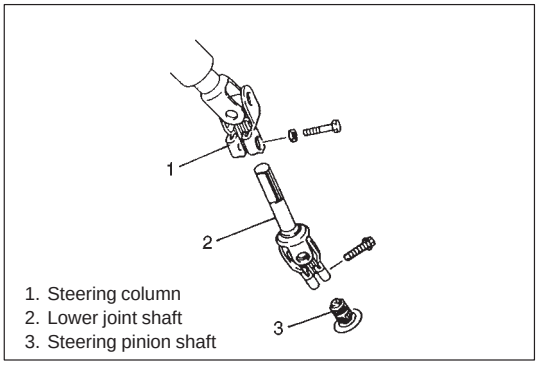
4) Pull off floor carpet at the foot of steering shaft and remove steering joint upper and lower cover.
5) Loosen steering shaft joint bolts.



6) Remove steering column lower nuts, and then loosen upper nuts.



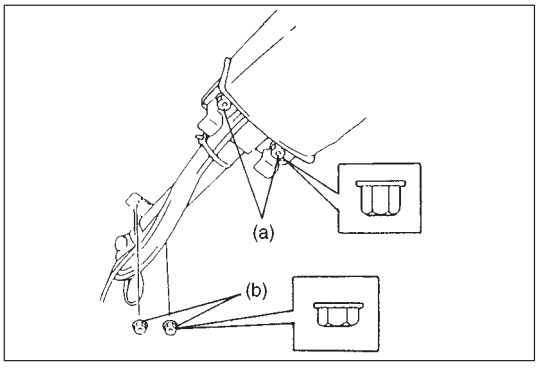
7) Remove steering shaft joint bolts and then remove steering shaft lower joint.



1. Steering column
2. Lower joint shaft
3. Steering pinion shaft

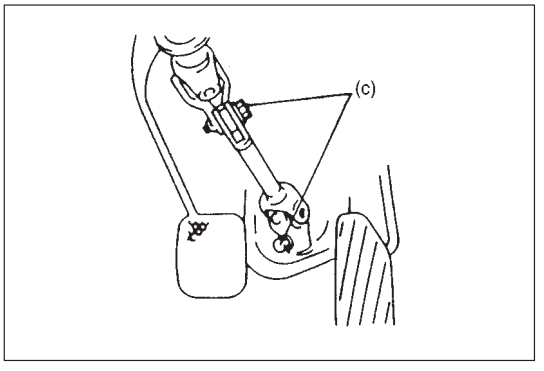
INSTALLATION

1) Align flat part of lower joint shaft with bolt hole of upper joint as shown. Then insert lower joint shaft into upper joint.
2) Be sure that front wheels and steering wheel are in straight- forward state and insert lower joint into steering pinion shaft.



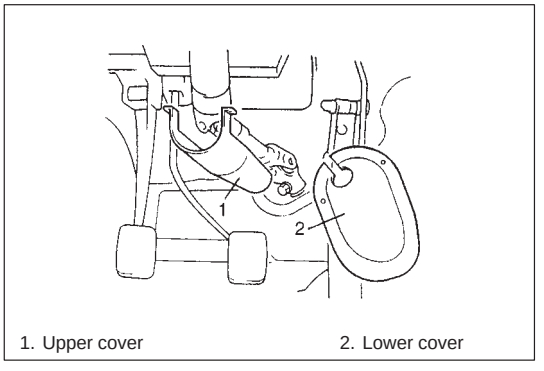
3) Tighten steering column upper nuts first and then lower nuts to specified torque.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 14 N·m (1.4 kg-m, 10.5 lb-ft)



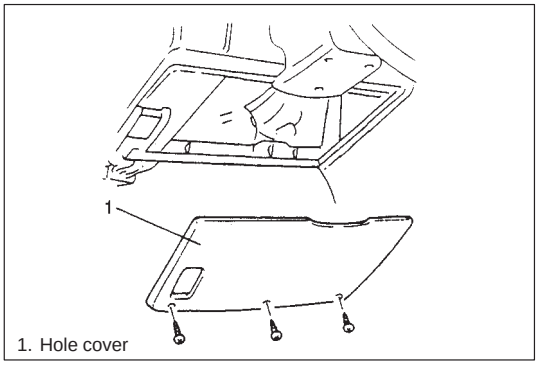
4) Torque steering shaft joint bolts to specification.

Tightening Torque
(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)



1. Upper cover 2. Lower cover

5) Install steering shaft joint lower cover and then upper cover.
6) Reposition floor carpet.

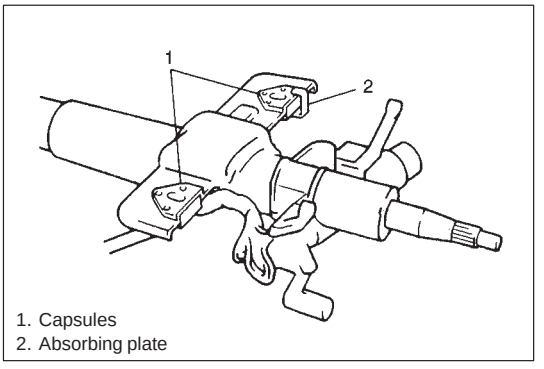


1. Hole cover

7) Install hole cover.

CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

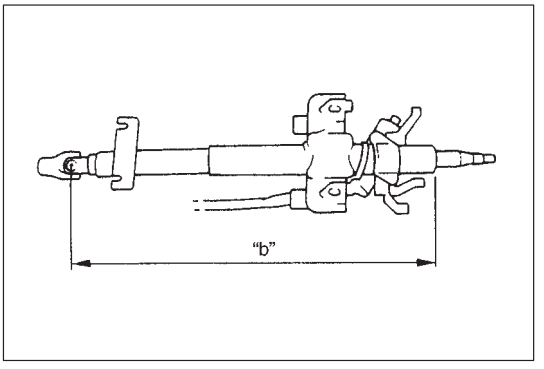
NOTE:
Vehicles involved in accidents resulting in body damage, where steering column has been impacted or air bag deployed, may have a damaged or misaligned steering column.



1. Capsules
2. Absorbing plate

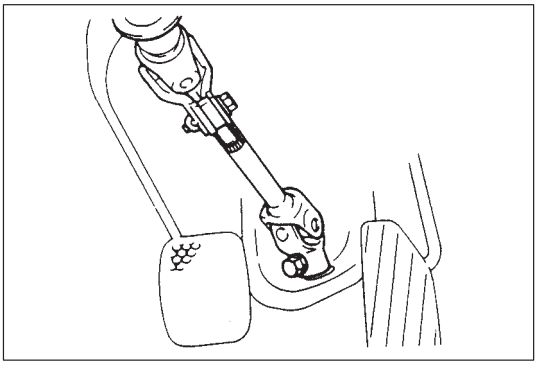
CHECKING PROCEDURE

1) Check that two capsules are attached to steering column bracket securely. If found loose, replace steering column assembly. Check absorbing plate for crack. If found defective, replace.

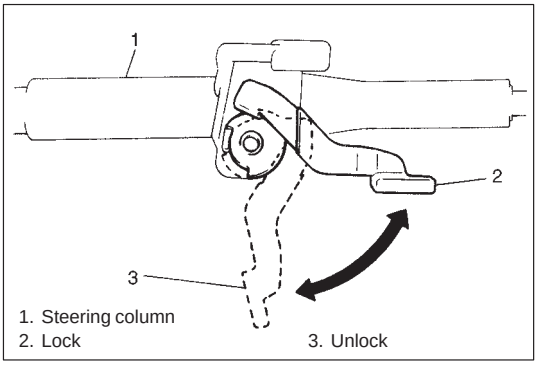


2) Take measurement "b" as shown. If it is shorter than specified length, replace column assembly with new one.

   Length "b": 513 mm (20.20 in.)



3) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play. If anything is found faulty, replace as joint assembly.
4) Check steering shaft for smooth rotation. If found defective, replace as column assembly.
5) Check steering shaft and column for bend, cracks or deformation. If found defective, replace.



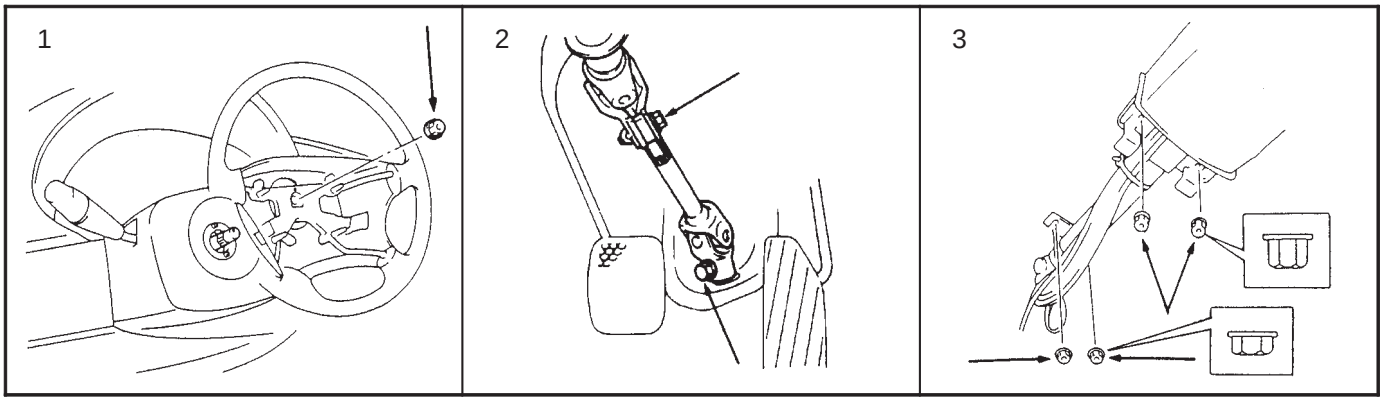
1. Steering column
2. Lock
3. Unlock

CHECKING TILT STEERING COLUMN (If equipped)

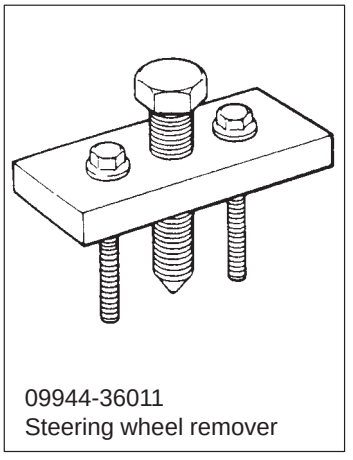
Check to make sure the following:
○ Steering column moves smoothly when tilt lever is at lower position (i.e., steering column is unlocked).
○ Steering column is fixed securely when tilt lever is at higher position (i.e., steering column is locked).

TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Steering shaft nut	33	3.3	23.5
2. Steering shaft joint bolts	25	2.5	18.0
3. Steering column mounting nuts	14	1.4	10.5



SPECIAL TOOL



09944-36011
Steering wheel remover

SECTION 3C1

AIR BAG STEERING WHEEL AND COLUMN

WARNING:
The procedures in this section must be followed in the order listed to temporarily disable the Air Bag System and prevent false diagnostic codes from setting.
Failure to follow procedures could result in possible air bag deployment, personal injury or otherwise unneeded air bag system repairs.

CAUTION:
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above procedures are not followed, parts or system damage could result.

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Checking Tilt Steering Column (if equipped) 3C1-20
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GENERAL DESCRIPTION

STEERING COLUMN

This double tube type steering column has following three important features in addition to the steering function:

○ The column is energy absorbing type, designed to contract in a front-end collision.

○ The ignition switch and lock are mounted conveniently on this column.

○ With the column mounted lock, the ignition and steering operations can be locked to inhibit theft of the vehicle.

When the column assembly is removed from the vehicle, special care must be taken in handling it.

STEERING WHEEL AND DRIVER AIR BAG (INFLATOR) MODULE

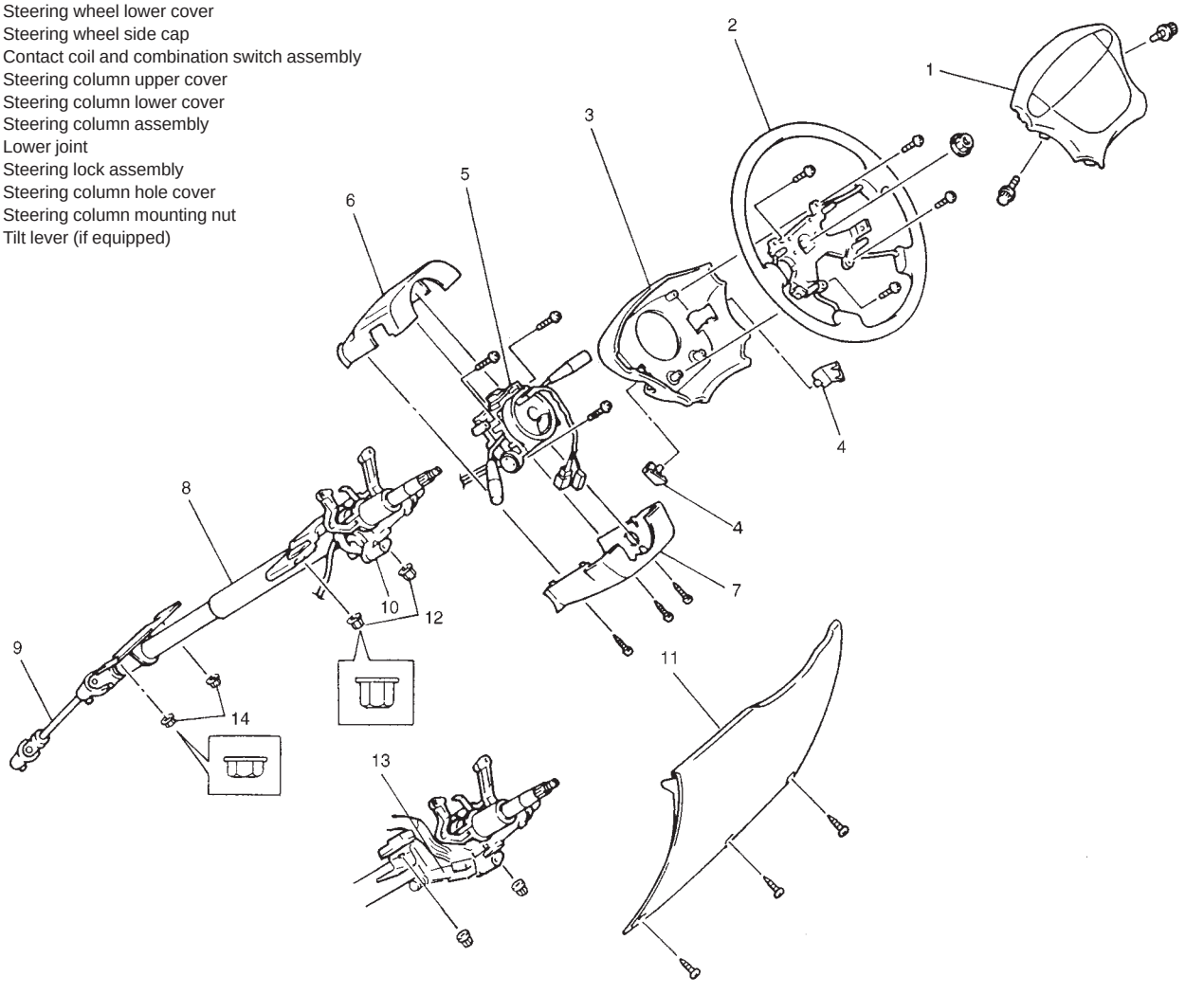
The driver air bag (inflator) module is one of the supplemental inflatable restraint air bag system components and is mounted to the center of the steering wheel.

During certain frontal crashes, the air bag system supplements the restraint of the driver's and/or passenger's seat belts by deploying the air bag in each air bag (inflator) module.

The air bag (inflator) module should be handled with care to prevent accidental deployment.

When servicing, be sure to observe all WARNINGS and CAUTIONS. Refer to "Service Precautions" and "Handling Precautions" under "On-Vehicle Service" later in this section, and to SECTION 9J.

1. Air bag (inflator) module
2. Steering wheel
3. Steering wheel lower cover
4. Steering wheel side cap
5. Contact coil and combination switch assembly
6. Steering column upper cover
7. Steering column lower cover
8. Steering column assembly
9. Lower joint
10. Steering lock assembly
11. Steering column hole cover
12. Steering column mounting nut
13. Tilt lever (if equipped)



ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

○ WARNING/CAUTION labels are attached on each part of air bag system components. Be sure to follow the instructions.

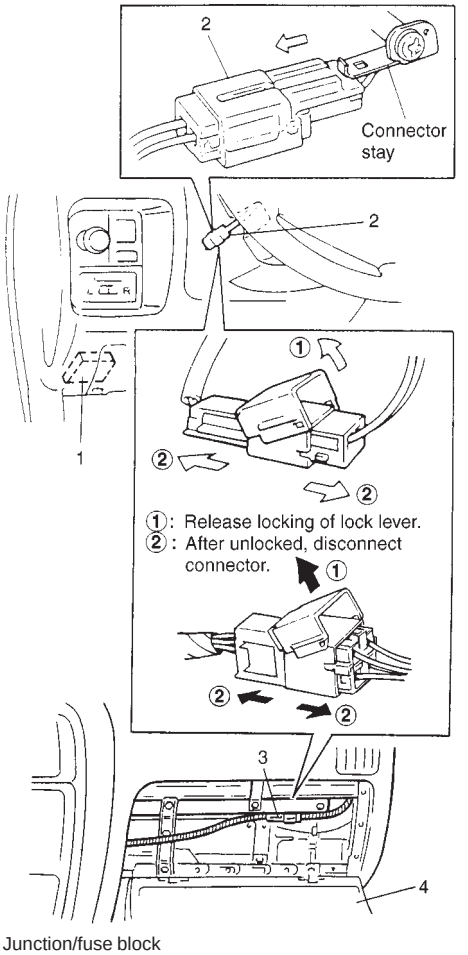
WARNING:
When performing service on or around air bag system components or air bag system wiring, follow the procedures listed below to temporarily disable the air bag system. Refer to appropriate service manual procedures.
Failure to follow procedures could result in possible air bag deployment, personal injury or unneeded air bag system repairs.

○ The Sensing and Diagnostic Module (SDM) in air bag system can maintain sufficient voltage to cause a deployment of air bag for up to 10 seconds after the ignition switch is turned to the "LOCK" position, the battery is disconnected or the fuse powering the SDM is removed. Therefore, wait for 10 seconds or more after the power to the SDM was turned "OFF" and before starting any operation on it.
Many of the service procedures require disconnection of the "AIR BAG" fuse and air bag (inflator) modules (driver and passenger) from the deployment loop to avoid an accidental deployment.

○ Never use air bag component parts from another vehicle.

○ If the vehicle will be exposed to temperatures over 93· C (200· F) (for example, during a paint baking process), remove the air bag system components.

○ When servicing, if shocks may be applied to air bag system component parts, remove those parts beforehand.

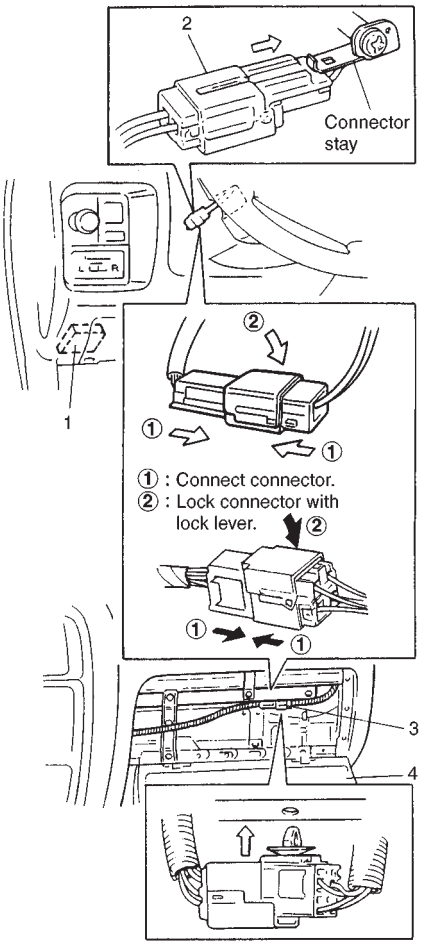


1. Junction/fuse block
2. Yellow connector of driver air bag (inflator) module
3. Yellow connector of passenger air bag (inflator) module
4. Glove box

DISABLING AIR BAG SYSTEM

1) Turn steering wheel so that vehicle's wheels (front tires) are pointing straight ahead.
2) Turn ignition switch to "LOCK" position and remove key.
3) Remove "AIR BAG" fuse from the junction/fuse block.
4) Remove steering wheel side cap (left) and disconnect Yellow connector of driver air bag (inflator) module.
5) Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector of passenger air bag (inflator) module.

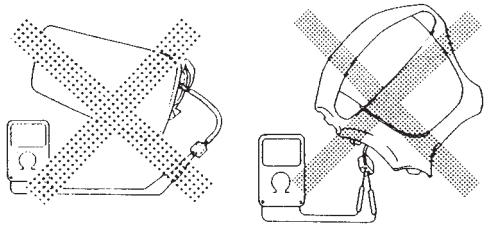
NOTE:
With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.
This is normal operation and does not indicate a air bag system malfunction.



1. Junction/fuse block
2. Yellow connector of driver air bag (inflator) module
3. Yellow connector of passenger air bag (inflator) module
4. Glove box

ENABLING AIR BAG SYSTEM

1) Turn ignition switch to “LOCK” and remove key.
2) Connect Yellow connector of passenger air bag (inflator) module and Yellow connector of driver air bag (inflator) module respectively, and be sure to lock each connector with lock lever. Fit each air bag (inflator) module connector onto each connector stay.
3) Install glove box and steering wheel side cap.
4) Install “AIR BAG” fuse to the junction/fuse block.
5) Turn ignition switch to “ON” and verify that “AIR BAG” warning lamp flashes 6 times and then turns off.
   If it does not operate as described, perform “Air Bag Diagnostic System Check” in SECTION 9J.



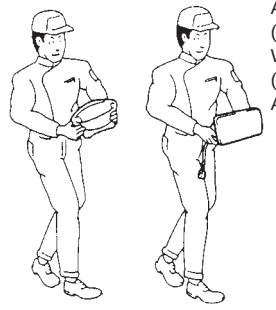
HANDLING PRECAUTIONS

Live (Undeployed) Air Bag (Inflator) Module (Driver and Passenger)

WARNING:
Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag.

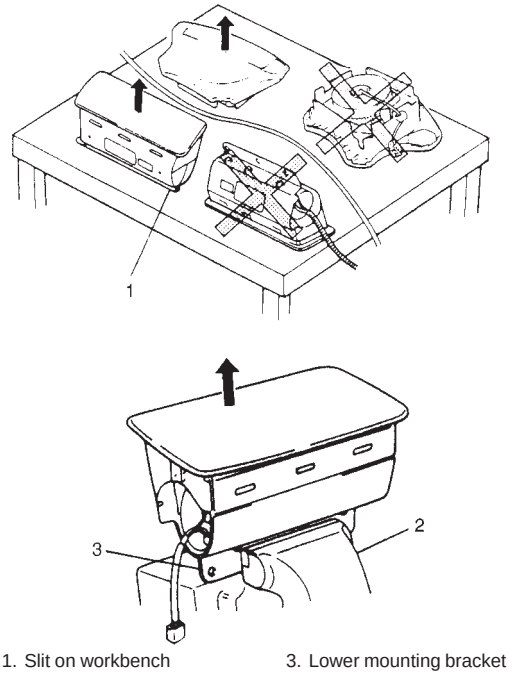
Special care is necessary when handling and storing a live (undeployed) air bag (inflator) module. The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

- ○ Never attempt disassembly of the air bag (inflator) module.
- ○ If any abnormality is found, be sure to replace it with new one as an assembly.
- ○ When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it. (Refer to “Air Bag (Inflator) Modules Disposal” in SECTION 9J.)



ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.

ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

○ When grease, cleaning agent, oil water, etc., got on the air bag (inflator) modules (driver and passenger), wipe it off immediately with a dry cloth.

○ If air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.

WARNING:

○ For handling and storing an air bag (inflator) module, select a place where the ambient temperature below 65° C (150° F), without high humidity and away from electric noise.

○ When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module.

○ When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.

It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) modules.

This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

Deployed Air Bag (Inflator) Module (Driver and Passenger)

WARNING:

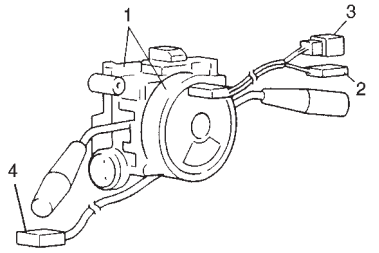
○ Immediately after deployment, the air bag (inflator) module is very hot. Wait for at least 30 minutes to cool it off before starting servicing (handling) it.

○ Do not apply water, etc. to deployed air bag (inflator) module.

○ After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.

○ Wash your hands with mild soap and water after completing the work.

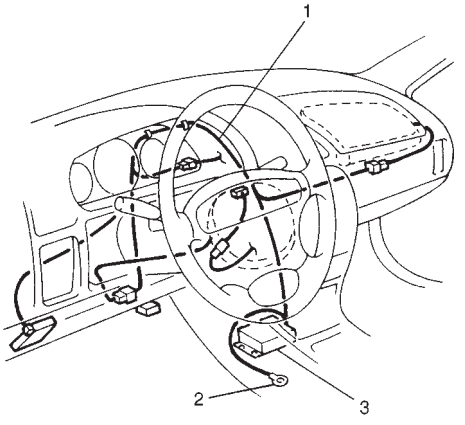
Refer to the procedure described under “Deployed Air Bag (Inflator) Module Disposal” in SECTION 9J, for details.



1. Contact coil and combination switch assembly
2. To horn
3. Connector to driver air bag (inflator) module
4. Connector to air bag wire harness

Contact Coil and Combination Switch Assembly

Do not turn contact coil (on combination switch) more than allowable number of turns (about two and a half turns from the center positIon clockwise or counterclockwise respectively), or coil will break.



1. Air bag wire harness
2. Ground
3. SDM case ground

Air Bag Wire Harness and Connectors

CAUTION:
When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.

- ○ Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.
- ○ When installing it, be careful so that the air bag wire harness is not caught or does not interfere with other parts.
- ○ Make sure all air bag system grounding points are clean and grounds are securely fastened for optimum metal-to metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

DISPOSAL PRECAUTIONS

Do not dispose of live (undeployed) air bag (inflator) modules (driver and passenger). When disposal is necessary, be sure to deploy it first according to the procedure described in SECTION 9J and then dispose it. Refer to SECTION 9J for disposal procedure.

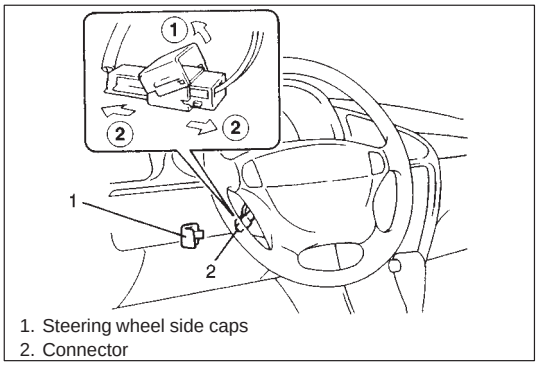
WARNING:
Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which could cause personal injury. Undeployed air bag (inflator) modules must not be disposed of through normal refuse channels. The undeployed air bag (inflator) module contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

DRIVER AIR BAG (INFLATOR) MODULE

WARNING:
When handling an air bag (inflator) module, be sure to read "HANDLING PRECAUTIONS" given earlier in this section and observe each instruction. Failure to follow them could cause a damage to the air bag (inflator) module or result in personal injury.

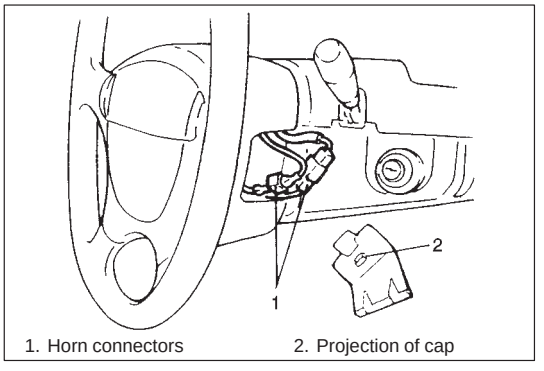
REMOVAL

1) Disconnect negative battery cable at battery terminal.



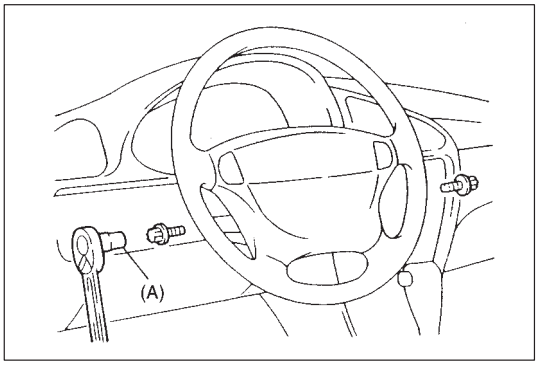
1. Steering wheel side caps
2. Connector

2) Disable air bag system. Refer to "Disabling Air Bag System" under "Service Precautions" earlier in this section.



1. Horn connectors 2. Projection of cap

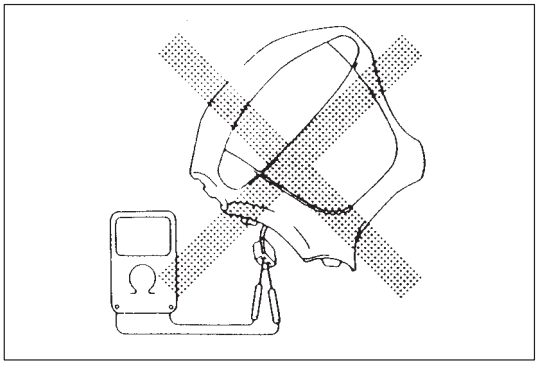
3) Remove steering wheel side cap of right side and disconnect horn connectors.



4) Remove air bag (inflator) module bolts (2 pcs).

Special Tool
(A): 09944-18230

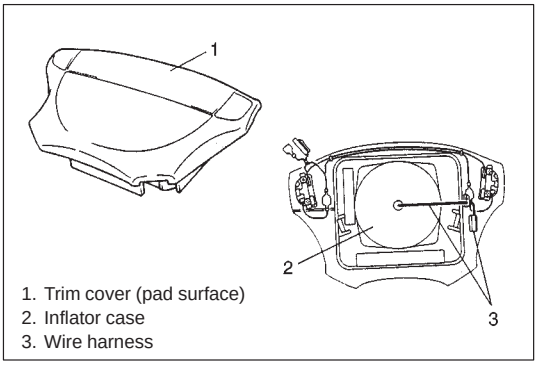
5) Remove air bag (inflator) module from steering wheel.



INSPECTION

WARNING:
Never disassemble air bag (inflator) module or measure its resistance. Otherwise, personal injury may result.

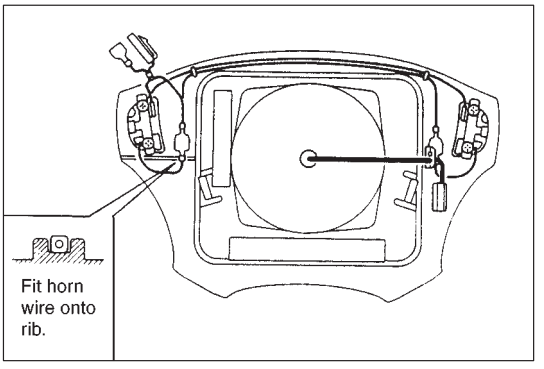
CAUTION:
If air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.



1. Trim cover (pad surface)
2. Inflator case
3. Wire harness

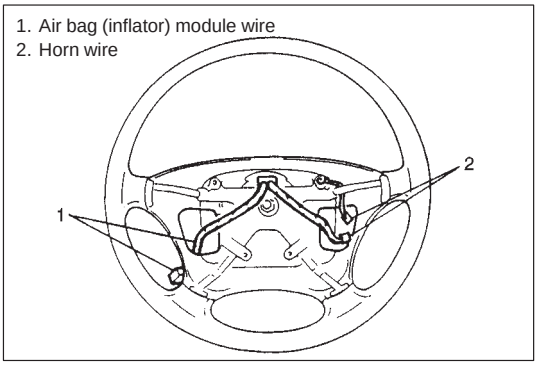
Check air bag (inflator) module visually and if any of the following is found, replace it with a new one.

- ○ Air bag being deployed
- ○ Trim cover (pad surface) being cracked
- ○ Wire harness or connector being damaged
- ○ Air bag (inflator) module being damaged or having been exposed to strong impact (dropped)



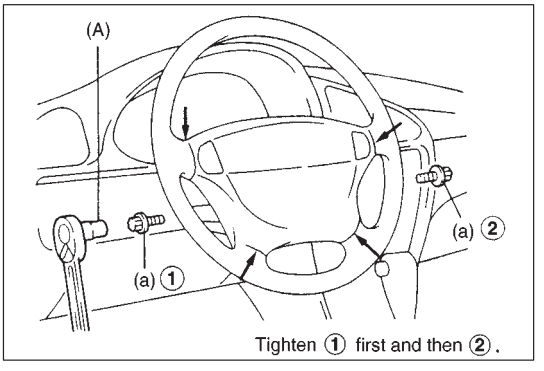
INSTALLATION

1) Making sure that wire harness at the back of air bag (inflator) module is arranged as shown in figure.



1. Air bag (inflator) module wire
2. Horn wire

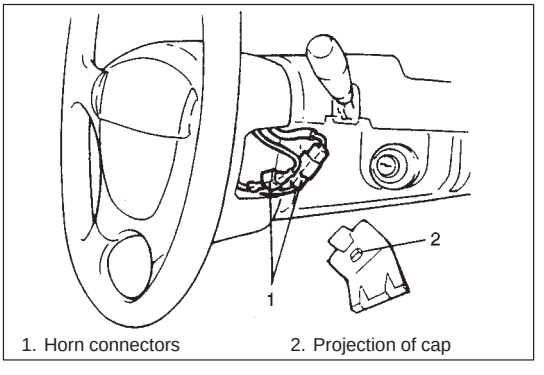
2) Making sure that contact coil lead wires and horn wire is arranged as shown in figure.
3) Install air bag (inflator) module to steering wheel, taking care so that no part of wire harness is caught between them.



4) Make sure that clearance between module and steering wheel is uniform all the way.
5) Tighten air bag (inflator) module left side bolt first and then its right side bolt to specified torque.

Special Tool
(A): 09944-18230

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Horn connectors
2. Projection of cap

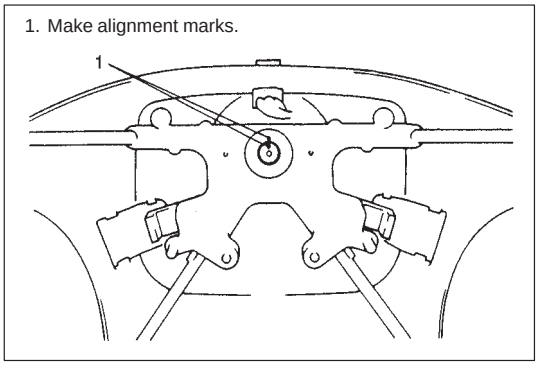
6) Connect horn connectors securely, fit connector onto projection of steering wheel right side cap and then install right side cap on steering wheel lower cover.
7) Connect negative battery cable.
8) Enable air bag system. Refer to “Enabling Air Bag System” under “Service Precautions” earlier in this section.

STEERING WHEEL

CAUTION:
Removal of the steering wheel allows the contact coil to turn freely but do not turn the contact coil (on the combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.

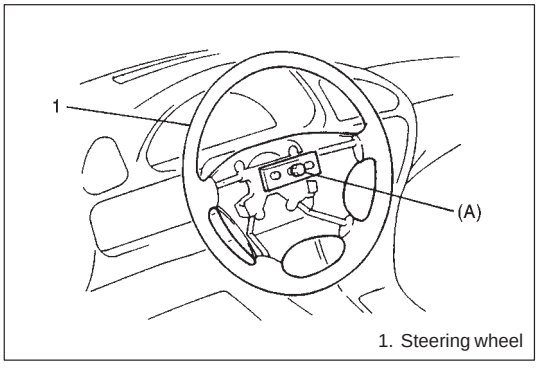
REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Disable air bag system. Refer to “Disabling Air Bag System” under “Service Precautions” earlier in this section.
3) Remove air bag (inflator) module from steering wheel referring to “Driver Air Bag (Inflator) Module” earlier in this section.



1. Make alignment marks.

4) Remove steering shaft nut.
5) Make alignment marks on steering wheel and shaft for a guide during reinstallation.



1. Steering wheel

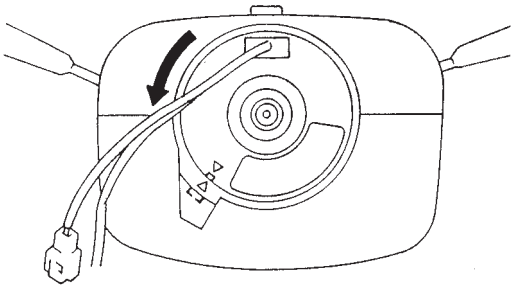
6) Remove steering wheel with special tool (A).

Special Tool
(A): 09944-36011

CAUTION:
Do not hammer the end of the shaft. Hammering it will loosen the plastic shear pins which maintain the column length and impair the collapsible design of the column.

CENTERING CONTACT COIL

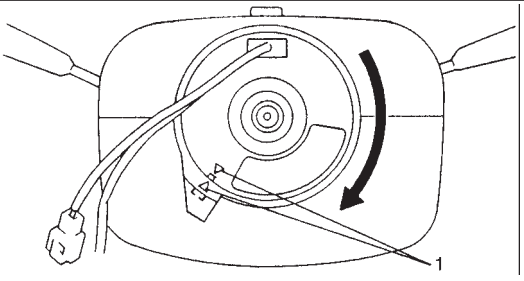
1) Check that vehicle’s wheels (front tires) are set at straight-ahead position.
2) Check that ignition switch is at “LOCK” position.



Turn slowly till coil stops.

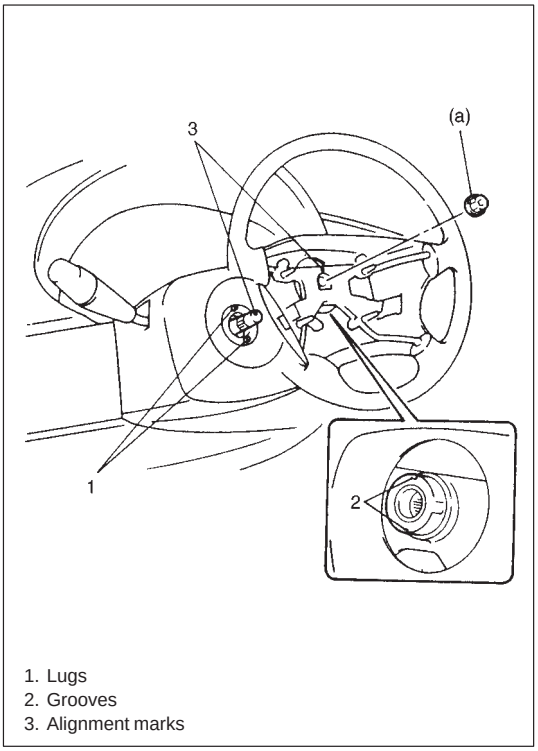
3) Turn contact coil counterclockwise slowly with a light force till contact coil will not turn any further.

NOTE:
Contact coil can turn about 5 turns at maximum, that is, if it is at the center position, can turn about two and a half turns both clockwise and counterclockwise.



Turn contact coil back about 2 and a half turns.
1. Align marks.

4) From the position where contact coil became unable to turn any further (it stopped), turn it back clockwise about two and a half rotations and align center mark with alignment mark.



1. Lugs
2. Grooves
3. Alignment marks

INSTALLATION

1) Check that vehicle's front tires are at straight-ahead position and contact coil is centered. Refer to "Centering Contact Coil" earlier in this section.

CAUTION:
These two conditions are prerequisite for installation of steering wheel. If steering wheel has been installed without these conditions, contact coil will break when steering wheel is turned.

2) Install steering wheel to steering shaft with 2 lugs on contact coil fitted in two grooves in the back of steering wheel and also aligning marks on steering wheel and steering shaft.
3) Tighten steering shaft nut to specified torque.

Tightening Torque
(a): 33 N·m (3.3 kg-m, 23.5 lb-ft)

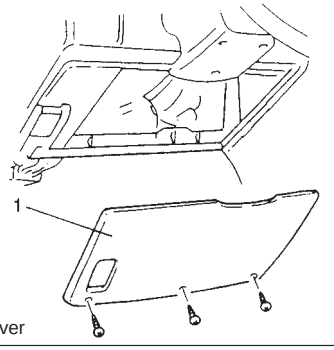
4) Install air bag (inflator) module to steering wheel. Refer to "Driver Air Bag (Inflator) Module" earlier in this section.
5) Connect negative battery cable.
6) Enable air bag system. Refer to "Enabling Air Bag System" under "Service Precautions" earlier in this section.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

CAUTION:
Do not turn contact coil (on combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counter-clockwise respectively), or coil will break.

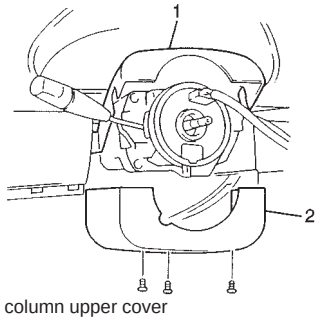
REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Disable air bag system. Refer to “Disabling Air Bag System” under “Service Precautions” earlier in this section.
3) Remove steering wheel from steering column shaft. Refer to “STEERING WHEEL” earlier in this section.



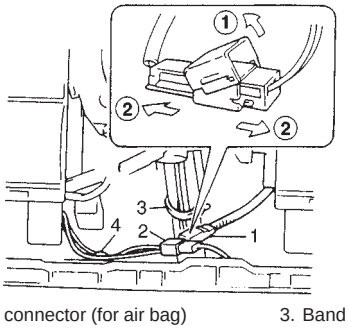
1. Hole cover

4) Remove hole cover.



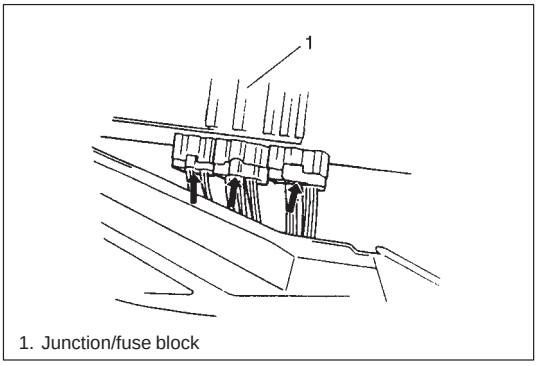
1. Steering column upper cover
2. Steering column lower cover

5) Remove steering column cover screws (3 pcs).
6) Separate upper cover and lower cover, then remove them.



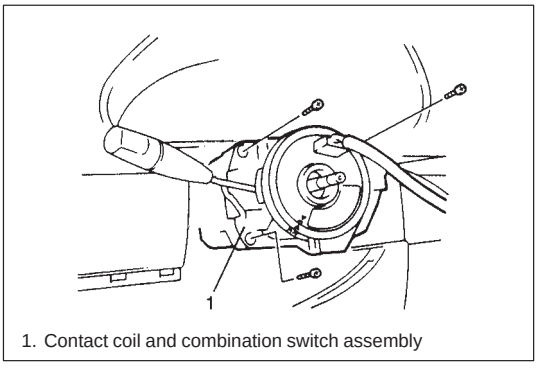
1. Yellow connector (for air bag)
2. White connector (for auto cruise)
3. Band
4. Clamp

7) Loosen clamp.
8) Remove band binding steering column and harness (for contact coil and combination switch assembly).
9) Disconnect yellow connector (for air bag) and white 4-P connector (for auto cruise, optional).



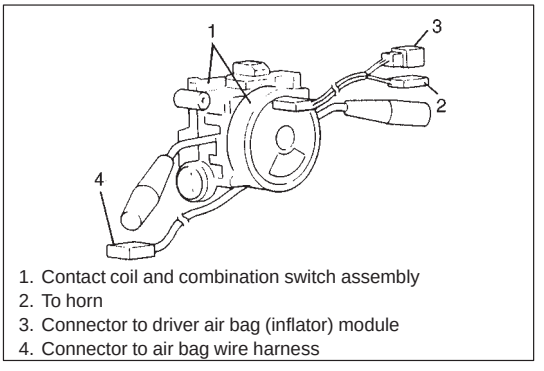
1. Junction/fuse block

10) Disconnect three connectors for contact coil and combination switch wire harness from junction/fuse block.



1. Contact coil and combination switch assembly

11) Remove contact coil and combination switch assembly from steering column.



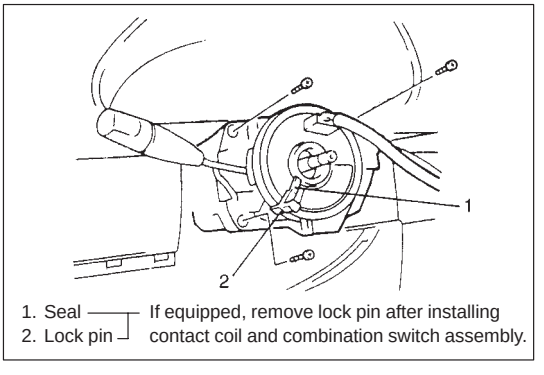
1. Contact coil and combination switch assembly
2. To horn
3. Connector to driver air bag (inflator) module
4. Connector to air bag wire harness

INSPECTION

Check contact coil and combination switch wire harness for any signs of scorching, melting or other damage. If it is damaged, replace.

INSTALLATION

1) Check to make sure that vehicle's front tires are set at straight-ahead position and then ignition switch is at "LOCK" position.

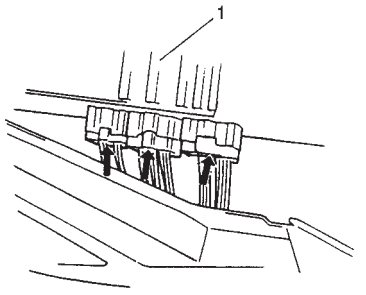


1. Seal
2. Lock pin

If equipped, remove lock pin after installing contact coil and combination switch assembly.

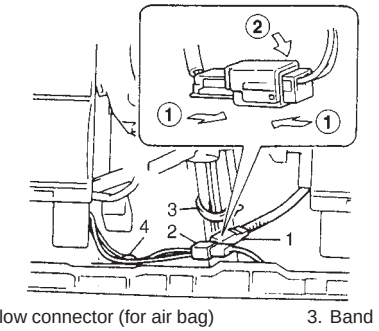
2) Install contact coil and combination switch assembly to steering column.

NOTE:
New contact coil and combination switch assembly is supplied with contact coil set and held at its center position with a lock pin and seal. Remove this lock pin after installing contact coil and combination switch assembly to steering column.



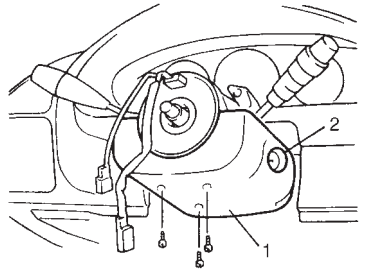
1. Junction/fuse block

3) Connect three connectors for contact coil and combination switch wire harness to junction/fuse block.



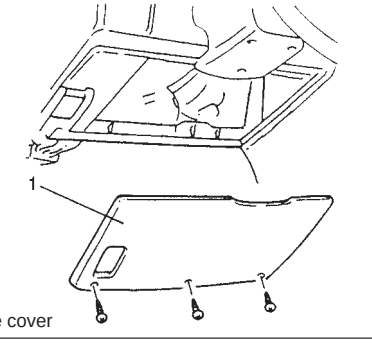
1. Yellow connector (for air bag)
2. White connector (for auto cruise)
3. Band
4. Clamp

4) Connect yellow connector (for air bag) and white 4-P connector (for auto cruise, optional).
5) Tighten clamp and band for contact coil and combination switch wire harness.



1. Steering column lower cover
2. Key cylinder

6) Install lower cover to key cylinder.
7) Tighten steering column lower cover screws, and then install upper cover to lower cover.



1. Hole cover

8) Install hole cover.

9) Install steering wheel to its shaft. Refer to “STEERING WHEEL” earlier in this section.
10) Connect battery negative cable.
11) Enable air bag system. Refer to “Enabling Air Bag System” under “Service Precautions” earlier in this section.

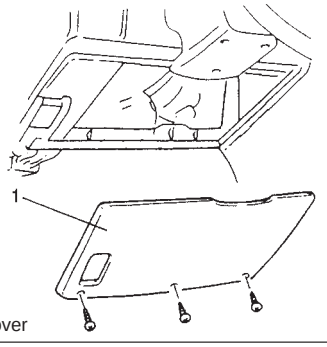
STEERING COLUMN

CAUTION:
- **Once the steering column is removed from the vehicle, the column is extremely susceptible to damage.**
- **Dropping the column assembly on its end could collapse the steering shaft.**
- **Loosen the plastic shear pins which maintain column length.**
- **Leaning on the column assembly could cause it to bend or deform.**
- **Any of the above damage could impair the column's collapsible design.**
- **Steering column mounting nuts should not be loosened with steering shaft joint upper side bolt tightened as this could cause damage to shaft joint bearing.**

NOTE:
When servicing steering column or any column-mounted component, remove steering wheel. But when removing steering column simply to gain access to instrument panel components, leave steering wheel installed on steering column.

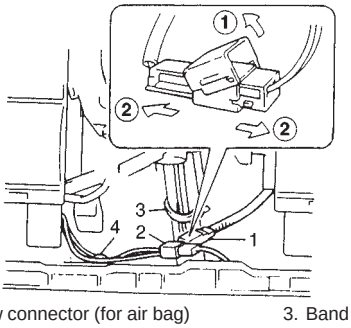
REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Disable air bag system. Refer to "Disabling Air Bag System" under "Service Precautions" earlier in this section.
3) Remove steering wheel and contact coil and combination switch assembly, if necessary. Refer to "STEERING WHEEL" and "CONTACT COIL AND COMBINATION SWITCH ASSEMBLY" earlier in this section.
4) Remove hole cover.

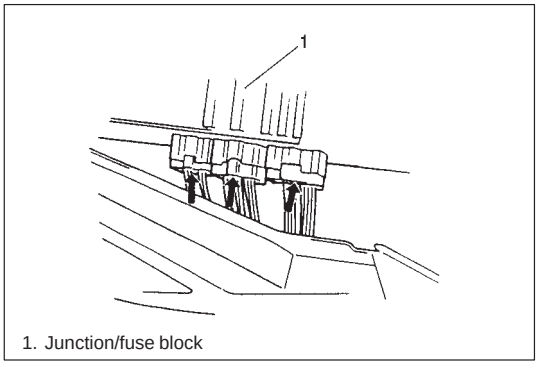


1. Hole cover

5) Loosen clamp.
6) Remove band binding steering column and harness (for contact coil and combination switch assembly).
7) Disconnect yellow connector (for air bag) and white 4-P connector (for auto cruise, optional).

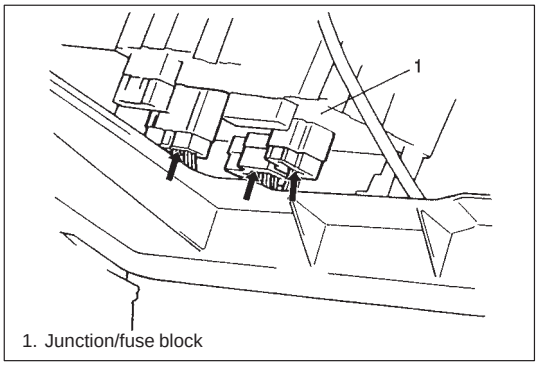


1. Yellow connector (for air bag)
2. White connector (for auto cruise)
3. Band
4. Clamp



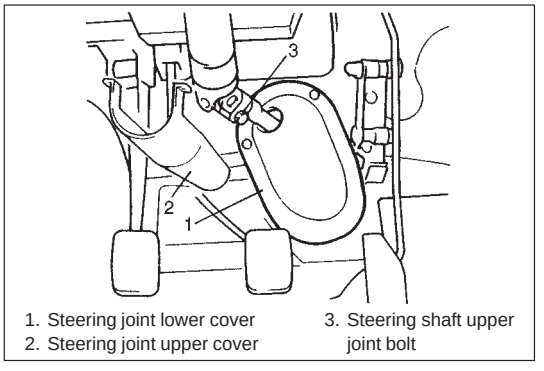
1. Junction/fuse block

8) Disconnect three connectors for contact coil and combination switch assembly wire harness from junction/fuse block.



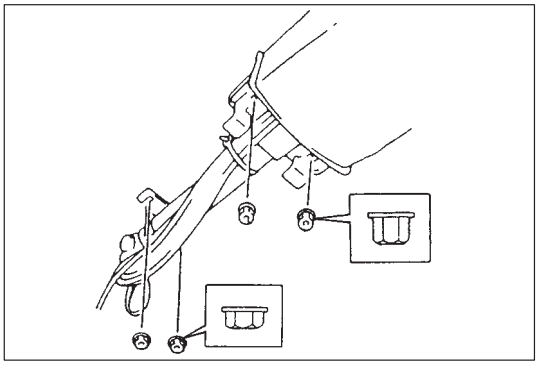
1. Junction/fuse block

9) Disconnect three connectors for ignition switch wire harness from junction/fuse block.

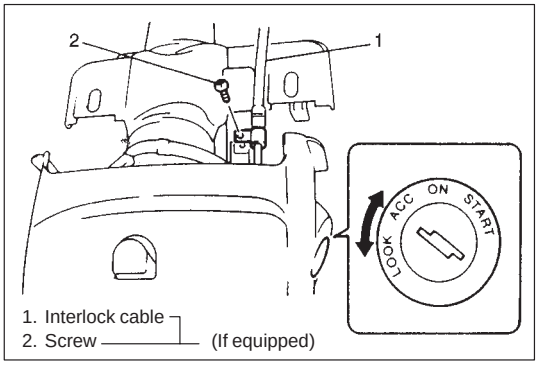


1. Steering joint lower cover
2. Steering joint upper cover
3. Steering shaft upper joint bolt

10) Remove steering joint upper cover.
11) Remove steering shaft upper joint bolt.



12) Remove steering column mounting nuts (4 pcs).



1. Interlock cable
2. Screw (If equipped)

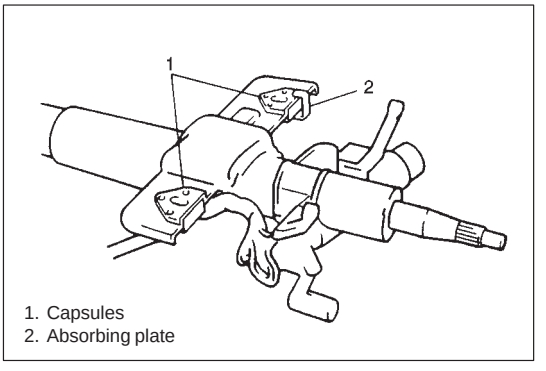
13) If equipped with shift (key) interlock cable, remove shift (key) interlock cable screw and then disconnect its cable from ignition switch with ignition switch turned at “ACC” position. After disconnecting, turn ignition switch to “LOCK” position.

14) Remove steering column from vehicle.

WARNING:
Never rest a steering column assembly on the steering wheel with the air bag (inflator) module face down and column vertical. Otherwise, personal injury may result.

INSPECTION

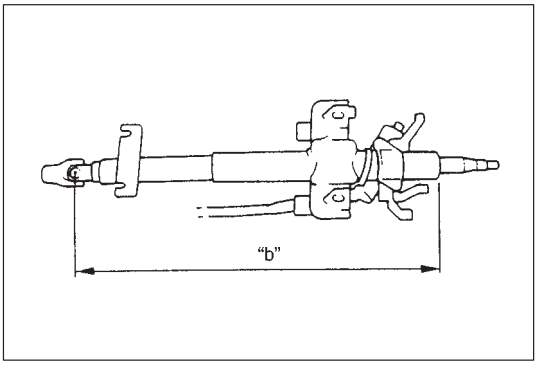
NOTE:
Vehicles involved in accidents resulting in body damage, where steering column has been impacted or air bag deployed, may have a damaged or misaligned steering column.



1. Capsules
2. Absorbing plate

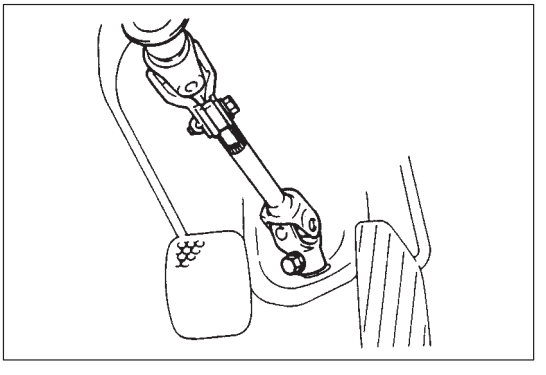
CHECKING PROCEDURE

1) Check that two capsules are attached to steering column bracket securely. If found loose, replace steering column assembly.
   Check absorbing plate for crack. If found defective, replace.

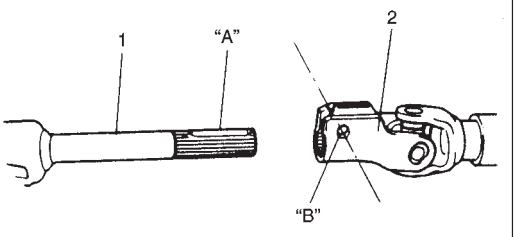


2) Take measurement "b" as shown. If it is shorter than specified length, replace column assembly with new one.

   Length "b": 513 mm (20.20 in.)



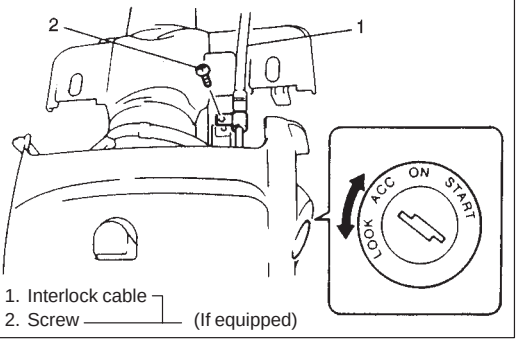
3) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play.
   If anything is found faulty, replace as joint assembly.
4) Check steering shaft for smooth rotation.
   If found defective, replace as column assembly.
5) Check steering shaft and column for bend, cracks or deformation.
   If found defective, replace.



1. Lower joint
2. Upper joint of steering column

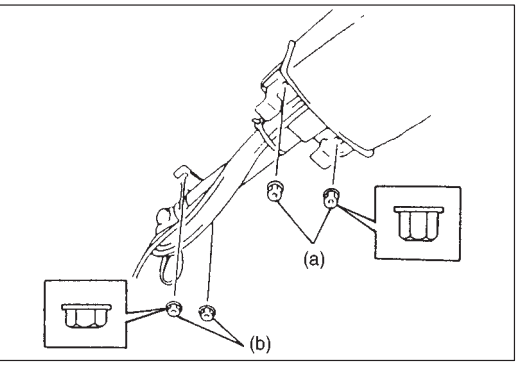
INSTALLATION

1) Align flat part "A" of lower joint shaft with bolt hole "B" of upper side joint of steering column as shown. Then insert upper side joint of steering column into lower joint shaft.



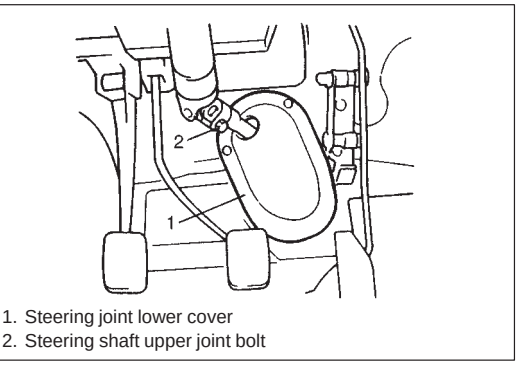
1. Interlock cable
2. Screw (If equipped)

2) If equipped with shift (key) interlock cable, connect shift (key) interlock cable to ignition switch with ignition switch turned at "ACC" position. And then turn ignition switch to "LOCK" position.
3) Tighten its cable screw.



4) Install steering column assembly to lower and upper brackets. Torque steering column upper nuts first and then lower nuts to specifications as given below.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 14 N·m (1.4 kg-m, 10.5 lb-ft)

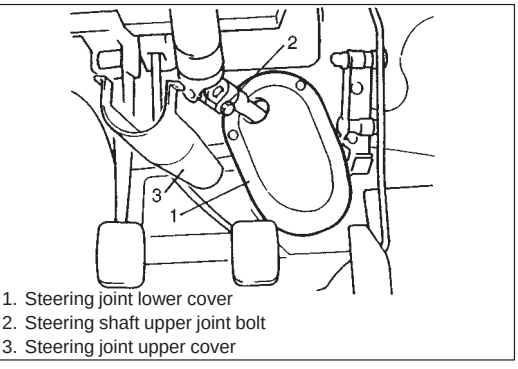


1. Steering joint lower cover
2. Steering shaft upper joint bolt

5) Install bolt to steering shaft upper joint and tighten it to specified torque.

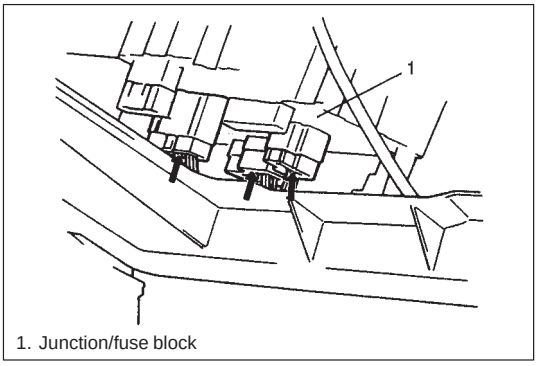
NOTE:
After tightening column nuts, bolt to steering shaft upper joint should be tightened.

Tightening Torque
(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)



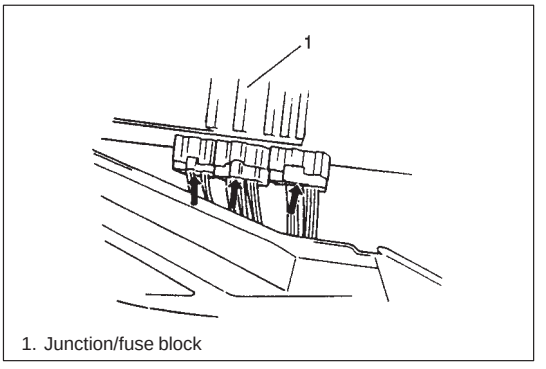
1. Steering joint lower cover
2. Steering shaft upper joint bolt
3. Steering joint upper cover

6) Install steering joint upper cover.



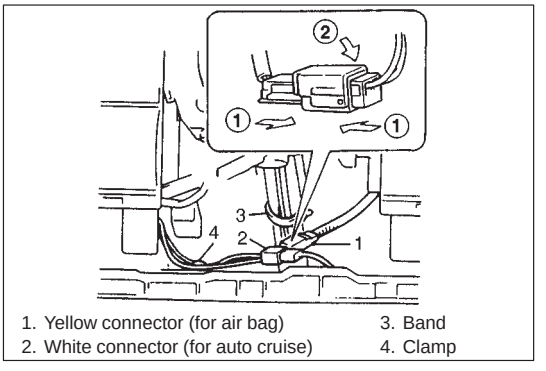
1. Junction/fuse block

7) Connect three connectors for ignition switch wire harness from junction/fuse block.
8) If contact coil and combination switch assembly is removed, install contact coil and combination switch assembly.
Refer to “Contact Coil and Combination Assembly” earlier in this section.



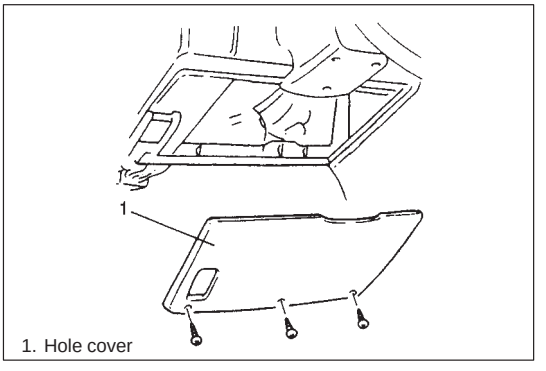
1. Junction/fuse block

9) If contact coil and combination switch assembly is not removed, follow the procedures below.
○ Connect three connectors for contact coil and combination switch wire harness to junction/fuse block.



1. Yellow connector (for air bag)
2. White connector (for auto cruise)
3. Band
4. Clamp

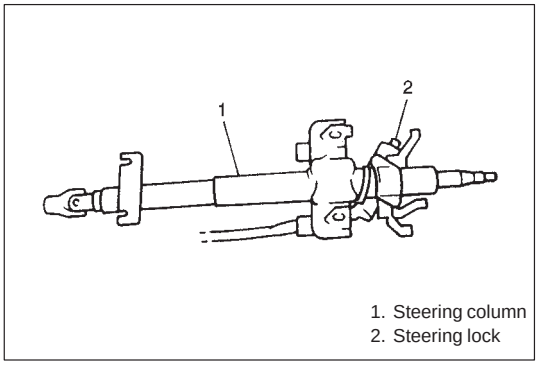
○ Connect yellow connector (for air bag) and white 4-P connector (for auto cruise, optional).
○ Fix wire harness with clamp and band.



1. Hole cover

10) Install hole cover.

11) If steering wheel is removed, install steering wheel. Refer to “STEERING WHEEL” earlier in this section.
12) Connect negative battery cable.
13) Enable air bag system. Refer to “Enabling Air Bag System” under “Service Precautions” earlier in this section.

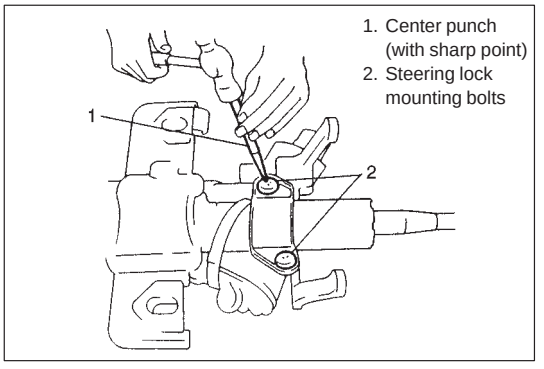


1. Steering column
2. Steering lock

STEERING LOCK (IGNITION SWITCH)

REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Disable air bag system. Refer to “Disabling Air Bag System” under “Service Precautions” earlier in this section.
3) Remove steering column. Refer to “STEERING COLUMN” earlier in this section.

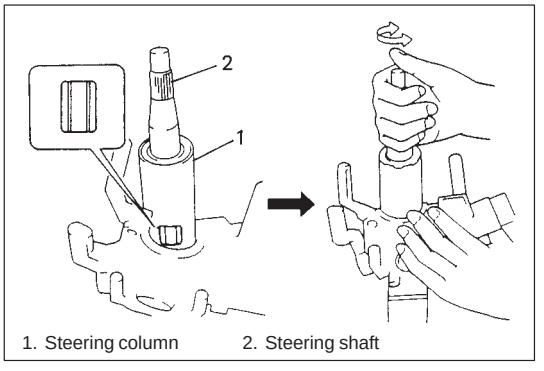


1. Center punch (with sharp point)
2. Steering lock mounting bolts

4) Using center punch as shown, loosen and remove steering lock mounting bolts.

   NOTE:
   Use care not to damage aluminum part of steering lock body with center punch.

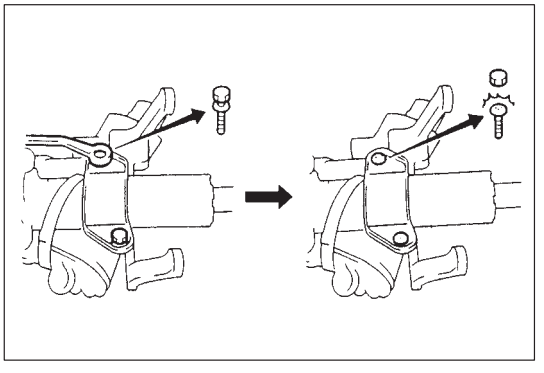
5) Turn ignition key to ”ACC” or ”ON” position and remove steering lock assembly from steering column.



1. Steering column 2. Steering shaft

INSTALLATION

1) Position oblong hole of steering shaft in the center of hole in column.
2) Turn ignition key to “ACC” or “ON” position and install steering lock assembly onto column.
3) Now turn ignition key to “LOCK” position and pull it out.
4) Align hub on lock with oblong hole of steering shaft and rotate shaft to assure that steering shaft is locked.



5) Tighten two new bolts until head of each bolt is broken off.
6) Turn ignition key to “ACC” or “ON” position and check to be sure that steering shaft rotates smoothly. Also check for lock operation.

7) Install steerIng column. Refer to “STEERING COLUMN” earlier in this section.
8) Connect negative battery cable.
9) Enable air bag System. Refer to “Enabling Air Bag System” under “Service Precautions” earlier in this section.

STEERING SHAFT LOWER JOINT

CAUTION:
Never turn steering wheel while steering shaft lower joint is removed.
Should it have been turned and contact coil (on combination switch) have got out of its centered position, it needs to be centered again. Also, turning steering wheel more than about two and a half turns will break contact coil.

For REMOVAL and INSTALLATION of steering shaft lower joint, refer to pages 3C-14 and 3C-15.

CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

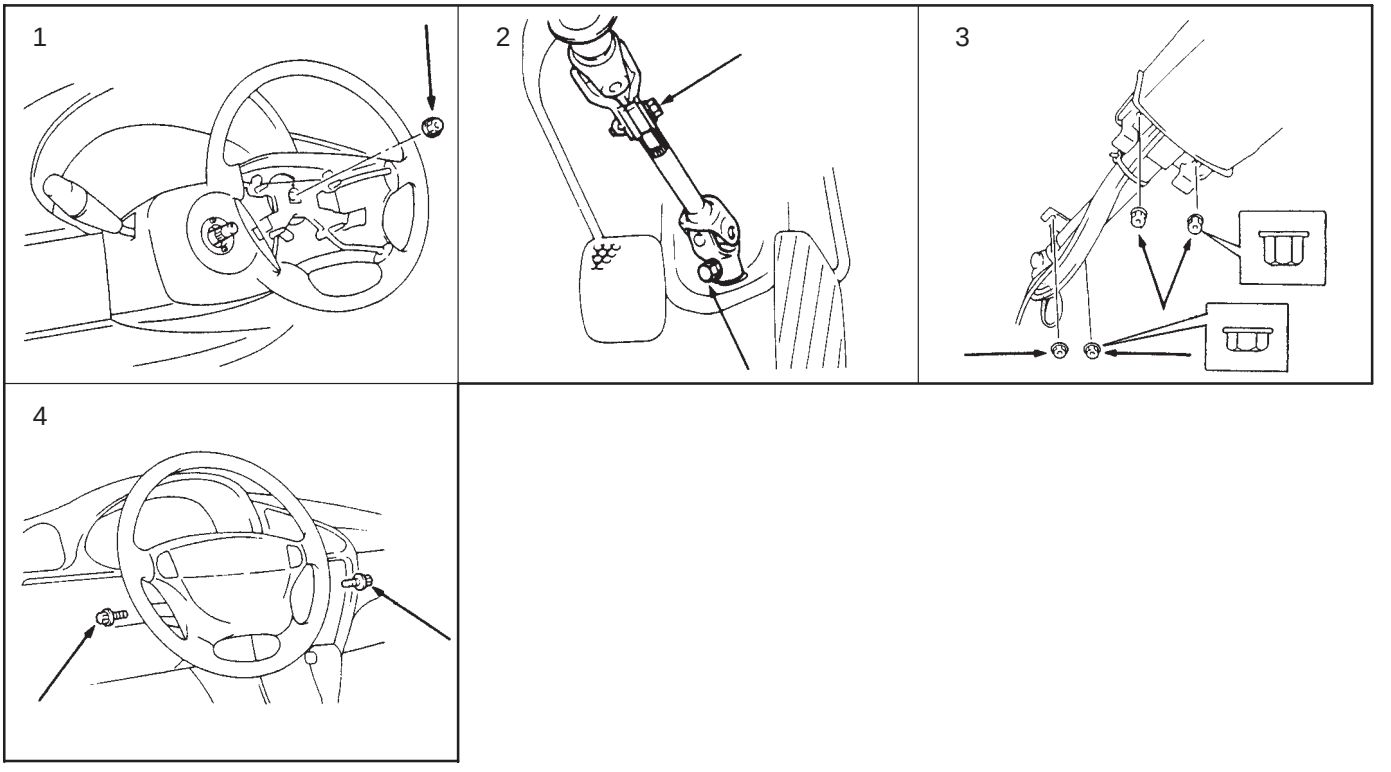
Refer to SECTION 3C “STEERING WHEEL AND COLUMN”.

CHECKING TILT STEERING COLUMN (If equipped)

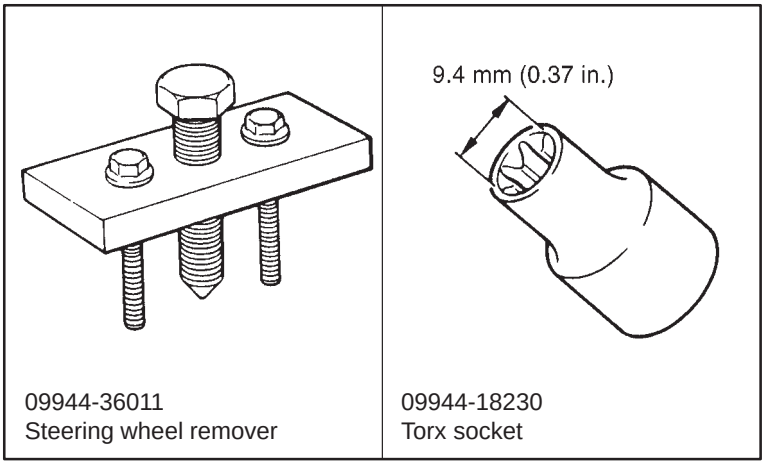
Refer to SECTION 3C “STEERING WHEEL AND COLUMN”.

TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Steering shaft nut	33	3.3	23.5
2. Steering shaft joint bolts	25	2.5	18.0
3. Steering column mounting nuts	14	1.4	10.5
4. Driver air bag (inflator) module bolts	23	2.3	17.0



SPECIAL TOOLS



09944-36011
Steering wheel remover

09944-18230
Torx socket

SECTION 3D

FRONT SUSPENSION

NOTE:

- **All front suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.**
- **Never attempt to heat, quench or straighten any front suspension part. Replace it with a new part or damage to the part may result.**

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Remove and Install Stabilizer Bar and/or Bushings 3D- 4
Remove and Install Strut Assembly 3D- 5
Disassemble and Assemble Strut Assembly 3D- 7
Remove and Install Wheel Hub, Wheel Stud/Wheel Bearing Outside Inner Race 3D- 9
Remove and Install Suspension Arm/Bushing 3D-12
Remove and Install Knuckle/Bearing 3D-14
Remove and Install Suspension Frame 3D-18
Front Suspension Inspection 3D-20

TORQUE SPECIFICATIONS 3D-23

REQUIRED SERVICE MATERIALS 3D-24

SPECIAL TOOLS 3D-24

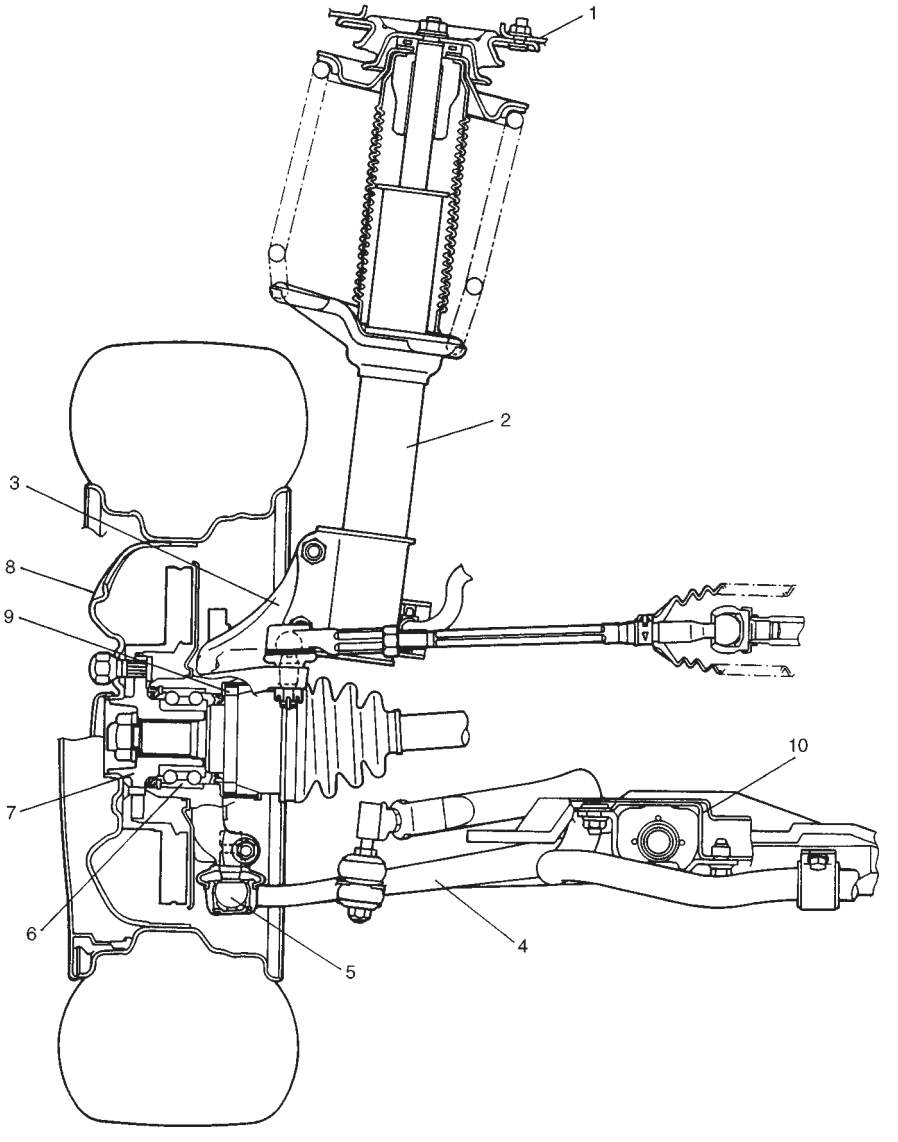
GENERAL DESCRIPTION

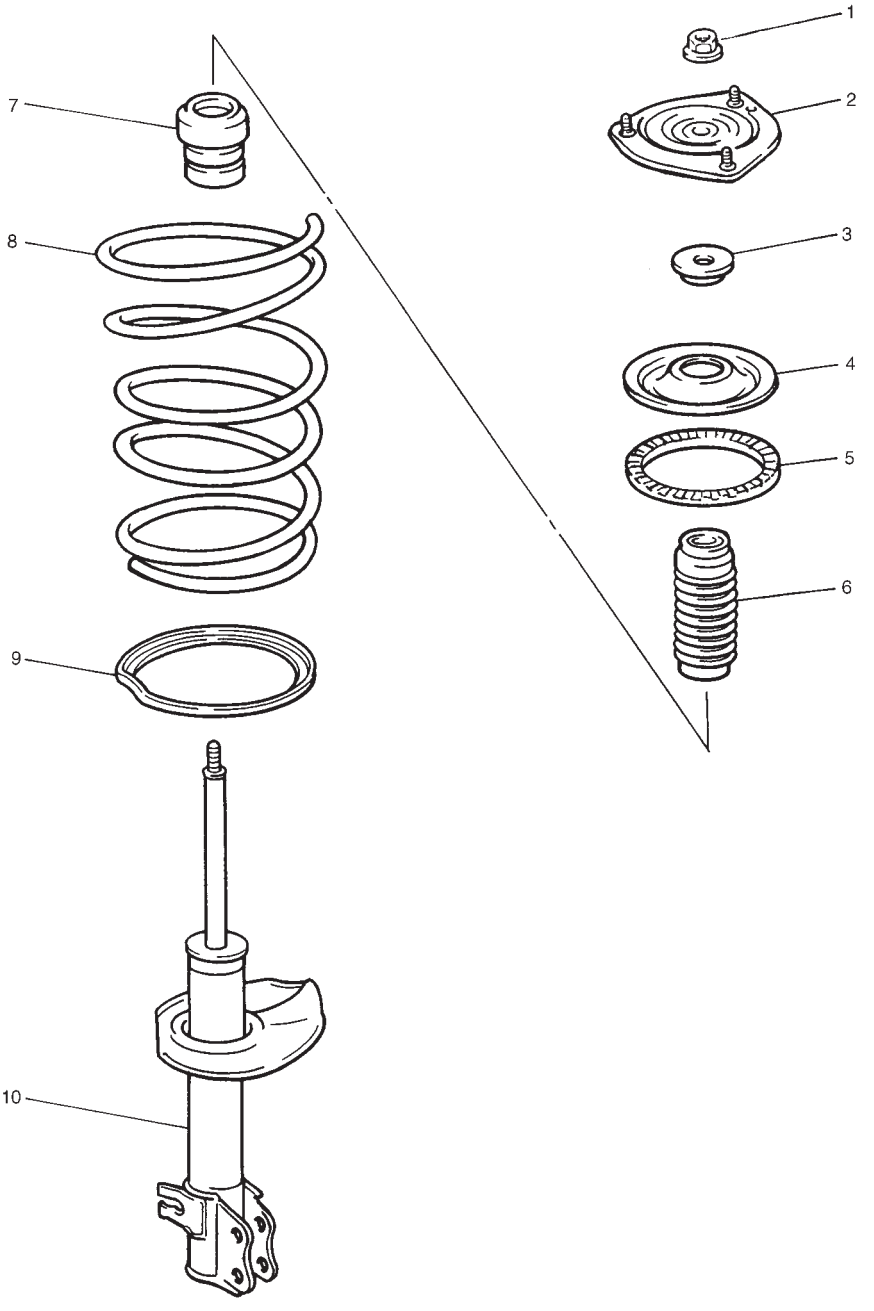
The front suspension is the strut type independent suspension. The upper end of a strut is anchored to the vehicle body by a strut support. The strut and strut support are isolated by a rubber mount. A strut bearing is also installed a little lower to the rubber mount.

The lower end of the strut is connected to the upper end of a steering knuckle and lower end of knuckle is attached to the strut of a ball joint which is incorporated in a unit with a suspension control arm. And connected to this steering knuckle is the tie-rod end.

Thus, movement of the steering wheel is transmitted to the tie-rod end and then to the knuckle, eventually causing the wheel-and-tire to move. In this operation, with the movement of the knuckle, the strut also rotates by means of the strut bearing and lower ball joint.

1. Vehicle body
2. Strut assembly
3. Steering knuckle
4. Suspension arm
5. Ball stud
6. Wheel bearing
7. Front wheel hub
8. Wheel
9. ABS wheel speed sensor rotor (If equipped)
10. Suspension frame

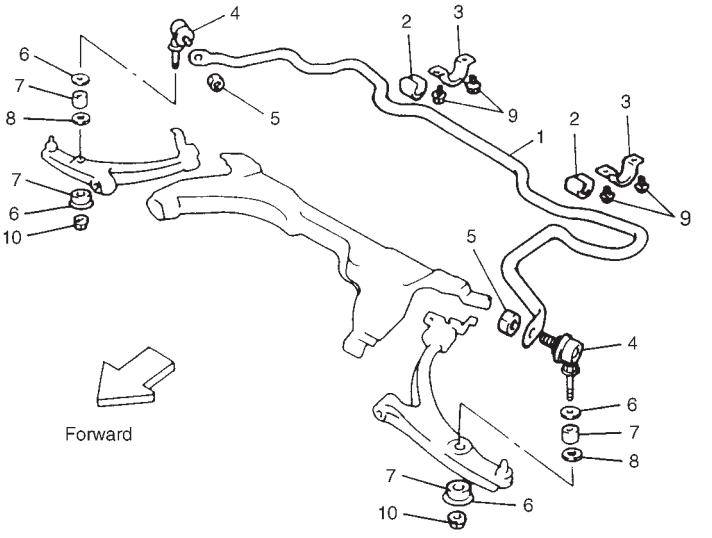




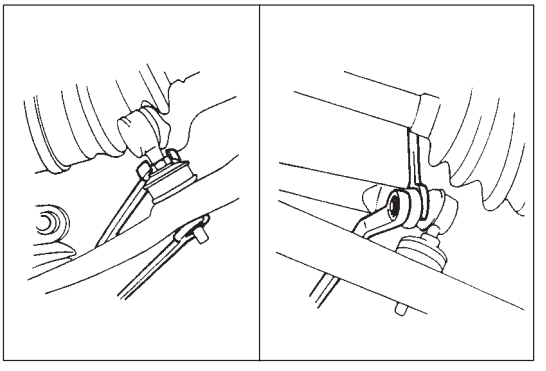
1. Nut
2. Support
3. Bearing
4. Coil spring upper seat
5. Coil spring seat
6. Dust cover
7. Bump stopper
8. Coil spring
9. Coil spring lower seat
10. Strut

ON-VEHICLE SERVICE

REMOVE AND INSTALL STABILIZER BAR AND/OR BUSHINGS

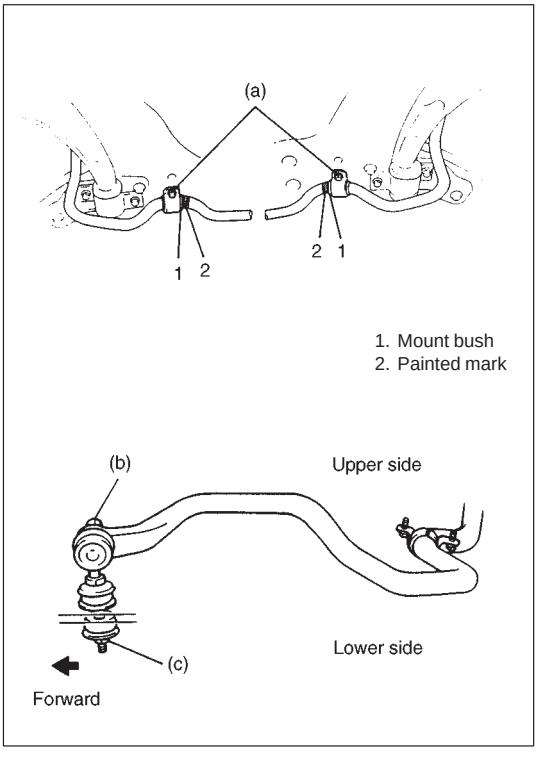


1. Stabilizer bar
2. Mount bush
3. Mount bracket
4. Joint
5. Joint nut
6. Link washer
7. Link cushion
8. Centering washer
9. Mount bolt
10. Link nut



REMOVAL

1) Remove stabilizer link nuts, washers and cushions.
   When loosening link nut, hold stud with wrench.
2) Remove stabilizer mount brackets.
3) Remove stabilizer.
4) Remove stabilizer joints from stabilizer.
   When loosening joint nut, hold stud with wrench.



1. Mount bush
2. Painted mark

INSTALLATION

1) Loosely assemble all components in reverse order of removal.
2) With painted mark on stabilizer bar and end face of mount bushing aligned, tighten mount bracket bolts to specified torque.

   NOTE:
   If painted mark has gone, align the vehicle center and the center of stabilizer bar.

   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

3) Tighten each nut to specified torque.
   When tightening, hold stud with wrench.

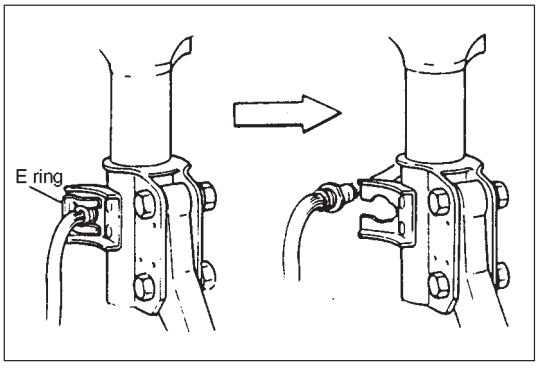
   Tightening Torque
   (b): 50 N·m (5.0 kg-m, 36.5 lb-ft)
   (c): 28 N·m (2.8 kg-m, 20.5 lb-ft)

REMOVE AND INSTALL STRUT ASSEMBLY

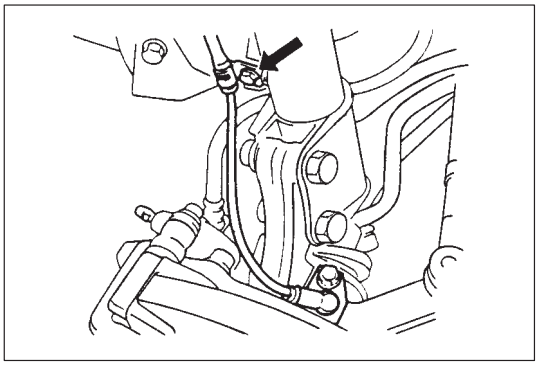
NOTE:
When disassembling strut assembly, loosen strut nut a little before removing strut assembly from vehicle. This will make disassembly easier. Note, however, nut must not be removed at this point.

REMOVAL

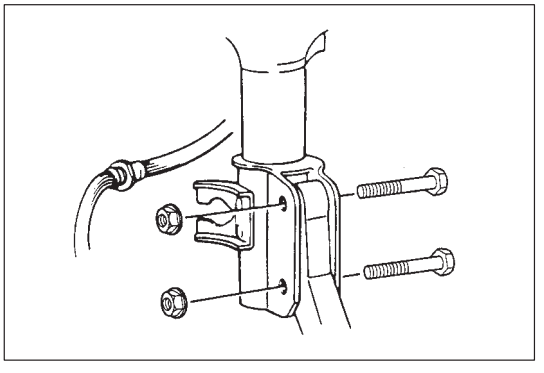
1) Hoist vehicle, allowing front suspension to hang free.
2) Remove wheel.



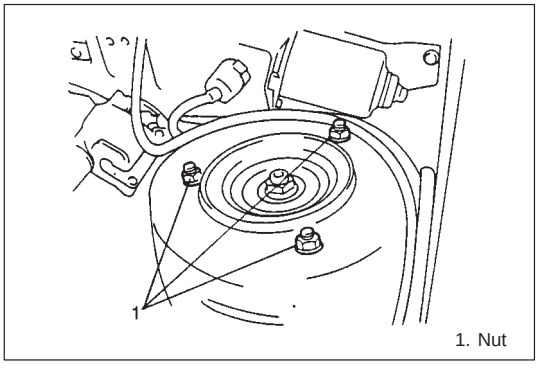
3) Remove E ring securing brake hose and take brake hose off strut bracket as shown.



4) Remove ABS wheel speed sensor harness mounting bolt. (If equipped)

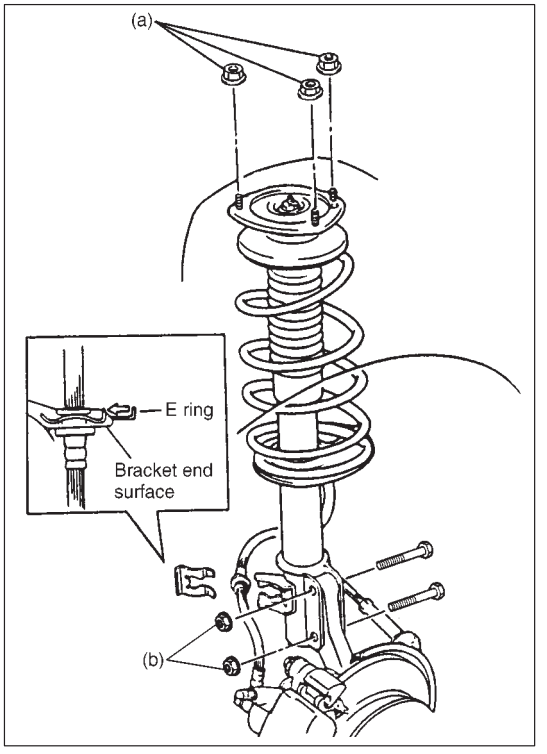


5) Remove strut bracket bolts.



1. Nut

6) Remove strut support nuts.
   Hold strut by hand so that it will not fall off.
7) Remove strut assembly.



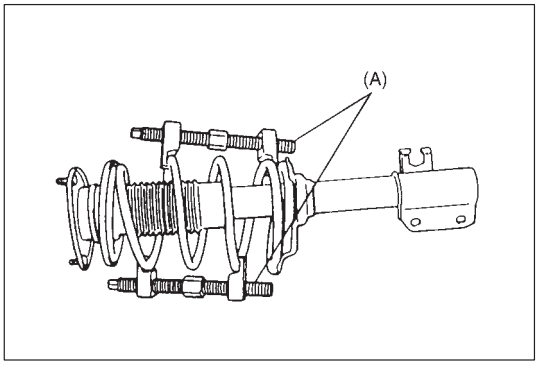
INSTALLATION

1) Install strut assembly by reversing REMOVAL Steps 1) – 7). Insert bolts in such a direction as shown.
2) Torque all fasteners to specification.

Tightening Torque
(a): 28 N·m (2.8 kg-m, 20.5 lb-ft)
(b): 90 N·m (9.0 kg-m, 65.0 lb-ft)

NOTE:
Don't twist brake hose when installing it.
Install E ring as far as it fits to bracket as shown.

3) Confirm front end (wheel) alignment referring to Section 3A.

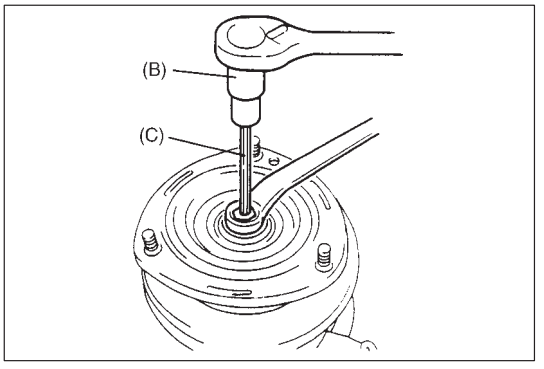


DISASSEMBLE AND ASSEMBLE STRUT ASSEMBLY

DISASSEMBLY

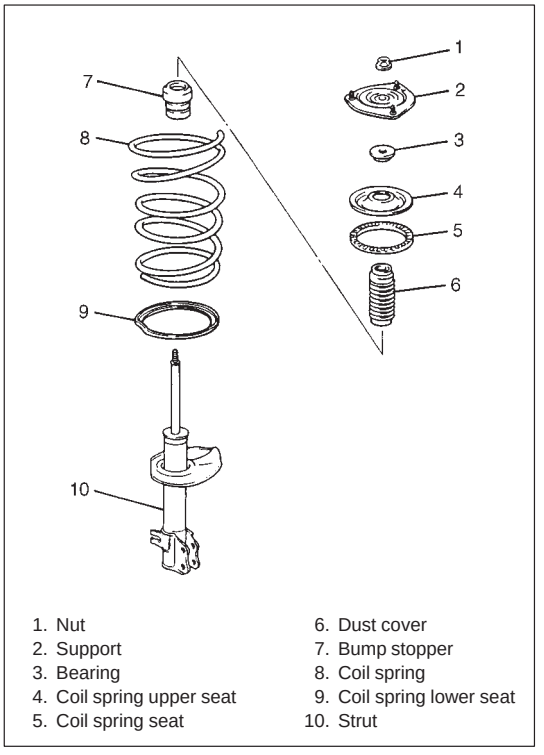
1) With special tool (A) placed to spring as shown, turn special tool bolts alternately until spring tension is released. Whether it is released or not can be known by whether strut turns lightly while strut spring is held stationary.

   Special Tool
   (A): 09940-71431



2) While keeping spring compressed with special tool as shown above, remove strut nut.

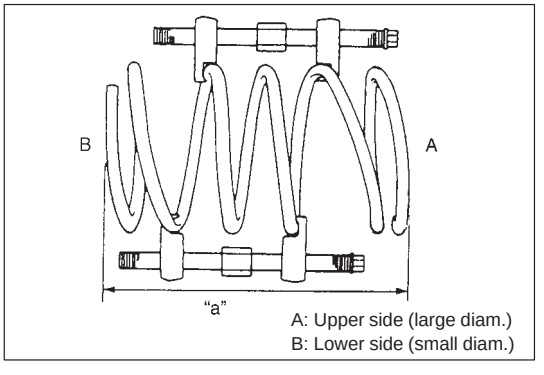
   Special Tool
   (B): 09900-00411 (Socket)
   (C): 09900-00414 (6 mm)



1. Nut
2. Support
3. Bearing
4. Coil spring upper seat
5. Coil spring seat
6. Dust cover
7. Bump stopper
8. Coil spring
9. Coil spring lower seat
10. Strut

3) Disassemble strut assembly.

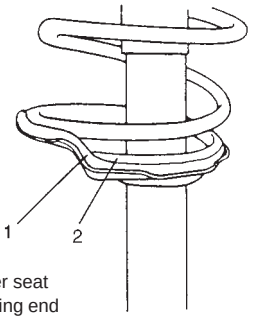
ASSEMBLY



A: Upper side (large diam.)
B: Lower side (small diam.)

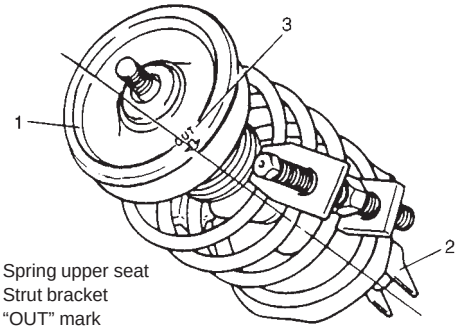
1) Compress spring with special tool (A) until total length becomes about 250 mm (9.8 in.) as shown.

   Length "a": 250 mm (9.8 in.)



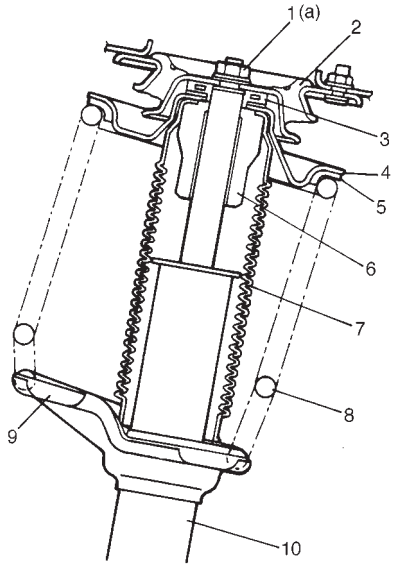
1. Coil spring lower seat
2. Small diam. spring end

2) Install coil spring lower seat and compressing coil spring, and mate spring end with stepped part of lower seat as shown.
3) Install bump stopper and dust cover onto strut rod. For installing direction, refer to above figure in DISASSEMBLY.
4) Pull strut rod as far up as possible and use care not to allow it to retract into strut.



1. Spring upper seat
2. Strut bracket
3. “OUT” mark

5) Install spring seat on coil spring and then spring upper seat aligning “OUT” mark on spring upper seat and center of strut bracket.



1. Strut nut
2. Strut support
3. Bearing
4. Coil spring upper seat
5. Coil spring seat
6. Bump stopper
7. Dust cover
8. Coil spring
9. Coil spring lower seat
10. Strut

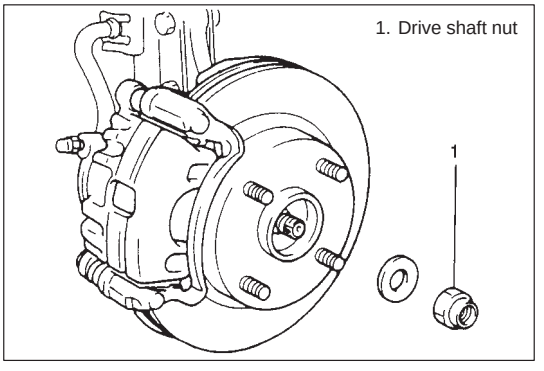
6) Install bearing strut support and strut nut in this sequence. Tighten strut nut to specified torque and then apply waterproof coating (paint or lacquer) all around nut and strut rod thread.

Tightening Torque
(a): 65 N·m (6.5 kg-m, 47.0 lb-ft)

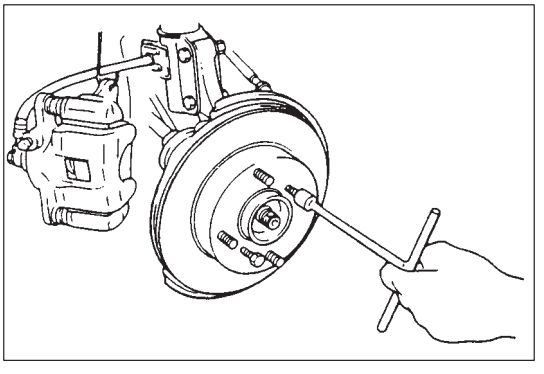
REMOVE AND INSTALL WHEEL HUB, WHEEL STUD/WHEEL BEARING OUTSIDE INNER RACE

REMOVAL

1) Hoist vehicle and remove wheel.



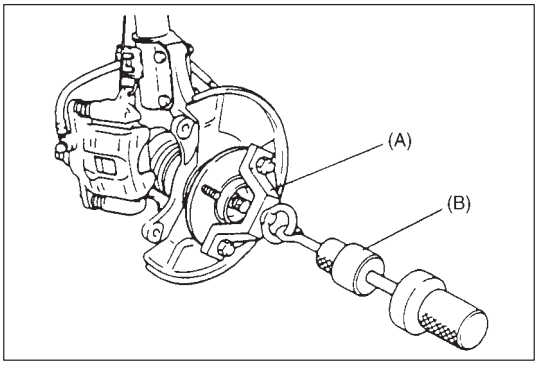
2) Uncalk drive shaft nut.
3) Depress foot brake pedal and hold it there. Remove drive shaft nut.
4) Remove caliper carrier bolts.



5) Remove caliper with carrier.

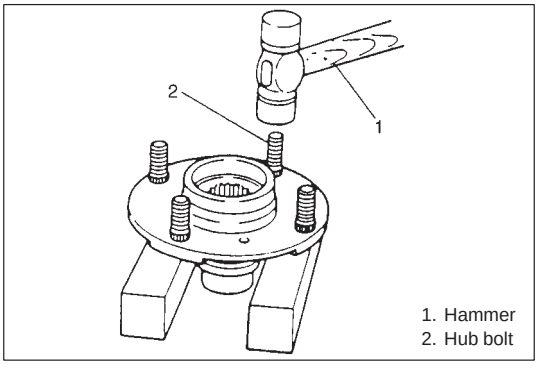
NOTE:
Hang removed caliper with a wire hook or the like so as to prevent brake hose from bending and twisting excessively or being pulled.
Don't operate brake pedal with pads removed.

6) Remove disc screws.
7) Pull brake disc off by using two 8 mm bolts.

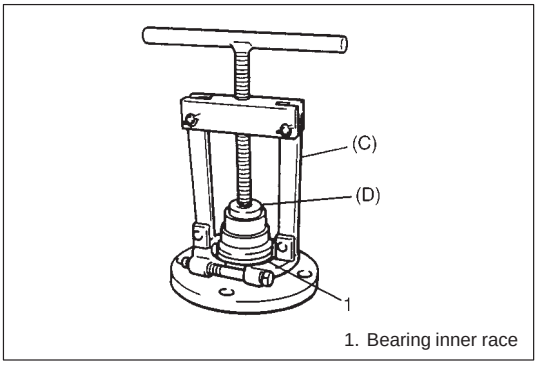


8) Pull out wheel hub with special tools (A) and (B).

Special Tools
(A): 09943-17912
(B): 09942-15511



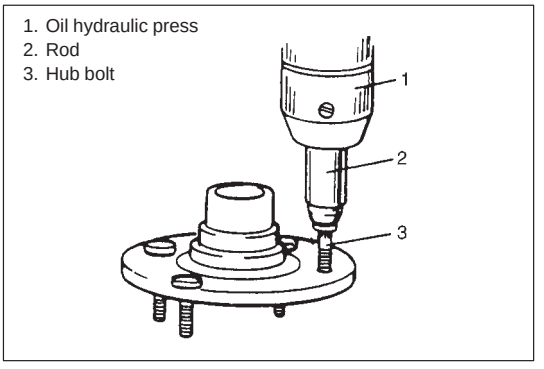
9) Remove hub bolts with copper hammer or hydraulic press.



1. Bearing inner race

10) Remove wheel bearing inner race.

Special Tools
(C): 09913-65810
(D): 09913-85230

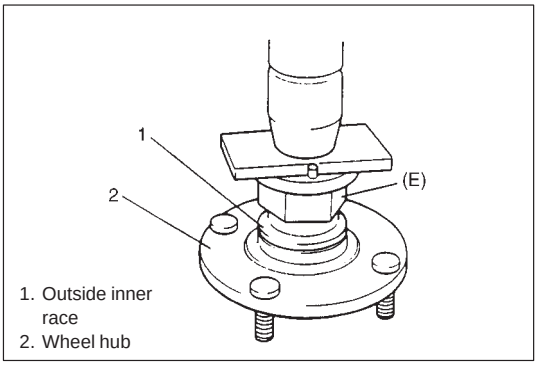


1. Oil hydraulic press
2. Rod
3. Hub bolt

INSTALLATION

Install Hub Bolts

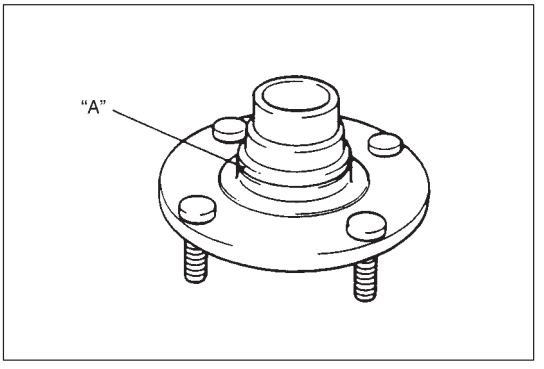
Insert new stud in hub hole. Rotate stud slowly to assure serration are aligned with those made by original bolt.



1. Outside inner race
2. Wheel hub

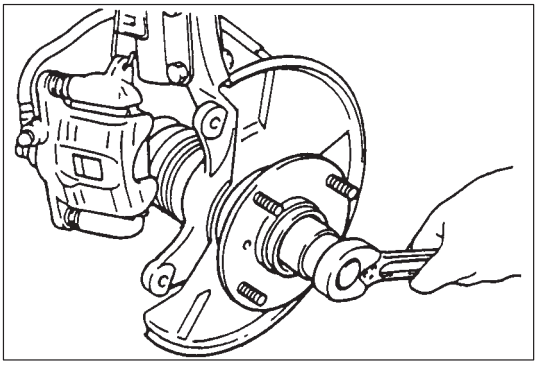
1) Install outside inner race to wheel hub using special tool. Installing direction is as shown.

Special Tool
(E): 09944-98010

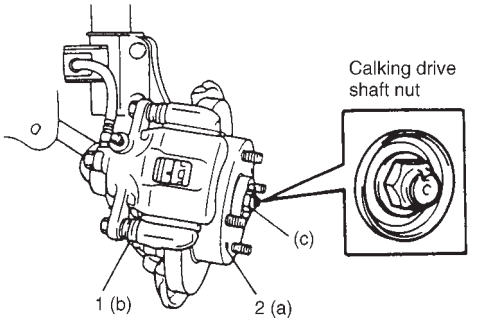


2) Apply grease to outside bearing, outside inner race and oil seal lip.

"A": Grease 99000-25010



3) Install wheel hub to knuckle by tightening drive shaft nut. Do not tap wheel hub.



1. Caliper carrier bolt
2. Brake disc screw

4) Install brake disc.

   Tightening Torque
   (a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

5) Install brake caliper/caliper carrier.
6) Tighten caliper carrier bolts to specified torque.

   Tightening Torque
   (b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

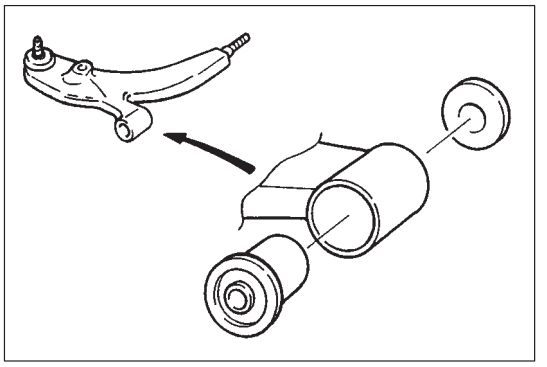
7) Depress foot brake pedal and hold it there.
   Tighten new drive shaft nut to specified torque.

   Tightening Torque
   (c): 175 N·m (17.5 kg-m, 126.5 lb-ft)

8) Calk drive shaft nut as shown.

   WARNING:
   Be careful while calking nut so that no crack will occur in calked part of nut. Cracked nut must be replaced with new one.

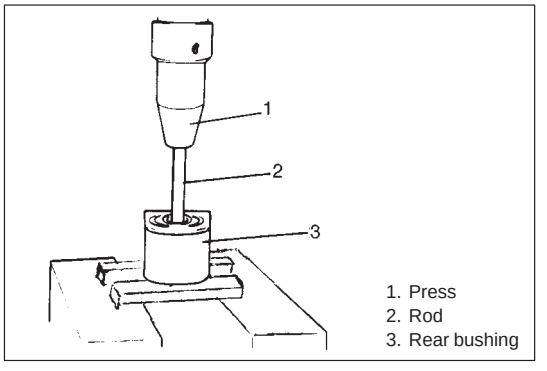
9) Install wheel and lower hoist.



REMOVE AND INSTALL SUSPENSION ARM / BUSHING

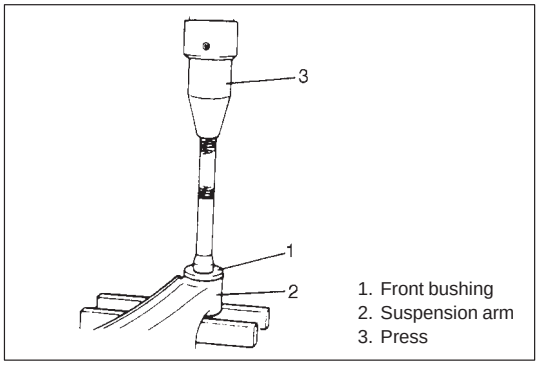
REMOVAL

1) Hoist vehicle and remove wheels.
2) Remove stabilizer link nut, washer and cushion.
3) Remove ball stud bolt.
4) Remove suspension arm front bushing bolt.
5) Remove suspension arm rear bracket bolt and nut.
6) Remove rear bracket and suspension arm.



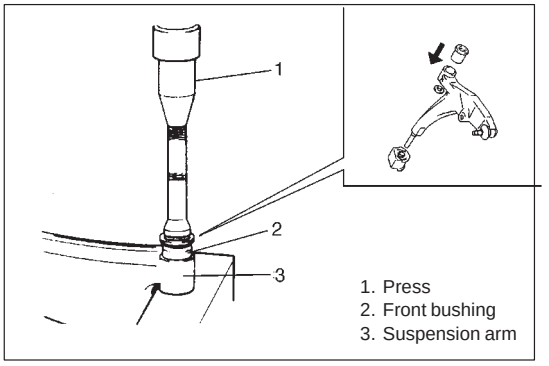
1. Press
2. Rod
3. Rear bushing

7) Remove rear bushing by using hydraulic press.



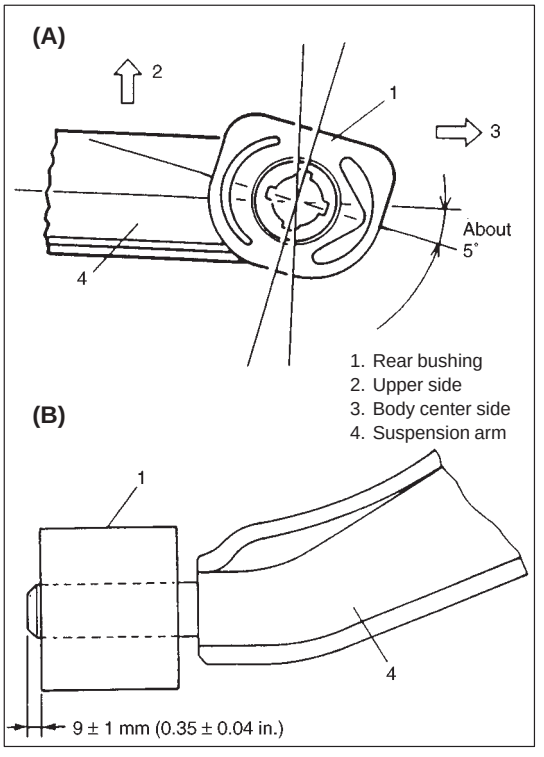
1. Front bushing
2. Suspension arm
3. Press

8) Remove flange of front bushing and then push out front bushing by using hydraulic press.

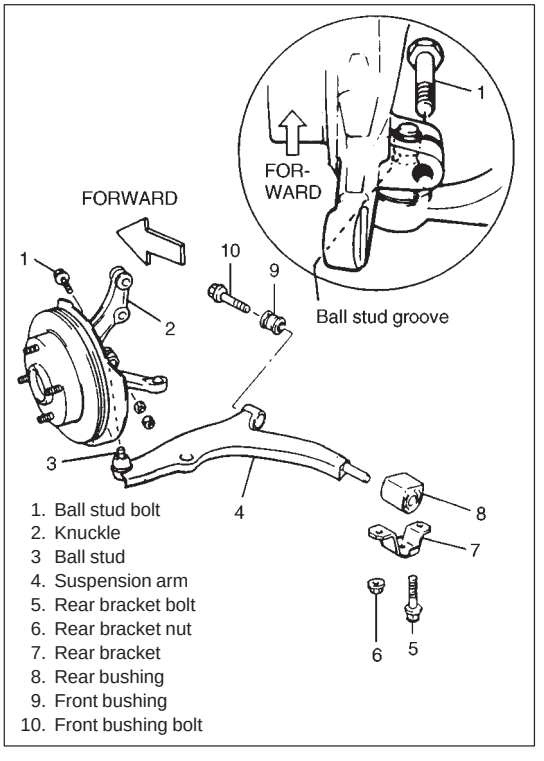


INSTALLATION

1) Install front bushing.
   Before installing bushing, apply soap water on its circumference to facilitate installation
   Install bushing in such direction shown in figure.



2) Install rear bushing to suspension arm as follows. First, push in rear bushing in such direction and angle as shown in figure (A) and drive it into such position as shown in figure (B).

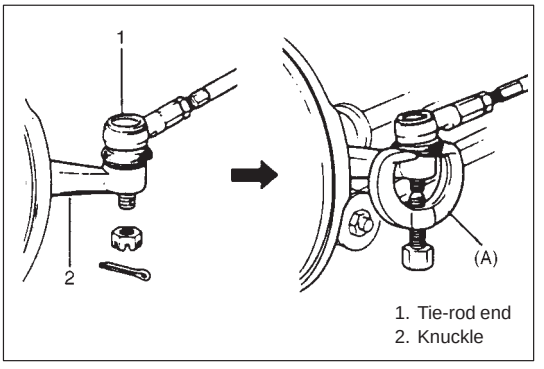


3) Attach suspension arm to suspension frame with rear bracket, bolts and nut and hand-tighten bolts and nut.
4) Install ball stud to knuckle.
   Align ball stud groove with knuckle bolt hole as shown in figure. Then install ball stud bolt from the direction as shown.
5) Install stabilizer cushion, washer and link nut.
6) Tighten all bolts and nuts in figure to each specified torque. Refer to “TORQUE SPECIFICATIONS” in this Section.
7) Install wheels and lower hoist
8) Confirm front end (wheel) alignment referring to Section 3A.

REMOVE AND INSTALL KNUCKLE/BEARING

REMOVAL

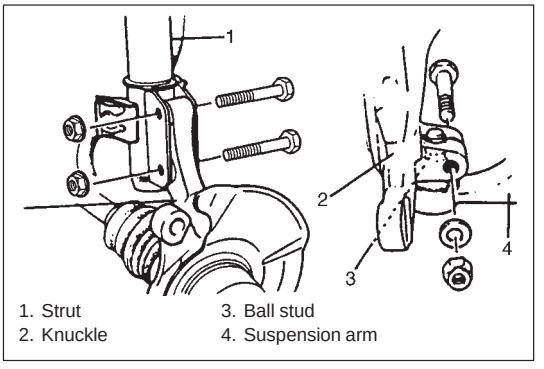
1) Hoist vehicle and remove wheel.
2) Remove wheel hub. Refer to Step 2) – 8) in WHEEL HUB REMOVAL of this section.



1. Tie-rod end
2. Knuckle

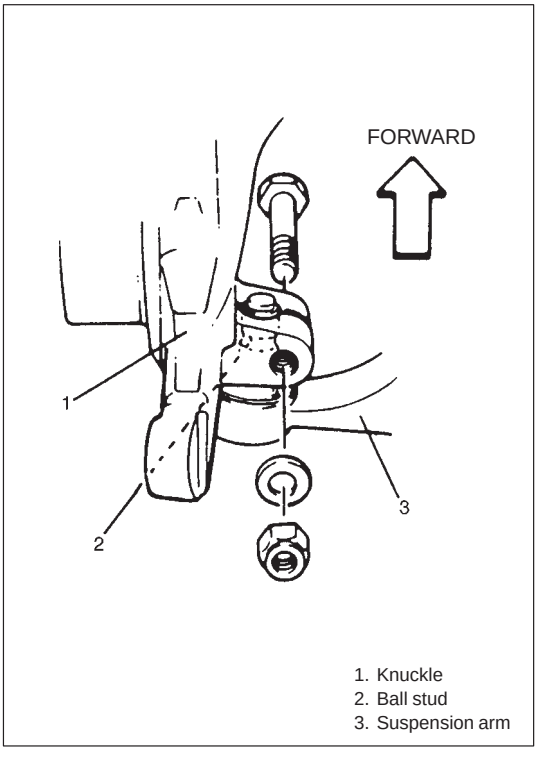
3) Disconnect tie-rod end from knuckle with special tool (A).

Special Tool
(A): 09913-65210



1. Strut
2. Knuckle
3. Ball stud
4. Suspension arm

4) Remove ABS wheel speed sensor from knuckle. (If equipped)
5) Remove strut bracket bolts from strut bracket and then ball stud bolt.
6) Remove knuckle.



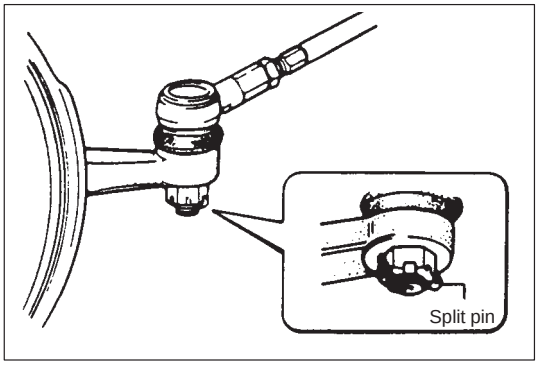
1. Knuckle
2. Ball stud
3. Suspension arm

INSTALLATION

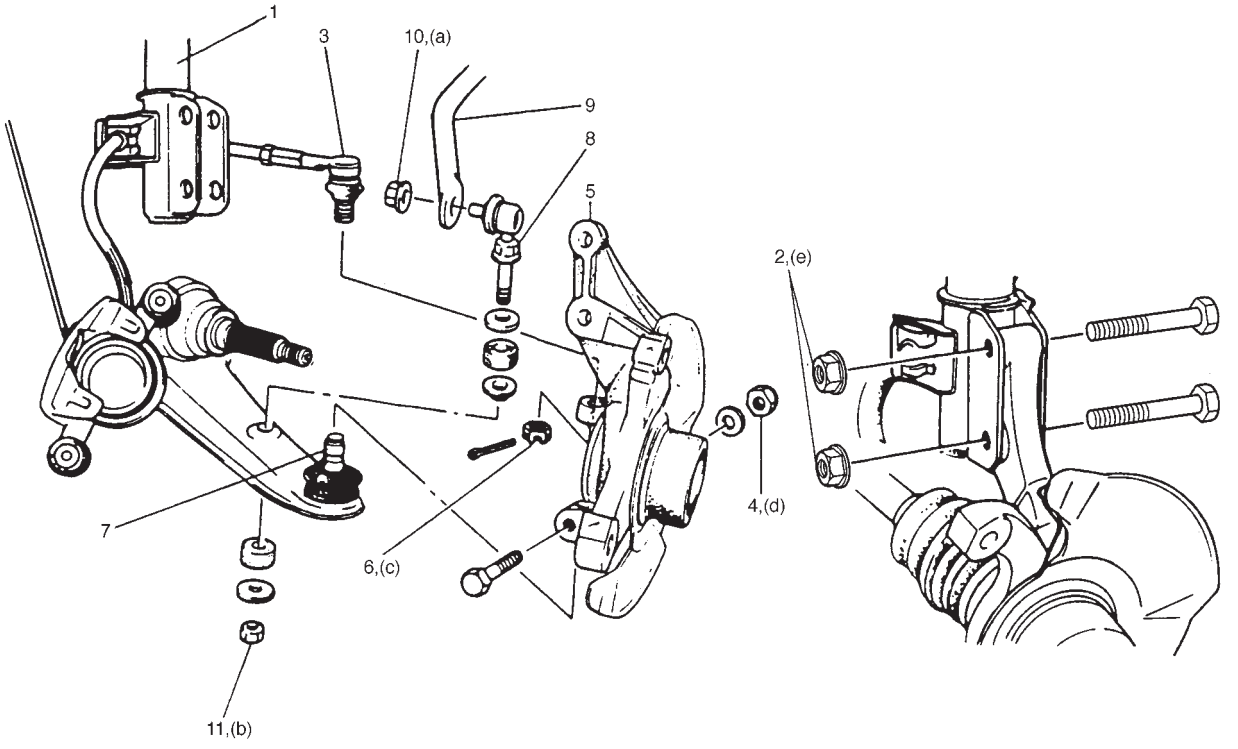
1) Install knuckle to ball stud on suspension arm and strut bracket. Installing direction of each bolt is as shown. Align knuckle bolt hole with ball stud groove as shown and install ball stud bolt. Tighten each nut to specified torque. (Refer to next page.)
2) Install ABS wheel speed sensor to knuckle, if equipped. Tighten sensor bolt to specified torque.

Tightening Torque
23 N·m (2.3 kg-m, 17.0 lb-ft)

NOTE:
Check to make sure that ABS wheel speed sensor tooth is free from any metal particles.

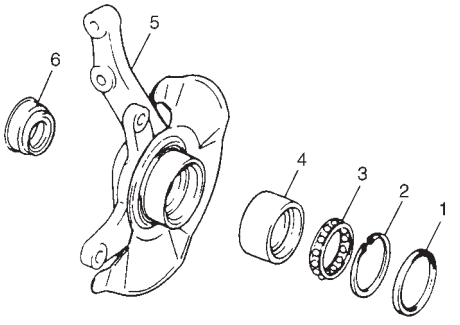


3) Connect tie-rod end to knuckle and tighten tie-rod end castle nut to specified torque.
   Install new split pin.
4) For installation procedures following the above, refer to Steps 2) – 9) in WHEEL HUB INSTALLATION of this section.



1. Strut
2. Strut bracket nut
3. Tie rod end
4. Ball stud nut
5. Knuckle
6. Tie rod end castle nut
7. Ball stud
8. Stabilizer bar
9. Stabilizer bar
10. Joint nut
11. Link nut

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)
(b): 28 N·m (2.8 kg-m, 20.5 lb-ft)
(c): 45 N·m (4.5 kg-m, 33.0 lb-ft)
(d): 60 N·m (6.0 kg-m, 43.5 lb-ft)
(e): 90 N·m (9.0 kg-m, 65.0 lb-ft)

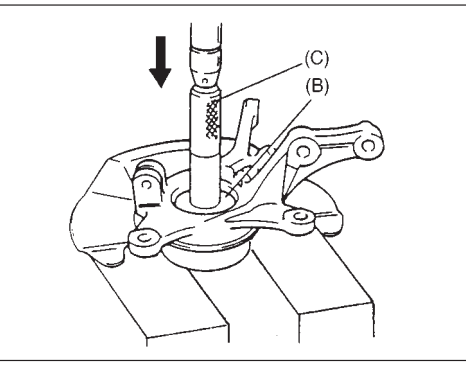


1. Outside oil seal
2. Snap ring
3. Outside bearing
4. Bearing outer race (and inner bearing)
5. Knuckle
6. Inside oil seal

REMOVE OIL SEALS, SNAP RING AND WHEEL BEARING

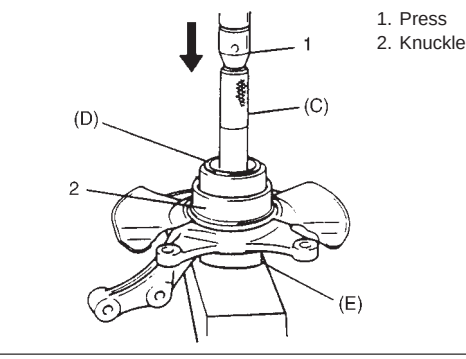
Once bearing outer race is removed, bearing set (outer race, bearings and inner races) should be replaced with new one.

○ Remove outside oil seal, snap ring, outside bearing and inside oil seal in that order.



○ After removing inside oil seal, remove bearing outer race/inner bearing using special tools (B) and (C), and hydraulic press.

Special Tool
(B): 09944-68510
(C): 09924-74510



1. Press
2. Knuckle

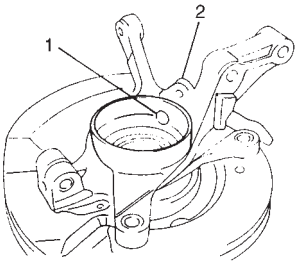
INSTALL OIL SEALS, SNAP RING AND WHEEL BEARING

When replacing bearing, inner race or outer race, be sure to replace them with new ones as a set.

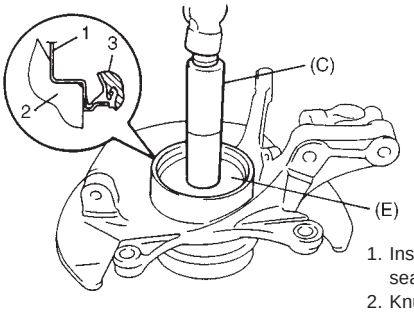
○ Press-fit bearing outer race/inner bearing using special tools (C), (D) and (E).

Special Tool
(C): 09924-74510
(D): 09951-16090
(E): 09944-66010

○ After greasing (lithic grease) bearing outer race, bearings and oil seal lips, install them.



1. Hole of inside oil seal (Wheel speed sensor installation hole in knuckle)
2. Projection on knuckle



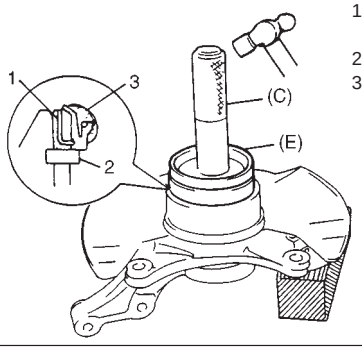
1. Inside oil seal
2. Knuckle
3. Grease

Inside Oil Seal

With hole in inside oil seal matched with projection on knuckle (for vehicle without ABS) or wheel speed sensor installation hole in knuckle (for vehicle with ABS), drive in Oil seal until its stepped surface contacts knuckle by using special tools (C) and (E).

NOTE:
When driving in oil seal, be careful not to deform or tilt it or not to cause damage to rubber part.

Special Tools
(C): 09924-74510
(E): 09944-66010



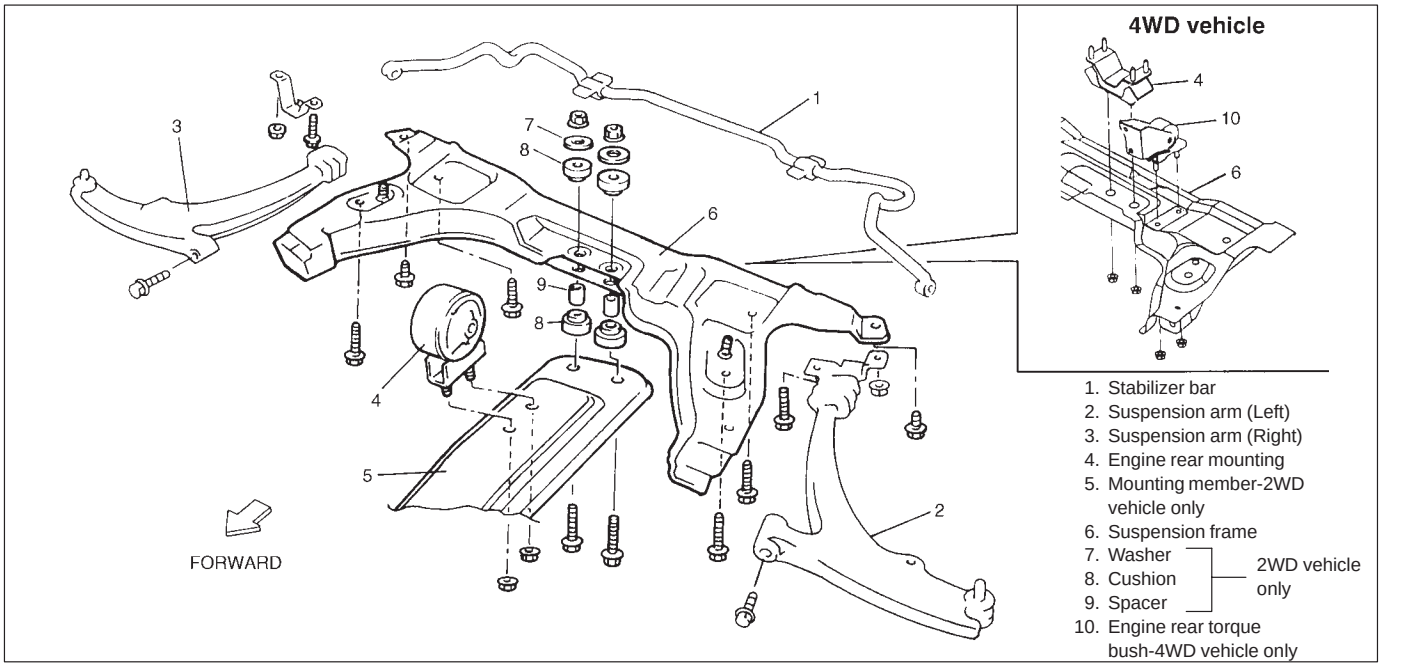
1. Outside oil seal
2. Knuckle
3. Grease

Outside Oil Seal

Drive in oil seal until its end contacts with snap ring using special tools (C) and (E). As for its installing direction, refer to left figure.

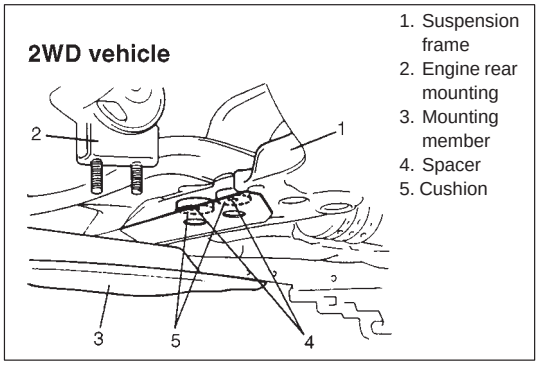
Special Tools
(C): 09924-74510
(E): 09944-66010

REMOVE AND INSTALL SUSPENSION FRAME



REMOVAL

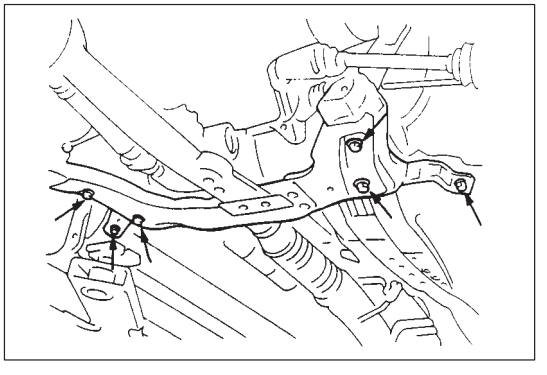
1) Hoist vehicle and remove wheels (right & left).
2) Remove stabilizer bar. Refer to Step 1) – 3) in STABILIZER BAR REMOVAL of this section.
3) Remove suspension arms (right & left). Refer to Step 3) – 6) in SUSPENSION ARM REMOVAL of this section.



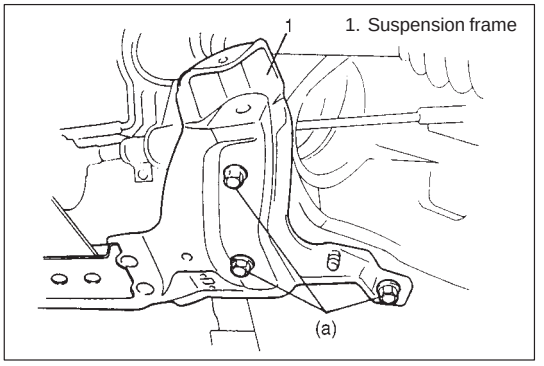
4) Remove engine rear mounting nuts and engine mounting member bolts (2WD vehicle) or torque bush nuts (4WD vehicle).

NOTE:

- **For 2WD vehicle, be careful not to loose cushions and spacers which may stick to suspension frame.**
- **For 4WD vehicle, support transmission to prevent joint parts from being applied excessive force at removal of suspension frame.**



5) Remove suspension frame from body.

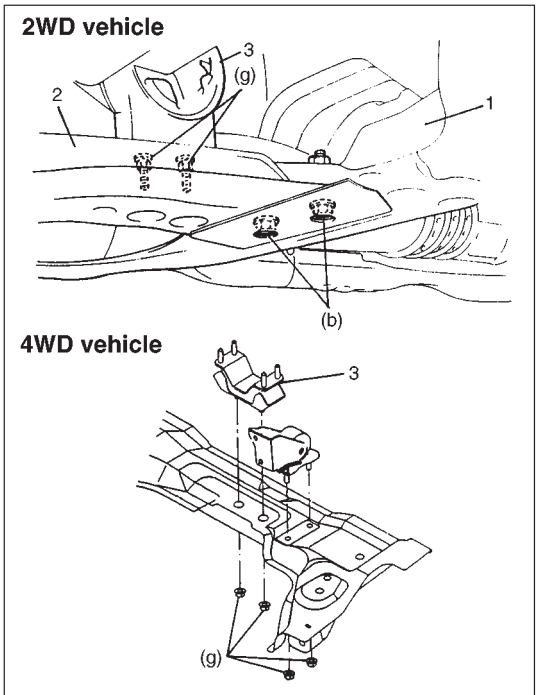


1. Suspension frame

INSTALLATION

1) Install suspension frame to body, and tighten bolt to specified torque.

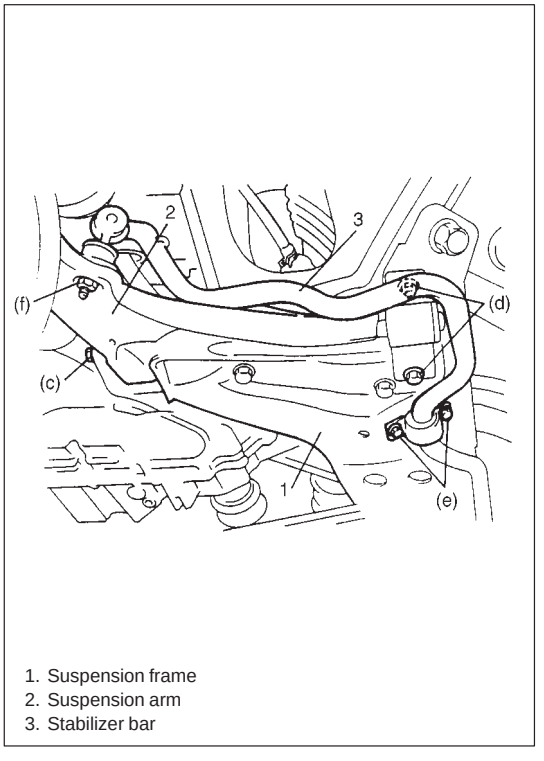
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



1. Suspension frame
2. Mounting member
3. Rear engine mounting

2) Install mounting member, spacers and cushions to suspension frame if removed and tighten bolts and nuts to specified torque.

Tightening Torque
(b): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(g): 45 N·m (4.5 kg-m, 33.0 lb-ft)

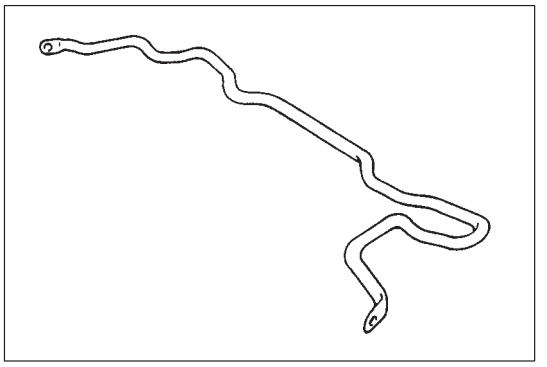


1. Suspension frame
2. Suspension arm
3. Stabilizer bar

3) Install suspension arms (right & left). Refer to Step 3), 4) in SUSPENSION ARM INSTALLATION of this section.
4) Install stabilizer bar. Refer to Step 1), 2) in STABILIZER BAR INSTALLATION of this section.
5) Tighten bolts and nuts to each specified torque.

Tightening Torque
(c): 90 N·m (9.0 kg-m, 65.0 lb-ft)
(d): 37 N·m (3.7 kg-m, 27.0 lb-ft)
(e): 23 N·m (2.3 kg-m, 17.0 lb-ft)
(f): 28 N·m (2.8 kg-m, 20.5 lb-ft)

6) Install wheels (right & left) and lower hoist.
7) Confirm front-end (wheel) alignment referring to Section 3A.

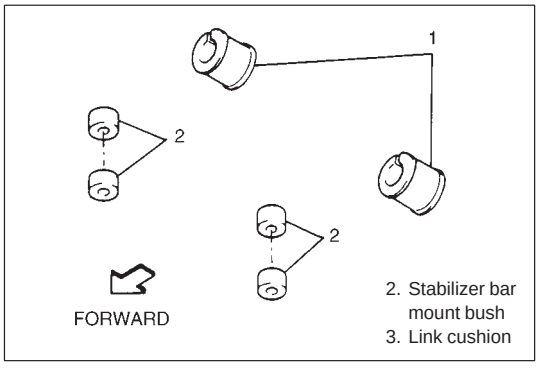


FRONT SUSPENSION INSPECTION

STABILIZER BAR AND/OR BUSHING

Bar

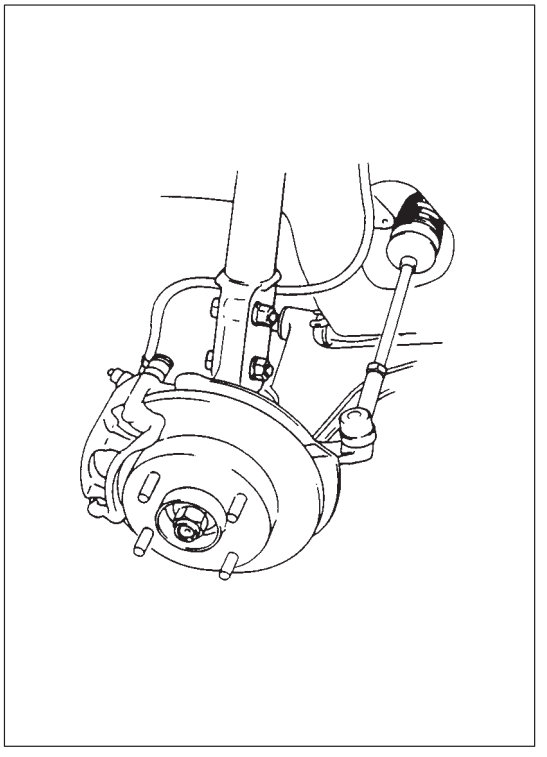
Inspect for damage or deformation. If defective, replace.



Bushing

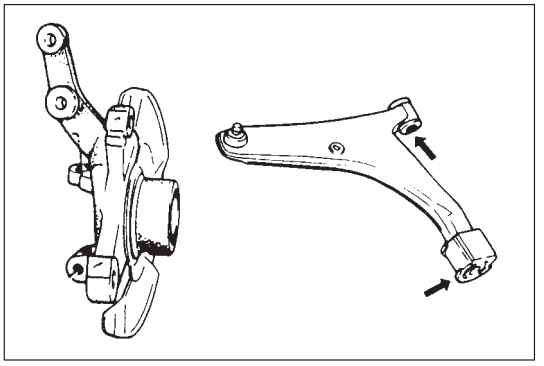
Inspect for damage, wear or deterioration. If defective, replace.

STRUT ASSEMBLY



1) Inspect strut for oil leakage. If strut is found faulty, replace it as an assembly unit, because it can not be disassembled.
2) Strut function check
   Check and adjust tire pressures as specified. Bounce vehicles body three or four times continuously by pushing front end on the side with strut to be checked. Apply the same amount of force at each push and note strut resistance both when pushed and rebounding.
   Also, note how many times car body rebounds before coming to stop after hands are off.
   Do the same for strut on the other side.
   Compare strut resistance and number of rebound on the right with those on the left. And they must be equal in both. With proper strut, car body should come to stop the moment hands are off or after only one or two small rebounds. If struts are suspected, compare them with known good vehicle or strut.
3) Inspect for damage or deformation.
4) Inspect bearing for wear, abnormal noise or gripping.
5) Inspect for cracks or deformation in spring seat.
6) Inspect for deterioration of bump stopper.
7) Inspect rebound stopper and strut mount for wear, cracks or deformation.

   Replace any parts found defective in Steps 2) – 7).

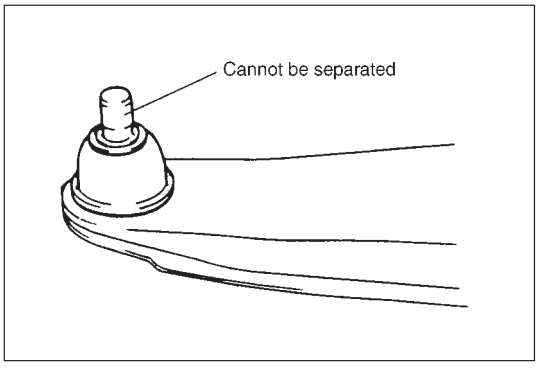


SUSPENSION ARM/STEERING KNUCKLE

Inspect for cracks, deformation or damage.

SUSPENSION ARM BUSHING

Inspect for damage, wear or deterioration.

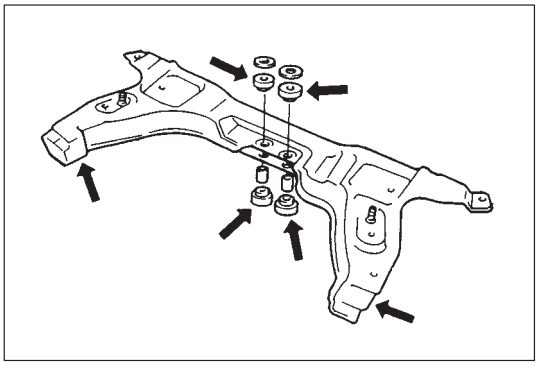


SUSPENSION ARM JOINT

1) Check for smooth rotation.
2) Inspect ball stud for damage.
3) Inspect dust cover for damage.

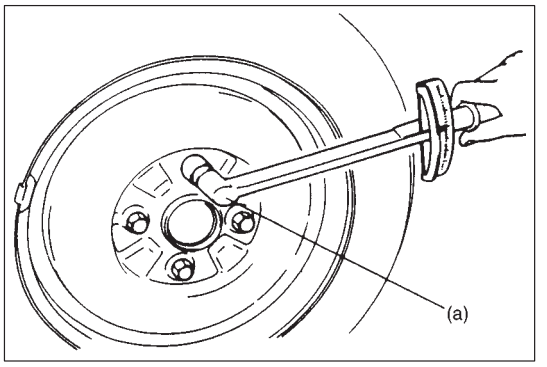
NOTE:
Suspension arm and arm joint cannot be separated.

If there is any damage to either, control arm assembly must be replaced as a complete unit.



SUSPENSION FRAME

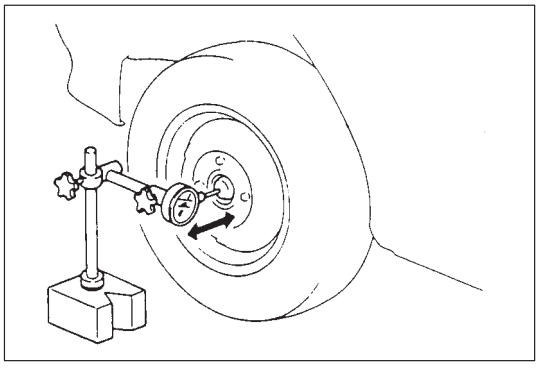
Inspect for cracks, deformation or damage.
Inspect cushion for deterioration or damage (2WD vehicle).



WHEEL DISC, NUT & BEARING

1) Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.
2) Check wheel nuts for tightness and, as necessary retighten them to specification.

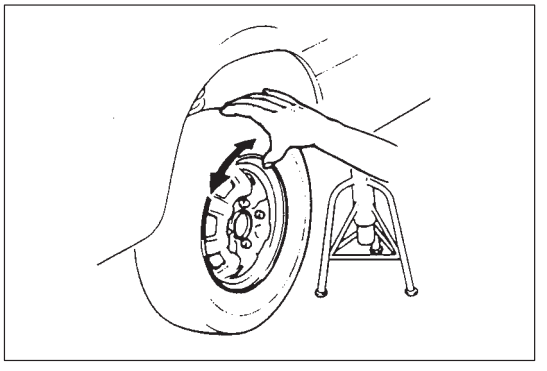
Tightening Torque
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



3) Check wheel bearing for wear. When measuring thrust play, apply a dial gauge to wheel hub.

Thrust play limit: 0.4 mm (0.016 in.)

When measurement exceeds limit and shaft nut is tightened to specified torque, replace bearing.



4) By rotating wheel actually, check wheel bearing for noise and smooth rotation. If defective, replace bearing.

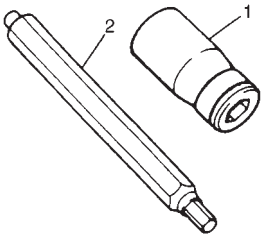
TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Strut Bracket nut	90	9.0	65.0
2. Strut nut	65	6.5	47.0
3. Strut support nut	28	2.8	20.5
4. Ball stud nut	60	6.0	43.5
5. Suspension arm rear bracket bolt and nut	37	3.7	27.0
6. Suspension arm front bushing bolt	90	9.0	65.0
7. Stabilizer joint nut	50	5.0	36.5
8. Stabilizer link nut	28	2.8	20.5
9. Stabilizer mount bracket bolt	23	2.3	17.0
10. Drive shaft nut	175	17.5	126.5
11. Tie rod end castle nit	45	4.5	33.0
12. Wheel nut	85	8.5	61.5
13. Wheel speed sensor bolt (For vehicles equipped with ABS)	23	2.3	17.0
14. Suspension frame bolt	90	9.0	65.0

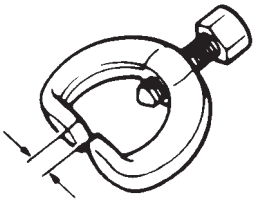
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithic wheel bearing grease	SUPER GREASE (A) (99000-25010)	Wheel bearing, wheel bearing oil seal lip

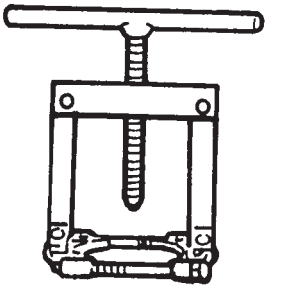
SPECIAL TOOLS



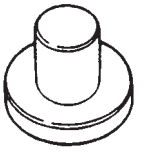
1. 09900-00411 Hexagon wrench socket
2. 09900-00414 Hexagon wrench bit (6 mm)



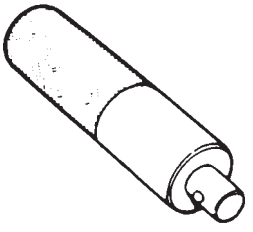
09913-65210
Tie-rod end remover



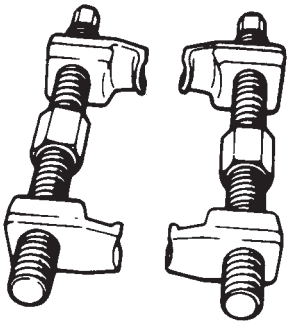
09913-65810
Bearing puller



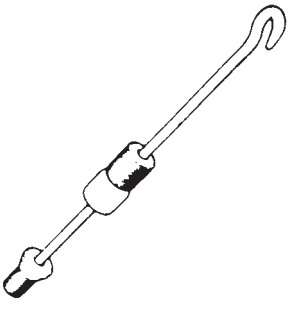
09913-85230
Bearing puller attachment



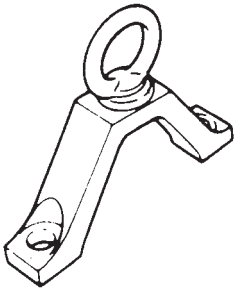
09924-74510
Bearing installer handle



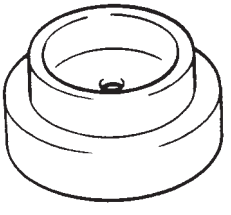
09940-71431
Spring compressor



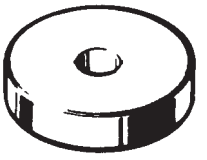
09942-15511
Sliding hammer



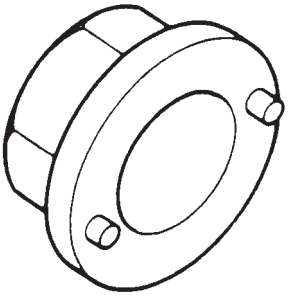
09943-17912
Front wheel hub remover
(Brake drum remover)



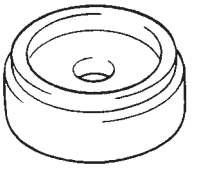
09944-66010
Bearing & oil seal installer



09944-68510
Bearing installer attachment



09944-98010
Bearing installer



09951-16090
Bearing & oil seal installer

SECTION 3E

REAR SUSPENSION
(2WD VEHICLE)

NOTE:

- **All suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.**
- **Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.**

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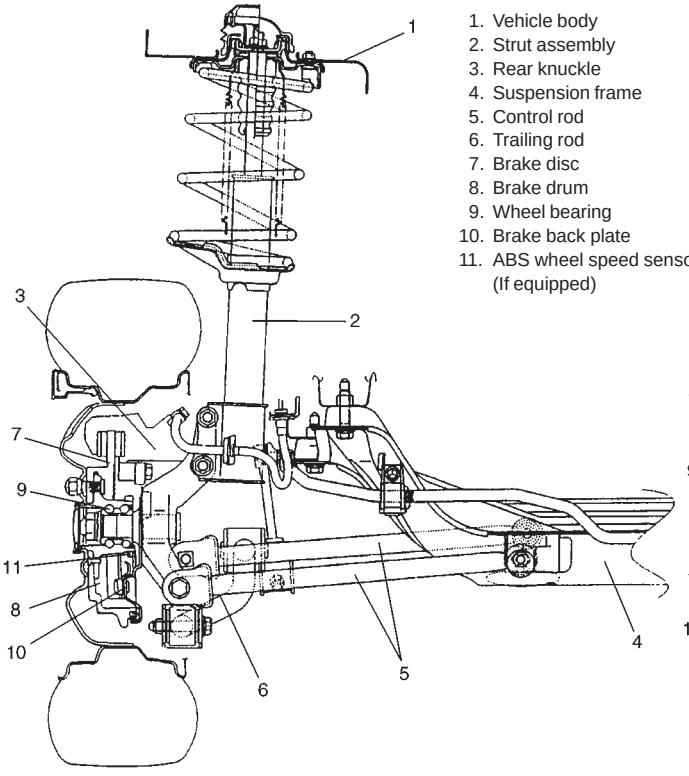
GENERAL DESCRIPTION

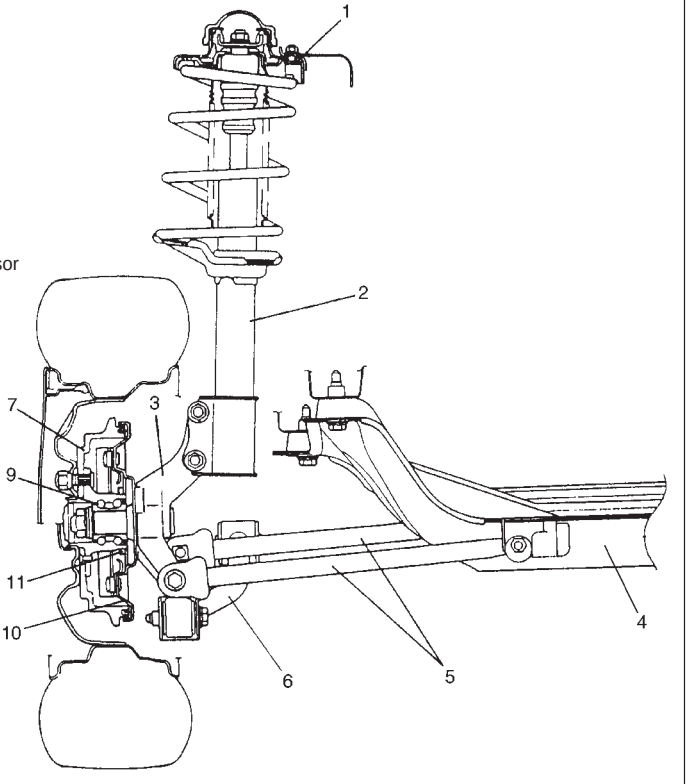
The rear suspension is a strut type independent suspension equipped with control rods (dual-link) and a trailing rod. The upper end of the strut is anchored to the vehicle body by the strut support. The strut and strut support are isolated by a rubber mount. The lower end of the strut is connected to the upper end of the knuckle. The lower side of knuckle is connected to the control rods and trailing rod.

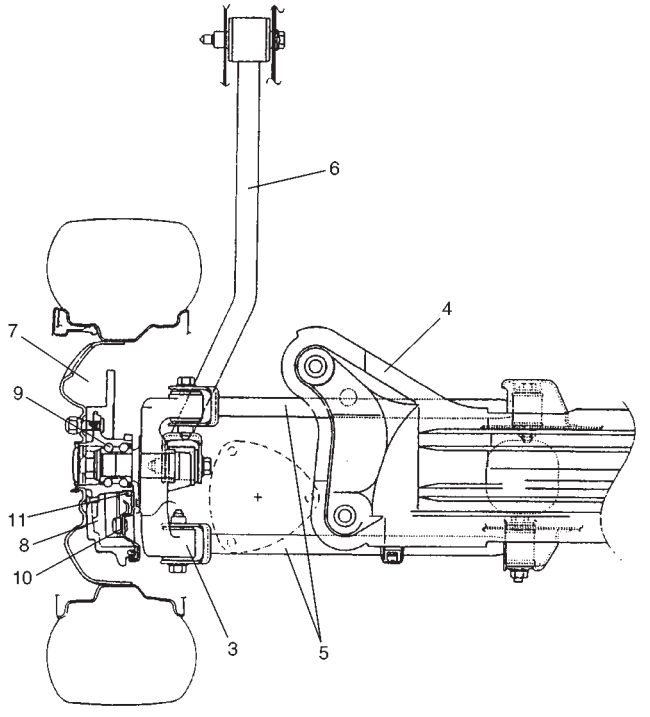
WITH STABILIZER

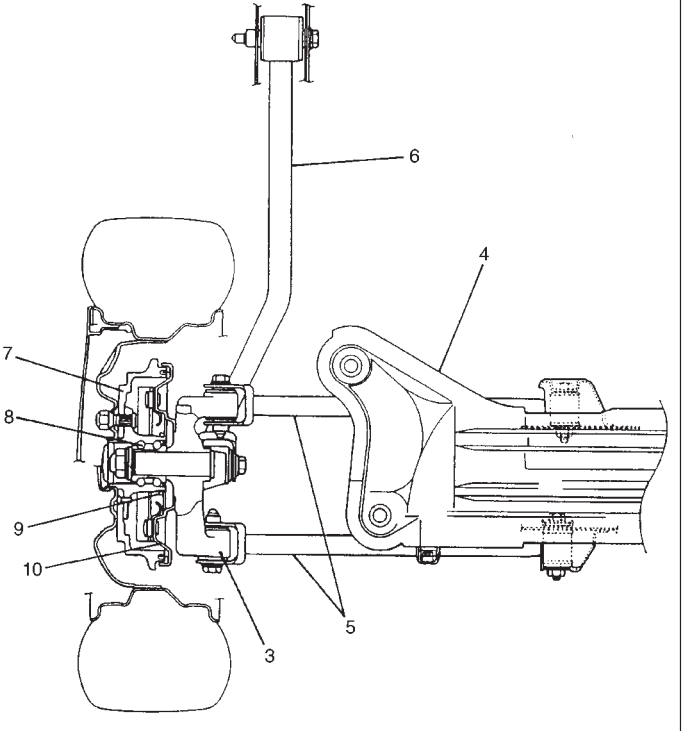
WITHOUT STABILIZER

1. Vehicle body
2. Strut assembly
3. Rear knuckle
4. Suspension frame
5. Control rod
6. Trailing rod
7. Brake disc
8. Brake drum
9. Wheel bearing
10. Brake back plate
11. ABS wheel speed sensor (If equipped)



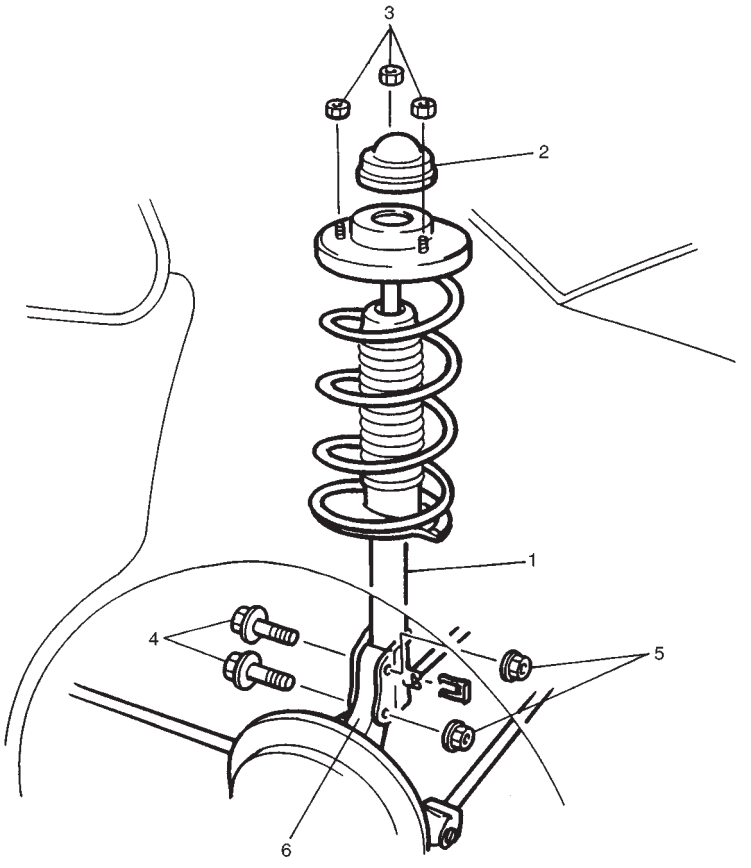






ON-VEHICLE SERVICE

REMOVE AND INSTALL REAR STRUT ASSEMBLY

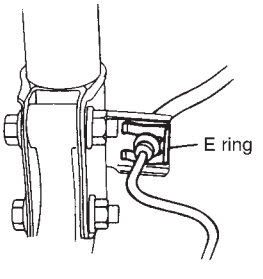


1. Strut assembly
2. Strut upper cap
3. Strut support nut
4. Strut bracket bolt
5. Strut bracket nut
6. Rear knuckle

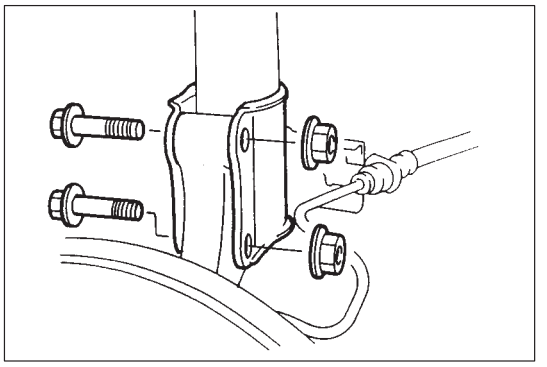
REMOVAL

NOTE:
When servicing component parts of strut assembly, loosen strut upper nut a little before removing strut assembly. This will make service work easier. Note, however, nut must not be removed at this point.

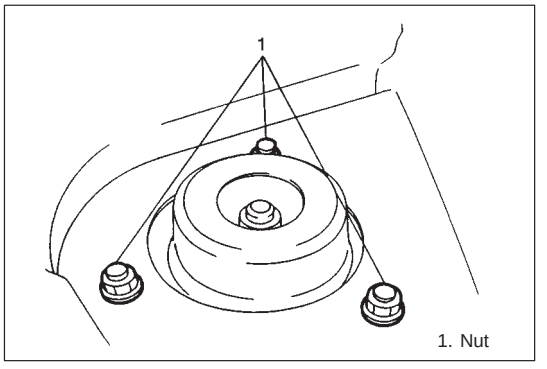
1) Hoist vehicle, allowing rear suspension to hang free.
2) Remove wheel.



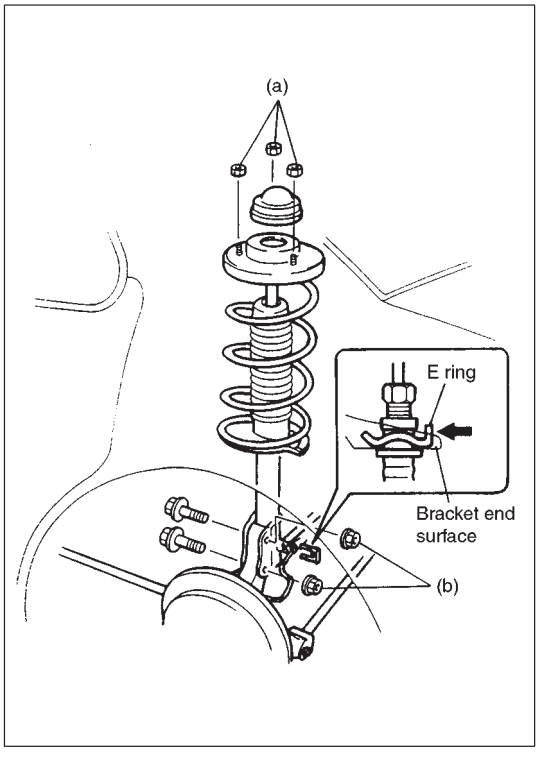
3) Remove E ring securing brake hose.



4) Remove strut bracket bolts and nuts.
   And then take brake hose off strut bracket using care not to deform brake pipe.



5) Remove strut support nuts.
   Hold strut by hand so that it will not fall off.
6) Remove strut assembly.



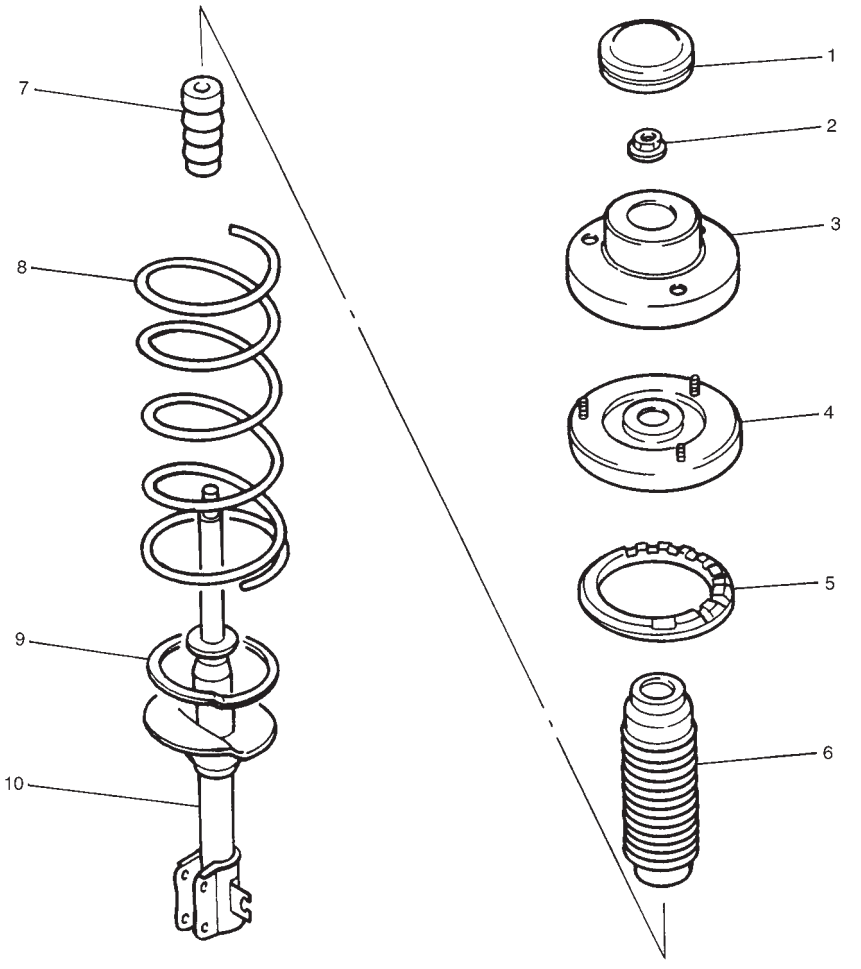
INSTALLATION

1) Install strut by reversing REMOVAL Steps 1) – 6). Insert bracket bolts in such a direction as shown in figure.
2) Torque all fasteners to specification.

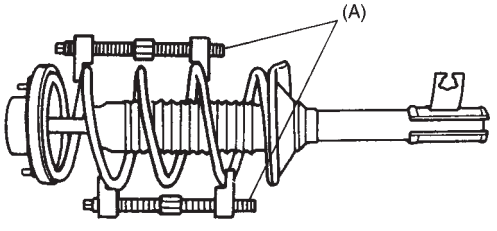
Tightening Torque
(a): 28 N·m (2.8 kg-m, 20.5 lb-ft)
(b): 90 N·m (9.0 kg-m, 65.0 lb-ft)

NOTE:
Do not twist brake hose when installing it.
Install E ring as far as it fits to bracket as shown.

DISASSEMBLE AND ASSEMBLE REAR STRUT ASSEMBLY



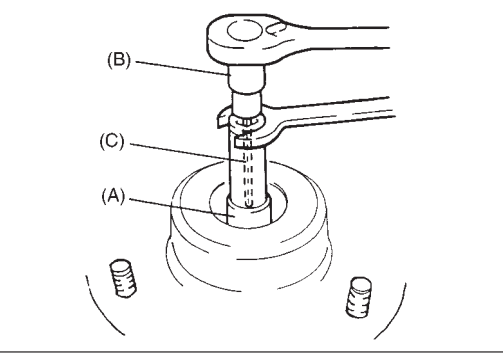
1. Strut upper cap
2. Strut upper nut
3. Strut support
4. Spring upper seat
5. Spring (rubber) seat
6. Strut dust cover
7. Bump stopper
8. Coil spring
9. Spring lower seat
10. Strut



DISASSEMBLY

1) With special tool (A) placed to spring as shown, turn special tool bolts alternately until spring tension is released .Whether it is released or not can be known by whether strut turns lightly while strut spring is held stationary.

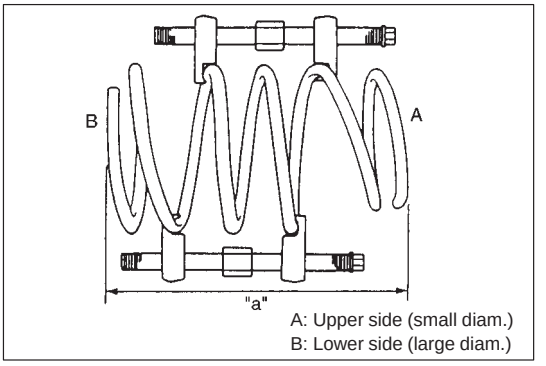
Special Tool
(A): 09940-71430



2) While keeping spring compressed with special tool as shown above, remove strut nut.

Special Tool
(A): 09945-26010 (17 mm socket)
(B): 09900-00411 (Socket)
(C): 09900-00414 (6 mm)

3) Disassemble strut assembly.

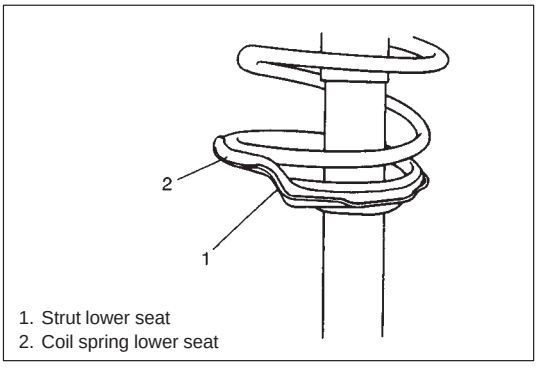


A: Upper side (small diam.)
B: Lower side (large diam.)

ASSEMBLY

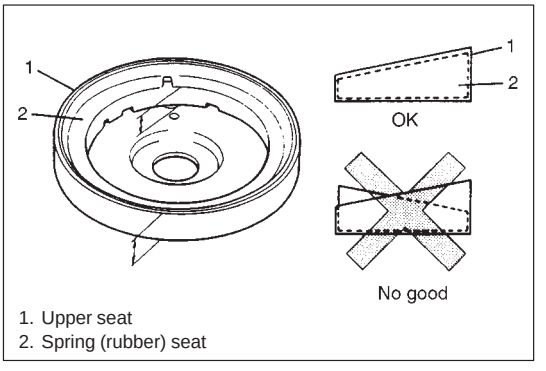
1) Compress spring with special tool (A) until total length becomes about 290 mm (11.42 in.) as shown.

   Length “a”: 290 mm (11.42 in.)



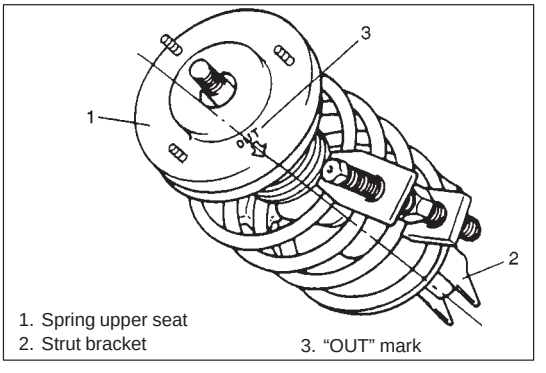
1. Strut lower seat
2. Coil spring lower seat

2) Install coil spring lower seat and compressing coil spring, mate large-dia. spring end with stepped part of lower seat as shown.
3) Install bump stopper onto strut rod. For installing direction, refer to above figure in DISASSEMBLY.
4) Instal dust cover onto bump stopper.



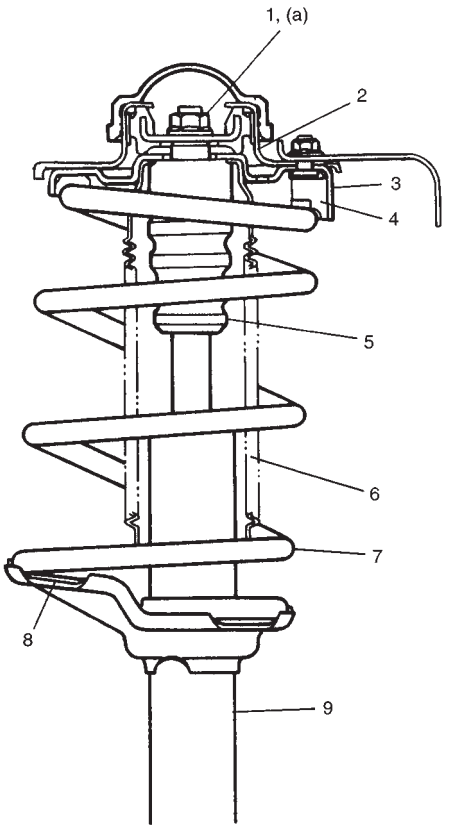
1. Upper seat
2. Spring (rubber) seat

5) Fit coil spring (rubber) seat in coil spring upper seat, making sure that their depth matches all around. No part of rubber seat should stick out higher than upper seat.



1. Spring upper seat
2. Strut bracket
3. “OUT” mark

6) Pull strut rod as far up as possible and use care not to allow it to retract into strut.
7) With “OUT” mark on spring upper seat and the center of strut bracket aligned, place upper spring seat together with spring (rubber) seat on coil spring.



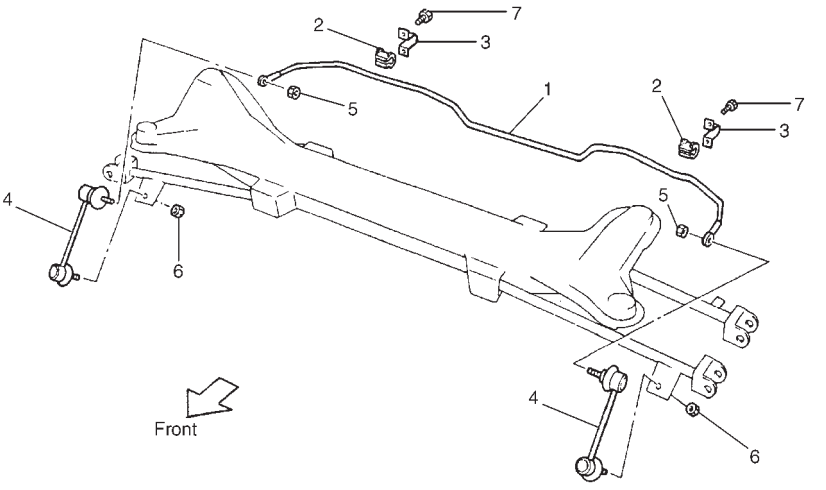
1. Strut upper nut
2. Strut support
3. Spring upper seat
4. Spring (rubber) seat
5. Bump stopper
6. Dust cover
7. Coil spring
8. Spring lower seat
9. Strut

8) Put strut support on spring upper seat.
Tighten strut upper nut to specified torque and then apply waterproof coating (paint or lacquer) all around nut and strut rod thread.

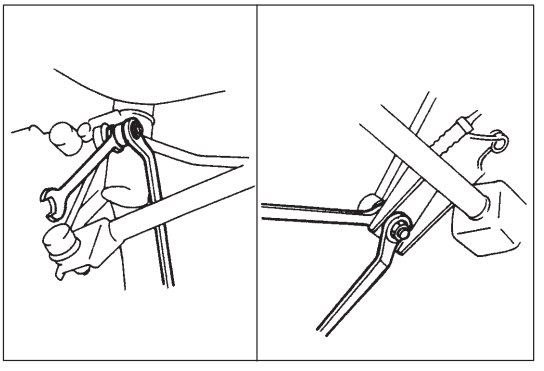
Tightening Torque
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)

9) Loosen and remove special tool (A) from compressing coil spring. While loosening special tool, recheck that stepped part of spring seat and spring end are in place to each other as described in foregoing Step 2).
Also, check to make sure that “OUT” mark on upper seat is matched with the center of strut bracket as described in Step 7).

REMOVE AND INSTALL STABILIZER BAR AND/OR BUSHINGS (IF EQUIPPED)



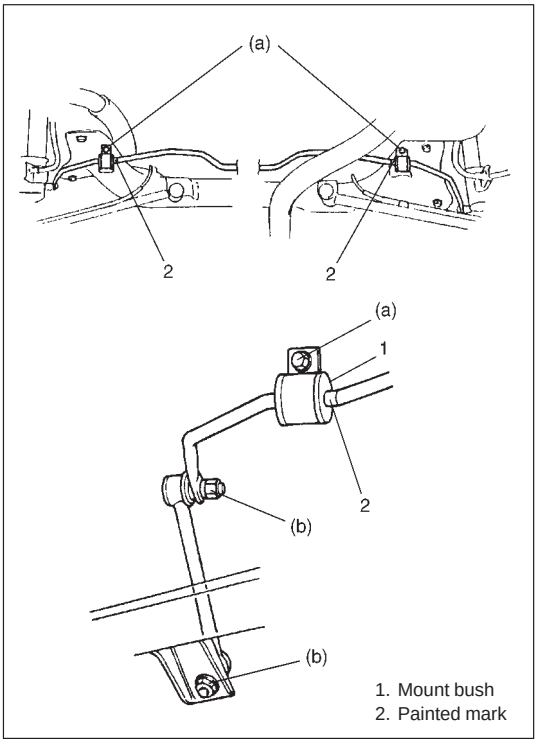
1. Stabilizer bar
2. Mount bush
3. Mount bracket
4. Joint
5. Joint nut
6. Link nut
7. Mount bolt



REMOVAL

CAUTION:
To avoid the risk of being burned, start your work after the exhaust system has cooled down.

1) Hoist vehicle and remove rear wheels.
2) Remove stabilizer link nuts. Then remove stabilizer joints from stabilizer bar. When loosening link nut and joint nut, hold stud with wrench.
3) Remove stabilizer mount brackets.
4) Remove stabilizer bar.



1. Mount bush
2. Painted mark

INSTALLATION

1) Loosely assemble all components in reverse order of removal.
2) With painted mark on stabilizer bar and end face of mount bushing aligned, tighten mount bracket bolts to specified torque.

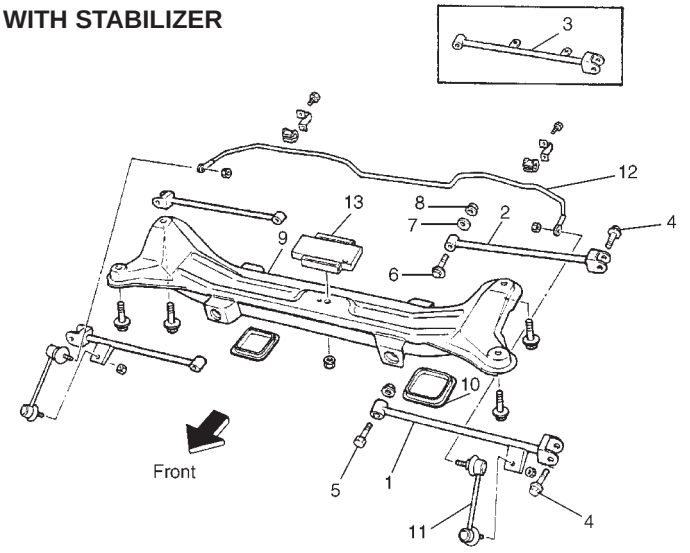
   NOTE:
   If painted mark has faded out, align the vehicle center and the center of stabilizer bar.
   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

3) Tighten each nut to specified torque.
   When tightening, hold stud with wrench.

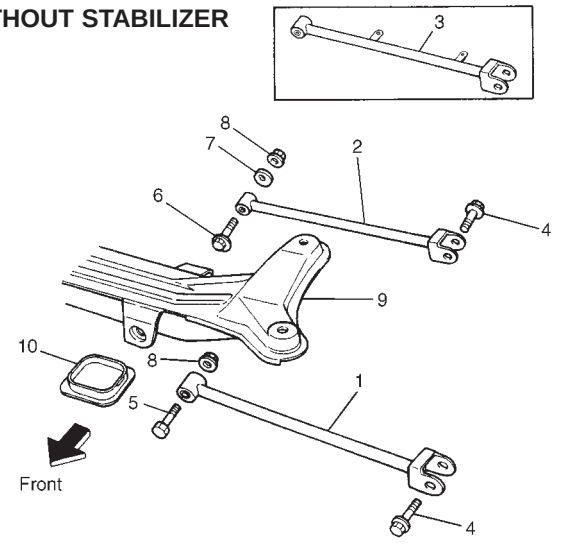
   Tightening Torque
   (b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

REMOVE AND INSTALL CONTROL ROD

WITH STABILIZER



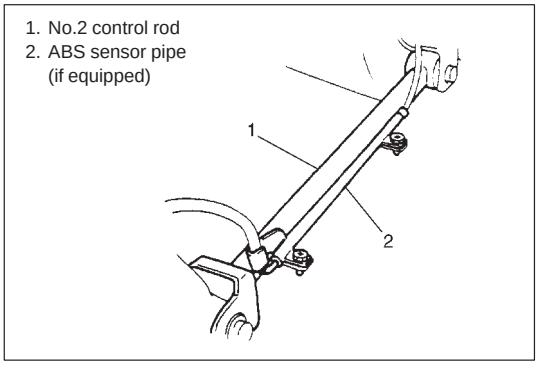
WITHOUT STABILIZER



1. No.1 control rod
2. No.2 control rod
3. No.2 control rod (for vehicle equipped with ABS)
4. Control rod outer bolt
5. Control rod inner bolt (inner bolt)
6. No.2 control rod bolt (inner bolt)
7. Control rod washer
8. Control rod inner nut
9. Suspension frame
10. Suspension frame cap
11. Joint
12. Stabilizer bar
13. Rear strut damper

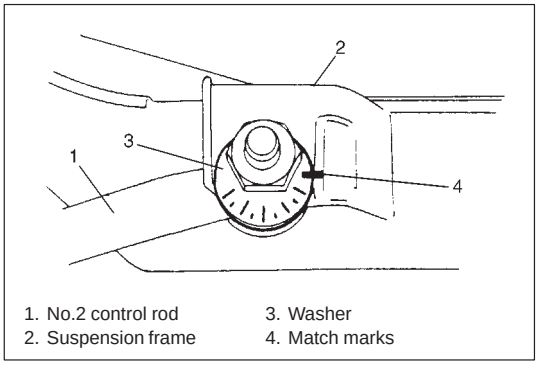
REMOVAL

1) Hoist vehicle and remove rear wheels.
2) Remove stabilizer bar (if equipped). Refer to STABILIZER BAR REMOVAL of this section.



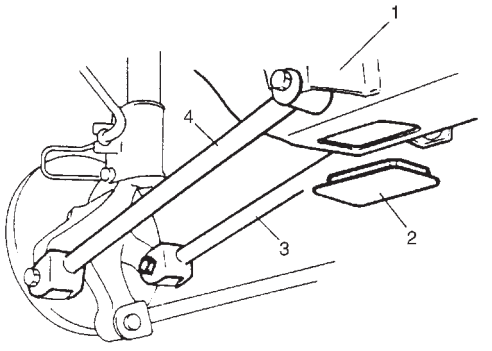
1. No.2 control rod
2. ABS sensor pipe (if equipped)

3) For vehicles equipped with ABS, detach ABS wheel speed sensor pipe from No.2 control rod.



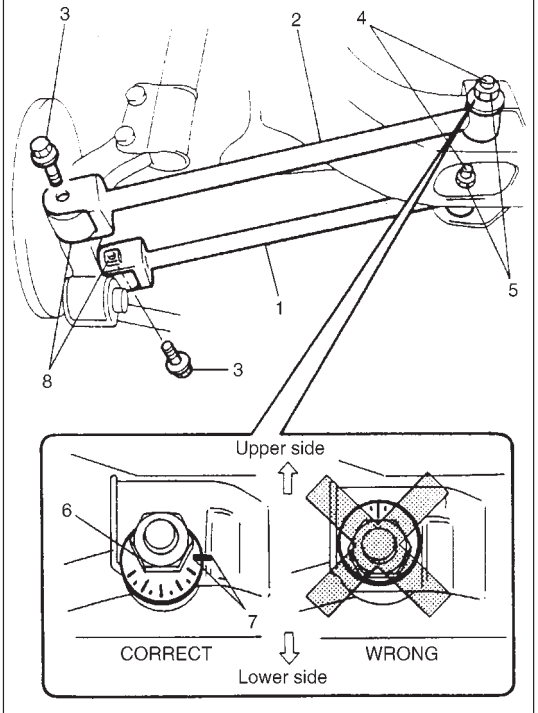
1. No.2 control rod
2. Suspension frame
3. Washer
4. Match marks

4) To facilitate toe adjustment after reinstallation, put match marks on washer and on suspension frame.



1. Suspension frame
2. Suspension frame cap
3. No.1 control rod
4. No.2 control rod

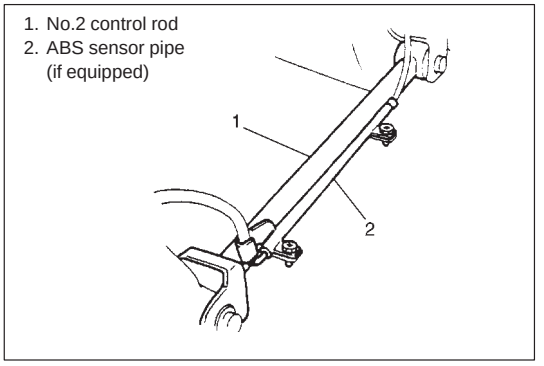
5) Remove suspension frame cap.
6) Remove No.2 control rod from suspension frame and knuckle.
7) Remove No.1 control rod from suspension frame and knuckle.



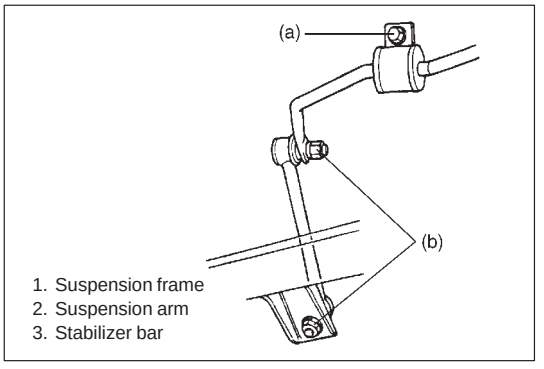
1. No.1 control rod
2. No.2 control rod
3. Outer bolt
4. Inner bolt and No.2 control rod bolt
5. Nut
6. Washer
7. Match marks
8. Welded nut

INSTALLATION

1) Install No.1 control rod.
   i) Install No.1 control rod, setting it so that its welded nut comes toward the rear.
   ii) Insert inner and outer bolts from the vehicle front and tighten them temporarily by hand.
2) Install No.2 control rod.
   i) Install No.2 control rod, setting it so that its welded nut comes toward the front.
   ii) Insert No.2 control rod bolt from the vehicle front and outer bolt from the rear.
   iii) Install washer with its graduated part facing down.
   iv) With marks on washer and frame marked before removal aligned to each other, tighten bolts and nut temporarily by hand.

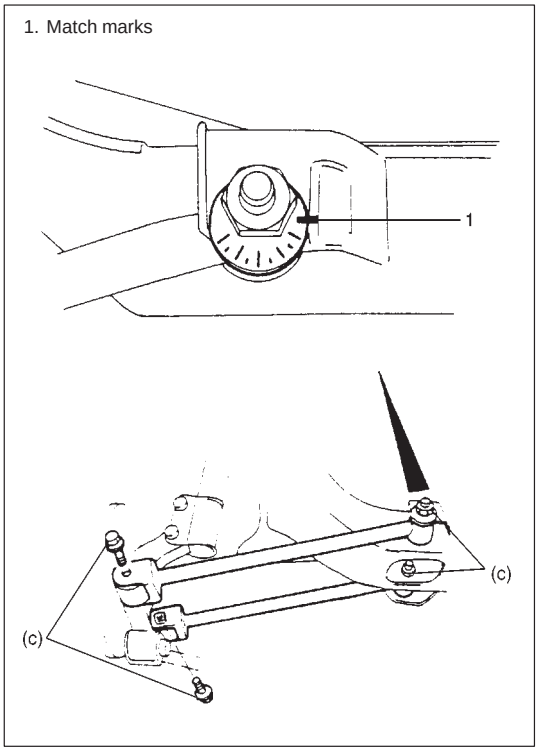


3) For vehicles equipped with ABS, attach ABS wheel speed sensor pipe to No.2 control rod.



4) Install stabilizer bar (if equipped). Refer to Step 1) thru 3) in STABILIZER BAR INSTALLATION of this section.

Tightening Torque
(a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)
(b) : 50 N·m (5.0 kg-m, 36.5 lb-ft)



5) Lower hoist and bounce vehicle up and down to stabilize suspension.
6) Tighten control rod bolts and nuts to specified torque with vehicle weight on suspension.

NOTE:
- ○ **It is the most desirable to have vehicle off hoist and in non-loaded condition when tightening them.**
- ○ **Tighten No.2 control rod inner nut with match marks aligned.**

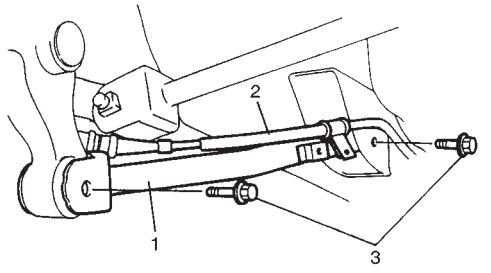
Tightening Torque
(c) : 90 N·m (9.0 kg-m, 65.0 lb-ft)

7) Install wheels (right & left) and lower hoist.
8) Check rear toe and adjust it as necessary. For check and adjustment procedures, refer to REAR WHEEL ALIGNMENT in this section.
9) Install suspension frame cap.

REMOVE AND INSTALL TRAILING ROD

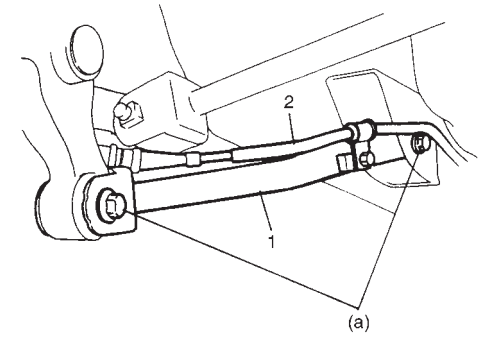
REMOVAL

1) Hoist vehicle.



1. Trailing rod
2. Parking brake cable
3. Bolt

2) Detach parking brake cable clamp from trailing rod.
3) Remove trailing rod bolts and trailing rod.



1. Trailing rod
2. Parking brake cable

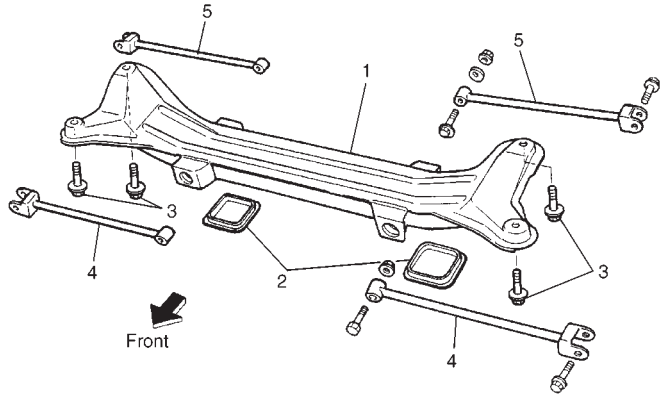
INSTALLATION

1) Install trailing rod and tighten bolts by hand.
2) Attach parking brake cable clamp to trailing rod.
3) Install wheel and tighten wheel nuts to specified torque.
4) Lower hoist and bounce vehicle up and down to stabilize suspension.
5) Tighten trailing rod bolts to specified torque with vehicle weight on suspension.

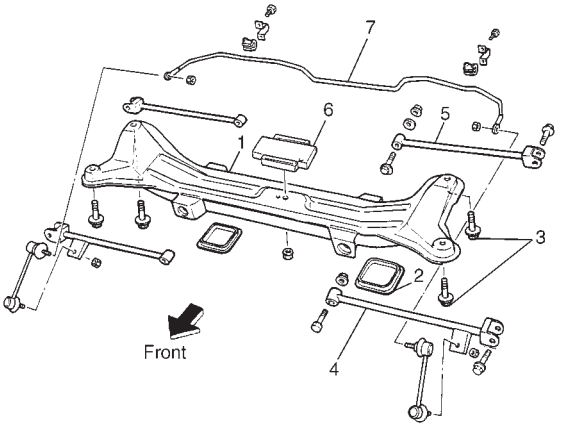
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

REMOVE AND INSTALL SUSPENSION FRAME

WITHOUT STABILIZER BAR



WITH STABILIZER BAR

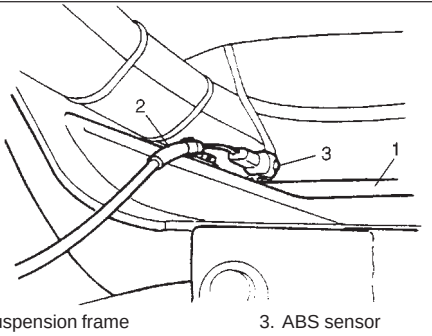


1. Suspension frame
2. Suspension frame cap
3. Suspension frame bolt
4. No.1 control rod
5. No.2 control rod
6. Rear strut damper
7. Stabilizer bar

REMOVAL

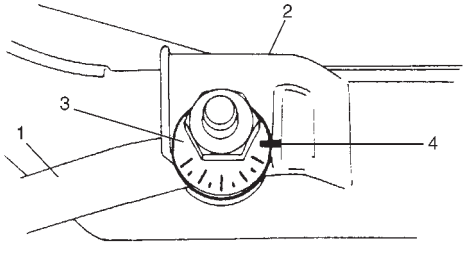
1) Hoist vehicle and remove rear wheels.
2) Remove muffler referring to SECTION 6K.

WARNING:
To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system has cooled down.



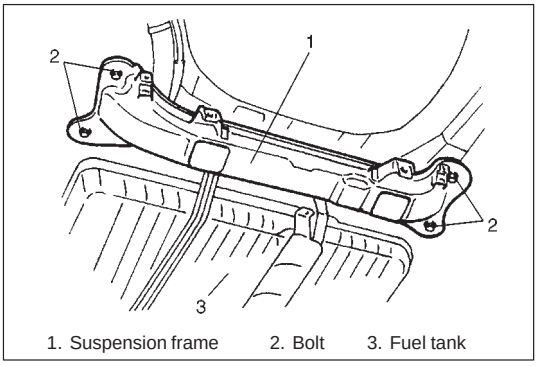
1. Suspension frame
2. ABS sensor harness
3. ABS sensor connector

3) Remove stabilizer bar (if equipped). Refer to Step 1) – 4) in STABILIZER BAR REMOVAL of this section.
4) For vehicles equipped with ABS, detach ABS wheel speed sensor connector and harness (right and left) from suspension frame and control rods.



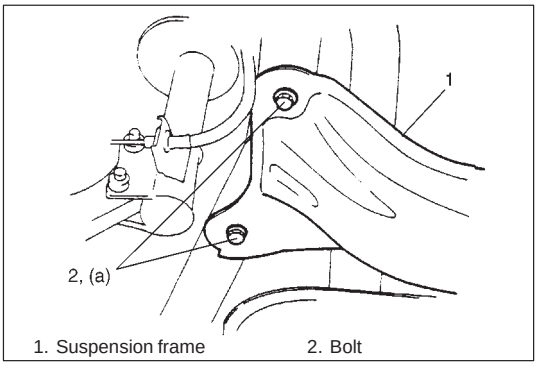
1. No.2 control rod
2. Suspension frame
3. Washer
4. Match marks

5) To facilitate toe adjustment after reinstallation, put match marks on washer and on suspension frame.
6) Loosen No.2 control rod outer bolts (right and left) and remove No.2 control rod bolts (right and left).
7) Loosen No.1 control rod outer bolts (right and left) and remove No.1 control rod inner bolts (right and left).



1. Suspension frame 2. Bolt 3. Fuel tank

8) Remove suspension frame bolts and suspension frame.
9) Remove rear strut damper.



1. Suspension frame 2. Bolt

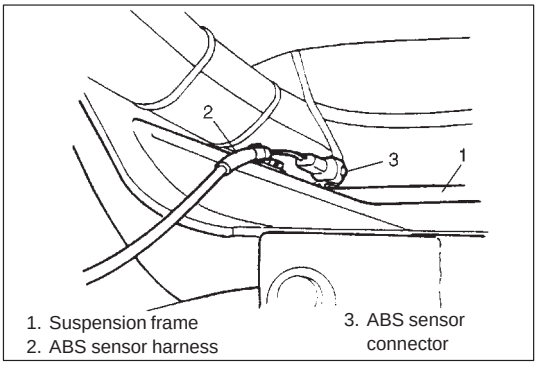
INSTALLATION

1) Install rear strut damper.

   Tightening Torque for rear strut damper
   30 N·m (3.0 kg-m, 22.0 lb-ft)

2) Install suspension frame and tighten suspension frame bolts to specified torque.

   Tightening Torque
   (a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



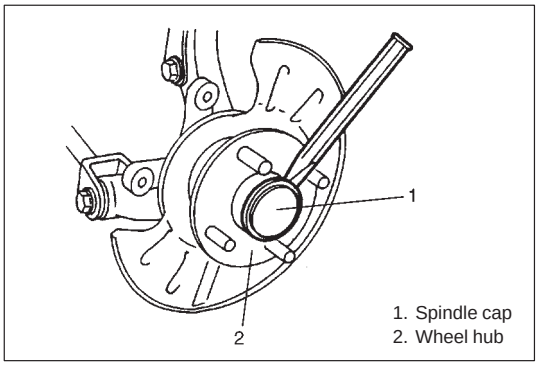
1. Suspension frame
2. ABS sensor harness
3. ABS sensor connector

3) Install control rods referring to steps 1) and 2) of CONTROL ROD INSTALLATION of this section.
4) For vehicles equipped with ABS, attach ABS wheel speed sensor connector and harness (right and left) to suspension frame and control rods.
5) Perform step 4) to 9) of CONTROL ROD INSTALLATION of this section.

6) Install muffler referring to SECTION 6K.

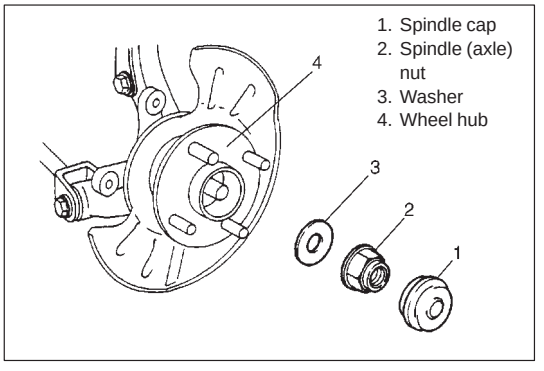
REMOVE AND INSTALL WHEEL HUB (WHEEL BEARING) ASSEMBLY AND WHEEL STUD (HUB BOLT)

Wheel bearing and wheel hub form a solid unit.
When wheel bearing is found defective and its replacement is necessary, replace hub assembly.

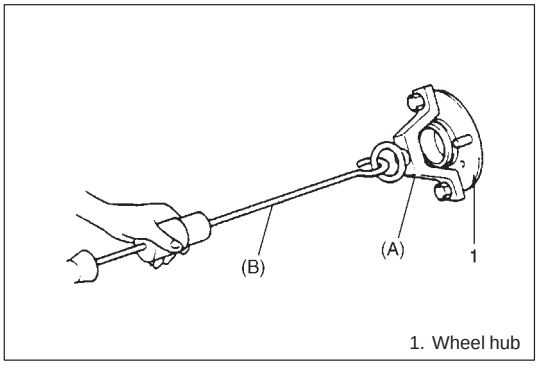


REMOVAL

1) Hoist vehicle and remove brake disc or brake drum referring to SECTION 5.
2) Remove spindle cap as shown (by hammering lightly at 3 locations around it so as not to deform or cause damage to seating part of cap).

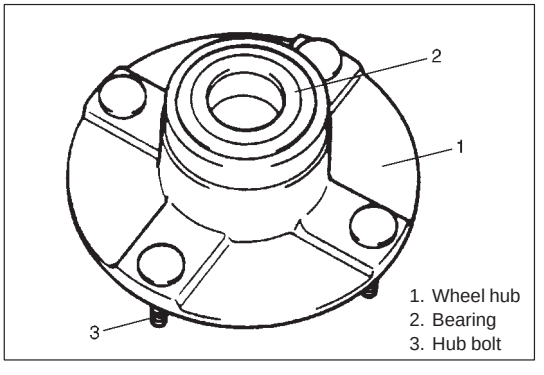


3) Uncalk spindle nut and remove spindle nut and washer.



4) Pull wheel hub off by using special tools.

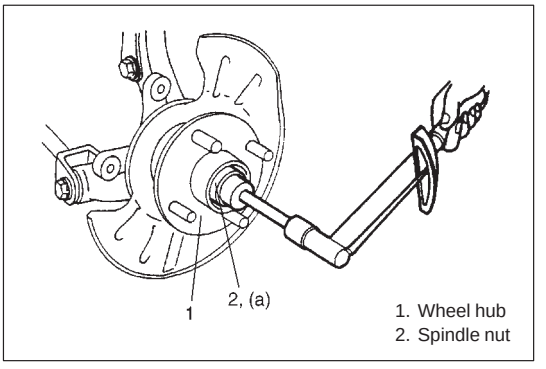
Special Tool
(A): 09943-17912
(B): 09942-15511



5) Remove hub bolts.
Refer to FRONT WHEEL STUD REMOVAL in SECTION 3D in the Service Manual mentioned in FOREWORD of this manual for removal procedure.

INSTALLATION

1) Install hub bolts.
   Refer to FRONT WHEEL STUD INSTALLATION in SECTION 3D in the Service Manual mentioned in FOREWORD of this manual for installation procedure.
2) For ABS equipped vehicle, check ABS wheel speed sensor rotor for damage.
3) Install wheel hub assembly, washer and new spindle nut.

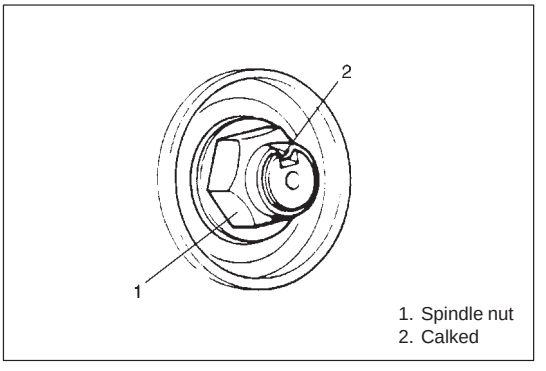


1. Wheel hub
2. Spindle nut

4) Tighten spindle nut to specified torque.

   NOTE:
   Removed spindle nut must be replaced with new one.

   Tightening Torque
   (a): 175 N·m (17.5 kg-m, 126.5 lb-ft)



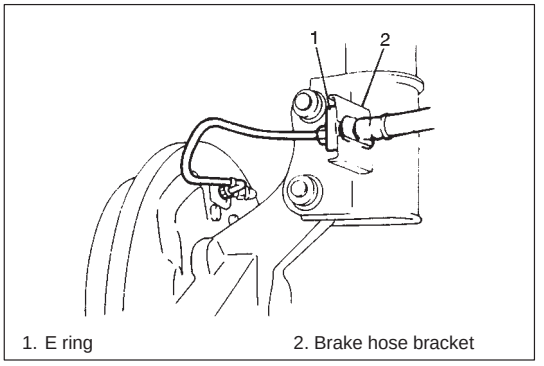
1. Spindle nut
2. Calked

5) Calk spindle nut securely.
6) Install spindle cap to wheel hub.

   NOTE:

- **When installing spindle cap, hammer lightly several locations on the collar of cap until collar comes closely into contact with wheel hub.**
- **If fitting part of cap is deformed or damaged or if it is fitted loosely, replace with new one.**

7) Install brake disc, caliper, and wheel referring to REAR BRAKE DISC INSTALLATION in SECTION 5.
8) Perform brake test.

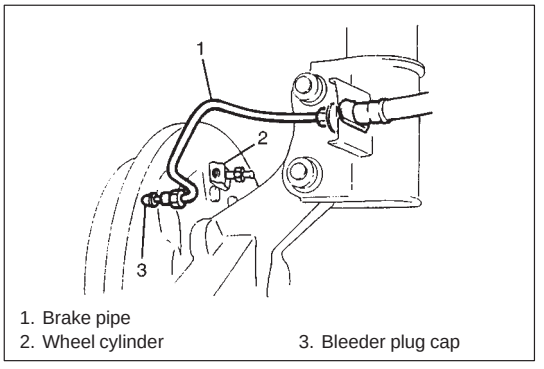


1. E ring
2. Brake hose bracket

REMOVE AND INSTALL KNUCKLE

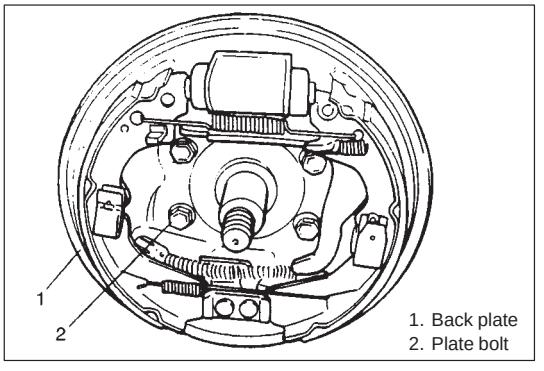
REMOVAL

1) Hoist vehicle and remove wheel hub referring to WHEEL HUB REMOVAL of SECTION 3E or 3E1.
2) Remove E ring securing brake hose.



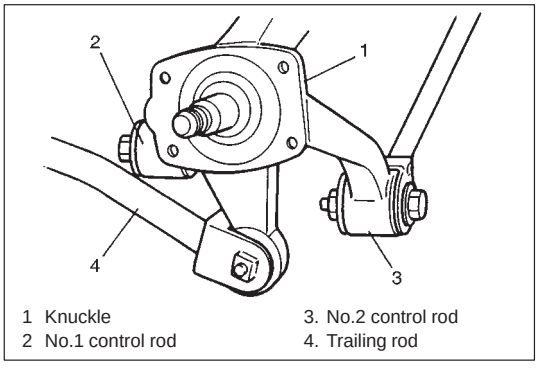
1. Brake pipe
2. Wheel cylinder
3. Bleeder plug cap

3) Disconnect brake pipe from wheel cylinder and put wheel cylinder bleeder plug cap onto pipe to prevent fluid from spilling.
4) Remove ABS wheel speed sensor from knuckle, if equipped.



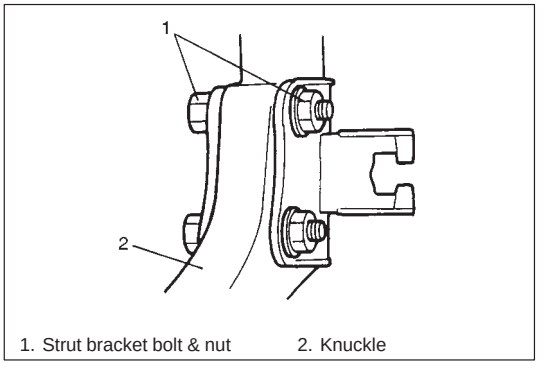
1. Back plate
2. Plate bolt

5) Remove brake back plate from knuckle.



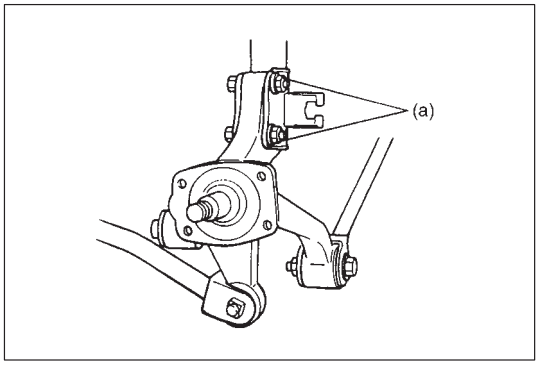
1 Knuckle
2 No.1 control rod
3. No.2 control rod
4. Trailing rod

6) Loosen control rod outer bolts, trailing rod rear bolt and strut bracket nuts.
7) Disconnect control rods (No.1 and No.2) from knuckle.
8) Disconnect trailing rod from knuckle.



1. Strut bracket bolt & nut
2. Knuckle

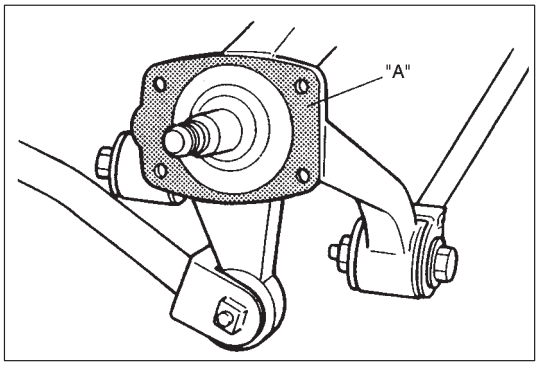
9) Remove knuckle from strut.



INSTALLATION

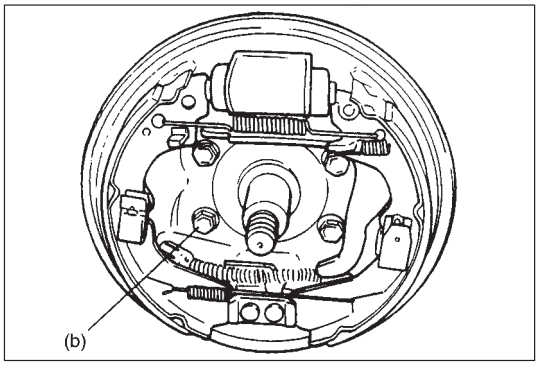
1) Install rear knuckle to strut, and connect control rods and trailing rod to knuckle. At this point, temporarily tighten them by hand.
2) Tighten strut bracket bolts and nuts to specified torque.

   Tightening Torque
   (a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



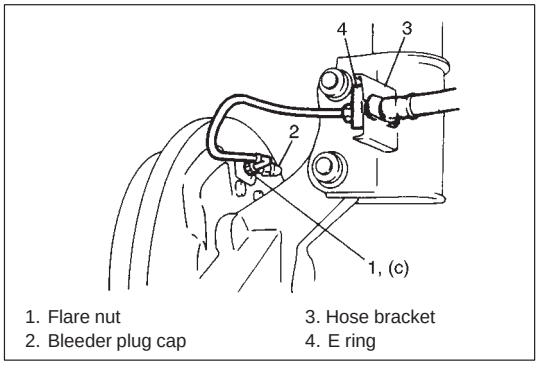
3) Apply water tight sealant to mating surfaces of brake back plate and rear knuckle.

   "A": Sealant 99000-31090



4) Install brake back plate and tighten back plate bolts to specified torque.

   Tightening Torque
   (b): 50 N·m (5.0 kg-m, 36.0 lb-ft)

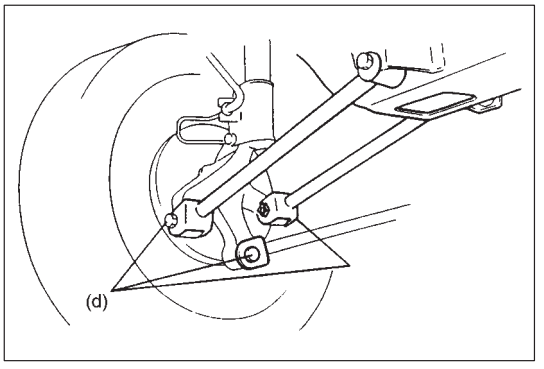


1. Flare nut
2. Bleeder plug cap
3. Hose bracket
4. E ring

5) For ABS equipped vehicle, check to make sure that ABS wheel speed sensor tooth is free from any metal particles and install it to knuckle.
6) Connect brake pipe to wheel cylinder and tighten brake pipe flare nut to specified torque and install bleeder plug cap taken off from pipe back to bleeder plug.

   Tightening Torque
   (c): 16 N·m (1.6 kg-m, 12.0 lb-ft)
7) Attach brake hose to strut bracket with E-ring securely.
8) Install wheel hub referring to WHEEL HUB INSTALLATION in SECTION 3E or 3E1.
9) Install brake drum referring to BRAKE DRUM INSTALLATION of SECTION 5.
10) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, see SECTION 5.)

11) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
    Adjust parking brake cable. (For adjustment, see SECTION 5.)
12) Tighten parking brake lever cover screws.
13) Install wheel and tighten wheel nuts to specified torque.
14) Check to ensure that brake drum is free from dragging and proper braking is obtained.
15) Lower hoist and bounce vehicle up and down to stabilize suspension.



16) Tighten control rod outer bolts and trailing rod rear bolt to specified torque with vehicle weight on suspension.

    Tightening Torque
    (d): 90 N·m (9.0 kg-m, 65.0 lb-ft)

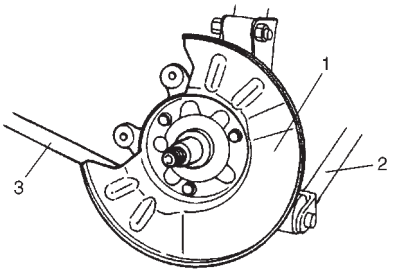
    Then check toe.

17) Perform brake test (foot brake and parking brake).
18) Check each installed part for fluid leakage.

REMOVE AND INSTALL KNUCKLE

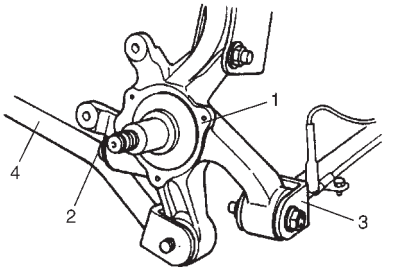
REMOVAL

1) Hoist vehicle and remove wheel hub referring to WHEEL HUB REMOVAL in this section.
2) If the vehicle is equipped with ABS, remove rear wheel speed sensor, refer to SECTION 5B of Service Manual mentioned in FOREWORD of this manual.
3) Remove caliper carrier from knuckle.



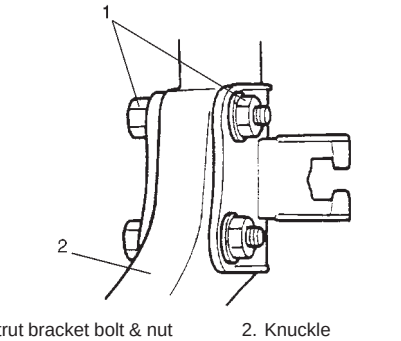
1. Brake disc dust cover
2. Control rod
3. Trailing rod

4) Remove brake disc dust cover.



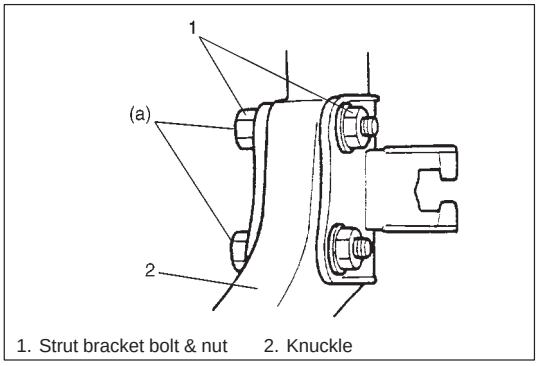
1. Knuckle
2. No.1 control rod
3. No.2 control rod
4. Trailing rod

5) Loosen control rod outer bolts, trailing rod rear bolt and strut bracket nuts.
6) Disconnect control rods (No.1 and No.2) from knuckle.
7) Disconnect trailing rod from knuckle.



1. Strut bracket bolt & nut
2. Knuckle

8) Remove knuckle from strut.

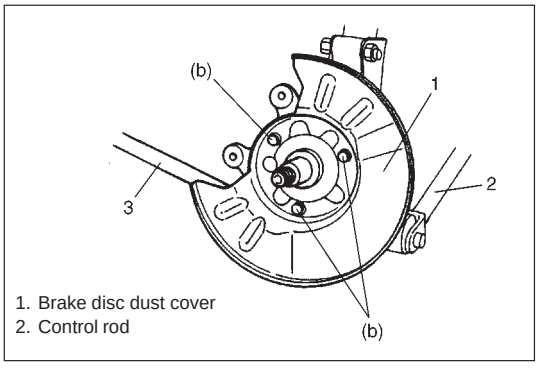


1. Strut bracket bolt & nut 2. Knuckle

INSTALLATION

1) Install rear knuckle to strut, and connect control rods and trailing rod to knuckle. At this point, temporarily tighten them by hand.
2) Tighten strut bracket bolts and nuts to specified torque.

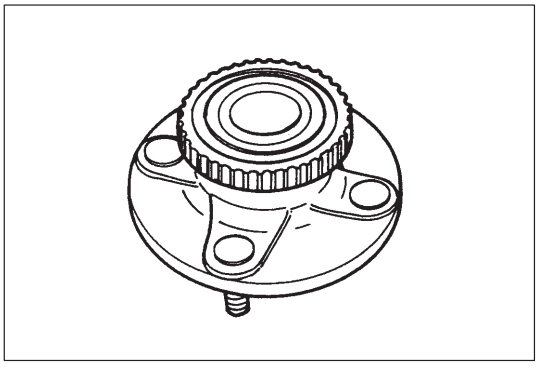
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



1. Brake disc dust cover
2. Control rod

3) Install brake disc dust cover.

Tightening Torque
(b): 10 N·m (1.0 kg-m, 7.2 lb-ft)

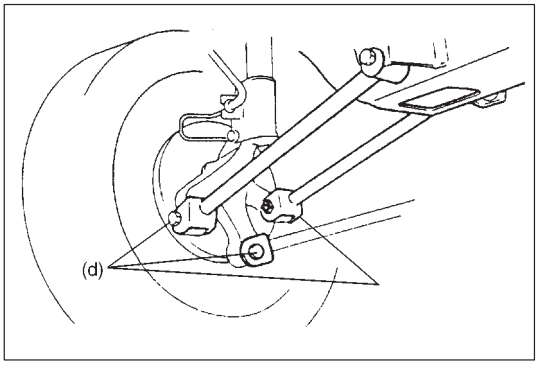


4) For ABS equipped vehicle, check to make sure that ABS wheel sensor tooth is free from any metal particles and install it to knuckle.
5) Install wheel hub referring to WHEEL HUB INSTALLATION in this section.
6) For ABS equipped vehicle, install rear wheel speed sensor. Refer to SECTION 5B of the Service Manual mentioned in FOREWORD of this manual.

7) Install caliper carrier to knuckle.

Tightening Torque for caliper carrier
50 N·m (5.0 kg-m, 36.0 lb-ft)

8) Install brake disc referring to REAR BRAKE DISC INSTALLATION of SECTION 5.

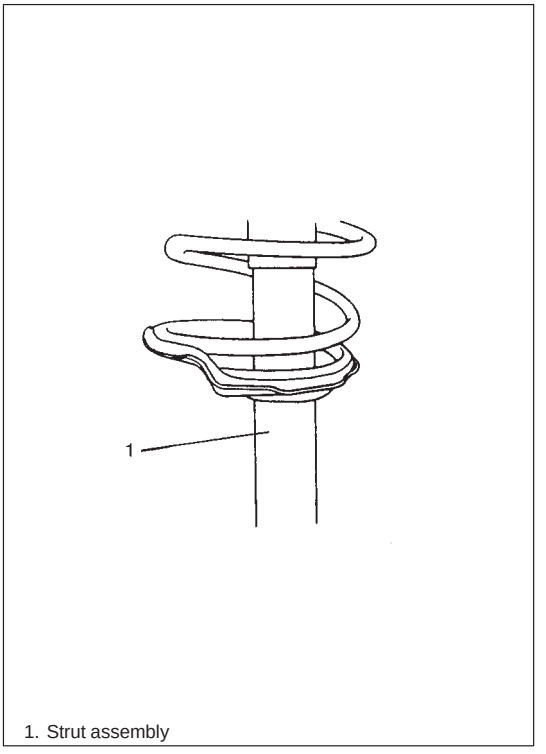


9) Tighten control rod outer bolts and trailing rod rear bolt to specified torque with vehicle weight on suspension.

Tightening Torque
(d): 90 N·m (9.0 kg-m, 65.0 lb-ft)

Then check toe.

10) Perform brake test (foot brake and parking brake).
11) Check each installed part for fluid leakage.



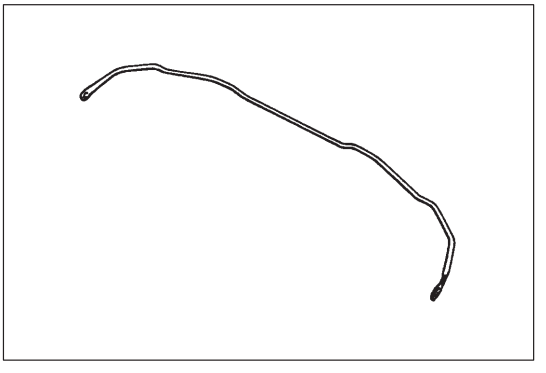
1. Strut assembly

REAR SUSPENSION INSPECTION

STRUT ASSEMBLY

1) Inspect strut for oil leakage. If strut is found faulty, replace it as an assembly unit, because it can not be disassembled.
2) Strut function check
   Check and adjust tire pressure as specified. Bounce vehicle body three or four times continuously by pushing rear end on the side with strut to be checked. Apply the same amount of force at each push and note strut resistance both when pushed and rebounding.
   Also, note how many times vehicle body rebounds before coming to stop after hands are off. Do the same for strut on the other side.
   Compare strut resistance and number of rebound on the right with those on the left. And they must be equal in both. With proper strut, vehicle body should come to stop the moment hands are off or after only one or two small rebounds. If struts are suspected, compare them with known good vehicle or strut.
3) Inspect for damage or deformation.
4) Inspect for abnormal noise.
5) Inspect for cracks or deformation in spring seat.
6) Inspect for deterioration of bump stopper.
7) Inspect strut support for wear, cracks or deformation.

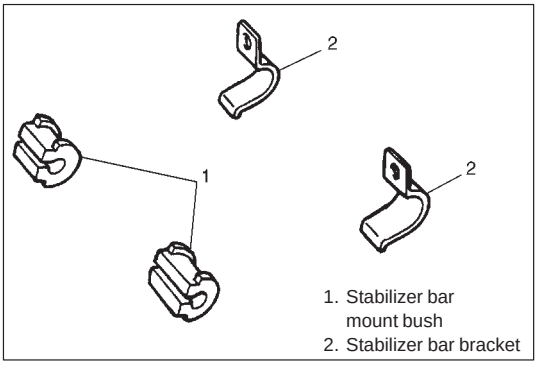
Replace any parts found defective in Steps 2) – 7).



STABILIZER BAR, BUSHING AND/OR JOINT (if equipped)

Stabilizer bar

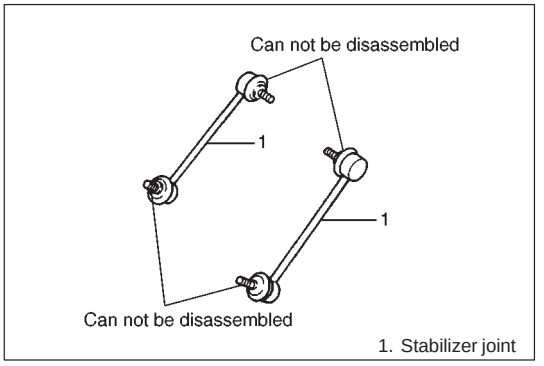
Inspect for damage or deformation. If defective, replace.



1. Stabilizer bar mount bush
2. Stabilizer bar bracket

Stabilizer Bushing/Bracket (if equipped)

Inspect for damage, wear deformation or deterioration. If defective, replace.



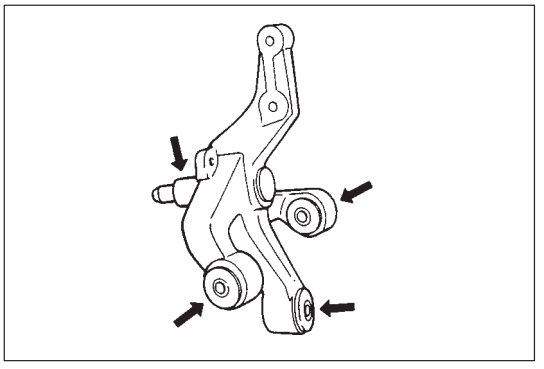
1. Stabilizer joint

Stabilizer joint (if equipped)

1) Check for smooth rotation.
2) Inspect ball stud for damage.
3) Inspect dust cover for damage.

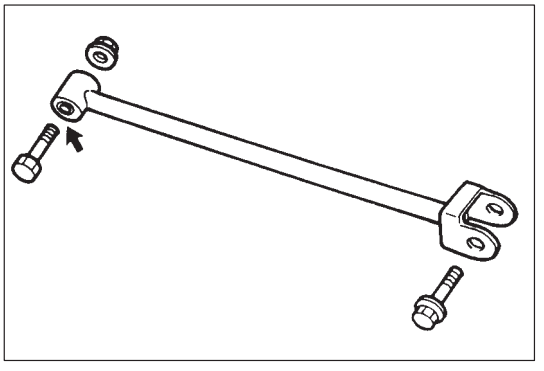
NOTE:
Stabilizer joint cannot be disassembled.

If there is any damage to either, stabilizer joint assembly must be replaced as a complete unit.



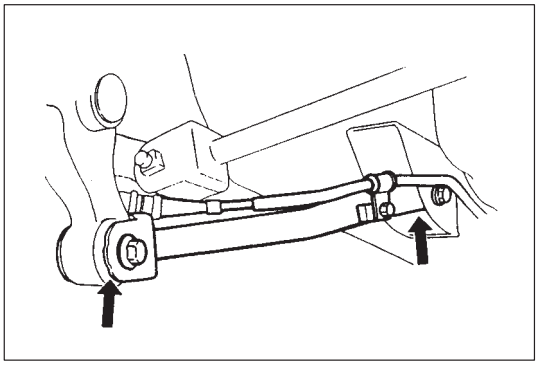
SUSPENSION KNUCKLE

○ Inspect for cracks, deformation or damage.
○ Inspect bushing for damage, wear or breakage.
If any faulty condition is found, replace.



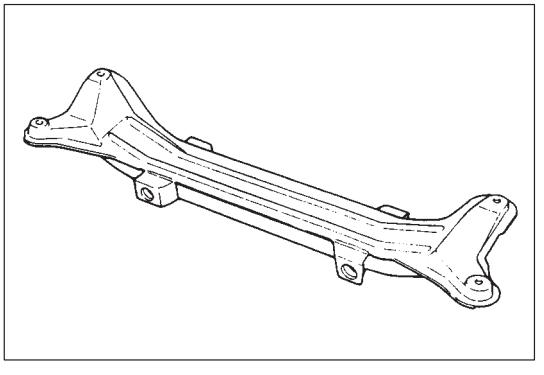
CONTROL ROD

○ Inspect for cracks, deformation or damage.
○ Inspect bushing for wear and breakage.
If any faulty condition is found, replace.



TRAILING ROD

○ Inspect for cracks, deformation or damage.
○ Inspect bushing for wear and breakage.
If any faulty condition is found, replace.



SUSPENSION FRAME

○ Inspect for cracks, deformation or damage.
If any faulty condition is found, replace.

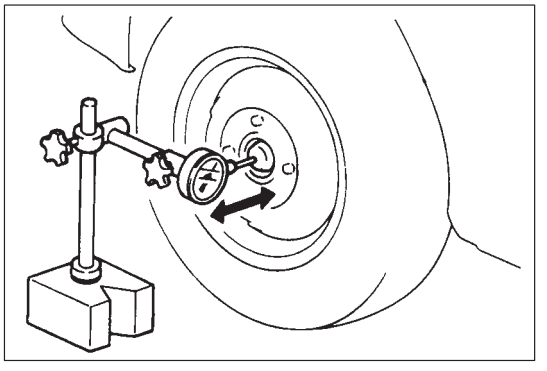
REAR SUSPENSION FASTENERS

Check each bolt and nut fastening suspension parts for tightness. Tighten loose one, if any, to specified torque, referring to TORQUE SPECIFICATIONS of this section.

WHEEL DISC, NUT & BEARING

○ Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.

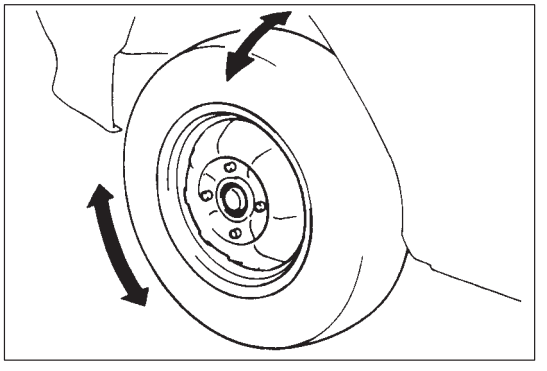
○ Check wheel (hub) nuts for tightness and, as necessary, retighten to specification (Refer to TORQUE SPECIFICATION).



○ Check wheel bearings for wear. When measuring thrust play, apply a dial gauge to spindle cap center or rear wheel hub.

Thrust play limit: 0.3 mm (0.012 in.)

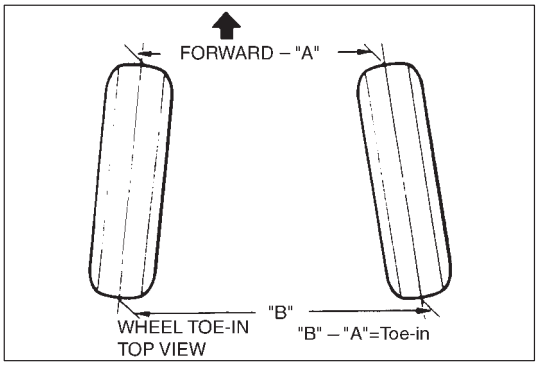
When measurement exceeds limit and spindle nut is tightened to specified torque, replace bearing.



○ By rotating wheel actually, check wheel bearing for noise and smooth rotation. If it is defective, replace bearing.

REAR WHEEL ALIGNMENT

Among factors for rear wheel alignment, only toe setting can be adjusted.
Camber and caster can't be adjusted. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in body or in suspension should be determined and damaged body should be repaired or damaged suspension should be replaced.

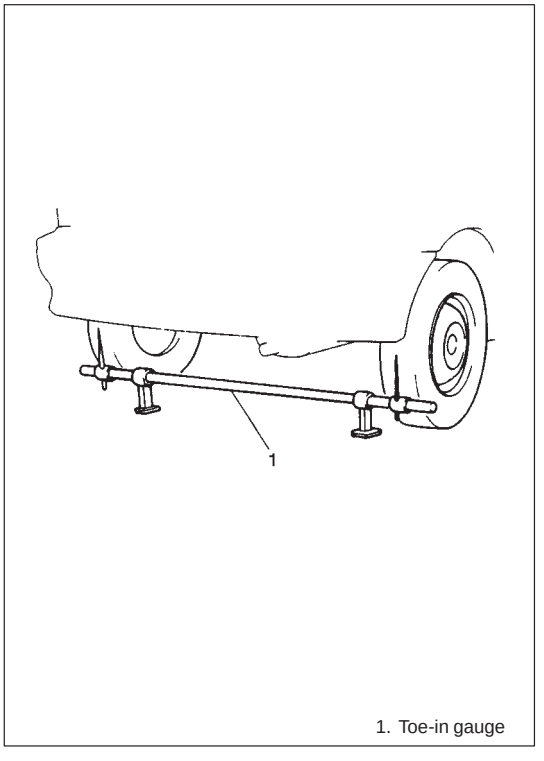


TOE SETTING

Amount of toe can be obtained by subtracting "A" from "B" as shown in left figure and therefore is given in mm (in.).

TOE INSPECTION AND ADJUSTMENT

Preparation for toe inspection and adjustment.
- ○ Place vehicle in non-loaded state on level floor.
- ○ Set steering wheel in straight state.
- ○ Check that inflation pressure of each tire is adjusted properly and disc wheel is free from deflection.
- ○ Check that each suspension part is free from bend, dent, wear or damage in any other form.
- ○ Check that ground clearance at the right and left is just about the same.



1. Toe-in gauge

INSPECTION

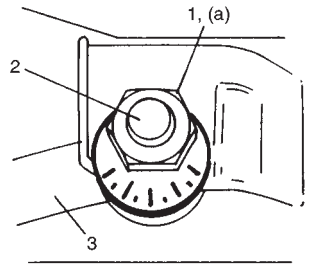
Measure toe with toe-in gauge.
Toe should be within following specifications.

Toe-in: 2 ∽ 2 mm (0.079 ∽ 0.079 in.)

When checked with side slip tester, side slip should satisfy following specification.

Side slip: 2 ∽ 3 mm/m (0.079 ∽ 0.118 in./3.3 ft)

If toe-in or side slip is out of above corresponding specification, adjust toe properly.



1. Inner nut
2. Inner bolt (cam bolt)
3. No.2 control rod

ADJUSTMENT

1) Loosen right and left No.2 control rod inner nuts.
2) Adjust toe to satisfy specification by turning right and left No.2 control rod inner bolts (cam bolts) by the same amount.
3) After adjustment, tighten right and left nuts to specified torque while holding cam bolt with another wrench to prevent it from turning.

Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

4) Install suspension frame cap.

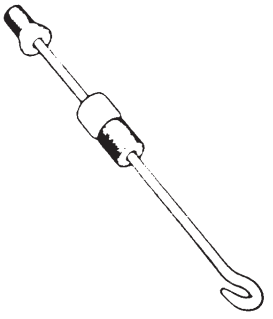
TIGHTENING TORQUE SPECIFICATIONS

Fastening Parts	Tightening Torque		
	N·m	kg-m	lb-ft
Stabilizer mount bolt	23	2.3	17.0
Stabilizer link nut	50	5.0	36.5
Control rod outer bolt	90	9.0	65.0
Control rod inner bolt & nut			
Trailing rod bolt			
Suspension frame bolt			
Strut support nut	28	2.8	20.5
Strut upper nut	55	5.5	40.0
Strut bracket bolt & nut	90	9.0	65.0
Rear spindle nut	175	17.5	126.5
Back plate bolt	50	5.0	36.0
Brake disc dust cover bolt	10	1.0	7.2
Wheel nut (hub nut)	85	8.5	61.5
Wheel speed sensor bolt (For vehicles equipped with ABS)	23	2.3	17.0

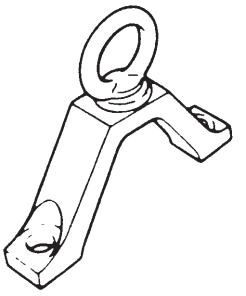
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir tank cap or described in owner's manual of vehicle	Brake reservoir tank
Water tight sealant	SEALING COMPOUND 366E (99000-31090)	Joint seam of knuckle and brake back plate

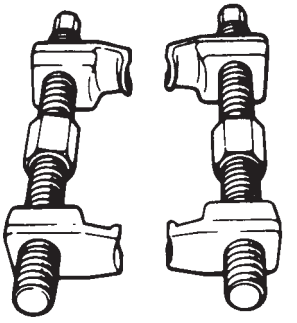
SPECIAL TOOLS



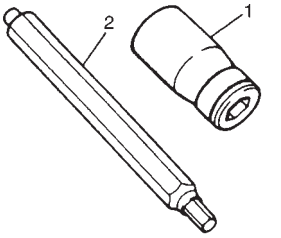
09942-15511
Sliding hammer



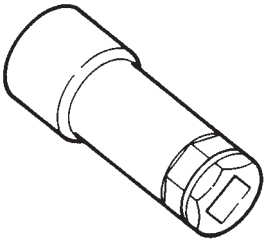
09943-17912
Rear wheel hub remover
(Brake drum remover)



09940-71431
Spring compressor



1. 09900-00411
   Hexagon wrench
   socket
2. 09900-00414
   Hexagon wrench bit
   6 mm



09945-26010
Socket wrench 17 mm

SECTION 3E1

REAR SUSPENSION
(4WD VEHICLE)

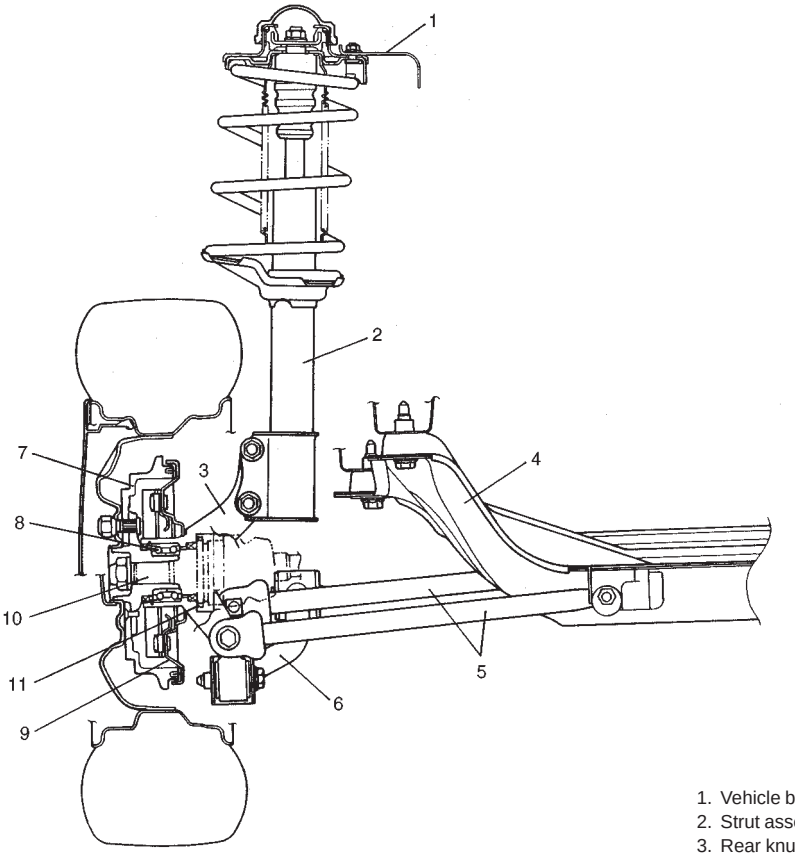
NOTE:

- **For the items not found in this section, refer to the SECTION 3E (2WD vehicle) of this manual.**
- **All suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.**
- **Never attempt to heat, quench or straighten any suspension part. Replace it with a new part, or damage to the part may result.**

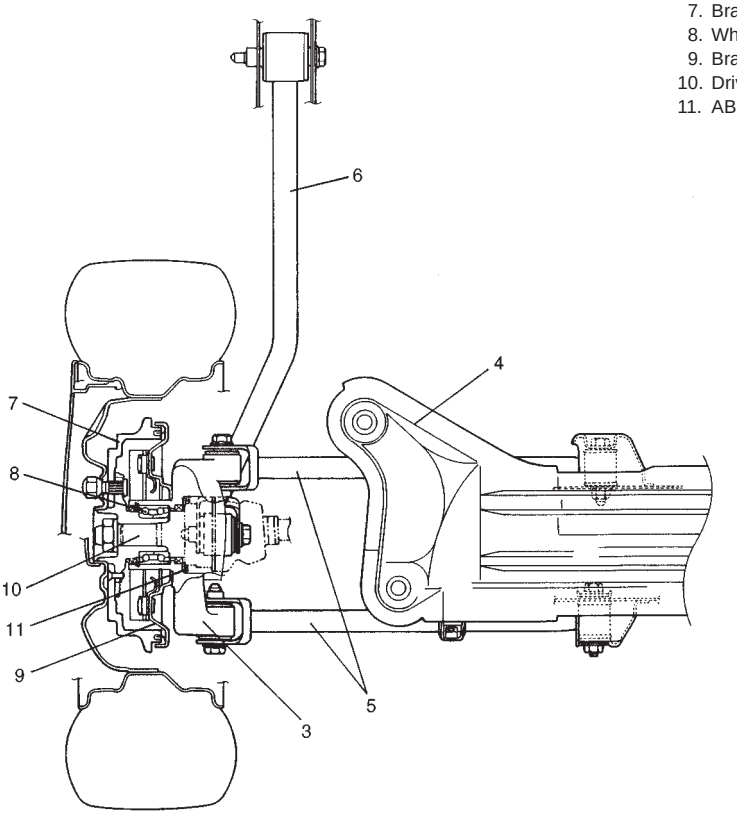
CONTENTS

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Remove and Install Wheel Hub, Wheel Stud/Wheel Bearing Outside Inner Race 3E1-5
Remove and Install Knuckle, Wheel Bearing/Oil Seal 3E1-7
TORQUE SPECIFICATIONS 3E1-8
REQUIRED SERVICE MATERIALS 3E1-8
SPECIAL TOOLS 3E1-9

GENERAL DESCRIPTION

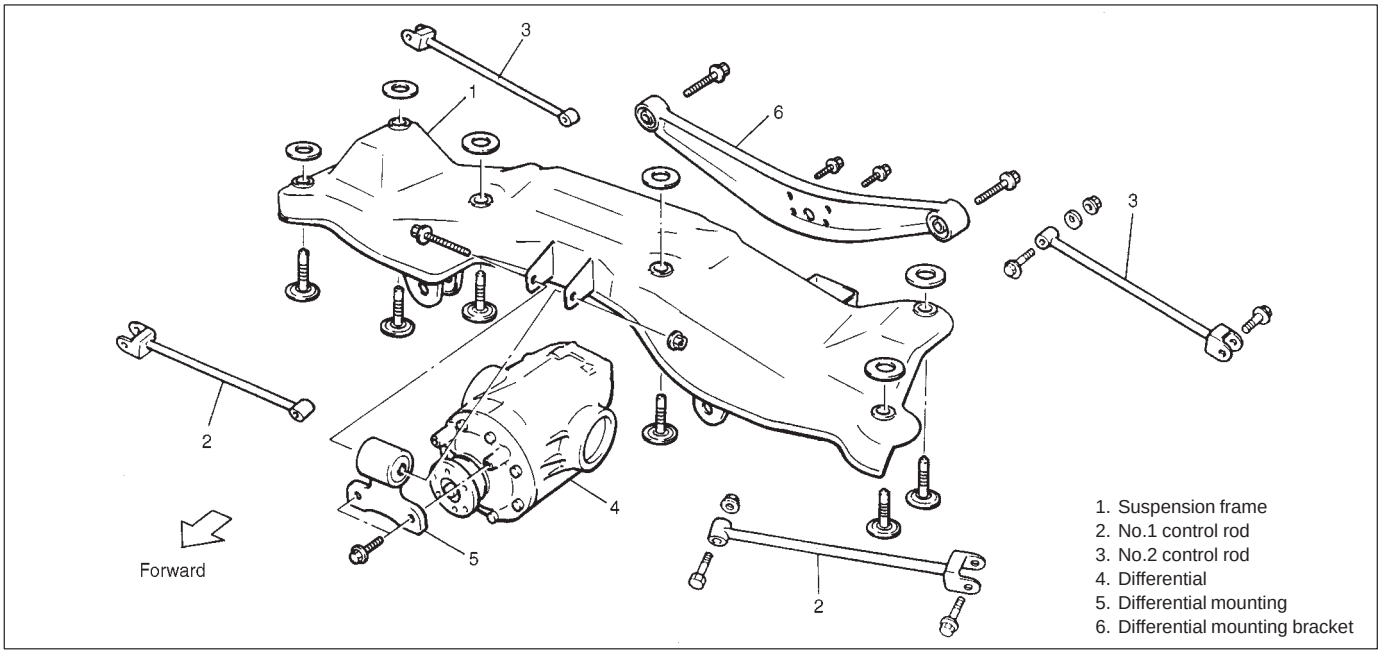


1. Vehicle body
2. Strut assembly
3. Rear knuckle
4. Suspension frame
5. Control rod
6. Trailing rod
7. Brake drum
8. Wheel bearing
9. Brake back plate
10. Drive shaft
11. ABS wheel speed sensor (if equipped)

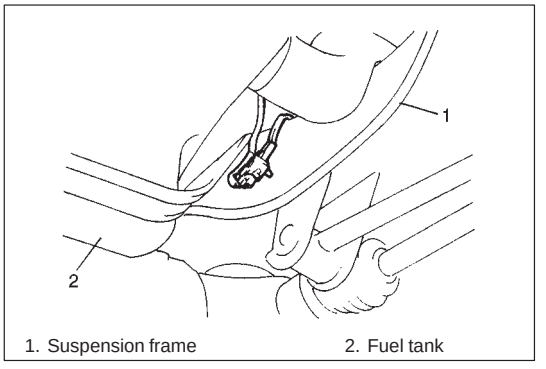


ON-VEHICLE SERVICE

REMOVE AND INSTALL SUSPENSION FRAME



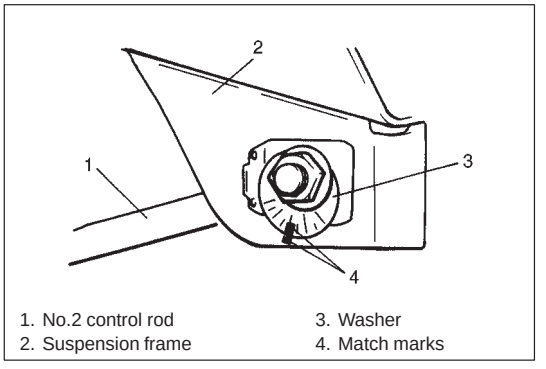
1. Suspension frame
2. No.1 control rod
3. No.2 control rod
4. Differential
5. Differential mounting
6. Differential mounting bracket



1. Suspension frame
2. Fuel tank

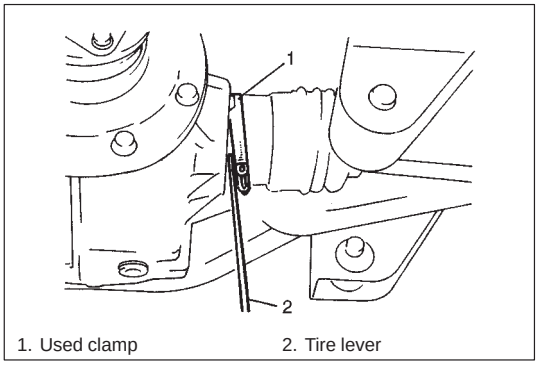
REMOVAL

1) Hoist vehicle and remove wheels (right and left).
2) Drain differential oil.
3) For vehicle equipped with ABS, detach ABS wheel speed sensor connector and harness (right and left) from suspension frame and control rod.
4) Remove rear drive shaft nut of left side.



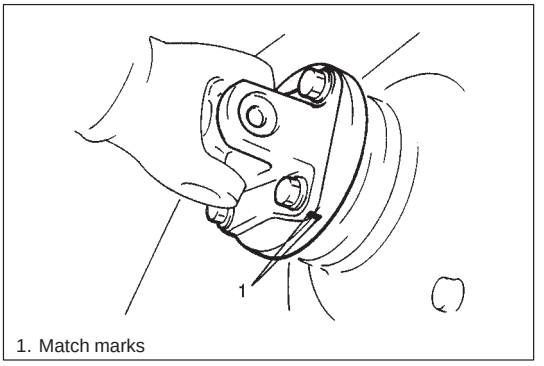
1. No.2 control rod
2. Suspension frame
3. Washer
4. Match marks

5) To facilitate toe adjustment after reinstallation, put match marks on washer and on suspension frame (right and left).
6) Loosen No.2 control rod outer bolts (right and left) and remove No.2 control rod (inner) bolts (right and left).
7) Remove No.1 control rods (right and left).



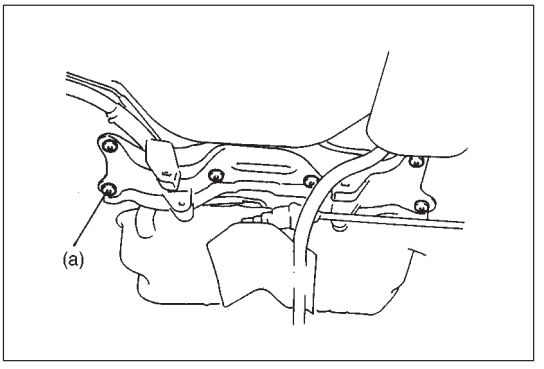
1. Used clamp
2. Tire lever

8) Remove left drive shaft from differential and knuckle, and disconnect right drive shaft from differential.



1. Match marks

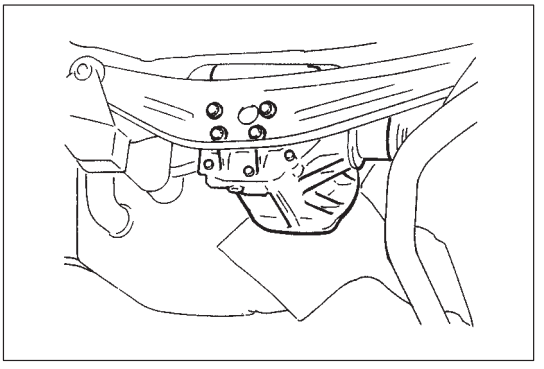
9) To facilitate reinstallation, put match marks on No.2 propeller shaft flange and differential flange.
   Disconnect No.2 propeller shaft from differential.
10) Remove differential, differential mounting and mounting bracket from suspension frame.
11) Remove suspension frame from vehicle body.



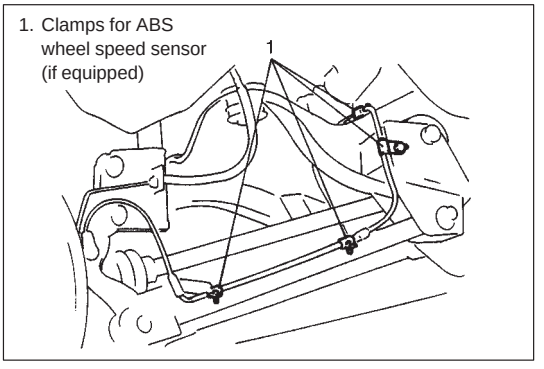
INSTALLATION

1) Install suspension frame to vehicle body and tighten suspension frame bolt to specified torque.

   Tightening Torque
   (a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

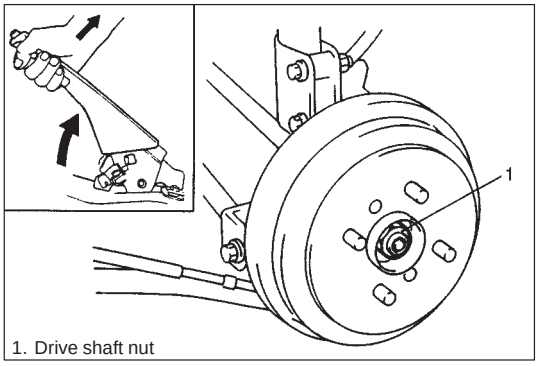


2) Install differential mounting, mounting bracket and differential to suspension frame.
   Tighten each bolt to specified torque referring to SECTION 7F.
3) Connect No.2 propeller shaft to differential aligning match marks on flanges. Tighten bolts and nuts to specified torque referring to SECTION 4B.
4) Install drive shafts (right and left) referring to SECTION 4C.



1. Clamps for ABS wheel speed sensor (if equipped)

5) Install control rods referring to CONTROL ROD INSTALLATION of SECTION 3E.
6) For vehicle equipped with ABS, attach ABS wheel speed sensor connector and harness to suspension frame.
7) Fill differential oil, referring to SECTION 7F.
8) Install wheels and tighten wheel nuts to specified torque.
9) Perform Step 4) to 6) CONTROL ROD INSTALLATION of SECTION 3E.

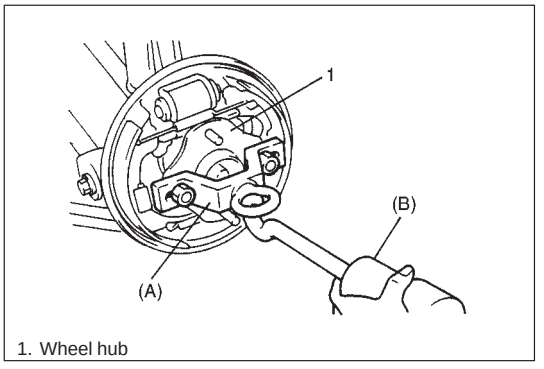


1. Drive shaft nut

REMOVE AND INSTALL WHEEL HUB, WHEEL STUD/WHEEL BEARING OUTSIDE INNER RACE

REMOVAL

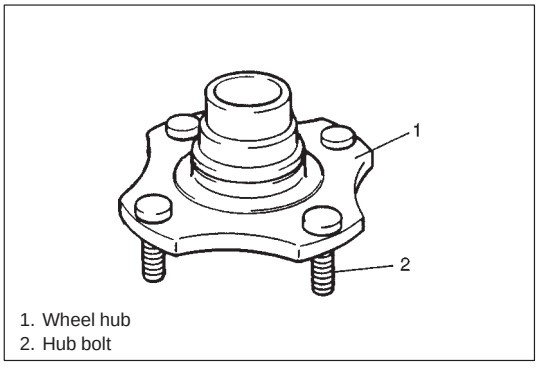
1) Hoist vehicle and remove wheel.
2) Uncaulk drive shaft nut.
3) Pull up parking brake lever fully and remove drive shaft nut.
4) Remove brake drum referring to BRAKE DRUM REMOVAL of SECTION 5.



1. Wheel hub

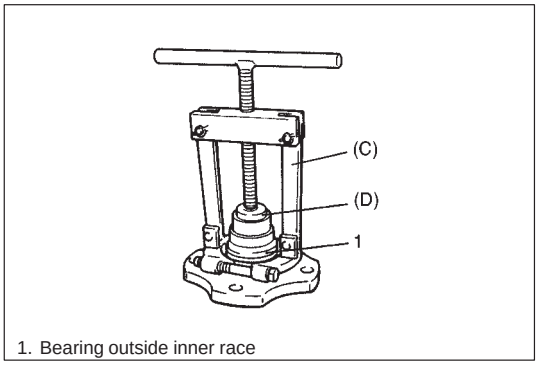
5) Pull wheel hub off by using special tools.

Special Tool
(A): 09943-17912
(B): 09942-15511



1. Wheel hub
2. Hub bolt

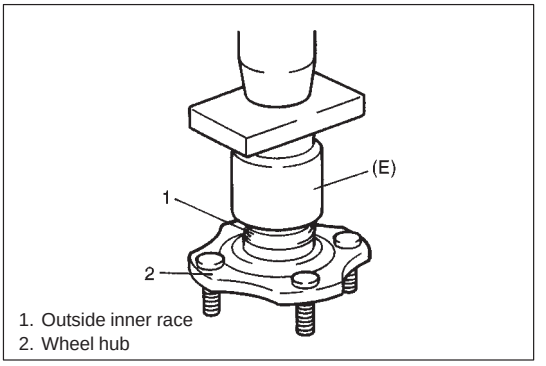
6) Remove hub bolts.
Refer to FRONT WHEEL STUD REMOVAL in SECTION 3D for removal procedure.



1. Bearing outside inner race

7) Remove wheel bearing inner race.

Special Tool
(C): 09913-65810
(D): 09925-88210

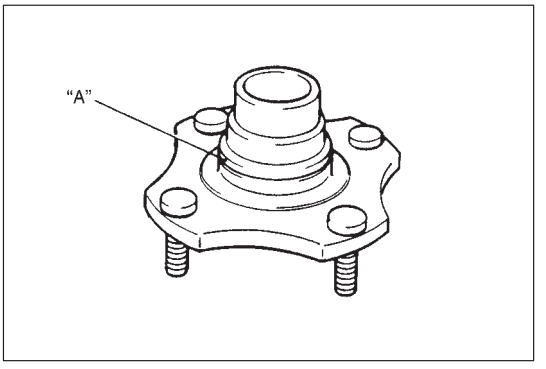


1. Outside inner race
2. Wheel hub

INSTALLATION

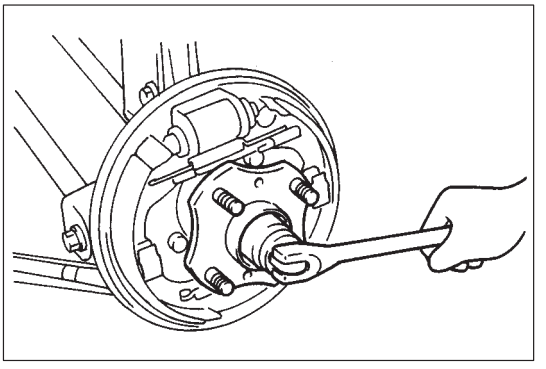
1) Install hub bolts.
   Refer to FRONT WHEEL STUD INSTALLATION in SECTION 3D for installation procedure.
2) Install outside inner race to wheel hub using special tool.
   Installing direction is as shown.

   Special Tool
   (E): 09940-53111

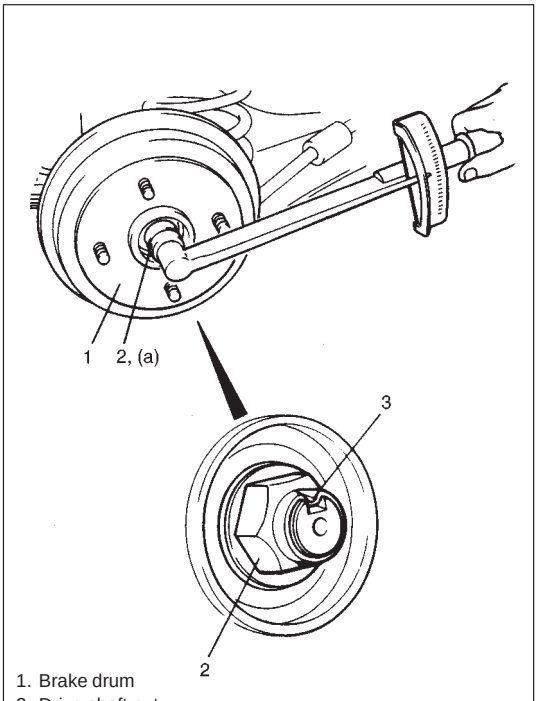


3) Apply grease to outside bearing, outside inner race and oil seal lip.

   "A": Grease 99000-25010



4) Install wheel hub to knuckle by tightening drive shaft nut. Do not tap wheel hub.



1. Brake drum
2. Drive shaft nut
3. Calked

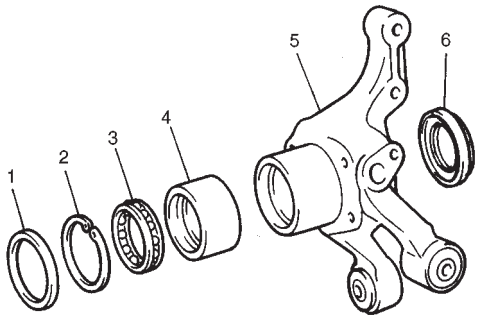
5) Install brake drum referring to BRAKE DRUM INSTALLATION in SECTION 5.
6) Pull up parking brake lever fully and tighten new drive shaft nut to specified torque.

   Tightening Torque
   (a): 175 N·m (17.5 kg-m, 126.5 lb-ft)

7) Calk drive shaft nut.

> **WARNING:**
> **Be careful while calking nut so that no crack will occur in calked part of nut. Cracked nut must be replaced with new one.**

8) Install wheel and lower hoist.
9) Perform brake test.



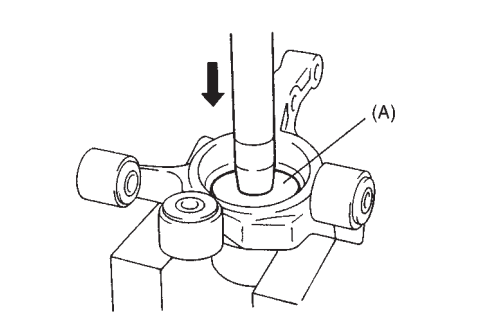
1. Outside oil seal
2. Snap ring
3. Outside bearing
4. Bearing outer race (and inner bearing)
5. Knuckle
6. Inside oil seal

REMOVE AND INSTALL KNUCKLE, WHEEL BEARING/OIL SEAL

REMOVAL

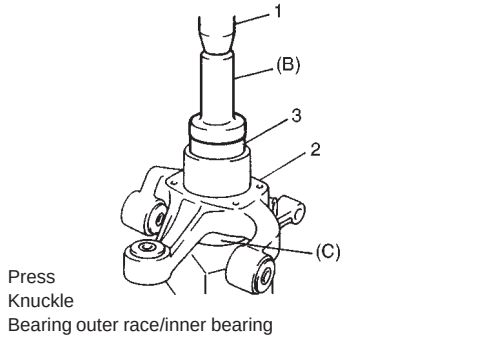
Once bearing outer race is removed, bearing set (outer race, bearings and inner races) should be replaced with new one.

1) Remove wheel hub referring to WHEEL HUB REMOVAL of this section.
2) Remove knuckle from vehicle referring to KNUCKLE REMOVAL of SECTION 3E.
3) Remove outside oil seal and snap ring from knuckle.
4) Remove inside oil seal from knuckle.



5) Remove bearing outer race/inner bearing using special tool and hydraulic press.

Special Tool
(A): 09924-84510-004



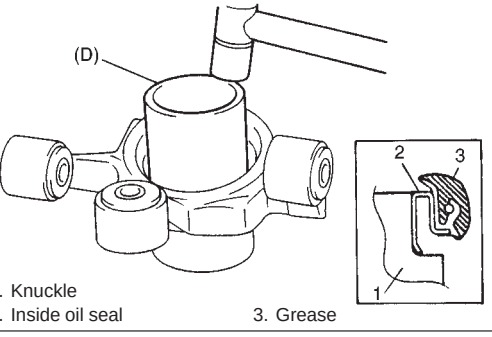
1. Press
2. Knuckle
3. Bearing outer race/inner bearing

INSTALLATION

When replacing bearing, inner race or outer race, be sure to replace them with new ones as a set.

1) Press-fit new bearing outer race/inner bearing using special tools.

Special Tool
(B): 09913-75520
(C): 09951-18210

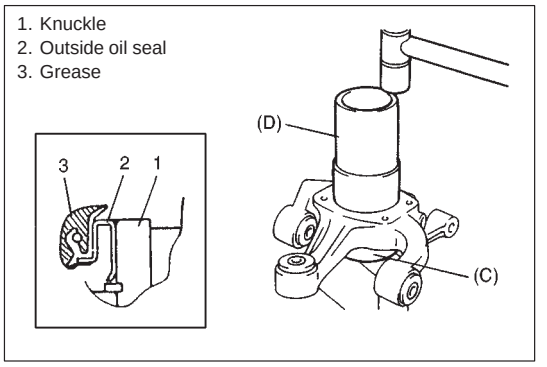


1. Knuckle
2. Inside oil seal
3. Grease

2) Apply grease (lithic grease) to bearing outer race and bearings.
3) Press-fit new inside oil seal until special tool contacts with knuckle.

Special Tool
(D): 09944-78210

Be sure to apply grease to oil seal lip.



4) Install snap ring to knuckle.
5) Press-fit new outside oil seal until special tool contacts with knuckle.

Special Tool
(D): 09944-78210
(C): 09951-18210

Be sure to apply grease to oil seal lip.

6) Install knuckle referring to Steps 1) to 7) of KNUCKLE INSTALLATION in SECTION 3E.
7) Install wheel hub referring to Steps 3) to 8) of WHEEL HUB INSTALLATION in this section.
8) Perform Steps 10) to 18) of KNUCKLE INSTALLATION in SECTION 3E.

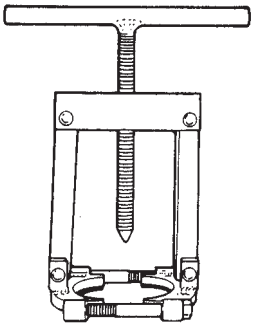
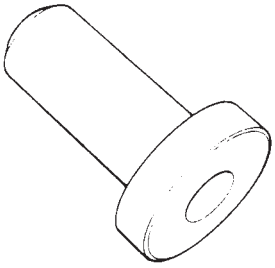
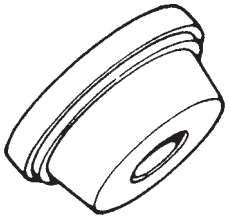
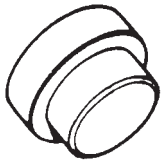
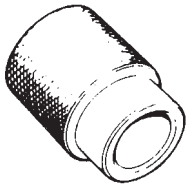
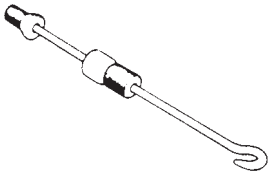
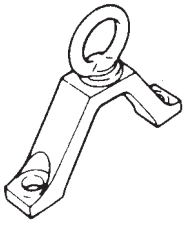
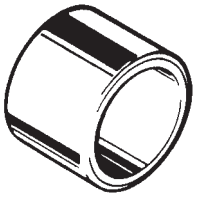
TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Rear suspension frame bolt	90	9.0	65.0
Rear drive shaft nut	175	17.5	126.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithic wheel bearing grease	SUPER GREASE A (99000-25010)	Wheel bearing, wheel bearing oil seal lip

SPECIAL TOOLS

 09913-65810 Bearing puller	 09913-75520 Bearing installer	 09924-84510-004 Bearing installer adapter (C)	 09925-88210 Bearing puller attachment
 09940-53111 Bearing installer	 09942-15511 Sliding hammer	 09943-17912 Brake drum remover	 09944-78210 Bearing installer support
 09951-18210 Oil seal remover & installer No.2			

SECTION 3F

WHEELS AND TIRES

NOTE:
All wheel fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts.
There is to be no welding as it may result in extensive damage and weakening of the metal.

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GENERAL DESCRIPTION

TIRES

This vehicle is equipped with following tire.
175/70 R13, 185/60 R14 or 195/55 R15
The tire is of tubeless type. The tire is designed to operate satisfactorily with loads up to the full rated load capacity when inflated to the recommended inflation pressures.
Correct tire pressures and driving habits have an important influence on tire life. Heavy cornering, excessively rapid acceleration, and unnecessary sharp braking increase tire wear.

WHEELS

Standard equipment wheels are the following steel wheels.
13 x 5J, 14 x 5 1/2 JJ or 15 x 5 1/2 JJ

REPLACEMENT TIRES

When replacement is necessary, the original equipment type tire should be used. Refer to the Tire Placard. Replacement tires should be of the same size, load range and construction as those originally on the vehicle. Use of any other size or type tire may affect ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire or snow chain clearance to the body and chassis.

kPa	kg^f/cm^2	psi
160	1.6	23
180	1.8	26
200	2.0	29
220	2.2	32
240	2.4	35
260	2.6	38
280	2.8	41
300	3.0	44

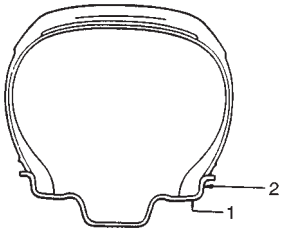
WARNING:
Do not mix different types of tires on the same vehicle such as radial, bias and bias-belted tires except in emergencies, because handling may be seriously affected and may result in loss of control.

It is recommended that new tires be installed in pairs on the same axle. If necessary to replace only one tire, it should be paired with the tire having the most tread, to equalize braking traction.
The metric term for tire inflation pressure is the kilopascal (kPa). Tire pressures is usually printed in both kPa and psi on the Tire Placard.
Metric tire gauges are available from tool suppliers.
The chart, shown left table, converts commonly used inflation pressures from kPa to psi.

REPLACEMENT WHEELS

Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, air leak through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than specification may cause objectional vibrations.

Replacement wheels must be equivalent to the original equipment wheels in load capacity, diameter, rim with offset and mounting configuration. A wheel of improper size or type may affect wheel and bearing life, brake cooling, speedometer/odometer calibration, vehicle ground clearance and tire clearance to body and chassis.



*** TOTAL INDICATOR READING IGNORE INDICATOR "JUMPS" DUE TO WELD SEAMS, PAINT RUNS, SCRATCHES, ETC.**

1. Radial runout
2. Lateral runout

HOW TO MEASURE WHEEL RUNOUT

To measure the wheel runout, it is necessary to use an accurate dial indicator. The tire may be on or off the wheel. The wheel should be installed to the wheel balancer of the like for proper measurement.

Take measurements of both lateral runout and radial runout at both inside and outside of the rim flange. With the dial indicator set in place securely, turn the wheel one full revolution slowly and record every reading of the indicator.

When the measured runout exceeds the specification and correction by the balancer adjustment is impossible, replace the wheel. If the reading is affected by welding, paint or scratch, it should be ignored.

	Radial runout limit	Lateral runout limit
Steel wheel	1.14 mm (0.045 in.)	1.40 mm (0.055 in.)

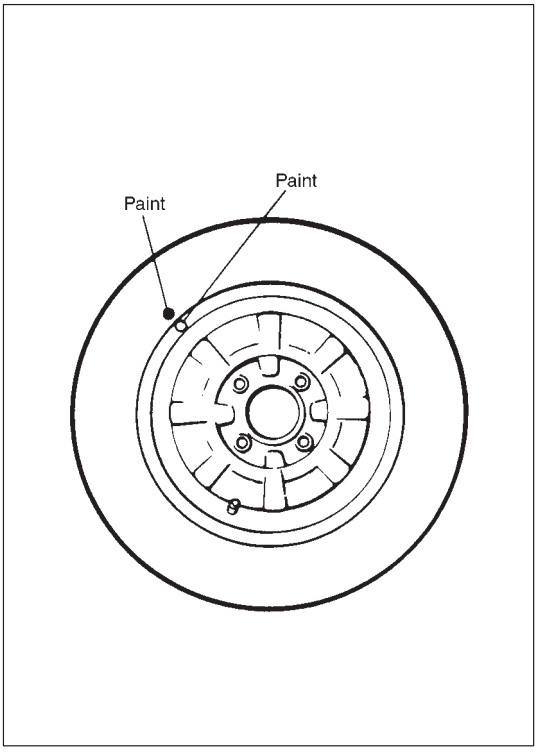
MAINTENANCE AND MINOR ADJUSTMENTS

WHEEL MAINTENANCE

Wheel repairs that use welding, heating, or peening are not approved. All damaged wheels should be replaced.

WHEEL ATTACHING STUDS

If a broken stud is found, see Section 3E (rear) or Section 3D (front) for Note and Replacement procedure.



MATCHED TIRES AND WHEELS
(For vehicle equipped with steel wheels)

Tires and wheels are matchmounted at the assembly plant. This means that the radially stiffest part of the tire, or “high spot”, is matched to the smallest radius or “low spot” of the wheel.
This is done to provide the smoothest possible ride.
The “high spot” of the tire is originally marked by paint dot on the outboard sidewall. This paint dot will eventually wash off the tire.
The “low spot” of the wheel is originally marked by paint dot on the wheel rim-flange. Properly assembled, the wheel rims’ paint dot should be aligned with the tires’ paint dot as shown in left figure.
Whenever a tire is dismounted from its wheel, it should be re-mounted so that the tire and wheel are matched. If the tire’s paint dot cannot be located, a line should be scribed on the tire and wheel before dismounting to assure that it is remounted in the same position.

INFLATION OF TIRES

The pressure recommended for any model is carefully calculated to give a satisfactory ride, stability, steering, tread wear, tire life and resistance to bruises.
Tire pressure, with tires cold, (after vehicle has set for three hours or more, or driven less than one mile) should be checked monthly or before any extended trip. Set to the specifications on the tire placard located on the left door (right door for right-hand side steering car) lock pillar.
It is normal for tire pressure to increase 28 kPa (4 psi) when the tires become hot during driving. Do not bleed or reduce tire pressure after driving. Bleeding reduces the “Cold Inflation Pressure”.

Higher than recommended pressure can cause:

1. Hard ride
2. Tire bruising or carcass damage
3. Rapid tread wear at center of tire

Unequal pressure on same axle can cause:

1. Uneven braking
2. Steering lead
3. Reduced handling
4. Swerve on acceleration

Valve caps should be on the valves to keep dust and water out.

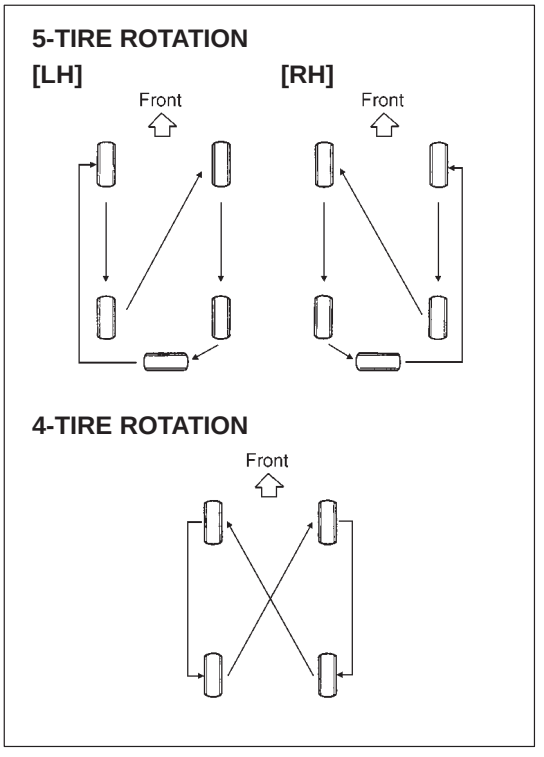
Lower than recommended pressure can cause:

1. Tire squeal on turns
2. Hard Steering
3. Rapid and uneven wear on the edges of the tread
4. Tire rim bruises and rupture
5. Tire cord breakage
6. High tire temperature
7. Reduced handling
8. High fuel consumption

TIRE PLACARD

The tire placard is located on the left door (right door for right-hand side steering vehicle) lock pillar and should be referred to for tire information.

The placard lists the maximum load, tire size and cold tire pressure where applicable.

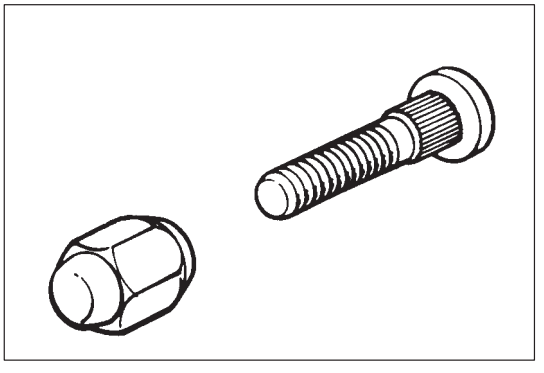


TIRE ROTATION

To equalize wear, rotate tires according to left figure periodically. Set tire pressure.

NOTE:

Due to their design, radial tires tend to wear faster in the shoulder area, particularly in front positions. This makes regular rotation especially necessary.

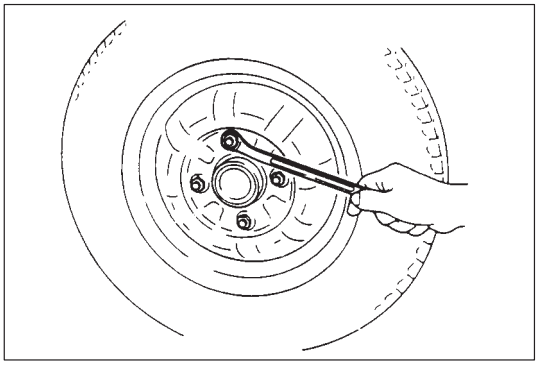


ON-VEHICLE SERVICE

SERVICE OPERATIONS

METRIC LUG NUTS AND WHEEL STUDS

All models use metric lug nuts and wheel studs (size: M12 x 1.25).

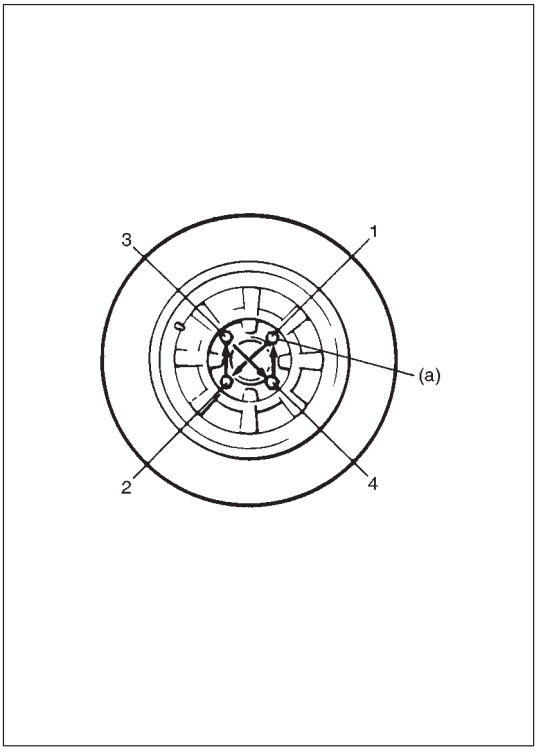


WHEEL REMOVAL

1) Loosen wheel nuts by approximately 180· (half a rotation).
2) Hoist vehicle.
3) Remove wheel.

CAUTION:

Never use heat to loosen tight wheel because application of heat to wheel can shorten life of wheel and damage wheel bearings.



Wheel nuts must be tightened in sequence given in figure and to proper torque to avoid bending wheel or brake disc.

NOTE:
Before installing wheels, remove any build-up of corrosion on wheel mounting surface and brake disc mounting surface by scraping and wire brushing. Installing wheels without good metal-to-metal contact at mounting surfaces can cause wheel nuts to loosen, which can later allow a wheel to come off while vehicle is moving.

Tightening Torque
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

TIRE MOUNTING AND DEMOUNTING

Use a tire changing machine to mount or demount tires. Follow equipment manufacturer's instructions. Do not use hand tools or tire irons alone to change tires as they may damage tire beads or wheel rim.

Rim bead seats should be cleaned with a wire brush or coarse steel wool to remove lubricants, old rubber and light rust. Before mounting or demounting a tire, bead area should be well lubricated with approved tire lubricant.

After mounting, inflate to specified pressure shown on tire placard so that beads are completely seated.

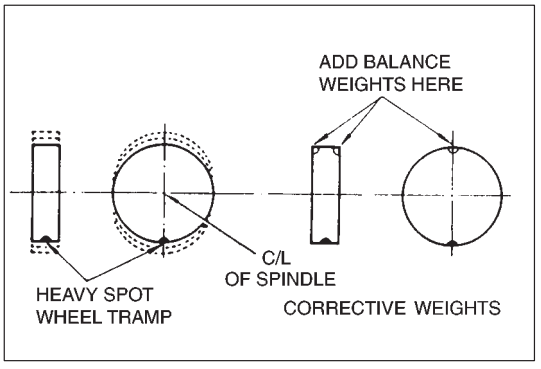
WARNING:
Do not stand over tire when inflating. Bead may break when bead snaps over rim's safety hump and cause serious personal injury.
Do not exceed specified pressure when inflating. If specified pressure will not seat beads, deflate, re-lubricate and reinflate.
Over inflation may cause bead to break and cause serious personal injury.

Install valve core and inflate to proper pressure.

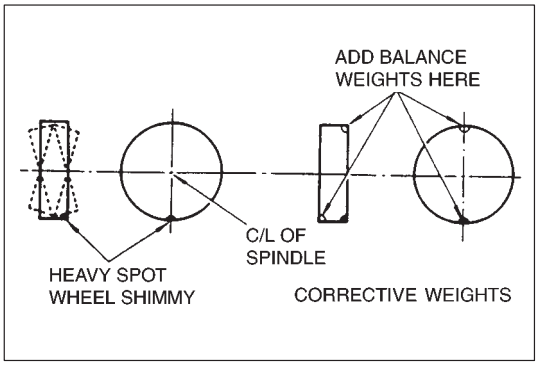
TIRE REPAIR

There are many different materials and techniques on the market to repair tires. As not all of these work on all types of tires, tire manufacturers have published detailed instructions on how and when to repair tires. These instructions can be obtained from each tire manufacturer.

BALANCING WHEELS



There are two types of wheel and tire balance: static and dynamic. Static balance, as shown in left figure, is the equal distribution of weight around the wheel. Wheels that are statically unbalanced cause a bouncing action called tramp. This condition will eventually cause uneven tire wear.



Dynamic balance, as shown in left figure, is the equal distribution of weight on each side of the wheel centerline so that when the tire spins there is no tendency for the assembly to move from side to side. Wheels that are dynamically unbalanced may cause shimmy.

GENERAL BALANCE PROCEDURES

Deposits of mud, etc. must be cleaned from inside of rim.

WARNING:
Stones should be removed from the tread in order to avoid operator injury during spin balancing and to obtain good balance.

Each tire should be inspected for any damage, then balanced according to equipment manufacturer's recommendation.

OFF-VEHICLE BALANCING

Most electronic off-vehicle balancers are more accurate than the on-vehicle spin balancers. They are easy to use and give a dynamic (two plane) balance. Although they do not correct for drum or disc unbalance as does on-vehicle spin balancing, this is overcome by their accuracy, usually to within 1/8 ounce.

ON-VEHICLE BALANCING

On-vehicle balancing methods vary with equipment and tool manufacturers. Be sure to follow each manufacturer's instructions during balancing operation.

WARNING:
Wheel spin should be limited to 35 mph (55 km/h) as indicated on speedometer.
This limit is necessary because speedometer only indicates one-half of actual wheel speed when one drive wheel is spinning and the other drive wheel is stopped.
Unless care is taken in limiting drive wheel spin, spinning wheel can reach excessive speeds. This can result in possible tire disintegration or differential failure, which could cause serious personal injury or extensive vehicle damage.

CAUTION:
For vehicle equipped with ABS, using on-vehicle balancing method with ignition switch "ON" may set malfunction diagnostic trouble code of ABS even when system is normal. Never turn ignition switch ON while spinning wheel.

TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Wheel nut	85	8.5	61.5

SECTION 3G

SUSPENSION CONTROL SYSTEM

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

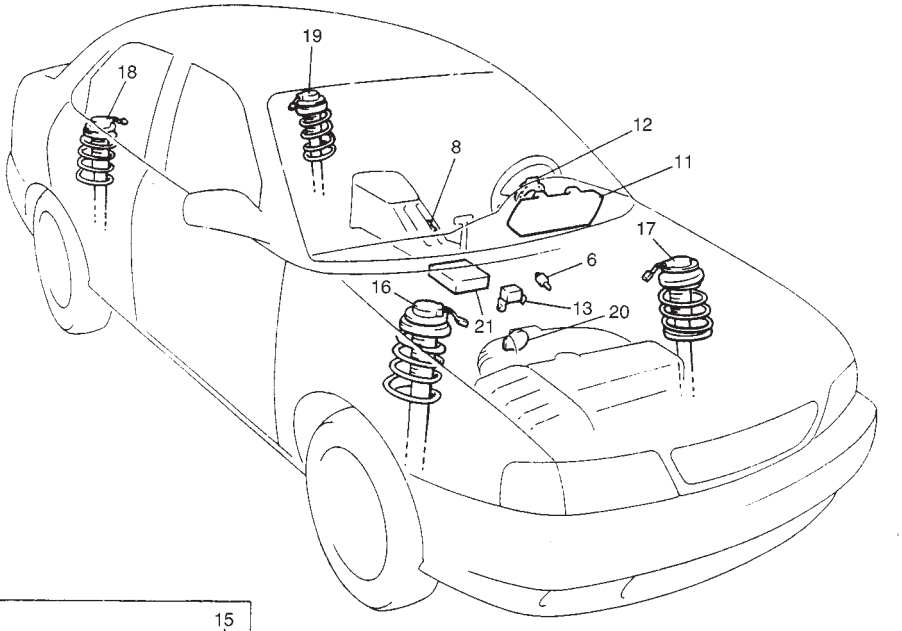
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

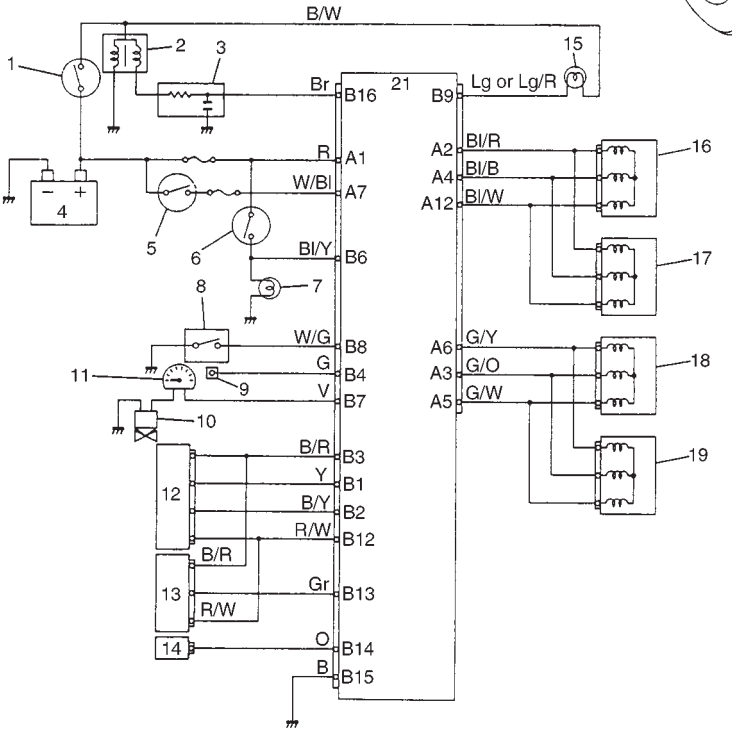
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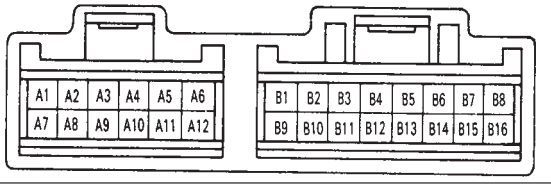
GENERAL DESCRIPTION

The suspension control system consists of front and rear adjustable shock absorbers, shock absorber adjusting actuators, a mode selector switch and a suspension control module.
The suspension control system is capable of setting the vehicle suspension to various damping positions by use of the mode selector switch and automatically depending on sensed informations input to the suspension control module.

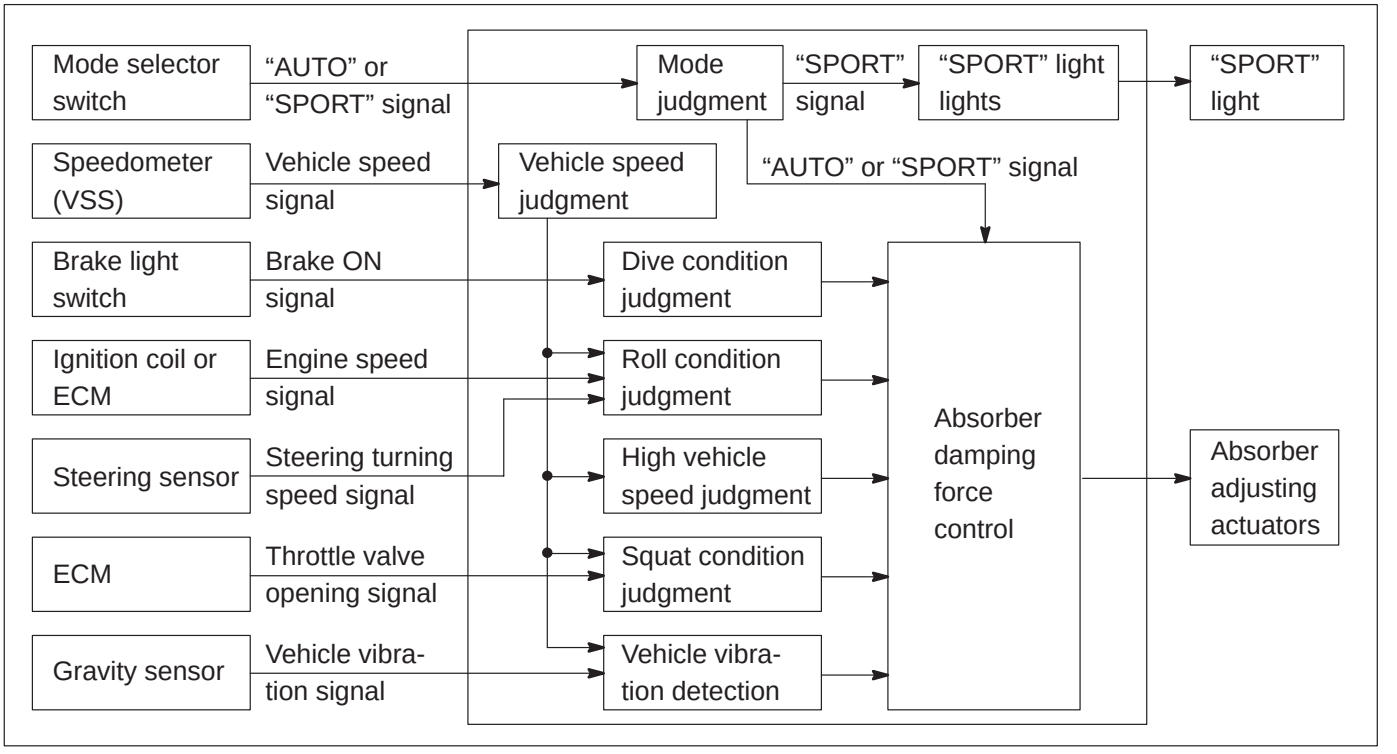


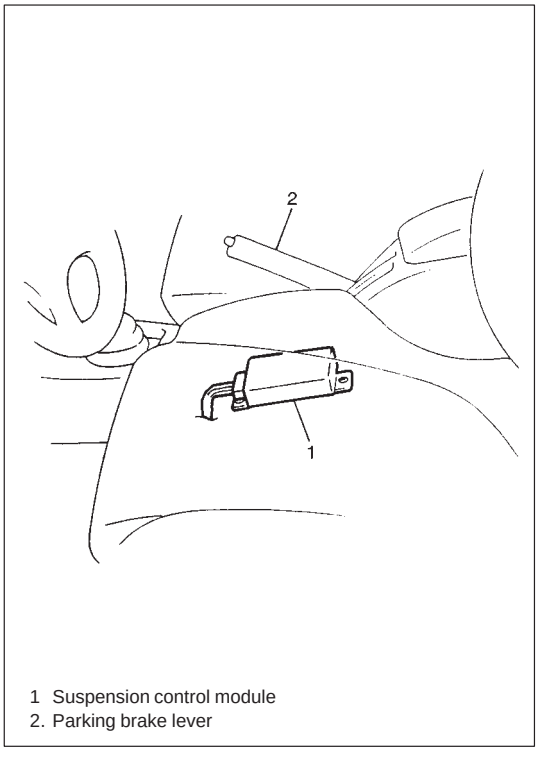


Terminal arrangement of suspension control module coupler
(Viewed from harness side)



1. Ignition switch (ON or START: ON)
2. Ignition coil
3. Noise suppressor
4. Battery
5. Ignition switch (ON: ON)
6. Brake light switch
7. Brake light
8. Mode selector switch
9. Diagnosis switch terminal (in diagnosis connector 2)
10. VSS
11. Speedometer
12. Steering sensor
13. Gravity sensor
14. ECM
15. “SPORT” indicator light
16. Front right actuator
17. Front left actuator
18. Rear right actuator
19. Rear left actuator
20. TP sensor
21. Suspension control module





1 Suspension control module
2. Parking brake lever

SUSPENSION CONTROL MODULE

Suspension control module is installed to the underside of the parking brake lever cover.

Suspension control module is a precision unit consisting of microcomputer, A/D (Analog/Digital) converter, I/O (Input Output) unit. etc.

It is an essential part of the electronic control system, for its functions include not only such a major function as to control shock absorber adjusting actuator but also on-board diagnostic system (self-diagnosis function) and fail-safe function as described in the following section.

On-board diagnostic system (Self-diagnosis function)

Suspension control module diagnosis troubles which may occur in the area including the following parts when the ignition switch is ON and indicates the result by flashing "SPORT" indicator light.

- ○ Steering sensor
- ○ Gravity sensor
- ○ Throttle opening signal
- ○ Vehicle speed signal
- ○ Engine speed signal
- ○ Absorber adjusting actuator

Suspension control module and "SPORT" light operation

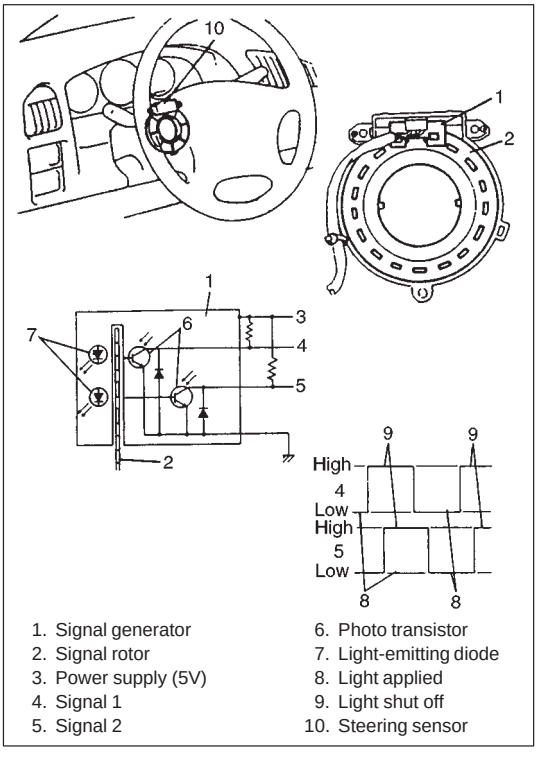
Vehicle condition	Mode selector switch	Mode	Damping force	"SPORT" indicator light	
				Diag. switch OFF	Diag. switch ON
For 2 seconds after ignition switch is turned ON	SPORT/AUTO	Depending on switch state	Holding state before ignition switch is turned ON	Lighting	
After 2 seconds from ignition switch is turned ON and system is in good condition	SPORT	SPORT	Hard	Lighting	Flashing (Code No.12: normal code)
	AUTO	AUTO	Hard, medium or soft	Put out	
System is not in good condition	SPORT/AUTO	Depending on switch state	Refer to fail-safe function	Flashing (1.25 Hz)	Flashing (fault code)

Fail-safe function

Code No.	Item	Condition	Fail-safe function
12	Normal (This code appears when none of the other codes is identified.)		———
13	Steering sensor	Open	Damping force fixed medium
14	Gravity sensor	Open or short	Prohibition of system control for comfort of ride
21	Throttle opening signal	Poor performance, open or short	Prohibition of system control for anti-squat
22	Vehicle speed sensor	Open or short	Damping force fixed medium
23	Engine speed signal	Open or short	
31	Absorber adjusting actuator	Open or short	Prohibition of actuator drive

NOTE:

When failure is detected in "SPORT" mode, damping force is fixed hard.



1. Signal generator
2. Signal rotor
3. Power supply (5V)
4. Signal 1
5. Signal 2
6. Photo transistor
7. Light-emitting diode
8. Light applied
9. Light shut off
10. Steering sensor

STEERING SENSOR

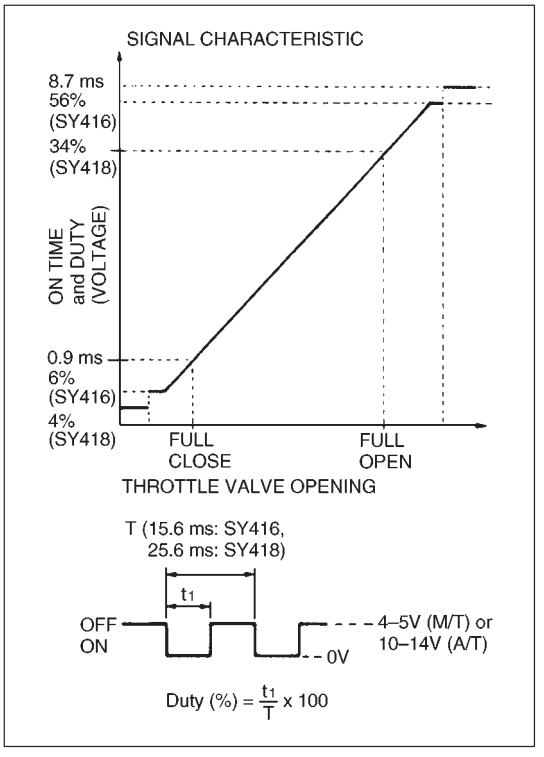
Steering sensor is installed in front of combination switch and consists of signal generator (photo transistors and light-emitting diodes) and signal rotor (slits plate).

As the signal rotor turns (i.e. the steering wheel turns), it causes the light flux from the light-emitting diodes to be applied to the photo transistors intermittently.

The photo transistors generate the voltages as shown in figure. These voltage are sent to suspension control module. Receiving these pulse signals (18 pulses/revolution), suspension control module detects the steering wheel turning speed.

GRAVITY SENSOR

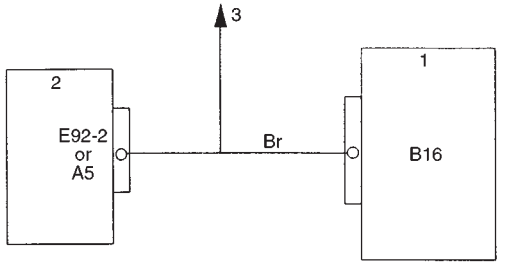
Gravity sensor is installed in front of shift lever (selector lever for A/T) and consists of weight, piezoelectric element, amplifier, filter. As weight moves up and down in accordance with vertical movement (vibration) of vehicle, that movement, after being converted into electric signal by piezoelectric element, is transmitted through amplifier and filter to suspension control module as voltage signal. Receiving this signal, suspension control module detects the vehicle vibration.



THROTTLE OPENING SIGNAL

Throttle opening signal is transmitted from TP sensor installed on the throttle valve shaft to ECM as voltage signal. The signal is converted to duty signal in ECM and it is sent to suspension control module.

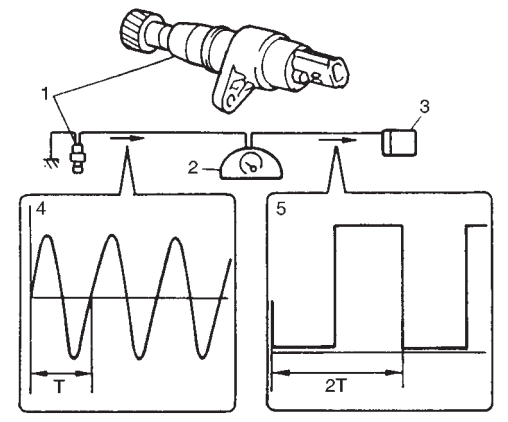
Receiving this signal, suspension control module detects the throttle valve opening.



1. Suspension control module
2. ECM
3. Tachometer

ENGINE SPEED SIGNAL

This signal is sent from the ECM.
Receiving this signal, suspension control module detects the engine speed.

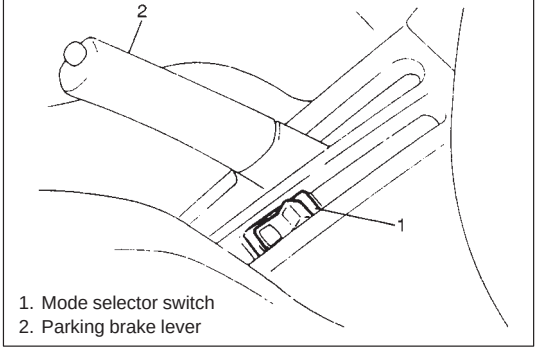


1. VSS
2. Speedometer
3. Suspension control module
4. Signal ➡
5. Signal →

T: 1 cycle of VSS signal

VEHICLE SPEED SENSOR

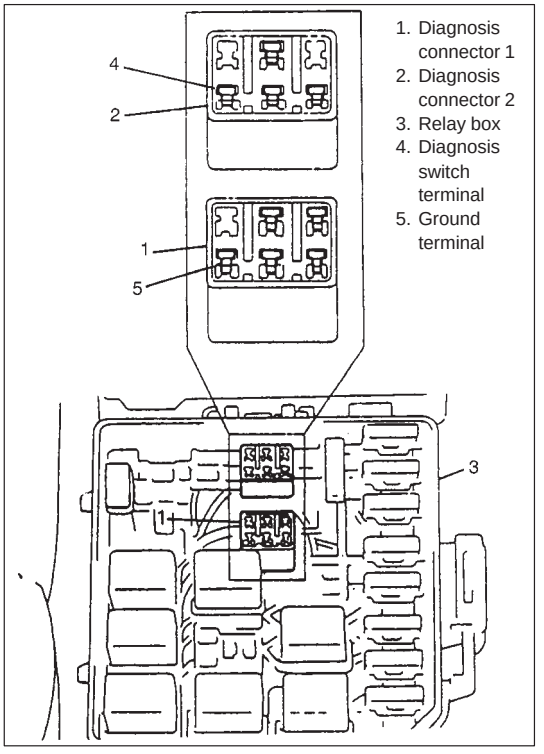
The vehicle speed sensor, located on the transmission, generates a signal in proportion to the vehicle speed (Signal ➡). Receiving this signal, the speedometer uses it for operation of its indicator and also converts it into the ON/OFF signal by doubling the cycle (Signal →).
Receiving this signal, suspension control module detects the vehicle speed.



1. Mode selector switch
2. Parking brake lever

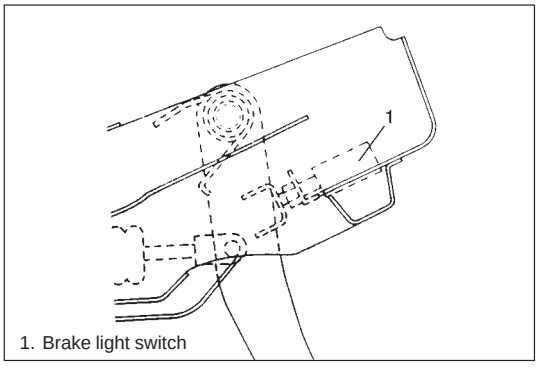
MODE SELECTOR SWITCH

This switch is installed on the parking brake cover.
By using this switch, suspension damping force, AUTO or SPORT can be selected.
In AUTO mode, suspension damping force is controlled by suspension control module automatically. (soft, medium, hard)
In SPORT mode, suspension damping force is fixed at hard.



DIAGNOSIS SWITCH TERMINAL

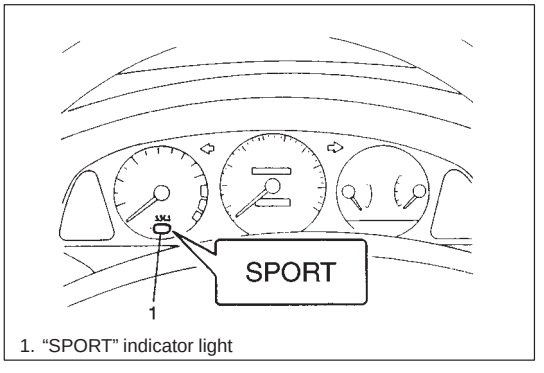
The diagnosis switch terminal is included in the diagnosis connector 2 in the relay box. When diagnosis switch terminal is grounded, a diagnosis signal is fed to suspension control module which then outputs diagnostic trouble code.



1. Brake light switch

BRAKE LIGHT SWITCH

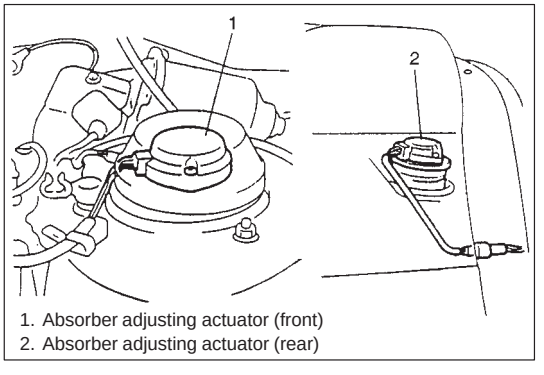
The same switch is used as the brake light switch.
Receiving this signal, suspension control module detects that vehicle is in braking condition.



1. "SPORT" indicator light

"SPORT" INDICATOR LIGHT

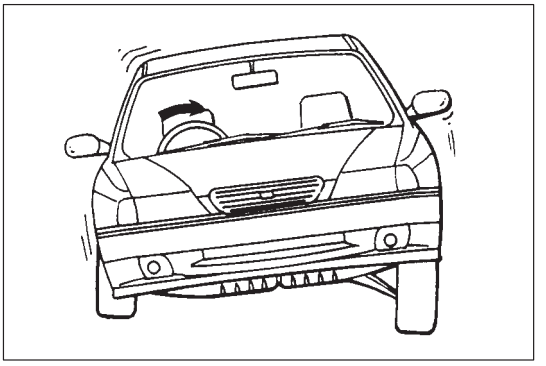
The "SPORT" indicator light is located in the combination meter.
This light turns ON when mode selector switch is in "SPORT" mode, flashes at failure in system and flashes to output diagnostic trouble code when diagnosis switch terminal is grounded.



1. Absorber adjusting actuator (front)
2. Absorber adjusting actuator (rear)

ABSORBER ADJUSTING ACTUATOR

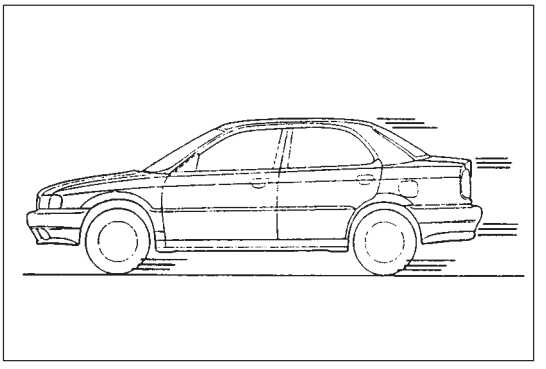
The four absorber adjusting actuators are installed on top of each suspension strut.
These actuators consist of stepper motor and adjust each suspension absorber damping force according to the signal from suspension control module.



SUSPENSION CONTROL (AUTO MODE ONLY)

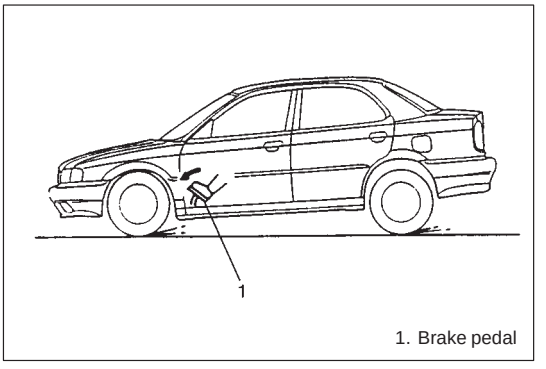
ROLLING CONTROL DURING QUICK STEERING

This control function suppresses rolling which occurs when vehicle enters a corner to improve steering stability by increasing damping force of absorber according to steering angle speed, engine speed and vehicle speed.



CONTROL BASED ON SENSED VEHICLE SPEED

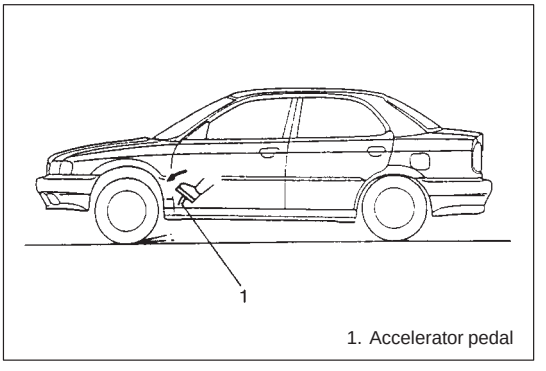
This control function improves steering stability by increasing damping force of absorber while vehicle is running at a high speed.



1. Brake pedal

ANTI-NOSE-DIVE CONTROL

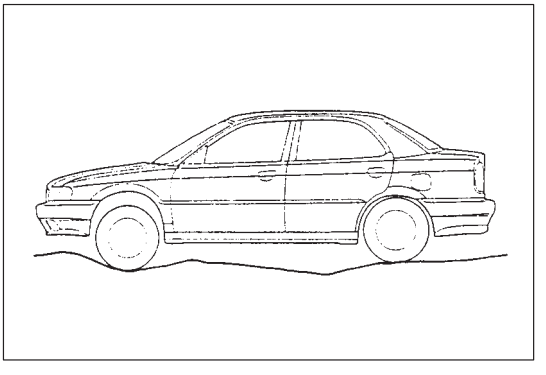
This control function prevents a nose-dive which may occur when applying brakes of vehicle by increasing damping force of absorber.



1. Accelerator pedal

ANTI-SQUAT CONTROL

This control function prevents a squat which may occur when starting or quickly accelerating vehicle by increasing damping force of absorber according to accelerator pedal being depressed and vehicle speed.



CONTROL FOR RIDING COMFORT

Pitching and Bouncing Control

This control function suppresses vehicle body vibration by changing damping force of absorber according to vertical vibration of vehicle body.

Control when Sensing Single Small Bump

This control function improves ride feeling by softening damping force of absorber when vehicle goes over a small bump.

DIAGNOSIS

Suspension control module has on-board diagnostic system (a system with self-diagnosis function) as described previously.
Investigate where the trouble is by referring to “DIAGNOSTIC FLOW CHART” and “DIAGNOSTIC TROUBLE CODE TABLE” on later pages.

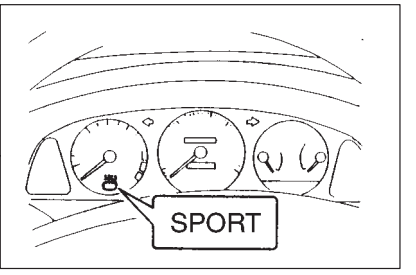
PRECAUTIONS IN DIAGNOSING TROUBLES

Refer to Section 0A of Service Manual mentioned in Foreword of this manual.

DIAGNOSTIC FLOW CHART

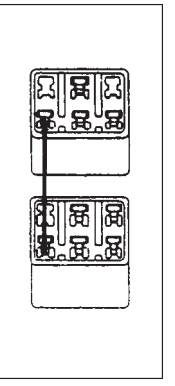
START

Does “SPORT” light turn ON for 2 seconds when ignition switch is turned ON and mode selector switch is in AUTO mode?



YES **(“SPORT” light turns OFF or flashes)**

Ground diagnosis switch terminal by using service wire and observe “SPORT” light.



FLASHES

Is diagnostic trouble code No.12 indicated?

YES

Proceed to “TROUBLE DIAGNOSIS” in this section.

NO

Check and repair according to flow chart corresponding to that code No.

1. After repair, disconnect battery negative cable for longer than 10 sec. to erase diagnosis trouble code stored in suspension control module memory and reconnect it.
2. Perform confirmation test.
3. Connect service wire to diagnosis switch terminal and ground terminal of diagnosis connectors and observe “SPORT” light.
4. Is diagnostic trouble code No.12 only?

NO

YES

END

NOT FLASH

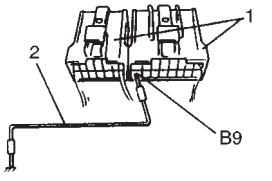
“SPORT” light doesn’t turn OFF

Faulty mode selector switch or “V/W” wire shorted to ground.
If all above are OK, check suspension control module and its circuit referring to “SUSPENSION CONTROL MODULE AND ITS CIRCUIT CHECK” in this section.

NO

“SPORT” light doesn’t turn ON

1. With ignition switch turned OFF, disconnect suspension control module coupler.
2. Ground B9 terminal by using service wire.
3. Does “SPORT” light turn ON at ignition switch ON?



1. Suspension control module coupler
2. Service wire

YES

Poor B9 connection.
If connections is OK, proceed to “SUSPENSION CONTROL MODULE POWER AND GROUND CIRCUIT CHECK”.

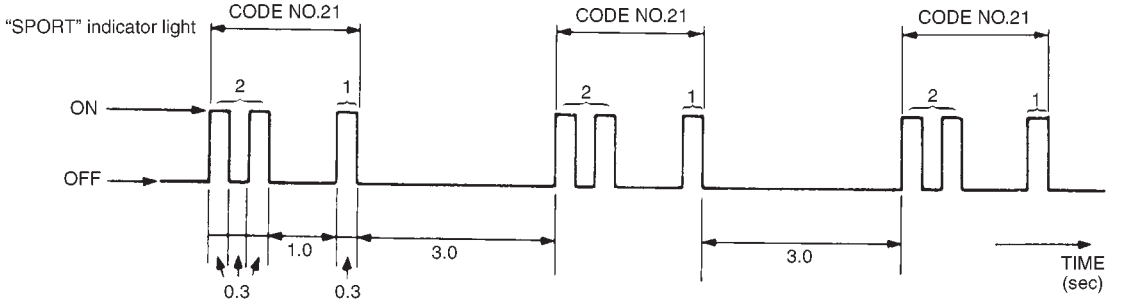
NO

Bulb burned out “V/W” wire circuit or “B/W” wire circuit open.

Poor “B4” connection of suspension control module coupler, “G” wire open or poor grounding service wire.
If all above are OK, check suspension control module and its circuit referring to “SUSPENSION CONTROL MODULE AND ITS CIRCUIT CHECK” in this section.

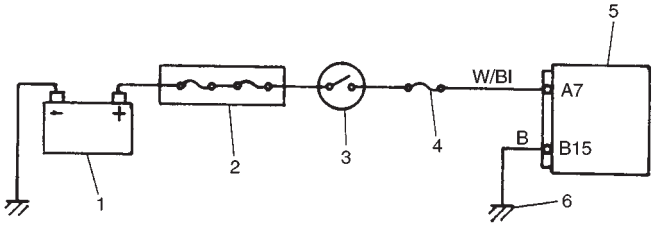
DIAGNOSTIC TROUBLE CODE TABLE

EXAMPLE: When throttle opening signal is failure (Code No.21)



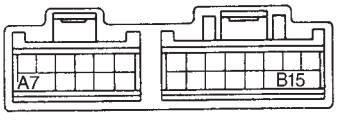
DIAGNOSTIC TROUBLE CODE NO.	"SPORT" LIGHT FLASHING PATTERN	DIAGNOSTIC ITEM	DIAGNOSIS
13	1 3	Steering sensor	Diagnose trouble according to "DIAGNOSTIC FLOW CHART" corresponding to each code No.
14	1 4	Gravity sensor	
21	2 1	Throttle opening signal	
22	2 2	Vehicle speed sensor	
23	2 3	Engine speed signal	
31	3 1	Absorber adjusting actuator	
12	1 2	Normal	This code appears when none of the other codes (above codes) is identified.

SUSPENSION CONTROL MODULE POWER AND GROUND CIRCUIT CHECK ("SPORT" LIGHT DOESN'T LIGHT AT IGNITION SWITCH ON AND SUSPENSION CONTROL SYSTEM DOESN'T WORK)



1. Battery
2. Main fuse
3. Ignition switch
4. Fuse (SSCS)
5. Suspension control module
6. Ground

Terminal arrangement of suspension control module coupler (Viewed from harness side)



Check voltage between A7 terminal of suspension control module coupler and body ground with ignition switch ON. Is it 10 – 14V?

YES ↓

Check voltage between B15 terminal of suspension control module coupler and body ground with ignition switch ON. Is it about 0V?

YES ↓

Poor A7 or B15 connection.
If all above are OK, replace known-good suspension control module and recheck.

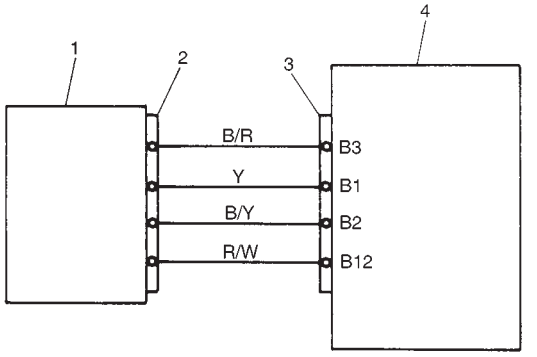
NO →

Blown SSCS fuse or "W/Bl" wire open.

NO →

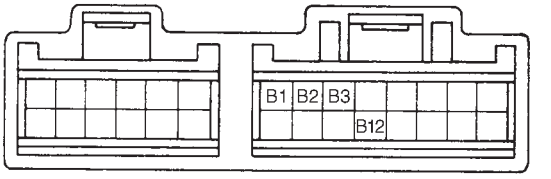
"B" wire open or poor grounding.

CODE NO.13 STEERING SENSOR CIRCUIT (SENSOR CIRCUIT OPEN: SIGNAL VOLTAGE HIGH)

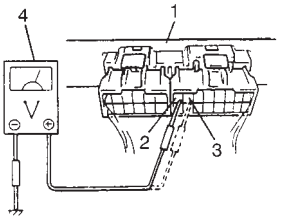


1. Steering sensor
2. Steering sensor coupler
3. Suspension control module coupler
4. Suspension control module

Terminal arrangement of suspension control module
(Viewed from harness side)



1. Remove suspension control module and connect couplers to suspension control module.
2. With ignition switch ON, check voltage at B1 and B2 terminals of suspension control module.
3. Turn steering wheel slowly. Does voltmeter indicator deflect between 0 – 0.5V and 2.5 – 3.5V?



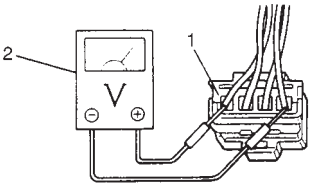
1. Suspension control module
2. B1 terminal
3. B2 terminal
4. Voltmeter

NO

1. Disconnect steering sensor coupler with ignition switch OFF.
2. Check voltage between “B/R” and “R/W” terminal of disconnected steering sensor coupler with ignition switch ON.
3. Is it about 4.5 – 5.5V?

YES

Poor B1 and/or B2 connection.
If connections are OK, substitute a known-good suspension control module and recheck.



1. Disconnected steering sensor coupler (main harness)
2. Voltmeter

YES

Check steering sensor referring to “STEERING SENSOR” in this section.
Is it OK?

NO

“R/W” wire open or poor B12 connection.
If wire harness and connections are OK, substitute a known-good suspension control module and recheck.

YES

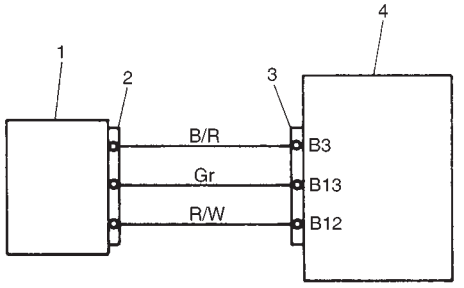
“Y” or “B/Y” wire open.

NO

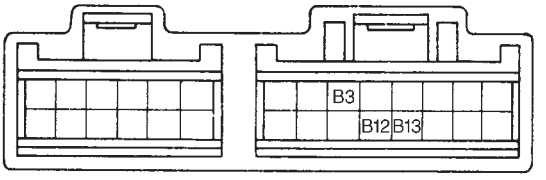
Faulty steering sensor.

CODE NO.14 GRAVITY SENSOR CIRCUIT (SENSOR CIRCUIT OPEN OR SHORTED TO GROUND SIGNAL VOLTAGE HIGH OR LOW)

1. Gravity sensor
2. Gravity sensor coupler
3. Suspension control module coupler
4. Suspension control module

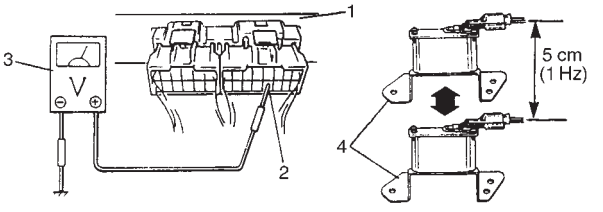


Terminal arrangement of suspension control module coupler
(Viewed from harness side)



1. Remove gravity sensor with ignition switch OFF.
2. Connect coupler to gravity sensor.
3. Check voltage between B13 terminal of suspension control module and ground with ignition switch turned ON and gravity sensor kept stationary as well as moved up and down slowly.

4 Is voltmeter indication about 2 to 3V when G sensor is kept stationary and does it deflect between 1 and 4V when it is moved up and down slowly?



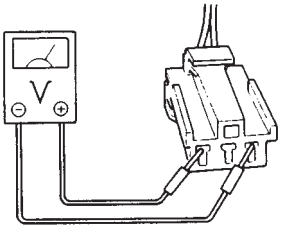
1. Suspension control module
2. B13 terminal
3. Voltmeter
4. Gravity sensor

NO

Disconnect gravity sensor coupler with ignition switch OFF and check voltage between "B/R" and "R/W" terminals of disconnected gravity sensor coupler with ignition switch ON.
Is it 4.5 – 5.5V?

YES

Poor B13 connection.
If connection is OK, substitute a known-good suspension control module and recheck.



1. Disconnected gravity sensor coupler
2. "R/W" wire terminal
3. "B/R" wire terminal
4. Voltmeter

YES

1. Remove gravity sensor with ignition switch OFF.
2. Check gravity sensor referring to "GRAVITY SENSOR" in this section.
   Is it in good condition?

NO

"B/R" wire open, "R/W" wire open or poor B3 or B12 connection. If connections and wire harness are OK, substitute a known-good suspension control module and recheck.

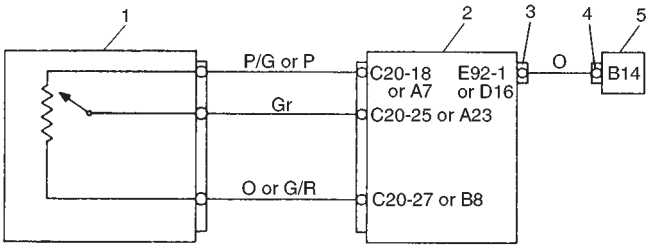
YES

"Gr" wire open, shorted to ground or poor gravity sensor coupler connection.

NO

Replace gravity sensor.

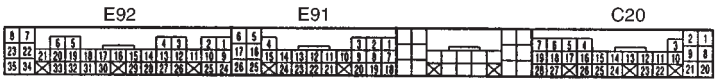
CODE NO.21 THROTTLE OPENING SIGNAL CIRCUIT (THROTTLE POSITION SENSOR CIRCUIT OR THROTTLE OPENING CIRCUIT FAULTY)



1. Throttle position sensor
2. ECM
3. ECM coupler
4. Suspension control module coupler
5. Suspension control module

Terminal arrangement of ECM coupler

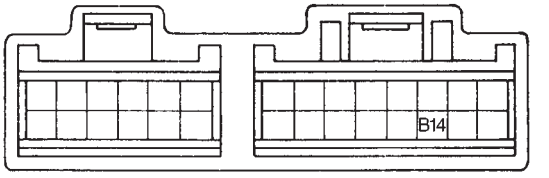
with WU TWC



without WU TWC



Terminal arrangement of suspension control module coupler (Viewed from harness side)



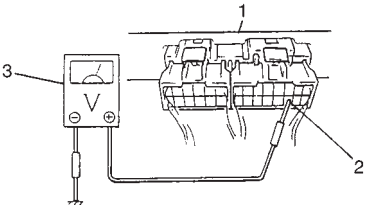
Does MIL for electronic fuel injection system turn on?

YES

Check diagnostic trouble code referring to "DIAGNOSTIC TROUBLE CODE CHECK" in Section 6-2 or 6E3.
Inspect and repair malfunction area referring to "DIAGNOSTIC TROUBLE CODE FLOW TABLE" in Section 6-2 or 6E3.

NO

1. Disconnect TCM couplers with ignition switch OFF (A/T vehicle only).
2. Check voltage between B14 terminal of suspension control module and ground with ignition switch ON.
3. Does voltage vary as specified in graph referring to "OUTPUT SIGNALS OF THROTTLE VALVE OPENING AND ENGINE COOLANT TEMP." in Section 6E3 while throttle valve is opened gradually?



1. Suspension control module
2. B14 terminal
3. Voltmeter

NO

1. Disconnect suspension control module, TCM (A/T vehicle only) and ECM couplers with ignition switch OFF.
2. Check resistance between B14 terminal of suspension control module and body ground.
3. Is it infinity?

YES

Intermittent trouble or faulty suspension control module. Recheck referring to "INTERMITTENT TROUBLE" in Section 0A in this manual.

YES

1. Connect suspension control module couplers with ignition switch OFF.
2. Turn ON ignition switch and check voltage between B14 terminal of disconnected ECM coupler and body ground.
3. Is it 4 – 5V?

NO

"O" wire shorted to ground.

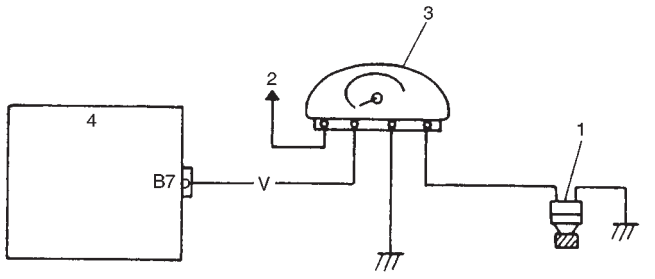
YES

Poor E92-1 (Vehicle with WU TWC) or D16 (Vehicle without WU TWC) connection of ECM coupler.
If connection is OK, substitute a known-good ECM and recheck.

NO

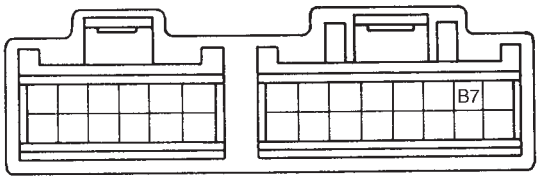
"O" wire open or poor B14 connection of suspension control module coupler.
If wire and connection are OK, substitute a known-good suspension control module and recheck.

CODE NO.22 VEHICLE SPEED SENSOR CIRCUIT (VEHICLE SPEED SIGNAL NOT INPUTTED ALTHOUGH ENGINE SPEED IS HIGHER THAN ABOUT 3,000 R/MIN. AND THROTTLE OPENING IS LESS THAN 10 DEG. FOR LONGER THAN 4 SECONDS)



1. Vehicle speed sensor
2. From ignition switch
3. Combination meter
4. Suspension control module

Terminal arrangement of suspension control module
(Viewed from harness side)



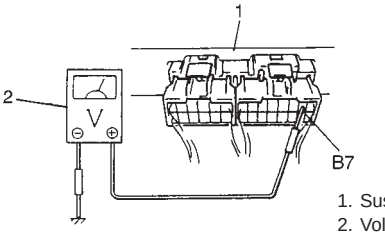
Does speedometer indicate vehicle speed?

YES

1. Remove suspension control module and connect couplers to suspension control module.
2. Connect voltmeter between B7 terminal of suspension control module coupler and body ground.
3. Hoist front end of vehicle and lock front right tire.
4. Turn front left tire quickly with ignition switch ON. Does voltmeter indicator deflect between 0 – 1V and 4 – 6V a few times while tire is turned one revolution?

NO

Faulty speedometer, VSS or its wire harness. Refer to “SPEEDOMETER CONTROL” in Section 8.



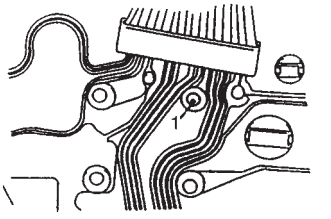
1. Suspension control module
2. Voltmeter

NO

1. Remove combination meter and connect coupler to combination meter.
2. Connect voltmeter between ground and vehicle speed output terminal screw.
3. Turn front left tire quickly with ignition switch ON. Does voltmeter indicator deflect between 0 – 1V and 4 – 6V a few times while tire is turned one revolution.

YES

Poor B7 connection. If connection is OK, substitute a known-good suspension control module and re-check.



1. Vehicle speed output terminal screw

YES

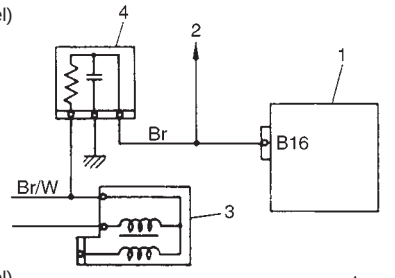
Poor speedometer coupler connection or “V” wire open.

NO

Faulty speedometer (signal convertor).

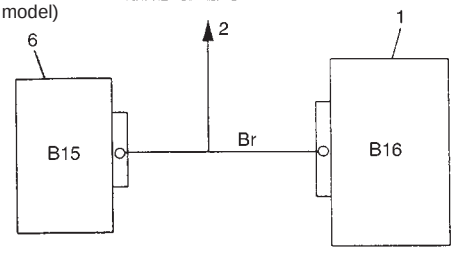
CODE NO.23 ENGINE SPEED SIGNAL CIRCUIT (ENGINE SPEED SIGNAL NOT INPUTTED ALTHOUGH VEHICLE SPEED IS HIGHER THAN 10 KM/H FOR LONGER THAN 20 SECONDS)

(For 1.6 L engine model)

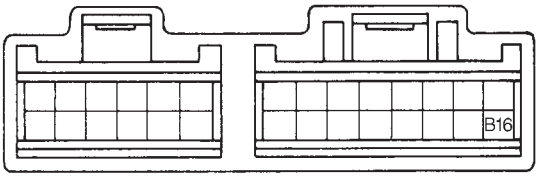


1. Suspension control module
2. To tachometer
3. Ignition coil
4. Noise suppressor
5. Suspension control module
6. ECM

(For 1.8 L engine model)



Terminal arrangement of suspension control module
(Viewed from harness side)



(For 1.6 L engine model)

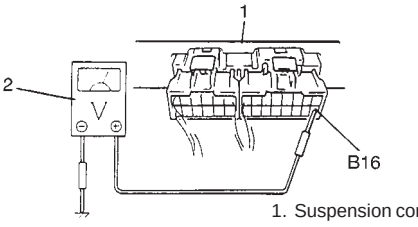
Does tachometer indicate engine speed?

YES

1. Remove suspension control module and connect suspension control module couplers with ignition switch OFF.
2. Check voltage between B16 terminal of suspension control module and body ground with ignition switch ON.
3. Is it 10 – 14V?

NO

Faulty noise suppressor, poor noise suppressor coupler connection, “Br/W” wire or “Br” wire open.



1. Suspension control module
2. Voltmeter

NO

Poor B16 connection.
If connection is OK, substitute a known-good suspension control module and recheck.

YES

“Br” wire open.

(For 1.8 L engine model)

Does tachometer indicate engine speed?

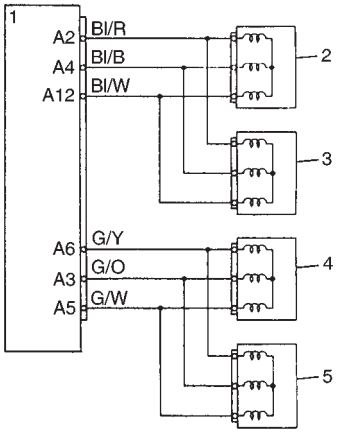
YES

“Br” wire open or poor B16 connection of suspension control module coupler.
If all aboves are OK, replace known-good suspension control module and recheck.

NO

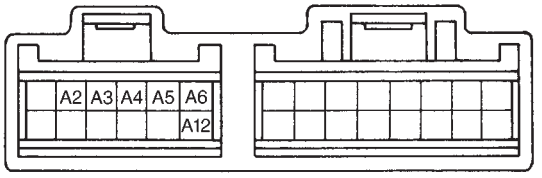
“Br” wire open, shorted to ground or poor B15 connection of ECM coupler.
If all aboves are OK, replace known-good ECM and recheck.

CODE NO.31 ACTUATOR CIRCUIT (ACTUATOR CIRCUIT OPEN OR SHORTED GROUND)



1. Suspension control module
2. Front left actuator
3. Front right actuator
4. Rear left actuator
5. Rear right actuator

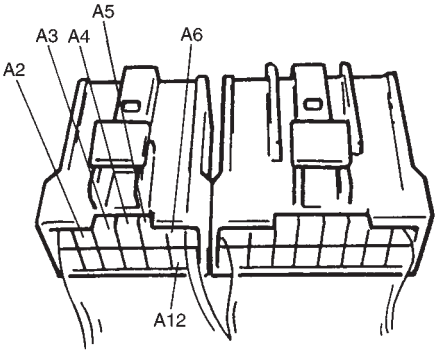
Terminal arrangement of suspension control module coupler (Viewed from harness side)



1 Disconnect suspension control module coupler with ignition switch OFF.
2. Check resistance between the following each two terminals.

TERMINALS	RESISTANCE
Between A2 and A4 Between A2 and A12 Between A4 and A12 Between A3 and A5 Between A3 and A6 Between A5 and A6	2.3 – 7.0 I

3. Is specified resistance obtained?



1. Disconnected suspension control module coupler
2. Ohmmeter

NO

Check absorber adjusting actuators, referring to “ABSORBER ADJUSTING ACTUATOR” in this section. Are they OK?

YES

Actuator wire shorted to ground circuit or poor suspension control module coupler connection.
If wire harnesses and connections are OK, intermittent trouble or faulty suspension control module. Refer to “Intermittent trouble” in Section 0A.

YES

Open actuator wire harness.

NO

Faulty actuator(s).

SUSPENSION CONTROL MODULE AND ITS CIRCUIT CHECK

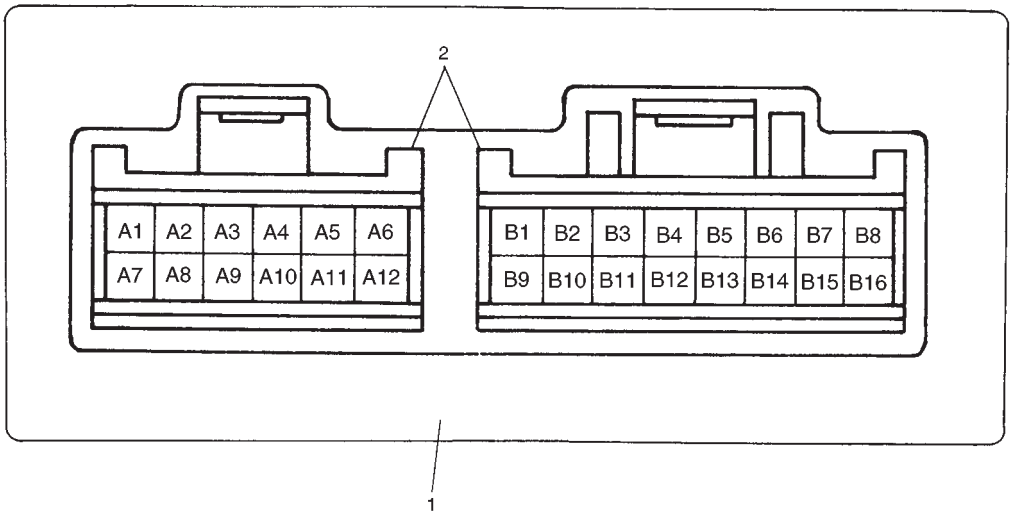
Suspension control module can be checked at suspension control module couplers by measuring voltage and resistance.

CAUTION:
Suspension control module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to suspension control module with coupler disconnected from it.

VOLTAGE CHECK

1) Remove suspension control module from body.
2) Connect couplers to suspension control module.
3) Check voltage at each terminal of couplers connected.

NOTE:
As each terminal voltage is affected by the battery voltage, confirm that it is 11V or more when ignition switch is ON.



1. Suspension control module
2. Suspension control module coupler

TERMI-NAL	CIRCUIT	STANDARD VOLTAGE	CONDITION
A1	Power source for back-up circuit	10 – 14V	Ignition switch ON and OFF
A2	Front actuator 1	4 – 8V	Ignition switch ON
A3	Rear actuator 2		
A4	Front actuator 2		
A5	Rear actuator 3		
A6	Rear actuator 1		
A7	Power source	10 – 14V	Ignition switch ON
A8 A9 A10 A11	Blank	———	———
A12	Front actuator 3	4 – 8V	Ignition switch ON
B1	Steering sensor 1	Voltmeter indicator deflects 0 – 0.5V and 2.5 – 3.5V	Ignition switch ON Turn steering wheel slowly
B2	Steering sensor 2		
B3	Sensor power supply	4.75 – 5.25V	Ignition switch ON
B4	Diagnosis switch terminal	4 – 6V	Ignition switch ON Diagnosis switch terminal is not grounded
		about 0V	Ignition switch ON Diagnosis switch terminal is grounded
B5	Blank	———	———
B6	Brake light switch	10 – 14V	Brake light switch ON
		about 0V	Brake light switch OFF
B7	Vehicle speed sensor	Voltmeter indicator deflects 0 – 1V and 4 – 6V	Ignition switch ON Front left tire turned quickly with front right locked
B8	Mode selector switch	4 – 6V	Ignition switch ON Mode selector switch is in AUTO mode
		about 0V	Ignition switch ON Mode selector switch is in SPORT mode
B9	“SPORT” indicator light	0 – 1V	For 2 seconds after ignition switch ON or after the above time and mode selector switch is in SPORT mode
		10 – 14V	After the above time and Mode selector switch is in AUTO mode
B10 B11	Blank	———	———
B12	Sensor circuit ground	———	———
B13	Gravity sensor	2.2 – 2.8V	Ignition switch ON
B14	Throttle opening signal	Ignition switch ON Voltage varies as specified referring to “THROTTLE OPENING SIGNAL” in this section.	
B15	Ground	———	———
B16	Engine speed signal	10 – 14V	Ignition switch ON

RESISTANCE CHECK

1) Disconnect suspension control module couplers from suspension control module with ignition switch OFF.

> **CAUTION:**
> **Never touch terminals of suspension control module itself or connect voltmeter of ohmmeter.**

2) Check resistance of each two terminals of disconnected couplers.

> **CAUTION:**
> ○ **Be sure to connect ohmmeter probe from wire harness side of coupler.**
> ○ **Be sure to turn OFF ignition switch for this check.**
> ○ **Resistance in table below represents that when parts temperature is 20°C (68°F).**

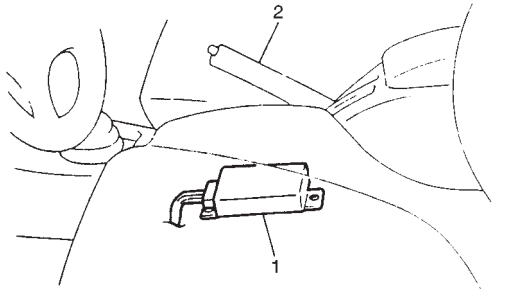
TERMINAL	CIRCUIT	NORMAL RESISTANCE	CONDITION
A1 – B6	Brake light switch	continuity	Brake pedal depressed
		infinity	Brake pedal not depressed
A2 – A4	Front actuator 1 and 2	2.3 – 7.0Ω	———
A2 – A12	Front actuator 1 and 3		
A4 – A12	Front actuator 2 and 3		
A3 – A5	Rear actuator 2 and 3		
A3 – A6	Rear actuator 2 and 1		
A5 – A6	Rear actuator 3 and 1		
B4 – Body ground	Diagnosis switch terminal	continuity	Diagnosis switch terminal grounded
		infinity	Diagnosis switch terminal not grounded
B15 – Body ground	Ground	continuity	

TROUBLE DIAGNOSIS

This section describes trouble diagnosis of suspension control system parts whose trouble is not indicated by the on-board diagnostic system (self-diagnostic function).

When diagnostic trouble code No.12 is indicated by the on-board diagnostic system (self-diagnosis function) and assuredly those suspension basic parts as described in “DIAGNOSIS CHART” in Section 3 are all in good condition, check following suspension control system parts which may be a possible cause for each symptom of the suspension.

SYMPTOM	POSSIBLE CAUSE	INSPECTION
Much vehicle rolling when turning	○ Poor performance of steering sensor	Check steering sensor referring to “STEERING SENSOR” under “ON-VEHICLE SERVICE” in this section.
	○ Steering sensor signal circuit (“Y” and “B/Y”) shorted to ground	Check “Y” and “B/Y” wire.
	○ Steering sensor power circuit (“B/R”) wire open	Check “B/R” wire terminal voltage of steering sensor coupler.
	○ Faulty actuator(s)	Check actuators referring to “ABSORBER ADJUSTING ACTUATOR” under “ON-VEHICLE SERVICE” in this section.
Much vehicle-nose diving when braking	○ Faulty brake switch or its circuit	Check brake light switch.
	○ Faulty actuator(s)	Check actuators referring to “ABSORBER ADJUSTING ACTUATOR” under “ON-VEHICLE SERVICE” in this section.
Much vehicle squatting when accelerating or starting	○ Poor performance of throttle position sensor	Check TP sensor referring to Section 6E1 (for 1.6 L engine model) or 6E2 (for 1.8 L engine model).
	○ Faulty actuator(s)	Check actuators referring to “ABSORBER ADJUSTING ACTUATOR” under “ON-VEHICLE SERVICE” in this section.
Uncomfortable riding	○ Poor performance of gravity sensor	Check gravity sensor referring to “ABSORBER ADJUSTING ACTUATOR” under “ON-VEHICLE SERVICE” in this section.
	○ Faulty actuator(s)	Check actuators referring to “ABSORBER ADJUSTING ACTUATOR” under “ON-VEHICLE SERVICE” in this section.



1. Suspension control module
2. Parking brake lever

ON-VEHICLE SERVICE

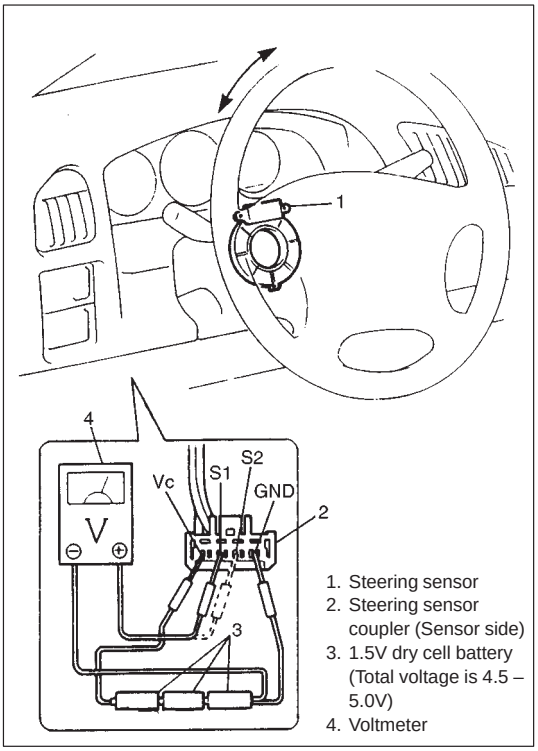
SUSPENSION CONTROL MODULE

REMOVAL

1) Disconnect negative cable at battery.
2) Remove parking brake cover.
3) Disconnect couplers.
4) Remove suspension control module.

INSTALLATION

Reverse removal procedure for installation.

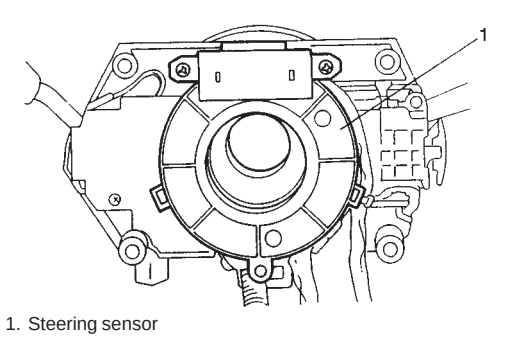


1. Steering sensor
2. Steering sensor coupler (Sensor side)
3. 1.5V dry cell battery (Total voltage is 4.5 – 5.0V)
4. Voltmeter

STEERING SENSOR

ON-VEHICLE INSPECTION

1) Disconnect steering sensor coupler with ignition switch OFF.
2) Arrange 3 new 1.5V batteries in series (check that total voltage is 4.5 – 5.0V) and connect its positive terminal to Vc terminal of disconnected steering sensor coupler and negative terminal to GND terminal.
3) Check voltage between S1 and GND (S2 and GND) terminal of steering sensor terminal while turning steering wheel clockwise and counterclockwise fully.
   Voltmeter indicator should deflect between 0 – 0.5V and 2.5 – 3.5V 18 times while steering wheel turns one revolution.
   If check result is not satisfactory, replace steering sensor (combination switch).
4) Connect steering sensor coupler.



1. Steering sensor

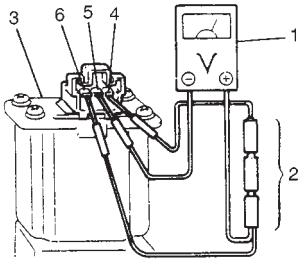
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Remove air bag module (if equipped), steering wheel and combination switch assembly (with steering sensor.)
   Refer to Section 3C (without air bag) or 3C1 (with air bag).

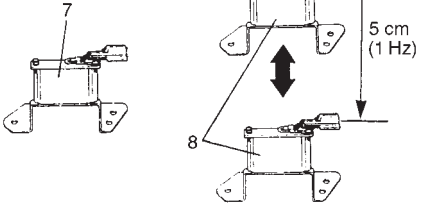
INSTALLATION
For installation, reverse removal procedure, surely referring to Section 3C (without air bag) or 3C1 (with air bag).

GRAVITY SENSOR

REMOVAL
1) Disconnect negative (–) cable at battery.
2) Remove parking brake cover front extension.
3) Remove front console silensor.
4) Remove gravity sensor.



1. Voltmeter
2. 1.5V battery (4.5V total)
3. Gravity sensor
4. Vc terminal
5. Sensor signal terminal
6. GND terminal



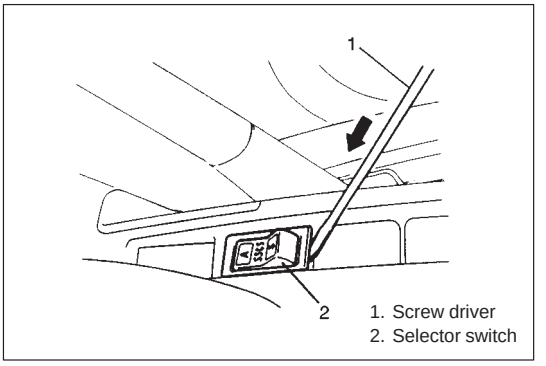
7. Sensor kept stationary
8. Sensor moved up and down slowly (1 Hz)

INSPECTION
1) Arrange 3 new 1. 5V batteries in series (check that total voltage is 4.5 – 5.0V) and connect its positive terminal to Vc terminal of gravity sensor and negative terminal to GND terminal. Then check voltage between sensor signal terminal and GND terminal under each of following conditions.

Sensor condition	Voltmeter indication
Kept stationary	About 2 to 3V
Moved up and down slowly	Deflects between 1 and 4V

If measured voltage is not as specified, replace gravity sensor.

INSTALLATION
Reverse removal procedure for installation.

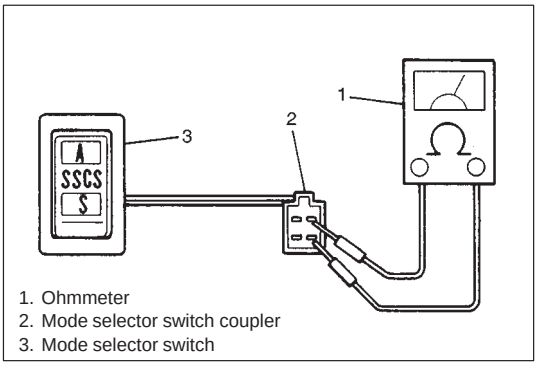


1. Screw driver
2. Selector switch

MODE SELECTOR SWITCH

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Remove mode selector switch from parking brake cover.
3) Disconnect mode selector switch coupler.



1. Ohmmeter
2. Mode selector switch coupler
3. Mode selector switch

INSPECTION

Check continuity between mode selector switch terminals.

Mode selector switch position	Ohmmeter indicator
AUTO	infinity
SPORT	continuity

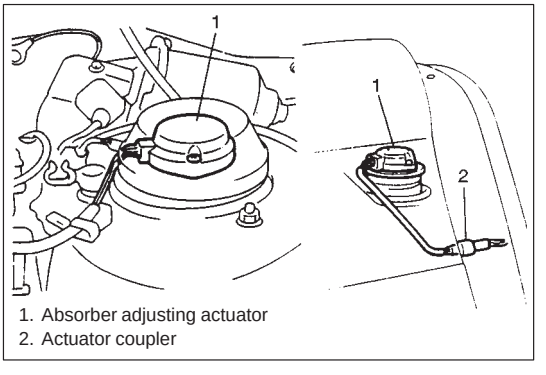
If check result is not as specified, replace mode selector switch.

INSTALLATION

1) Connect mode selector switch coupler.
2) Install mode selector switch to parking brake cover.
3) Connect negative (–) cable to battery.

BRAKE LIGHT SWITCH

Refer to Section 5.

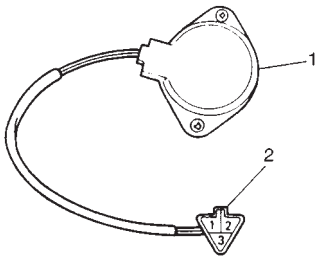


1. Absorber adjusting actuator
2. Actuator coupler

ABSORBER ADJUSTING ACTUATOR

REMOVAL

1) Disconnect negative cable at battery.
2) Disconnect actuator coupler.
3) Remove absorber actuator by removing its mounting screws.



1. Absorber adjusting actuator
2. Actuator coupler

INSPECTION

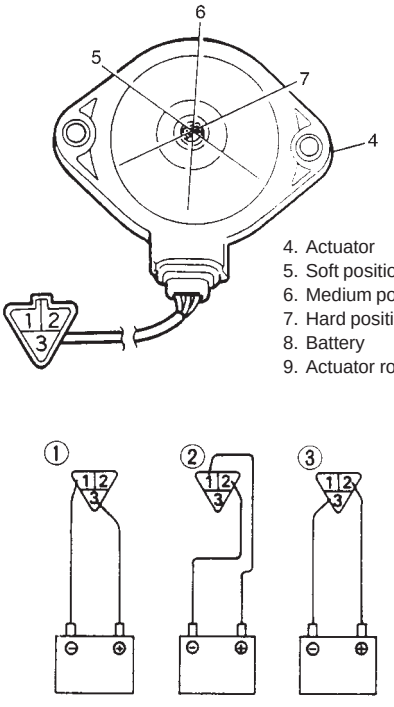
1) Check resistance between each two terminals of actuator coupler.

Terminals	Standard resistance
1 and 2 2 and 3 3 and 1	4.6 – 14I

If check results are as specified, proceed to next operation check. If not, replace.

2) Apply battery voltage to 2 out of 3 terminals of actuator coupler as indicated in figure.
Check that actuator rod moves to Soft, Medium and Hard positions as shown below when battery voltage is applied to different terminals.

CAUTION:
Do not apply battery voltage to actuator for longer than 0.5 seconds. Applying it for longer than 0.5 seconds may cause actuator to burn.



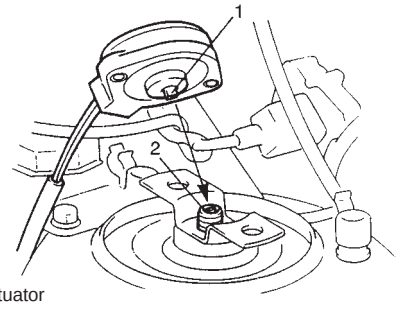
4. Actuator
5. Soft position
6. Medium position
7. Hard position
8. Battery
9. Actuator rod

	Battery positive terminal	Battery negative terminal	Actuator rod position
➡	3	1	Soft
→	1	2	Medium
③	2	3	Hard

If found defective, replace actuator.

INSTALLATION

1) Install absorber actuator to top of strut.
Fit actuator rod to strut adjusting rod end securely.

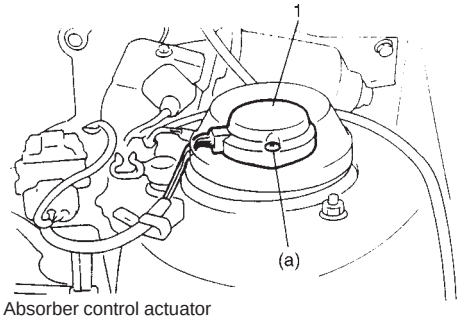


1. Actuator
2. Strut adjusting rod end

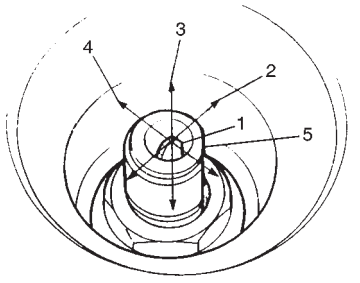
2) Tighten screw to specified torque.

Tightening Torque
(a): 3 N·m (0.3 kg-m, 2.2 lb-ft)

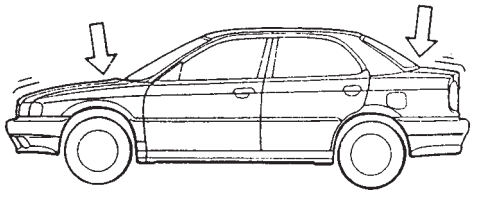
3) Connect actuator coupler.
4) Connect negative (–) cable at battery.



1. Absorber control actuator
2. Actuator coupler



1. Absorber adjusting rod
2. Soft
3. Medium
4. Hard
5. Flat surface



STRUT ASSEMBLY

INSPECTION

1) Remove absorber adjusting actuator.
2) Check to make sure that damping force is changed depending on absorber adjusting rod position.
   If not, replace strut.

NOTE:
Turn absorber adjusting rod by using long nosed plier or the like.

REMOVAL AND INSTALLATION

For removal and installation procedure except absorber adjusting actuator removal and installation, refer to Section 3D (front strut) or 3E (rear strut) of Service Manual mentioned in Foreword of this manual.

DISASSEMBLY AND ASSEMBLY

When disassembly loosen strut nut (about 1 turn) before removal and when assembly tighten strut nut to specified torque after installation.

Strut nut tightening torque: 55 N·m (5.5 kg-m, 40.0 lb-ft)

NOTE:
If actuator bracket turns when tighten strut nut, be sure to tighten strut nut to specified torque with holding actuator bracket.

For other procedure, refer to Section 3D (front strut) or 3E (rear strut) of Service Manual mentioned in Foreword of this manual.

TORQUE SPECIFICATIONS

Fastening parts	Tightening Torque		
	N·m	kg-m	lb-ft
Absorber adjusting actuator	3.0	0.30	2.2
Strut nut	55	5.5	40.0

SECTION 4

FRONT DRIVE SHAFT (Double Offset Joint (DOJ) Type)

NOTE:
The DOJ type drive shaft can be identified by the outside shape of the differential side joint which has no dent.

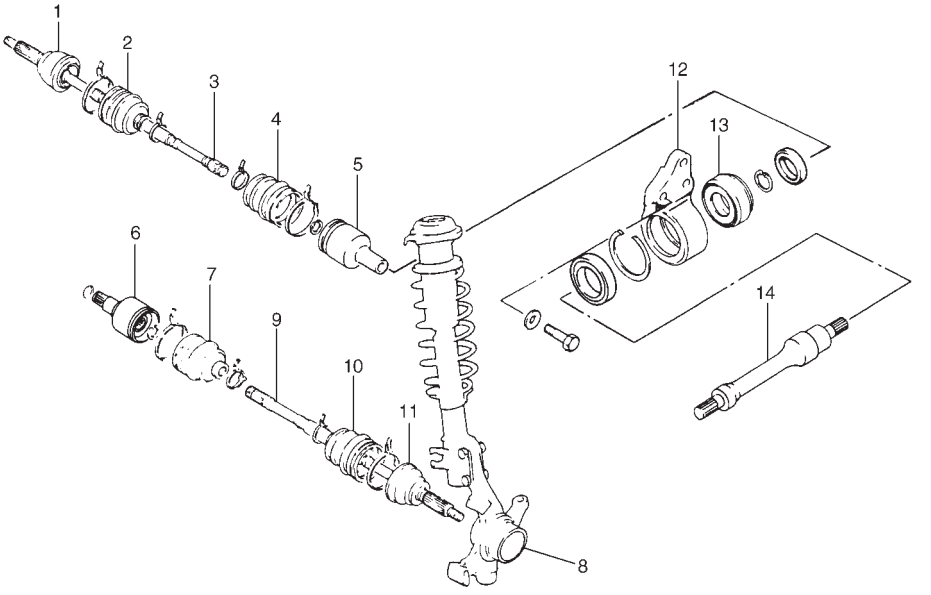
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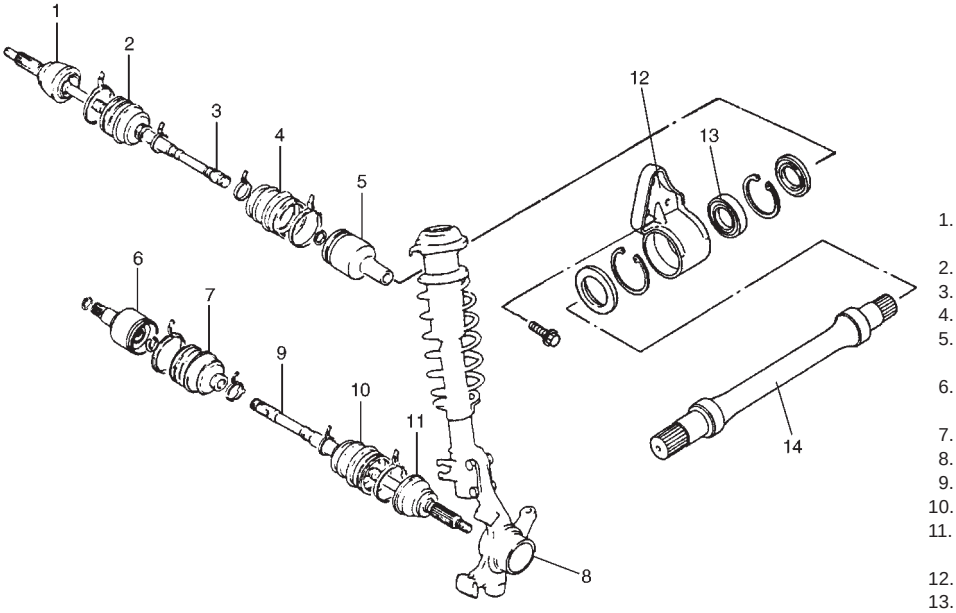
GENERAL DESCRIPTION

A constant velocity ball joint is used on the wheel side of front drive shaft and a constant velocity double offset joint (DOJ) on the differential side.

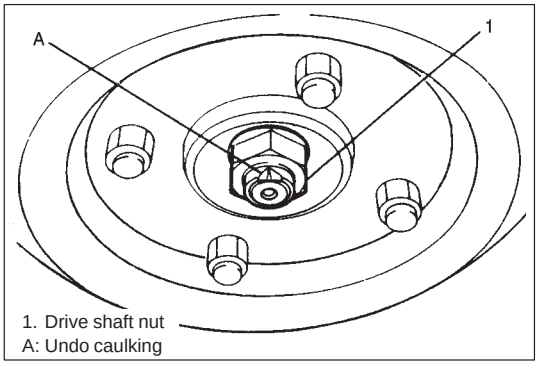
[1.3 L and 1.6 L engine models]



[1.8 L engine model]



1. Wheel side joint (RH) (Constant velocity ball joint)
2. Boot
3. Drive shaft (RH)
4. Boot
5. Differential side joint (RH) (Constant velocity DOJ)
6. Differential side joint (LH) (Constant velocity DOJ)
7. Boot
8. Steering knuckle
9. Drive shaft (LH)
10. Boot
11. Wheel side joint (LH) (Constant velocity ball joint)
12. Center bearing support
13. Center bearing
14. Center shaft

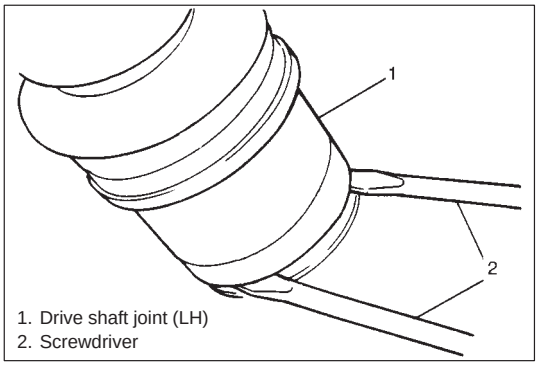


1. Drive shaft nut
A: Undo caulking

REMOVAL (Left Side Shaft)

ON FLOOR

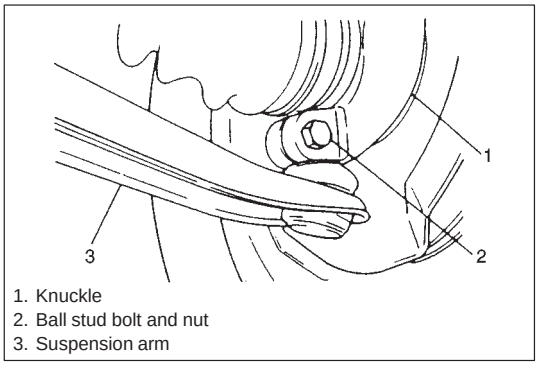
Undo caulking and remove drive shaft nut and washer.



1. Drive shaft joint (LH)
2. Screwdriver

ON LIFT

1) Drain transmission oil.
2) By using large size screwdrivers, pull out drive shaft joint so as to release snap ring fitting of joint spline at differential side.
3) Disconnect stabilizer joint from suspension arm.



1. Knuckle
2. Ball stud bolt and nut
3. Suspension arm

4) Remove ball stud bolt, and then separate suspension arm from knuckle.

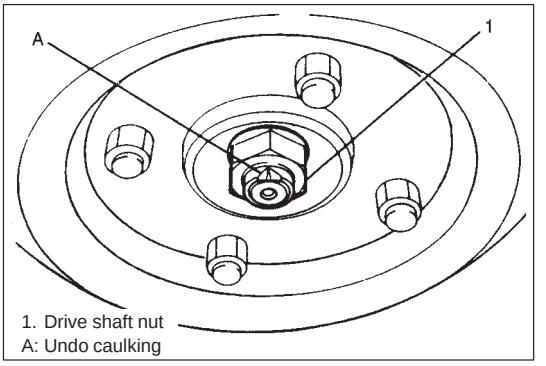
5) To remove drive shaft assembly, pull out inboard joint from differential side and then wheel side joint from steering knuckle.

CAUTION:
To prevent breakage of boots, be careful not to bring them into contact with other parts, when removing drive shaft assembly.

REMOVAL (Right Side Shaft)

ON FLOOR

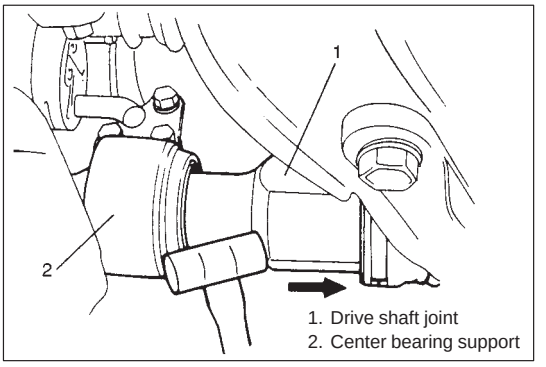
Undo caulking and remove drive shaft nut and washer.



1. Drive shaft nut
A: Undo caulking

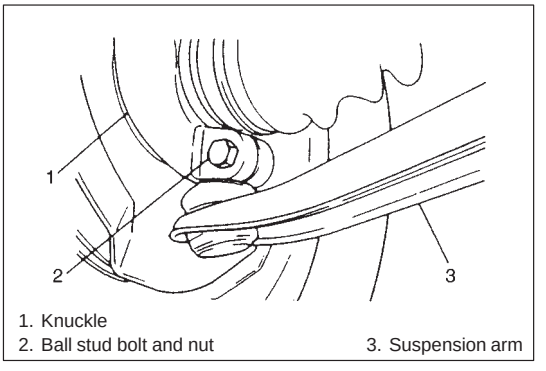
ON LIFT

1) By using plastic hammer, drive out drive shaft joint so as to release snap ring fitting of joint spline at center shaft.



1. Drive shaft joint
2. Center bearing support

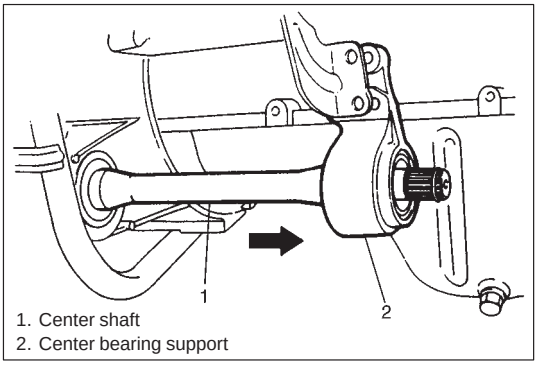
2) Disconnect stabilizer joint from suspension arm.
3) Remove ball stud bolt, and then separate suspension arm from knuckle.



1. Knuckle
2. Ball stud bolt and nut
3. Suspension arm

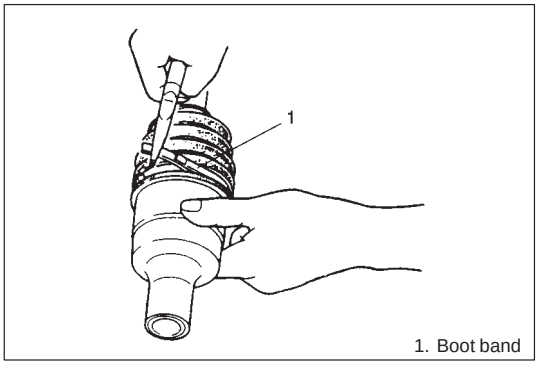
4) To remove drive shaft assembly, pull out inboard joint from center shaft and then wheel side joint from steering knuckle.

CAUTION:
To prevent breakage of boots, be careful not to bring them into contact with other parts, when removing drive shaft assembly.



1. Center shaft
2. Center bearing support

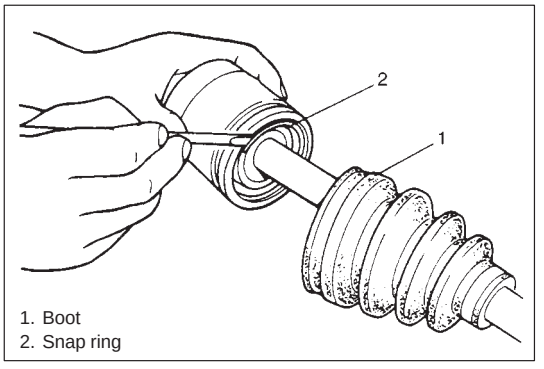
5) Drain transmission oil.
6) Loosen center bearing support bolts and remove center shaft from differential side gear.



1. Boot band

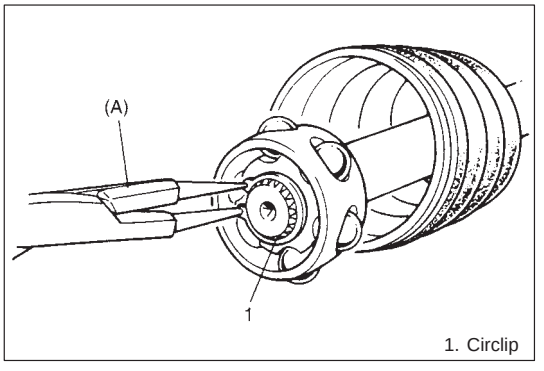
DISASSEMBLY (Drive Shaft)

1) Remove boot band of differential side joint.



1. Boot
2. Snap ring

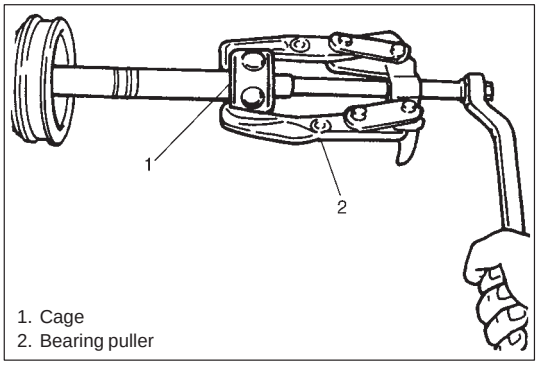
2) Slide boot toward the center of shaft and remove snap ring from outer race, then take shaft out of outer race.



1. Circlip

3) Wipe off grease and remove circlip used to fix cage by using special tool (A).

Special Tool
(A): 09900-06107



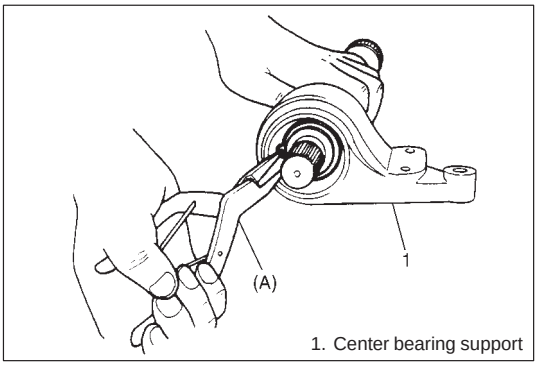
1. Cage
2. Bearing puller

4) Draw away cage by using bearing puller, and remove boot from shaft.

NOTE:
Do not disassemble wheel side joint (outboard joint). If any malcondition is found in any joint, replace it as assembly.

INSPECTION

○ Check boots for breakage or deterioration. Replace them as necessary.
○ Check circlip, snap ring and boot bands for breakage or deformation. Replace as necessary.



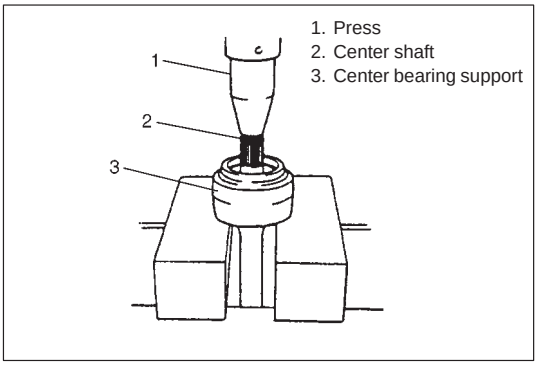
1. Center bearing support

DISASSEMBLY (Center Shaft and Center Bearing Support)

[1.3 L and 1.6 L Engine Models]

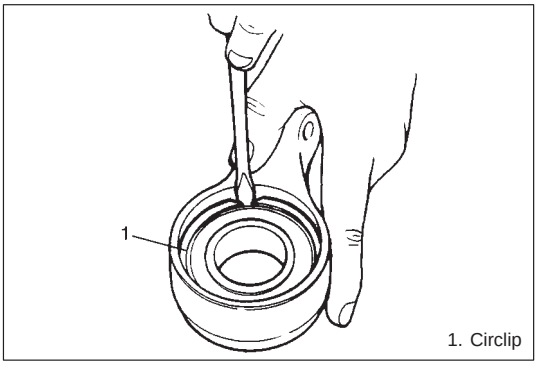
1) Remove right side oil seal from center bearing support.
2) Remove circlip.

Special Tool
(A): 09900-06107



1. Press
2. Center shaft
3. Center bearing support

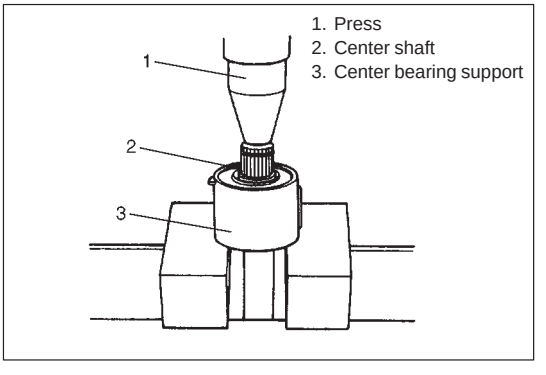
3) By using hydraulic press, draw out center shaft from center bearing.
4) Remove left side oil seal from center bearing support.



1. Circlip

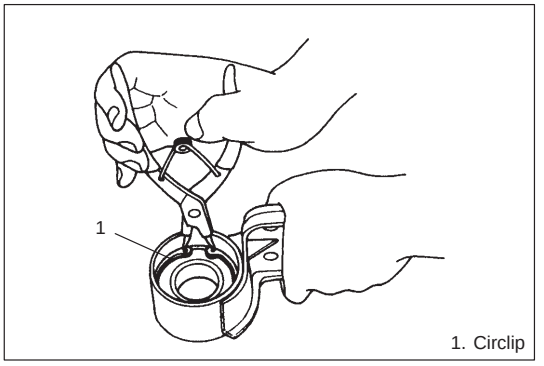
5) Remove bearing support circlip.
6) Remove center bearing from center bearing support.

[1.8 L Engine Model]



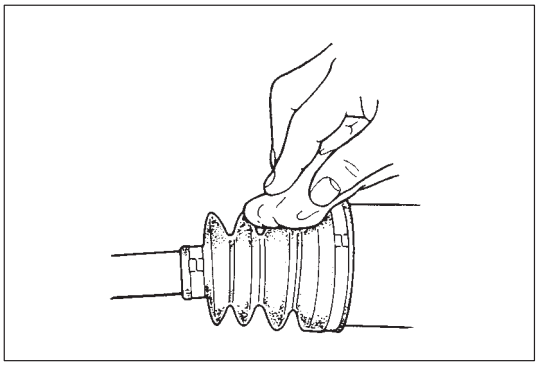
1. Press
2. Center shaft
3. Center bearing support

1) By using hydraulic press, draw out center shaft from center bearing.
2) Remove oil seals from center bearing support.



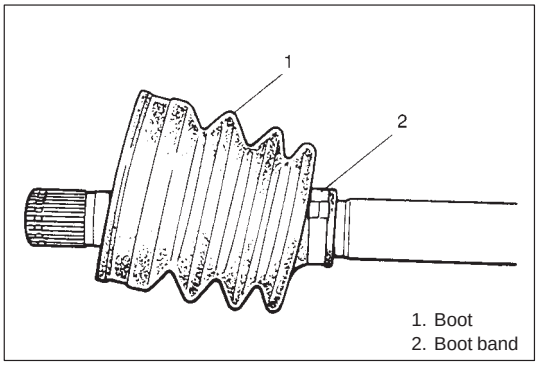
1. Circlip

3) Remove bearing support circlips.
4) Remove center bearing from center bearing support.



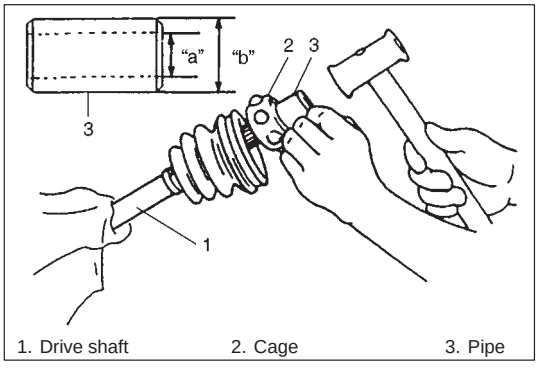
REASSEMBLY (Drive Shaft)

1) Wash disassembled parts (except boots). After washing, dry parts completely by blowing air.
2) Clean boots with cloth. Do not wash boots in degreaser, such as gasoline or kerosene, etc.
   Washing in degreaser causes deterioration of boot.



1. Boot
2. Boot band

3) Install boot onto drive shaft till its small diameter side fits to shaft groove and fix there with boot band.

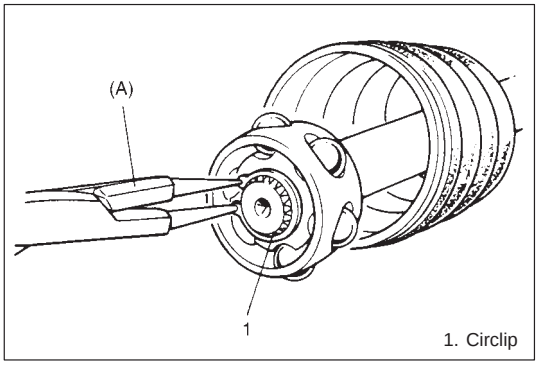


1. Drive shaft 2. Cage 3. Pipe

4) Drive in the cage by using a pipe whose inner diameter is 23 mm (0.906 in.) or more and outer diameter is 32 mm (1.260 in.) or less.

Diameter "a": 23 mm (0.906 in.) or more
Diameter "b": 32 mm (1.260 in.) or less

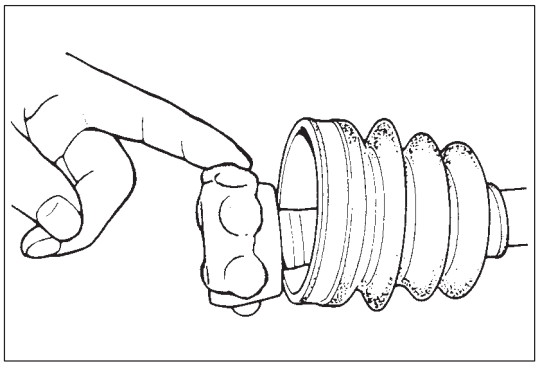
> **CAUTION:**
> **Install cage directing smaller outside diameter side to shaft end.**



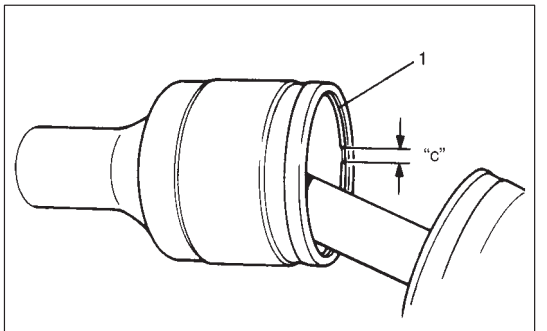
1. Circlip

5) Install circlip by using special tool (A).

Special Tool
(A): 09900-06107



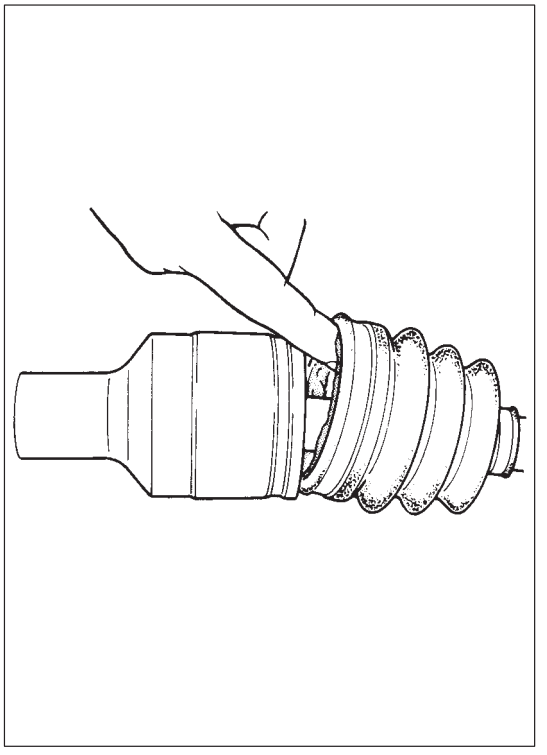
6) Apply grease to entire surface of cage.
   Use joint grease in tube included in differential side boot set or DOJ set of spare parts.



1. Snap ring

7) Insert cage into outer race and fit snap ring into groove of outer race.

> **CAUTION:**
> **Position opening of snap ring "c" so that it will not be lined up with a ball.**

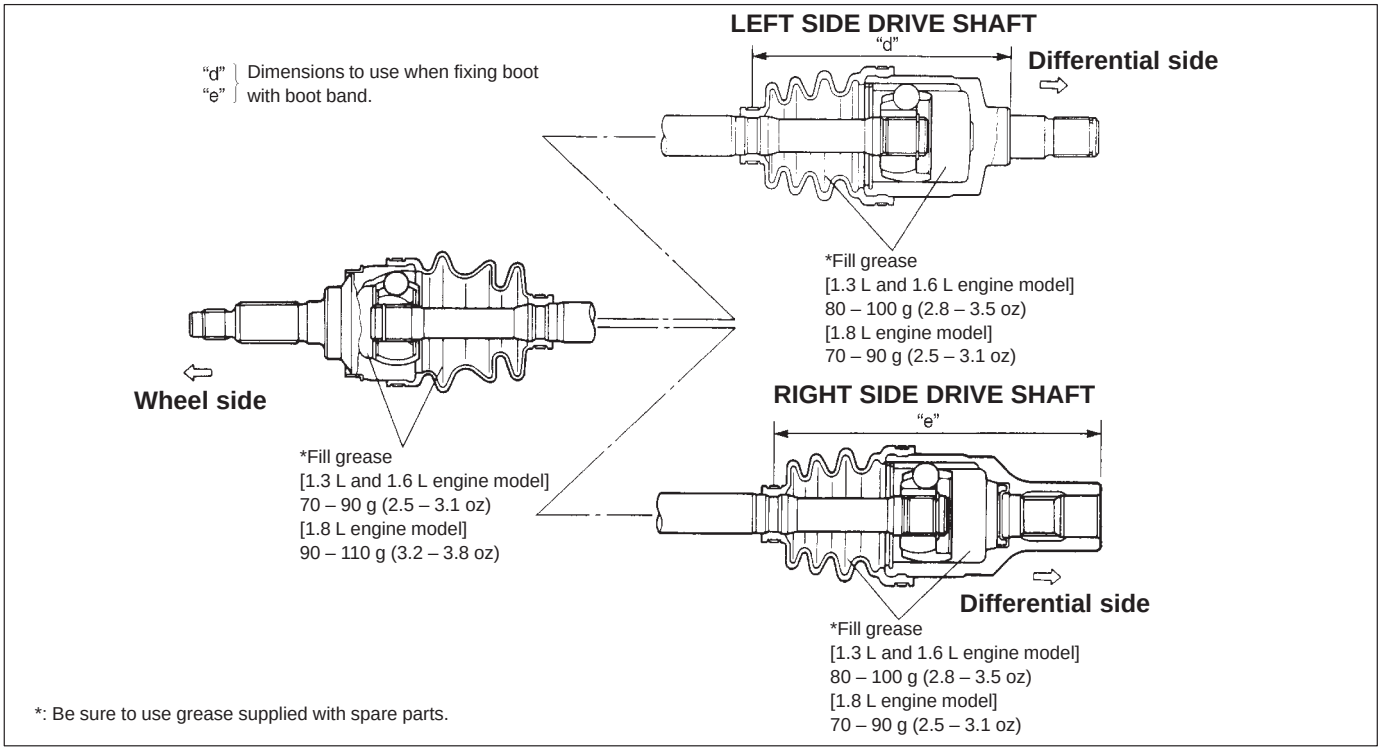


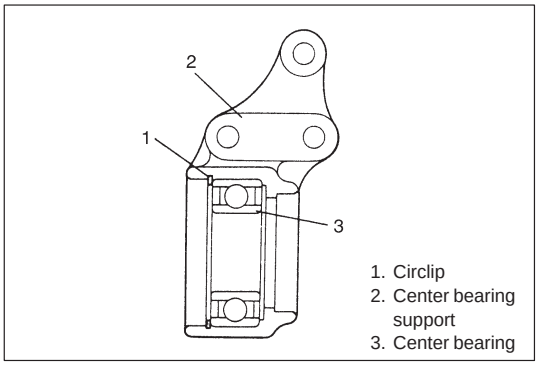
8) Apply grease to inside of outer race, and fit boot to outer race.
9) Fitting boot to outer race, adjust so that measurements "d" and "e" become as indicated in figure.

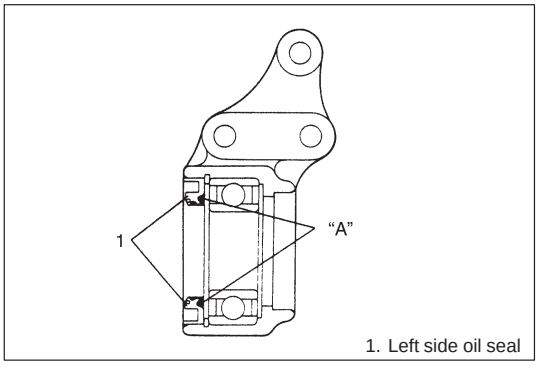
   [1.3 L and 1.6 L engine model]
   Length "d": 162.5 mm (6.40 in.)
   "e": 196.5 mm (7.74 in.)

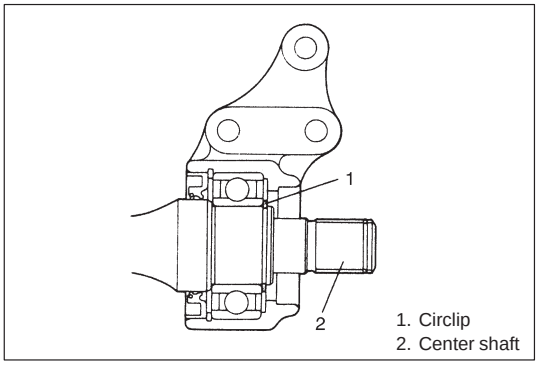
   [1.8 L engine model]
   Length "d": 171.5 mm (6.75 in.)
   "e": 193.0 mm (7.60 in.)

   Before fixing boot band, insert screwdriver into boot on outer race side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.
10) Fixing boot band.









REASSEMBLY (Center Shaft and Center Bearing Support)

[1.3 L and 1.6 L Engine Model]

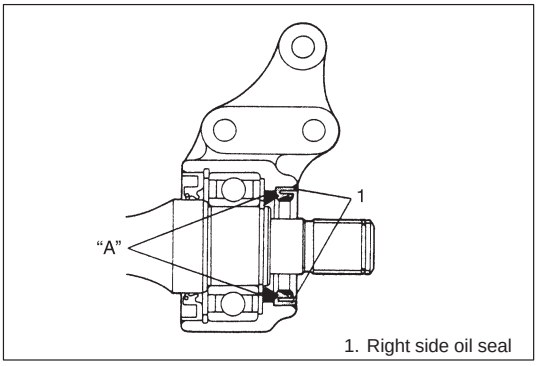
Install center shaft by reversing removal procedure and noting the following points.

○ When installing bearing support circlip, make sure that it fits in circlip groove in center bearing support securely as shown.

○ When installing left side oil seal, use care so that it is in proper direction by referring to left figure.

"A": Grease 99000-25010

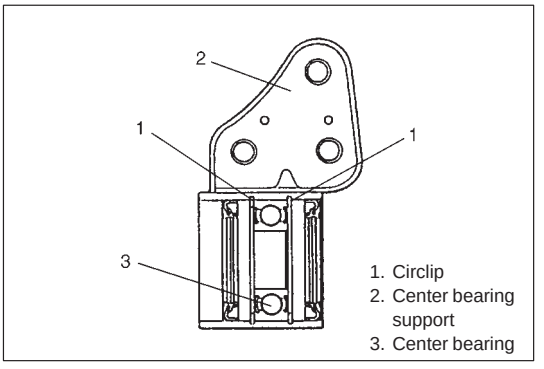
○ After press-fitting center shaft from left side oil seal side, fit circlip into groove in shaft securely.



1. Right side oil seal

○ When installing right side oil seal, use care so that it is in proper direction by referring to left figure.

"A": Grease 99000-25010

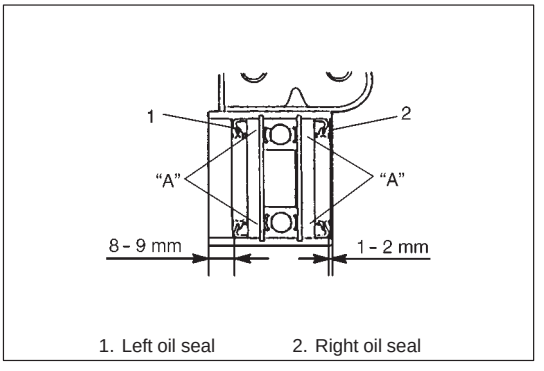


1. Circlip
2. Center bearing support
3. Center bearing

[1.8 L Engine Model]

Install center shaft by reversing removal procedure and noting the following points.

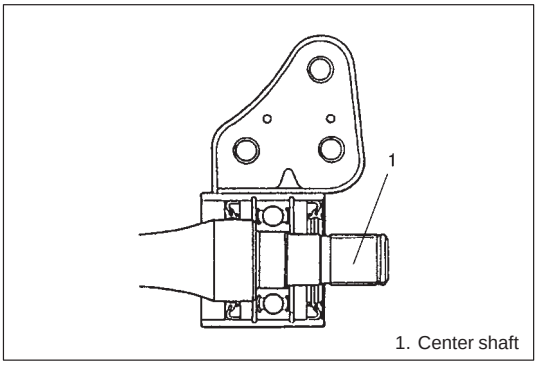
○ When installing bearing support circlip, make sure that it fits in circlip groove in center bearing support securely as shown.



1. Left oil seal 2. Right oil seal

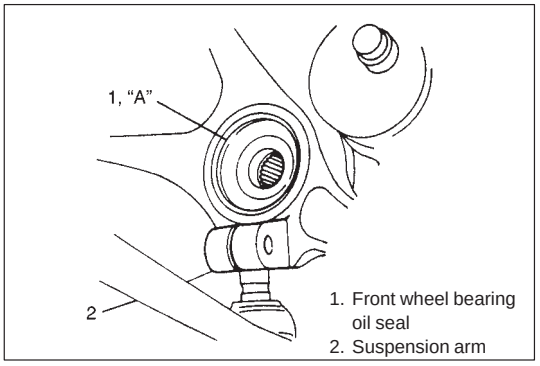
○ When installing oil seals, use care so that they are in proper direction referring to left figure.

"A": Grease 99000-25010



1. Center shaft

○ Press-fit center shaft from left oil seal side.



INSTALLATION

Install drive shaft assembly by reversing removal procedure and noting the following points.

○ Clean front wheel bearing oil seal and then apply grease. Replace it if required.

"A": Grease 99000-25010

○ Install wheel side joint to steering knuckle first and then DOJ to differential side.

○ Apply sealant to drain plug for manual transmission.

○ Fill transmission with oil as specified.

CAUTION:

- **○ Protect oil seals and boots from any damage, preventing them form unnecessary contact while installing drive shaft.**
- **○ Do not hit joint boot with hammer. Inserting joint only by hands is allowed.**
- **○ Make sure that differential side joint is inserted fully and its snap ring is seated as it was.**

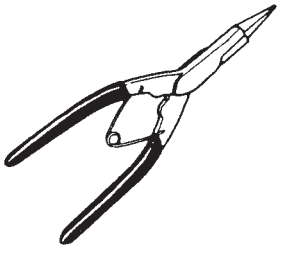
TIGHTENING TORQUE SPECIFICATIONS

Fastener		Tightening torque		
		N·m	kg-m	lb-ft
Oil drain plug	M/T	21	2.1	15.5
	A/T	40	4.0	29.0
Oil filler and level plug	M/T	21	2.1	15.5
Ball joint stud bolt and nut		60	6.0	43.5
Drive shaft nut		175	17.5	127.0
Center bearing support bolt		50	5.0	36.5
Stabilizer joint nut		28	2.8	20.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Oil drain plug for manual transmission

SPECIAL TOOL



09900-06107
Snap ring pliers
(Opening type)

SECTION 4A

FRONT DRIVE SHAFT (Tripod Joint Type)

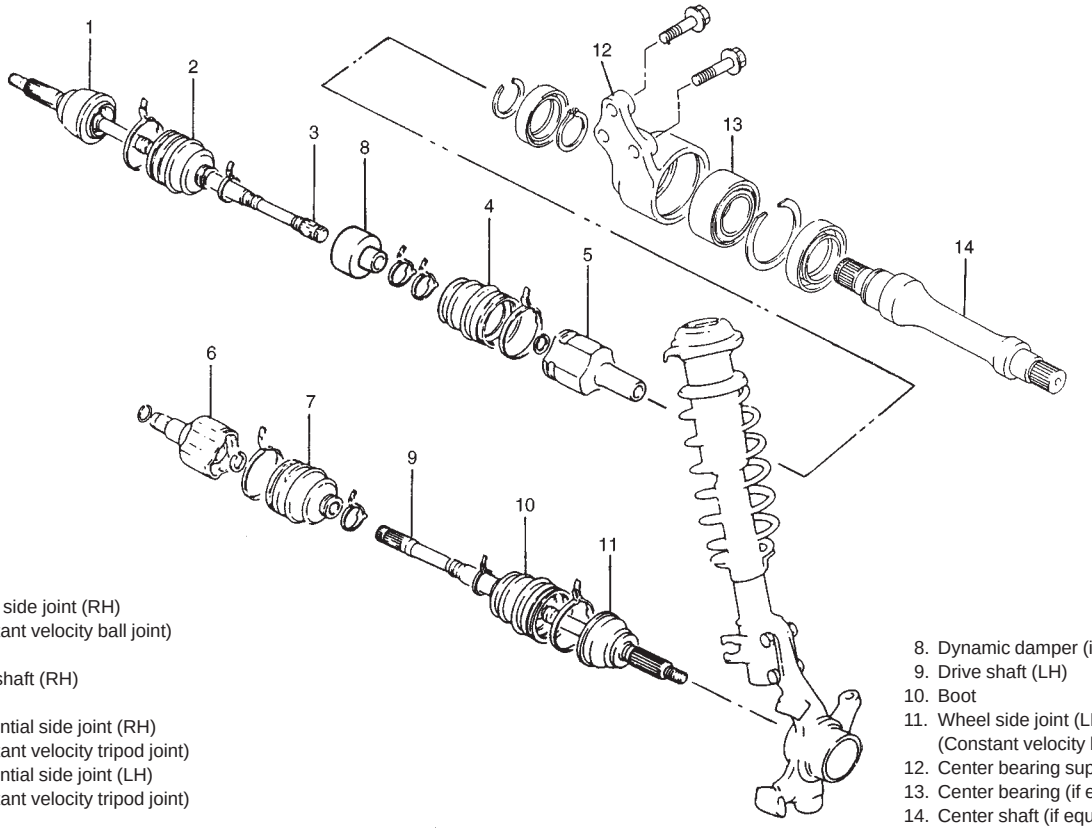
NOTE:
The tripod joint type drive shaft can be identified by 3 dent lines on outside of differential side joint (cylinder shape).

CONTENTS

GENERAL DESCRIPTION 4A- 1
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DISASSEMBLY 4A- 3
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GENERAL DESCRIPTION

A constant velocity ball joint is used on the wheel side of front drive shaft and a constant velocity tripod joint on the differential side. The drive shaft can slide through the tripod joint in the extension/contraction direction.

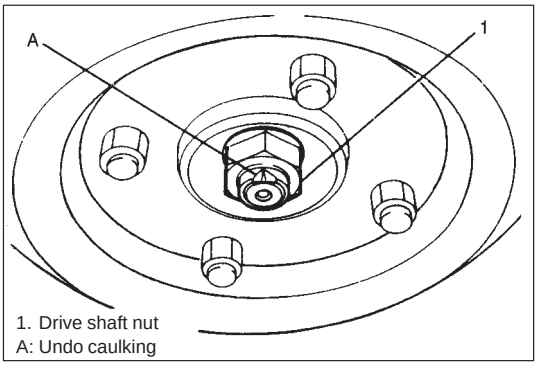


1. Wheel side joint (RH) (Constant velocity ball joint)
2. Boot
3. Drive shaft (RH)
4. Boot
5. Differential side joint (RH) (Constant velocity tripod joint)
6. Differential side joint (LH) (Constant velocity tripod joint)
7. Boot
8. Dynamic damper (if equipped)
9. Drive shaft (LH)
10. Boot
11. Wheel side joint (LH) (Constant velocity ball joint)
12. Center bearing support (if equipped)
13. Center bearing (if equipped)
14. Center shaft (if equipped)

REMOVAL

RIGHT SIDE SHAFT WITH CENTER SHAFT AND LEFT SIDE SHAFT

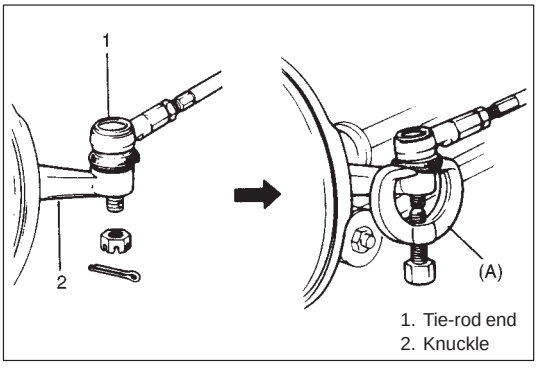
Refer to REMOVAL description in SECTION 4 of this manual.



1. Drive shaft nut
A: Undo caulking

RIGHT SIDE SHAFT WITHOUT CENTER SHAFT

1) Undo caulking and remove drive shaft nut and washer.
2) With vehicle lifted up, remove wheel.
3) Drain transmission oil.

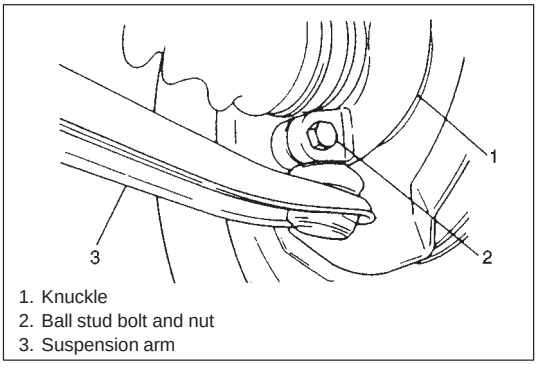


1. Tie-rod end
2. Knuckle

4) Disconnect tie-rod end from knuckle with special tool (A).

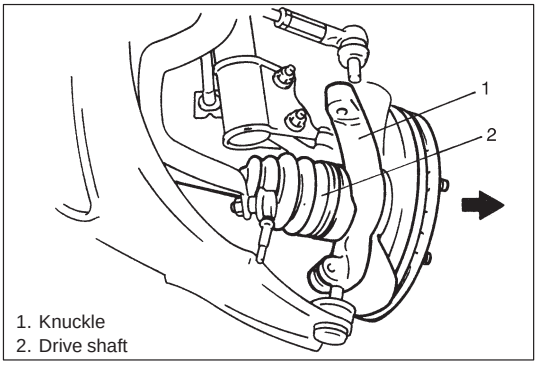
Special Tool
(A): 09913-65210

5) Disconnect stabilizer joint from suspension arm.



1. Knuckle
2. Ball stud bolt and nut
3. Suspension arm

6) Remove ball stud bolt, and then separate knuckle from suspension arm (ball stud).



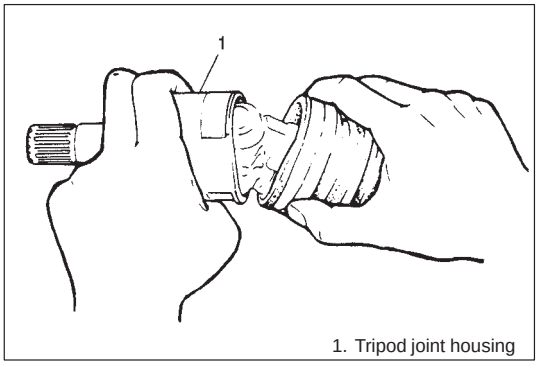
1. Knuckle
2. Drive shaft

7) Pull out drive shaft joint from steering knuckle.

CAUTION:
- **When removing steering knuckles, never pull brake hose.**
- **To prevent breakage of boots, be careful not to bring them into contact with other parts, when removing drive shaft assembly.**

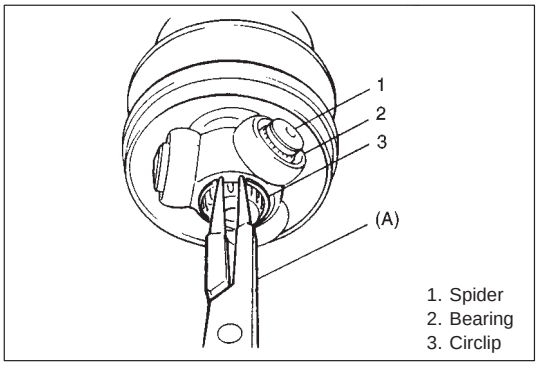
DISASSEMBLY

DRIVE SHAFT (4 A/T MODEL)



1. Tripod joint housing

1) Remove tripod joint boot band, then take out tripod joint housing.



1. Spider
2. Bearing
3. Circlip

2) Remove grease from shaft and take off circlip by using special tool, then pull out spider from shaft.

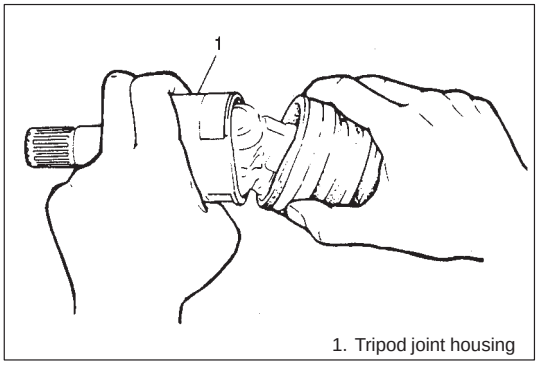
Special Tool
(A): 09900-06107

CAUTION:
To prevent needle bearing of joint from being degreased, do not wash it if it is to be reused.

3) Remove boot band, then pull out differential side boot from shaft.
4) Undo band of dynamic damper, then pull out damper through shaft.
5) Undo boot bands of wheel side joint boot, then pull out boot through shaft.

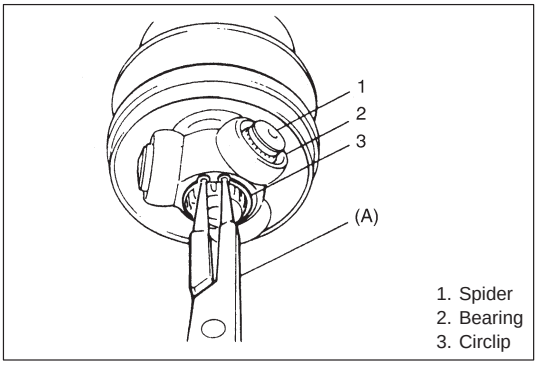
CAUTION:
- **Disassembly of wheel side joint is not allowed. If noise or damage exists in it, replace it as assembly.**
- **Do not disassemble tripod joint spider. If any malcondition is found in it, replace it as differential side joint assembly.**

DRIVE SHAFT (EXCEPT 4 A/T MODEL)



1. Tripod joint housing

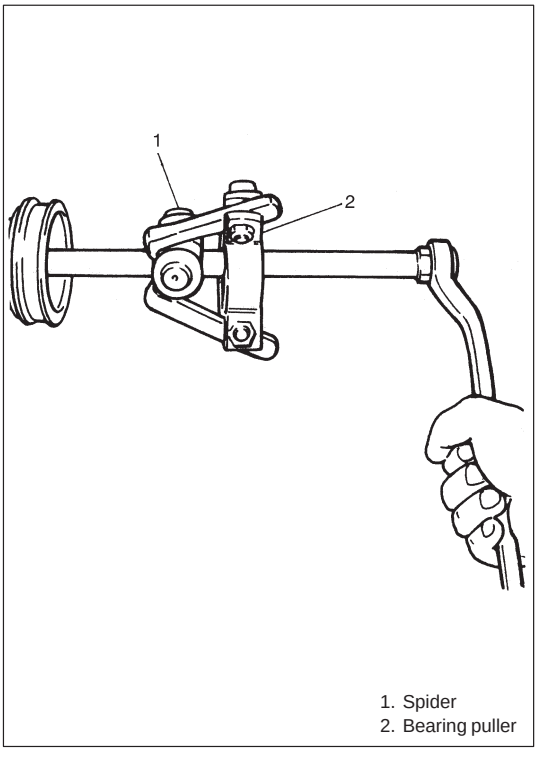
1) Remove tripod joint boot band, then take out tripod joint housing.



1. Spider
2. Bearing
3. Circlip

2) Remove grease from shaft and take off circlip by using special tool.

Special Tool
(A): 09900-06107



1. Spider
2. Bearing puller

3) Draw away spider by using bearing puller as shown.

CAUTION:
- **When removing a spider, be sure to use bearing puller with 3 arms. Removing it otherwise may cause damage to spider.**
- **To prevent needle bearing of joint from being degreased, do not wash it, if it is to be reused.**
- **Do not disassemble tripod joint spider. If any malcondition is found in it, replace it as differential side joint assembly.**
- **Disassembly of wheel side joint is not allowed. If noise or damage exists in it, replace it as assembly.**

4) Remove boot band, then pull out differential side boot from shaft.
5) Undo band of dynamic damper, then pull out damper through shaft. (if equipped.)
6) Undo boot bands of wheel side joint boot, then pull out boot through shaft.

CENTER SHAFT AND CENTER BEARING SUPPORT (IF EQUIPPED)

Refer to DISASSEMBLY description in SECTION 4 of this manual for its removal procedure.

INSPECTION

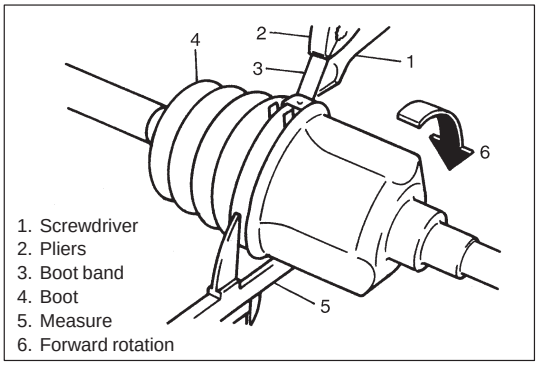
- Check boots for breakage or deterioration. Replace them as necessary.
- Check circlip, snap ring and boot bands for breakage or deformation. Replace as necessary.

REASSEMBLY

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that wheel side joint assembly and tripod joint housing are washed thoroughly and air dried, and boots are cleaned with cloth if they are to be reused.

DRIVE SHAFT (4 AIT MODEL)

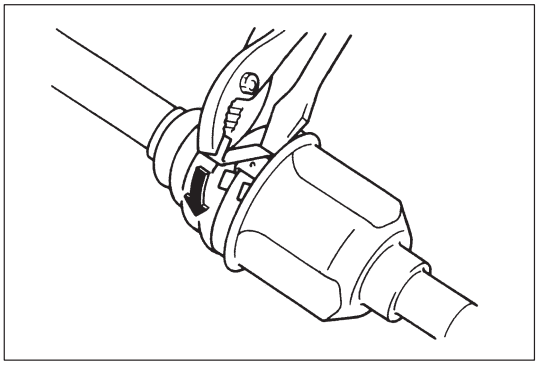
1) Apply grease to wheel side joint. Use black grease in tube included in wheel side boot set.
2) Install wheel side boot on shaft.
3) Fill up boot inside with grease.



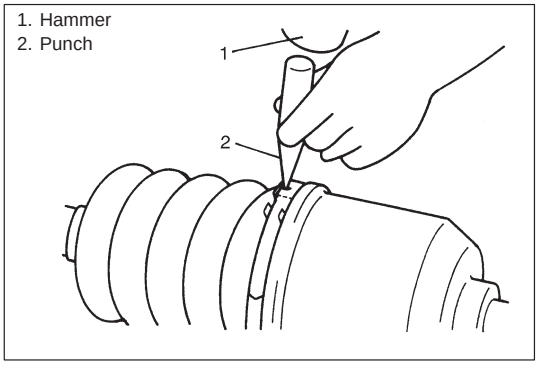
1. Screwdriver
2. Pliers
3. Boot band
4. Boot
5. Measure
6. Forward rotation

4) Fix boot with boot band.
   i) Fit boot band into groove in boot.
   ii) Tighten boot band till its outer diameter value becomes as specified below.

   Diameter: Approx. 79 mm (3.11 in.)



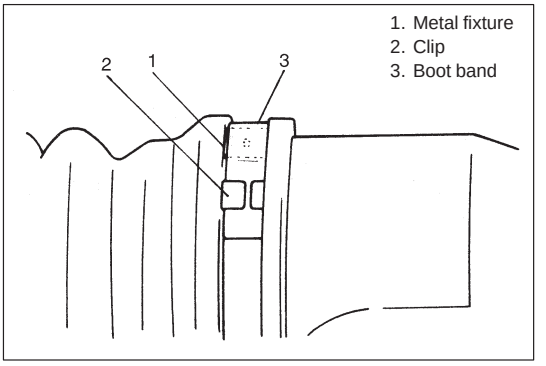
iii) Fold boot band over metal fixture.



1. Hammer
2. Punch

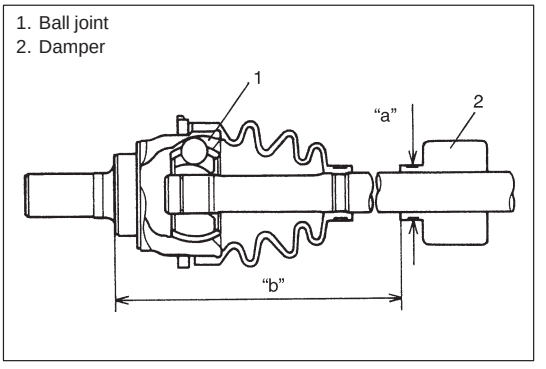
iv) Using a punch, caulk the center of boot band folded over metal fixture.

NOTE:
Be careful not to damage boot.



v) Cut off boot band at about 7 mm (0.28 in.) from clip.
vi) Clamp boot band with clip.
vii) Fix small diameter side of boot with boot band by repeating sequence i) to v).

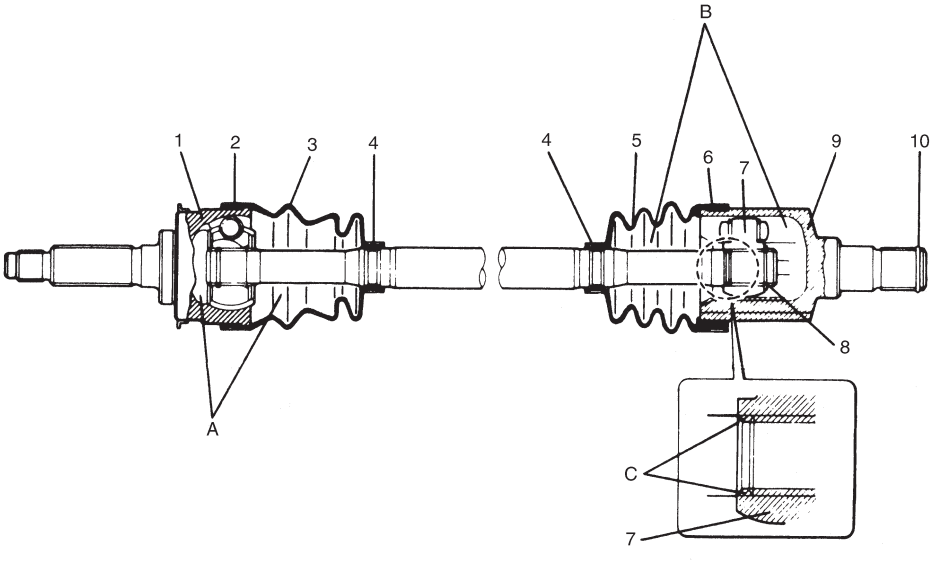
Diameter: Approx. 29 mm (1.14 in.)



5) Install dynamic damper on right side drive shaft, referring to sequence i) to v) of Step 4) and according to dimensions specified below.

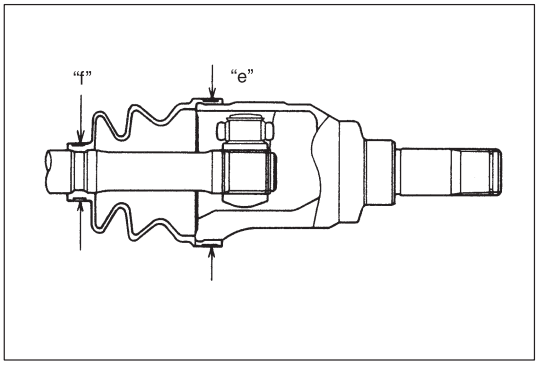
Diameter "a" : Approx. 30 mm (1.18 in.)
Length "b" : 333 – 339 mm (13.1 – 13.3 in.)

6) Install differential side boot with boot band on shaft.
Apply grease to tripod joint. Use yellow grease in tube included in differential side boot set or differential side joint assembly of spare parts.
7) Install tripod joint spider on shaft, facing its chamfered spline inward (wheel side), then fasten it with circlip.
8) Fill up differential side boot inside with grease, then install housing and joint it with boot.
9) Fit boot to outer race.



1. Wheel side joint assembly
2. Wheel side boot band
3. Wheel side boot
4. Boot band
5. Differential side boot
6. Differential side boot band
7. Tripod joint spider
8. Circlip
9. Tripod joint housing
10. Snap ring

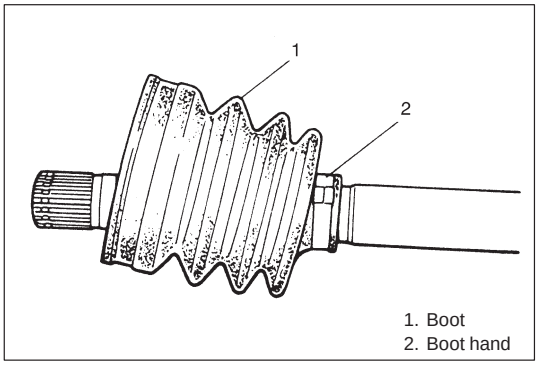
A: Black grease (about 52 g/1.8 oz)
B: Yellow grease (about 100 g/3.5 oz)
C: Chamfered spline



10) Before fixing boot band, insert screwdriver into boot on outer race side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.
11) Fixing boot with boot band, referring to sequence i) to vii) of Step 4).

Diameter "e" : Approx. 79 mm (3.11 in.)
Diameter "f" : Approx. 29 mm (1.14 in.)

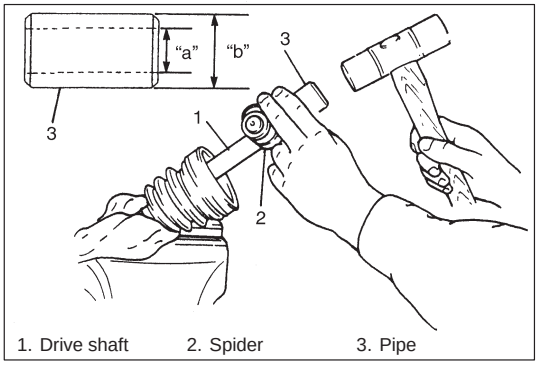
CAUTION:
- **To prevent any problem caused by washing solution, do not wash joint boots and tripod joint except its housing.**
  Degreasing of those parts with cloth is allowed.
- **To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint, i.e. black grease (130 g tube) to wheel side joint and yellow one (130 g tube) to tripod joint.**
- **Band each boot band against forward rotation.**
- **Do not squeeze or distort boot when fastening it with bands.**
  Distorted boot caused by squeezing air may reduce its durability.



1. Boot
2. Boot hand

DRIVE SHAFT (EXCEPT 4 A/T MODEL)

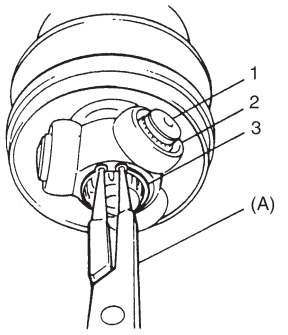
1) Apply grease to wheel side joint. Use black grease in tube included in wheel side boot set.
2) Install wheel side boot on shaft.
3) Fill up boot inside with grease and then fasten boot with bands.
4) Install dynamic damper on shaft. (If equipped.)
5) Install differential side boot on shaft.
   Apply grease to tripod joint. Use yellow grease in tube included in differential side boot set or differential side joint assembly of spare parts.



1. Drive shaft 2. Spider 3. Pipe

6) Drive in spider by using a pipe whose inner diameter is 23 mm (0.906 in.) or more and outer diameter is 32 mm (1.260 in.) or less.

Diameter "a" : 23 mm (0.906 in.) or more
Diameter "b" : 32 mm (1.260 in.) or less



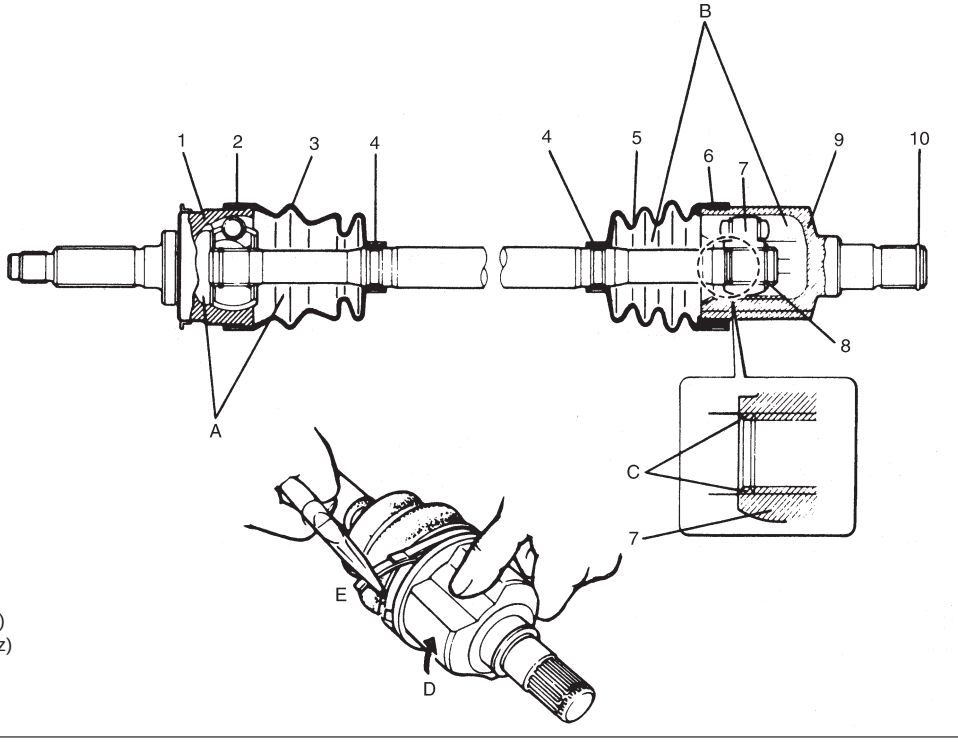
1. Spider
2. Bearing
3. Circlip

7) Facing its chamfered spline inward (wheel side), then fasten it with circlip.

Special Tool
(A): 09900-06107

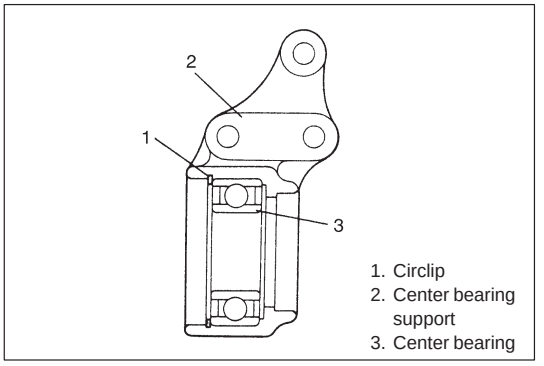
8) Fill up differential side boot inside with grease, then install housing and joint it with boot.
9) Fasten boot with bands.

CAUTION:
- **To prevent any problem caused by washing solution, do not wash joint boots and tripod joint except its housing.**
  Degreasing of those parts with cloth is allowed.
- **To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint, i.e. black grease (130 g tube) to wheel side joint and yellow one (130 g tube) to tripod joint.**
- **Band each boot band against forward rotation.**
- **Do not squeeze or distort boot when fastening it with bands.**
  Distorted boot caused by squeezing air may reduce its durability.



1. Wheel side joint assembly
2. Wheel side boot band
3. Wheel side boot
4. Boot band
5. Differential side boot
6. Differential side boot band
7. Tripod joint spider
8. Circlip
9. Tripod joint housing
10. Snap ring

A: Black grease (about 70 g/2.5 oz)
B: Yellow grease (about 95 g/3.4 oz)
C: Chamfered spline
D: Forward rotation
E: Clamp band this way

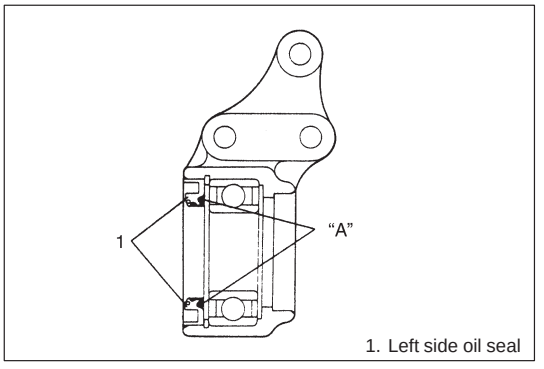


1. Circlip
2. Center bearing support
3. Center bearing

CENTER SHAFT AND CENTER BEARING SUPPORT

Install center shaft by reversing removal procedure and noting following points.

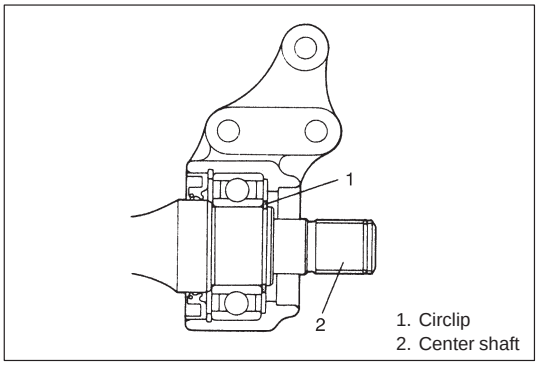
○ When installing bearing support circlip, make sure that it fits in circlip groove in center bearing support securely as shown.



1. Left side oil seal

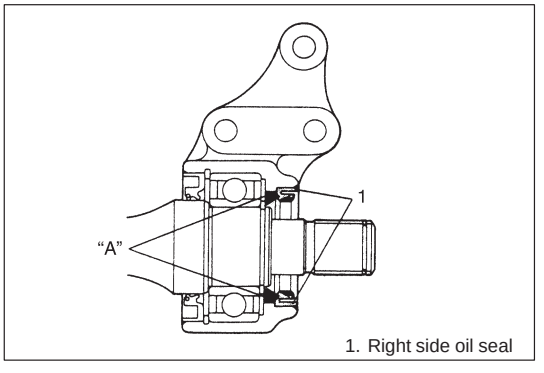
○ When installing left side oil seal, use care so that it is in proper direction by referring to left figure.

"A": Grease 99000-25010



1. Circlip
2. Center shaft

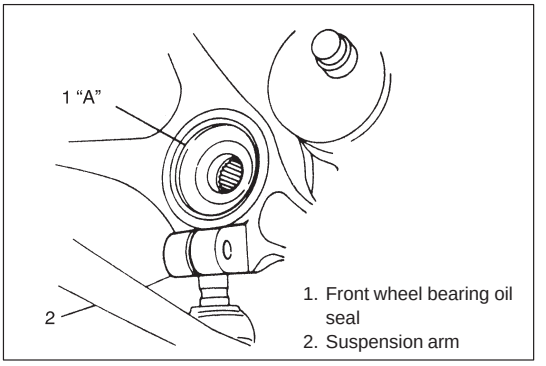
○ After press-fitting center shaft from left side oil seal side, fit circlip into groove in shaft securely.



1. Right side oil seal

○ When installing right side oil seal, use care so that it is in proper direction by referring to left figure.

"A": Grease 99000-25010



1. Front wheel bearing oil seal
2. Suspension arm

INSTALLATION

Install drive shaft assembly by reversing removal procedure and noting following points.

○ Clean front wheel bearing oil seal and then apply grease. Replace it if required.

“A”: Grease 99000-25010

○ When install left side drive shaft, install wheel side joint to steering knuckle first, and tripod joint to differential side.
○ When install right side drive shaft, install tripod joint to differential side first, and wheel side joint to steering knuckle.
○ Apply sealant to drain plug for manual transmission.
○ Tighten each bolt and nut to specified torque.
○ Fill transmission with oil as specified.

CAUTION:
○ To avoid excessive expansion of boot and consequential disconnection of joint in boot, do not pull tripod joint housing.
○ Protect oil seals and boots from any damage, preventing them form unnecessary contact while installing drive shaft.
○ Do not hit joint boot with hammer. Inserting joint only by hands is allowed.
○ Make sure that differential side joint is inserted fully and its snap ring is seated as it was.

NOTE:
○ For automatic transmission, carry out full step of fluid level check procedure i.e. ROOM TEMPERATURE LEVEL CHECK first, and then NORMAL OPERATING TEMPERATURE LEVEL CHECK, referring to SECTION 7B.
○ Check toe seating and adjust as required.

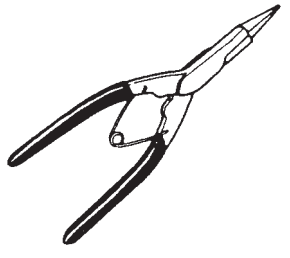
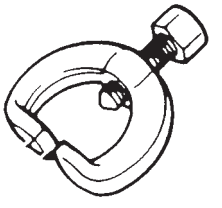
TIGHTENING TORQUE SPECIFICATIONS

Fastener		Tightening torque		
		N·m	kg-m	lb-ft
Oil drain plug	M/T	21	2.1	15.5
	A/T	40	4.0	29.0
Oil filler and level plug	M/T	21	2.1	15.5
Ball joint stud bolt and nut		60	6.0	43.5
Drive shaft nut		175	17.5	127.0
Center bearing support bolt		50	5.0	36.5
Stabilizer joint nut		28	2.8	20.5
Tie-rod end nut		45	4.5	32.5
Wheel nut		85	8.5	61.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Oil drain plug for manual transmission

SPECIAL TOOLS

	
09900-06107 Snap ring pliers (Opening type)	09913-65210 Tie-rod end remover

SECTION 4B

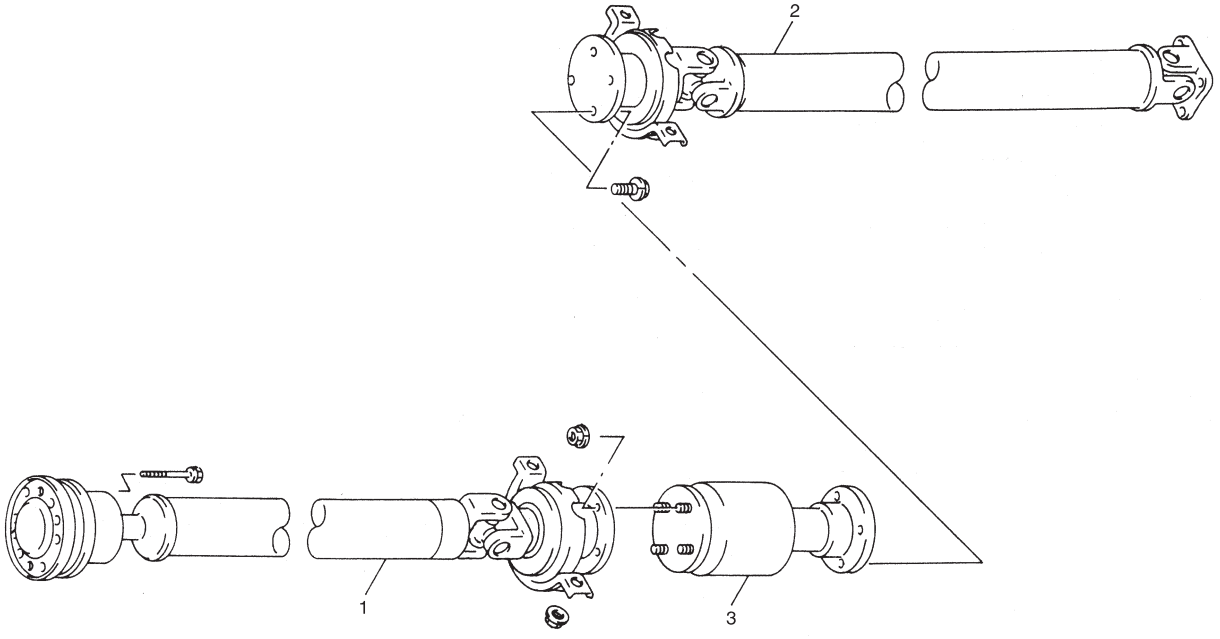
PROPELLER SHAFTS

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GENERAL DESCRIPTION

Most universal joints require no maintenance. They are lubricated for life and can not be lubricated on the vehicle. If a universal joint becomes noisy or worn, it must be replace.
The propeller shaft is a balanced unit. Handle it carefully so that balance can be maintained.
A rotary blade coupling (RBC) is used for the coupling system which distributes an optimum driving force to the front and rear wheels according to the driving conditions. It is located at the center of the propeller shaft. Also, a 2WD/4WD switching shaft is installed to the transfer. (Refer to SECTION 7A2.)



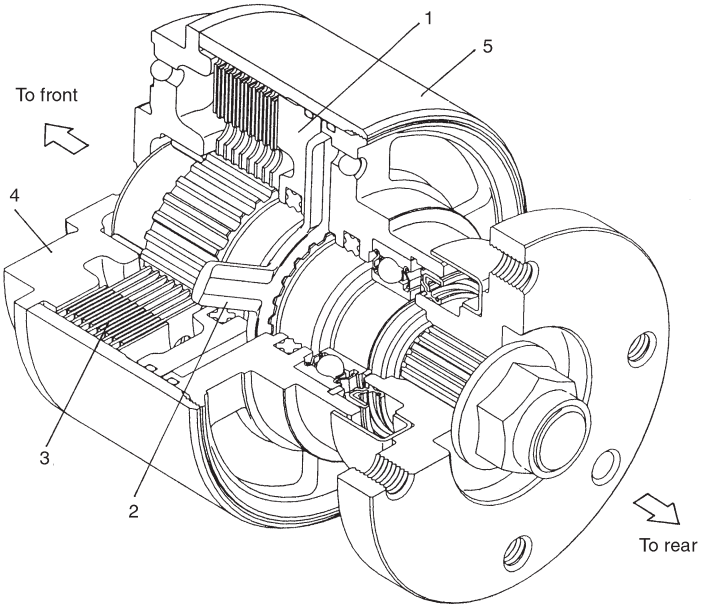
1. Propeller shaft No.1
2. Propeller shaft No.2
3. Rotary blade coupling

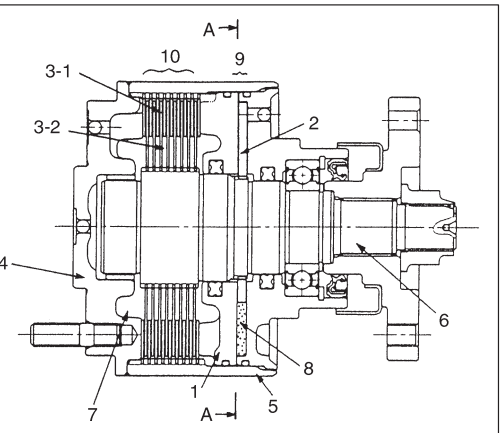
CONSTRUCTION AND OPERATION

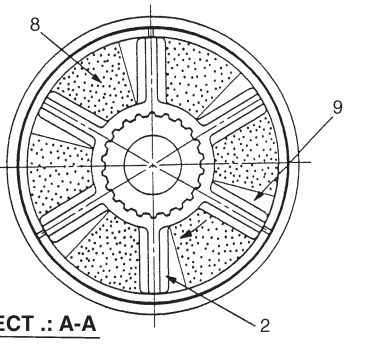
RBC (ROTARY BLADE COUPLING)

The main components of the rotary blade coupling are: pressure generation section (silicon chamber) and torque transmission section (multi-plate clutch). The pressure generation section consists of a blade which is in mesh with the coupling shaft at the output side through spline and silicon oil filling the section with a small amount of air.

The torque transmission section consists of a piston, a multi-plate clutch (separate plate, friction plate), A/T fluid and a coupling No.1 housing.

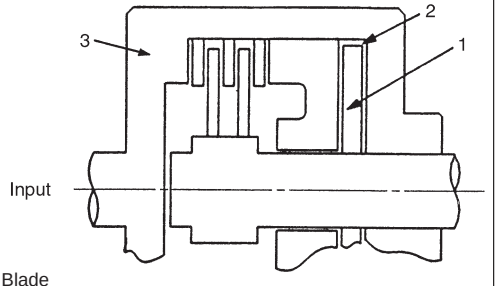






SECT .: A-A

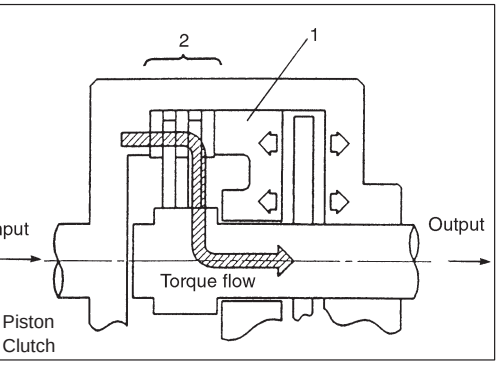
1. Piston
2. Rotary blade
3. Clutch
3-1. Separate plate
3-2. Friction plate
4. Coupling No.1 housing
5. Coupling No.2 housing
6. Propeller shaft No.2
7. A/T fluid
8. Silicon oil
9. Air
10. Pressure generation section
11. Torque transmission section



1. Blade
2. Silicon oil
3. Housing

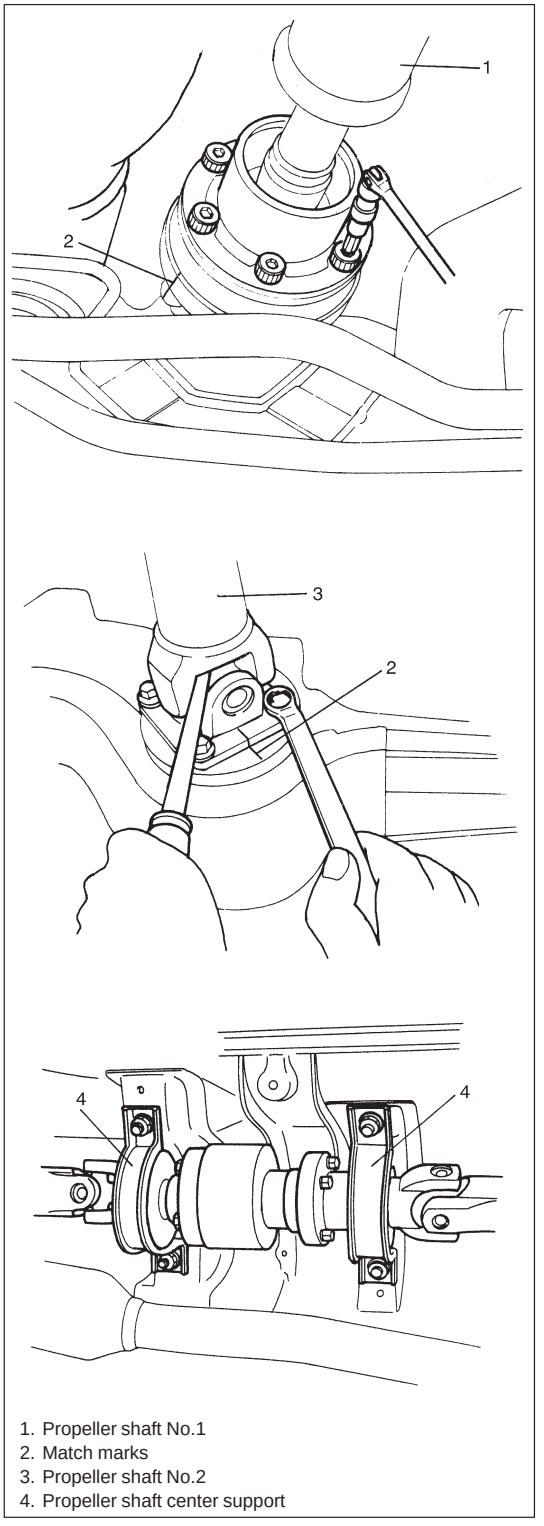
OPERATION

1) When difference occurs in revolution between front and rear wheels, the blade turns relatively to the housing.
2) As the blade turns, silicon flows, causing pressure to occur at the front face of the blade.



1. Piston
2. Clutch

3) The piston operates and pushes the multi-plate clutch.
4) The torque is transmitted in the lower revolution direction.



1. Propeller shaft No.1
2. Match marks
3. Propeller shaft No.2
4. Propeller shaft center support

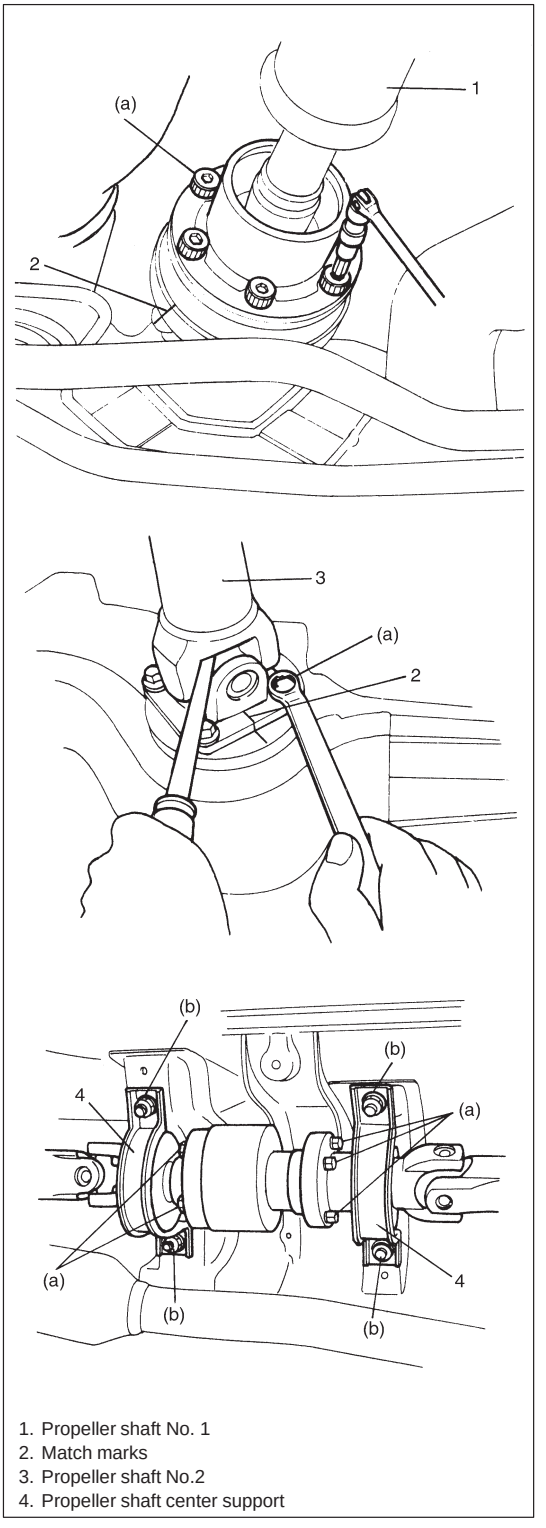
ON-VEHICLE SERVICE

REMOVAL

1) Hoist vehicle.
2) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown.
3) Separate No.2 propeller shaft from rear differential case.
4) Remove No.1 propeller shaft from transmission case flange.
5) Remove propeller shaft center support brackets from vehicle body. (Bracket and No.1 & No.2 shaft are removed in one without separation.) Use care not to drop it.

INSPECTION

1) Check propeller shaft connecting bolts for looseness. If looseness is found, tighten to specified torque.
2) Check propeller shaft joints for wear, play and damage. If any defect is found, replace.
3) Check propeller shaft center support for biting of foreign matter, crack, abnormal noise and damage. If any defect is found, replace.



1. Propeller shaft No. 1
2. Match marks
3. Propeller shaft No.2
4. Propeller shaft center support

INSTALLATION

1) Reverse removal procedure to install propeller shaft, noting following point.
   - ○ When installing propeller shaft, align the match marks. Otherwise, vibration may occur during driving.
   - ○ Use following specification to torque universal joint flange.

   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)
   (b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Center support nuts	50	5.0	36.5
2. Propeller shaft No.1 screws	23	2.3	17.0
3. Propeller shaft No.2 bolts			
4. Center coupling bolts and nuts			

SECTION 4C

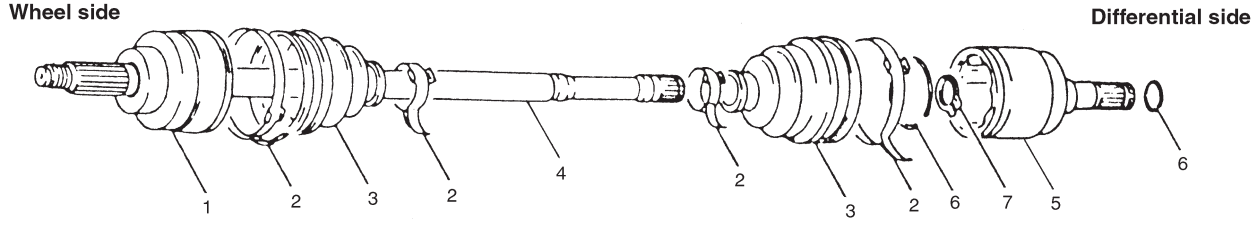
REAR DRIVE SHAFT

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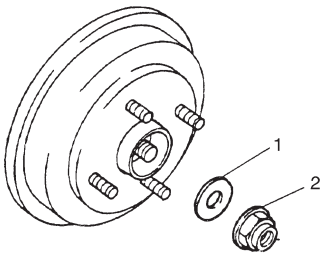
GENERAL DESCRIPTION

A constant velocity ball joint is used on the wheel side of rear drive shaft and a constant velocity double, offset joint (DOJ) on the differential side.



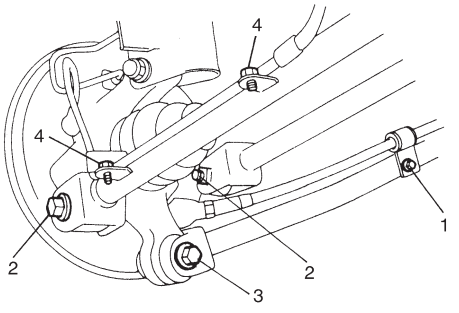
1. Wheel side joint (Constant velocity ball joint)
2. Boot band
3. Boot
4. Drive shaft
5. Differential side joint (Constant velocity DOJ)
6. Snap ring
7. Circlip

1. Washer
2. Nut



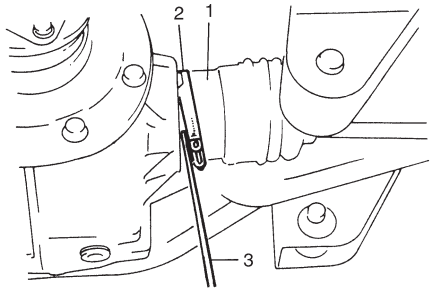
REMOVAL

1) Remove caulking of spindle nut and then remove spindle nut and washer.
2) Remove tire and drain rear differential oil.
3) Hoist vehicle.



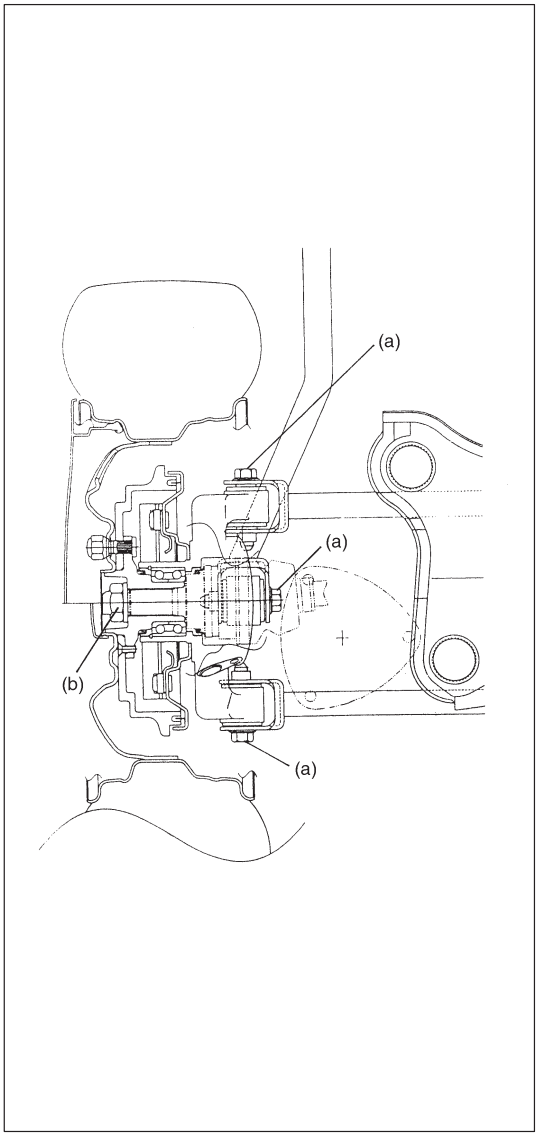
1. Parking brake wire mounting screw
2. Rear control rod outer bolt
3. Rear trailing rod rear bolt
4. ABS sensor bracket bolt

4) Remove parking brake wire mounting bolt, ABS wheel speed sensor wire bracket mounting bolt (if equipped), rear control rod outer bolts and rear trailing rod rear bolt.



1. Drive shaft
2. Used clamp
3. Tire lever

5) Pull out drive shaft from rear differential gear case.
6) Remove drive shaft.



INSTALLATION

Install drive shaft assembly by reversing removal procedure and noting following points.

○ Be sure to use new drive shaft center nut.

Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)
(b): 175 N·m (17.5 kg-m, 126.5 lb-ft)

○ Clean front wheel bearing oil seal and then apply grease. Replace it if required.

"A": Grease 99000-25010

○ Apply sealant to drain plug for rear differential gear case.
○ Fill rear differential gear case with oil as specified, refer to SECTION 7F.

CAUTION:
- **○ Protect oil seals and boots from any damage, preventing them form unnecessary contact while installing drive shaft.**
- **○ Do not hit joint boot with hammer. Inserting joint only by hands is allowed.**
- **○ Make sure that differential side joint is inserted fully and its snap ring is seated as it was.**

DISASSEMBLY

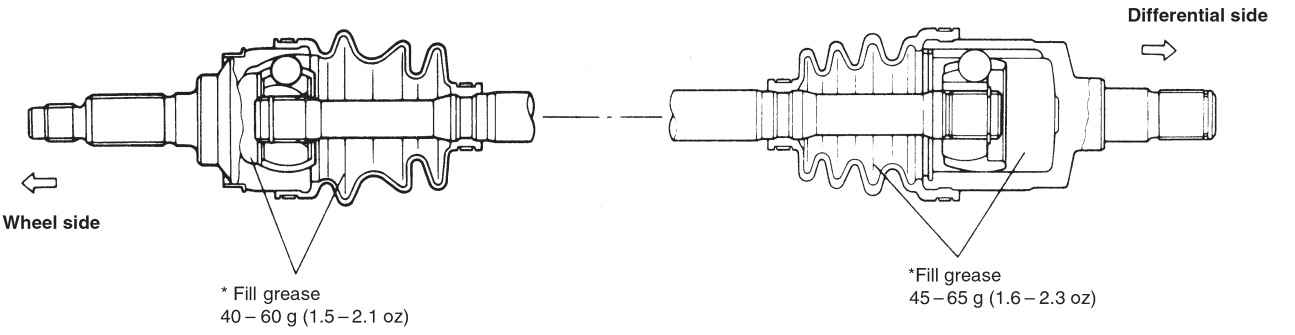
Refer to SECTION 4 "DISASSEMBLY (DRIVE SHAFT)".

INSPECTION

Refer to SECTION 4 "INSPECTION".

REASSEMBLY

Refer to Steps 1) – 8) of SECTION 4 “REASSEMBLY”.
9) fixing boot band.



*Be sure to use grease supplied with spare parts.

TIGHTENING TORQUE SPECIFICATIONS

Fastener	Tightening torque		
	N·m	kg-m	lb-ft
Rear differential gear oil drain plug	25	2.5	18.5
Oil filler and level plug			
Rear control rod outer bolt	90	9.0	65.0
Rear trailing rod rear bolt			
Drive shaft center nut	175	17.5	126.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Differential oil seal lips
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Differential oil drain plug

SECTION 5

BRAKES

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

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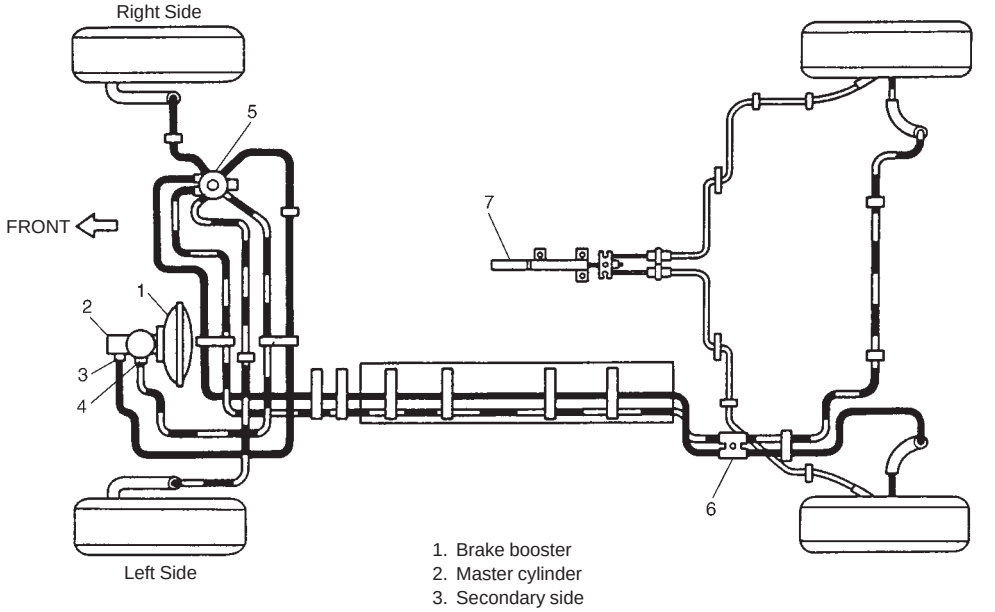
REQUIRED SERVICE MATERIAL 5-89

SPECIAL TOOL 5-90

GENERAL DESCRIPTION

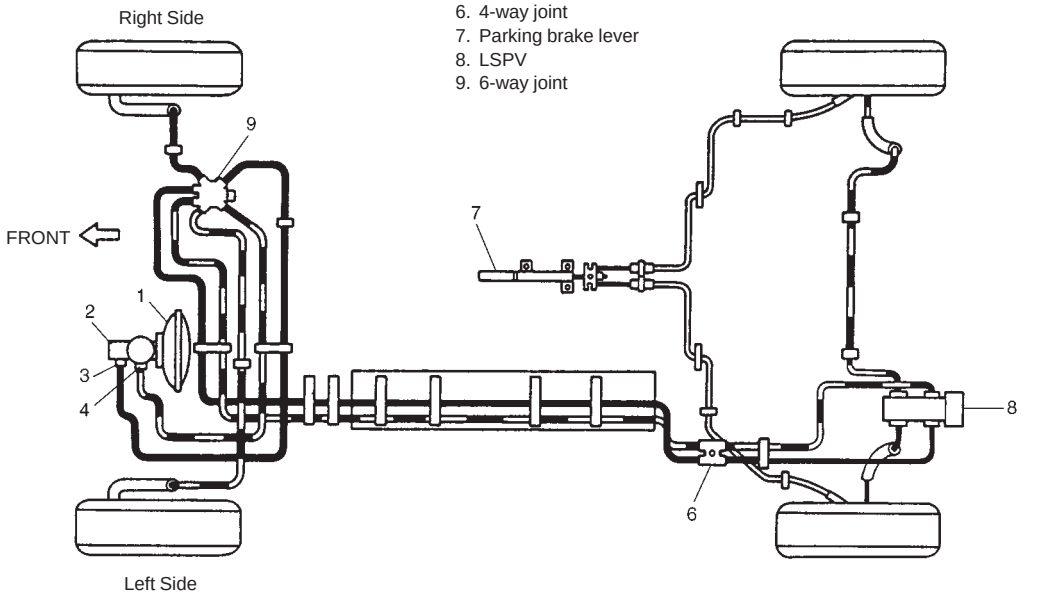
When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and two in rear).
The master cylinder is a tandem master cylinder. The brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right & rear left brakes and the other connects front left & rear right brakes.
The proportioning valve (P valve) or the load sensing proportioning valve (LSPV) is included in these circuits between the master cylinder and rear wheels.
The brake system of this vehicle is: the front brake has a ventilated or solid disc, and the rear brake has either a drum (leading/trailing shoes) or a solid disc.
The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake shoes (for drum rear brake) or pads (for disc rear brake) are used for both parking and foot brakes.

FOR LEFT-HAND STEERING VEHICLES WITHOUT ABS
[For vehicles equipped with P valve]

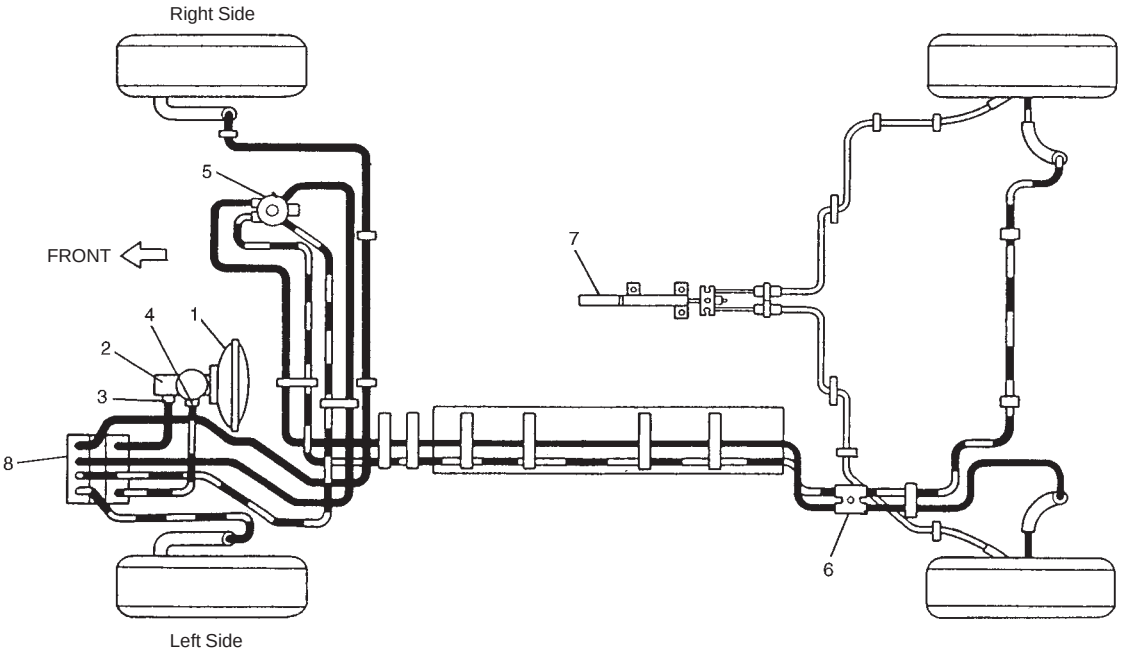


1. Brake booster
2. Master cylinder
3. Secondary side
4. Primary side
5. Proportioning valve
6. 4-way joint
7. Parking brake lever
8. LSPV
9. 6-way joint

[For vehicles equipped with LSPV]

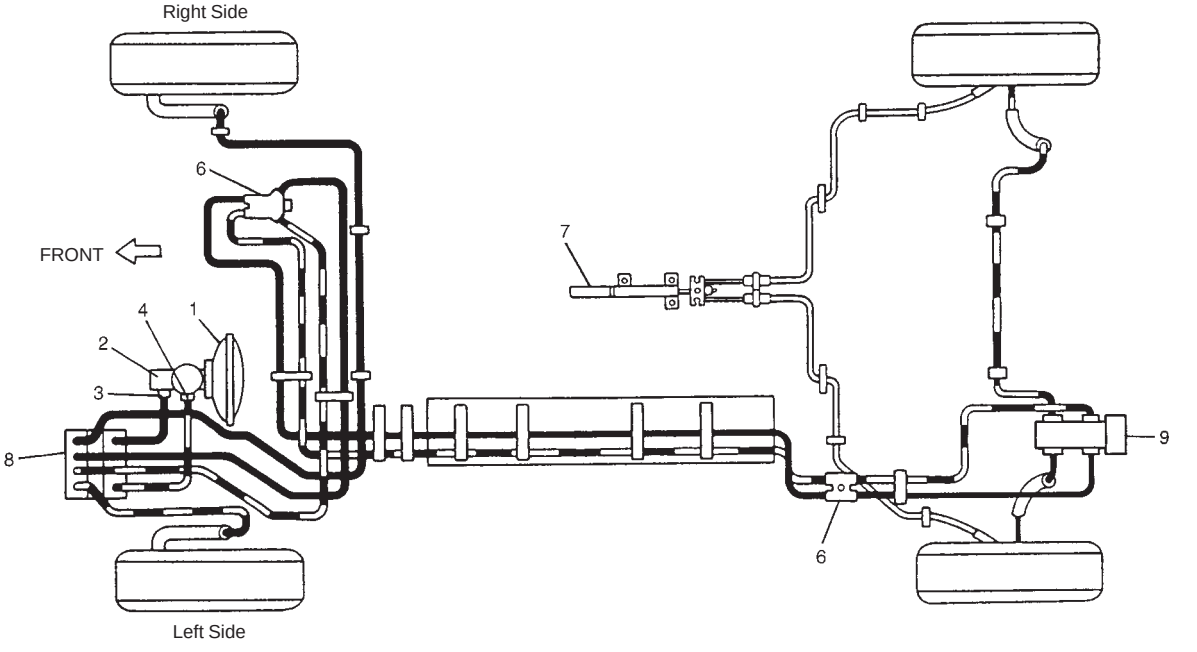


FOR LEFT-HAND STEERING VEHICLES WITH ABS
[For vehicles equipped with P valve]



1. Brake booster
2. Master cylinder
3. Secondary side
4. Primary side
5. Proportioning valve
6. 4-way joint
7. Parking brake lever
8. ABS hydraulic unit (actuator)
9. LSPV

[For vehicles equipped with LSPV]



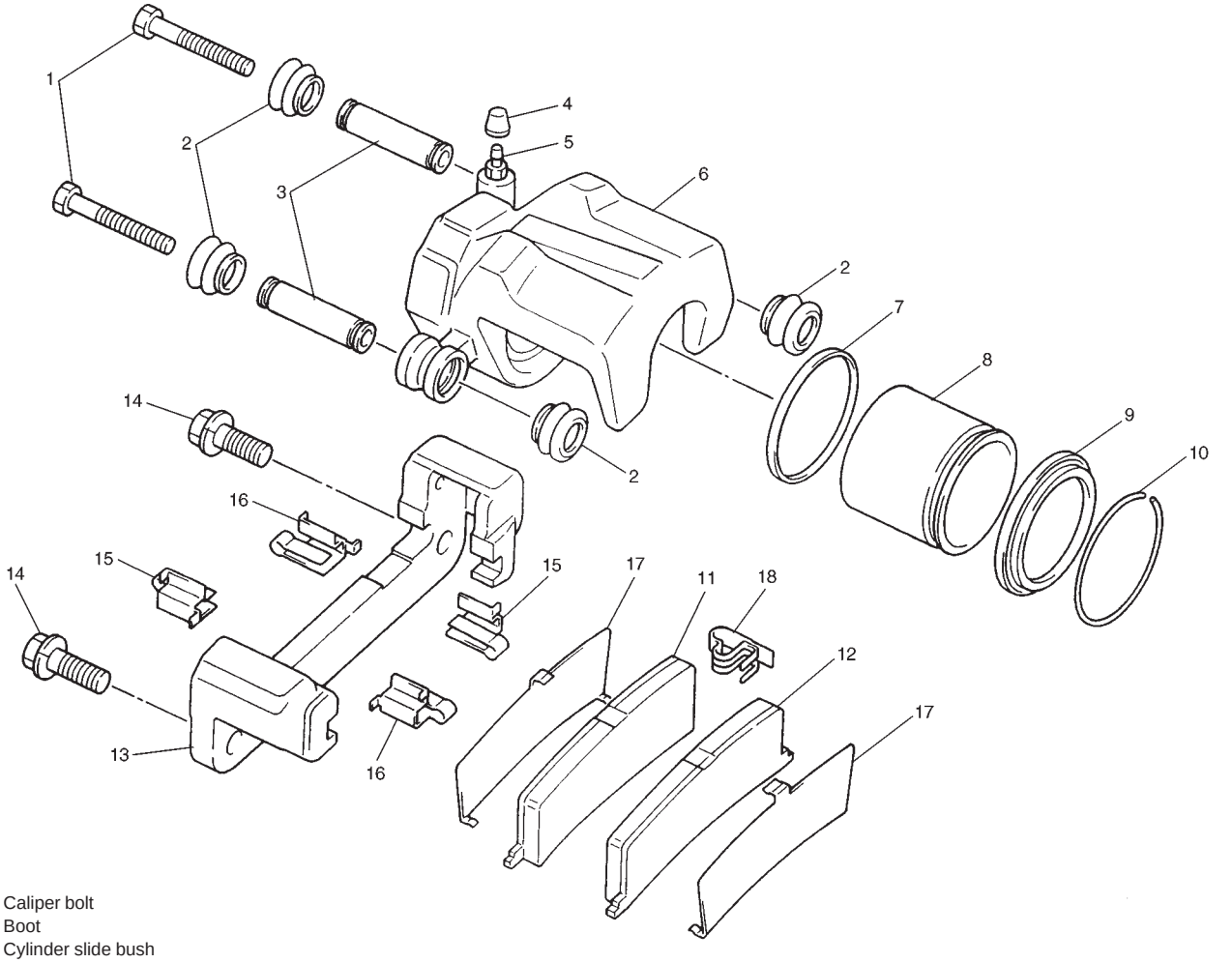
FRONT DISC BRAKE CALIPER ASSEMBLY

This caliper has a single bore. Hydraulic force, created by applying force to the brake pedal, is converted by the caliper to friction. The hydraulic force acts equally against the piston and the bottom of the caliper bore to move the piston outward and to move (slide) the caliper inward, resulting in a clamping action on the disc. This clamping action forces the pads (linings) against the disc, creating friction to stop the vehicle.

NOTE:

Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.

For vehicle equipped with proportioning valve



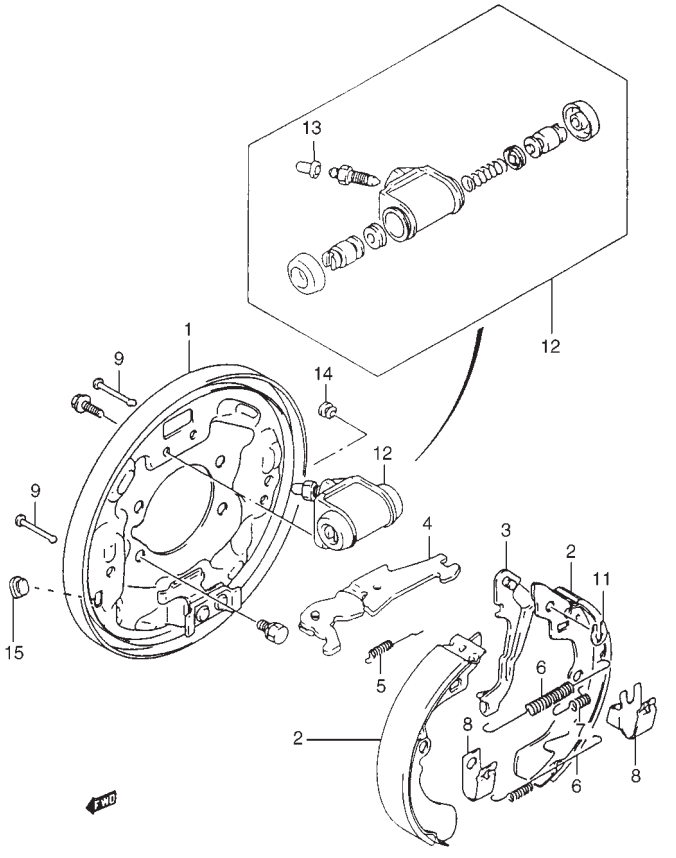
1. Caliper bolt
2. Boot
3. Cylinder slide bush
4. Bleeder plug cap
5. Bleeder plug
6. Disc brake caliper (Disc brake cylinder)
7. Piston seal
8. Disc brake piston
9. Cylinder boot
10. Set ring (boot ring)
11. Disc brake inner pad
12. Disc brake outer pad
13. Brake caliper carrier
14. Carrier bolt
15. Pad support plate No.1
16. Pad support plate No.2
17. Anti-noise shim
18. Pad wear plate (wear indicator)

REAR DRUM BRAKE ASSEMBLY

The drum brake assembly has a self shoe clearance adjusting system so that drum-to-shoe clearance is maintained appropriate at all times.

NOTE:
Replace all components included in repair kits to service this drum brake. Lubricate parts as specified.

WARNING:
If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.



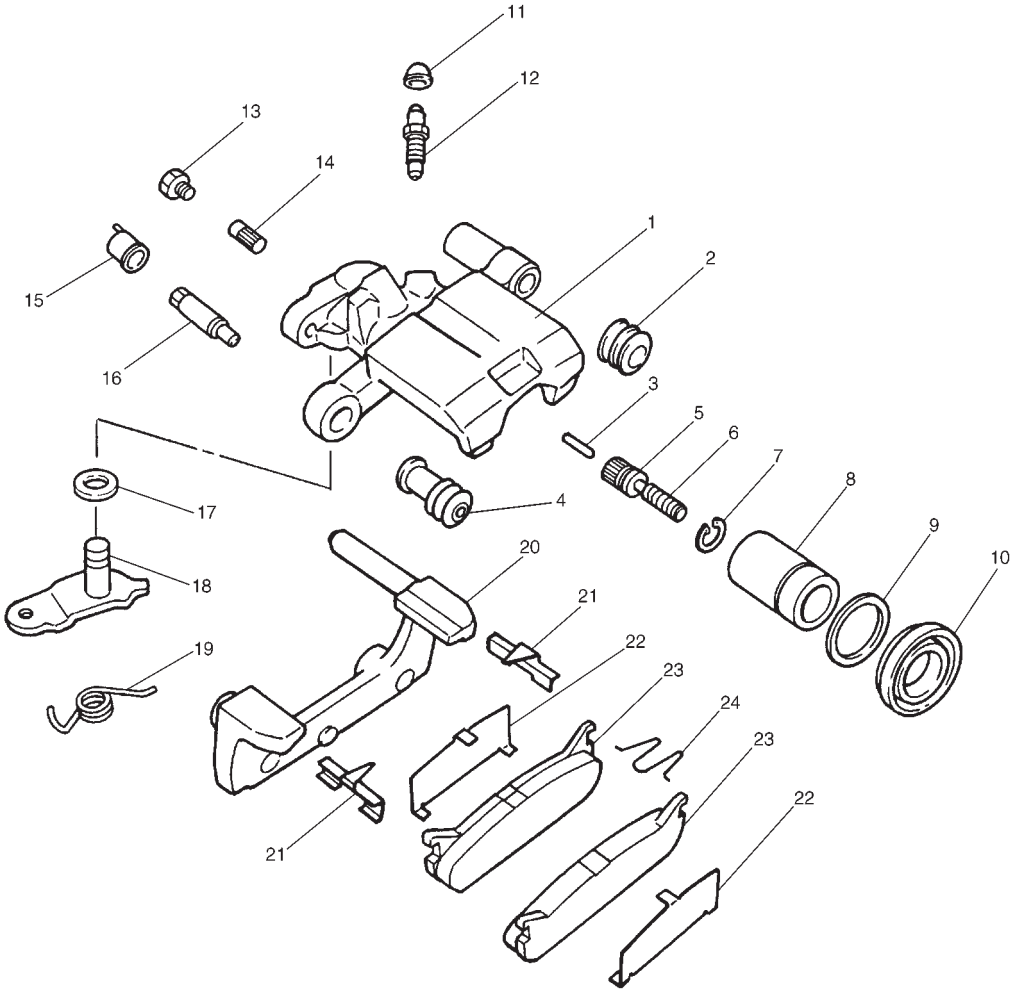
1. Brake back plate
2. Brake shoe
3. Parking brake shoe lever
4. Brake strut
5. Quadrant spring
6. Shoe return spring
7. Antirattle spring
8. Shoe hold down spring
9. Shoe hold down pin
10. Blank
11. Parking lever retainer
12. Wheel cylinder
13. Bleeder plug cap
14. Rubber plug
15. Rubber plug

REAR DISC BRAKE CALIPER ASSEMBLY

This caliper assembly serves for both foot brake and parking brake. It has a single floating piston and a self pad-disc clearance adjusting system which maintains appropriate pad-disc clearance at all time. This caliper assembly also has a manual adjustment gear which ables the adjustment of self pad-disc clearance manually.
The main component of self pad-disc clearance adjusting system is included in the piston, but those components can not be taken out from the piston or can not be disassembled. If in case of replacement, replace them as a piston assembly.
The mechanism of parking brake is very simple. When parking brake lever is pulled in the cabin, the lever at the caliper let the piston push the pad to the disc mechanically and locks the disc.

NOTE:
Replace all components included in repair kits to service this disc brake.
Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.

WARNING:
If any hydraulic component of brake system is removed or any brake line is disconnected, bleed the brake system.



1. Disc brake caliper
2. Guide pin boot
3. Push rod
4. Rubber bush
5. O-ring
6 Adjuster screw
7. Retaining ring
8. Piston ass'y
9. Piston seal
10. Piston boot
11. Bleeder cap
12. Bleeder plug
13. Screw plug ass'y
14. Adjustment gear
15. Guide pin cap
16. Guide pin
17. Lever shaft seal
18. Lever
19. Lever return spring
20. Caliper carrier
21. Antirattle spring
22. Shim
23. Brake pad
24. Pad retract spring

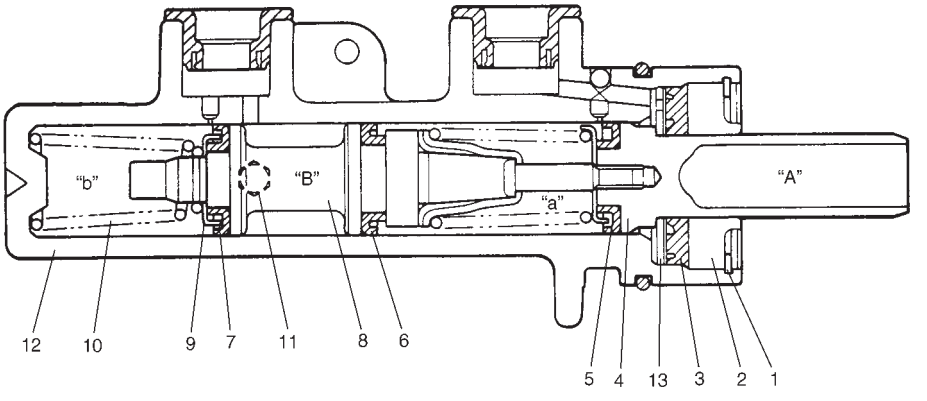
MASTER CYLINDER ASSEMBLY

The master cylinder has two pistons and three piston cups. Its hydraulic pressure is produced in the primary ("a" in the below figure) and secondary ("b") chambers. The hydraulic pressure produced in the primary chamber ("a") acts on left front wheel brake (caliper) and right rear wheel brake (caliper).
Also, the hydraulic pressure produced in the secondary chamber ("b") acts on right front wheel caliper and left rear wheel brake (caliper).

WARNING:
[1.8L engine RH model only]
Brake master cylinder cannot be disassembled. When any part of it other than primary piston as described in CAUTION above has been disassembled, or when anything faulty is found in it, it must be replaced as an assembly.

CAUTION:
- **Replace all components included in repair kits to service this master cylinder. Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.**
- **[1.8L engine RH model only]**
  Brake master cylinder cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir tank and place it back in cylinder.

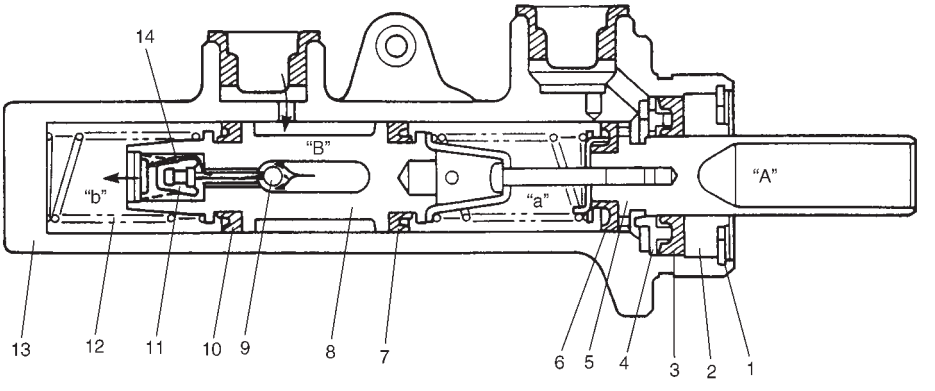
[For vehicles not equipped with ABS]



1. Piston stopper circlip
2. Piston stopper
3. Cylinder cup
4. Primary piston
5. Piston cup
6. Secondary piston pressure cup
7. Piston cup
8. Secondary piston
9. Return spring secondary seat
10. Secondary piston return spring
11. Secondary piston stopper bolt
12. Master cylinder body
13. Plate

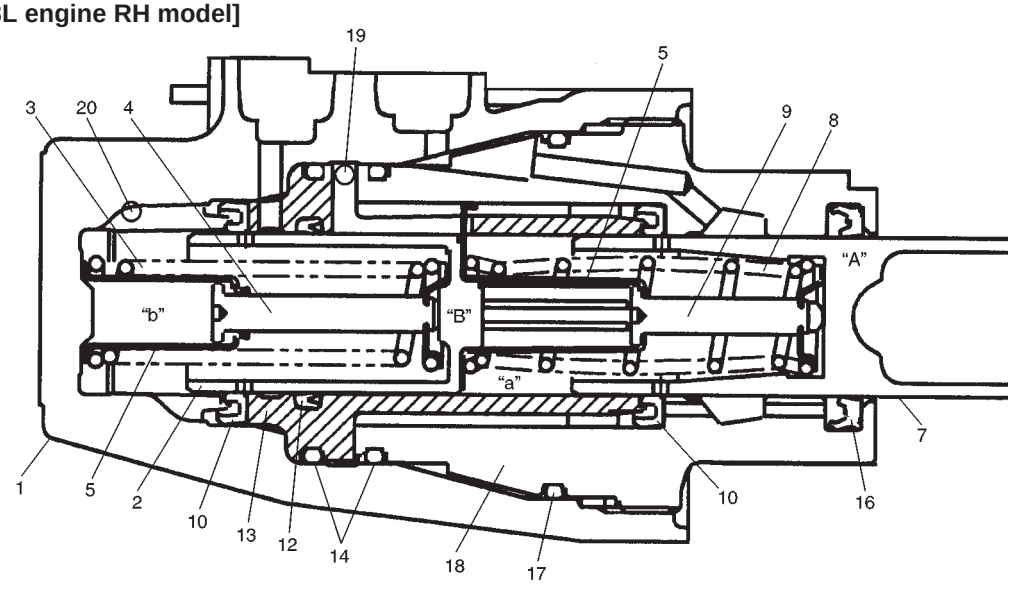
A: Primary piston
B: Secondary piston

[For vehicles equipped with ABS]



1. Piston stopper circlip
2. Piston guide
3. Cup
4. Cup retainer
5. Primary piston
6. Piston cup
7. Secondary piston pressure cup
8. Secondary piston
9. Piston stopper bolt (Supply valve stopper)
10. Piston cup
11. Supply valve
12. Secondary piston return spring
13. Body
14. Fluid flow

[1.8L engine RH model]



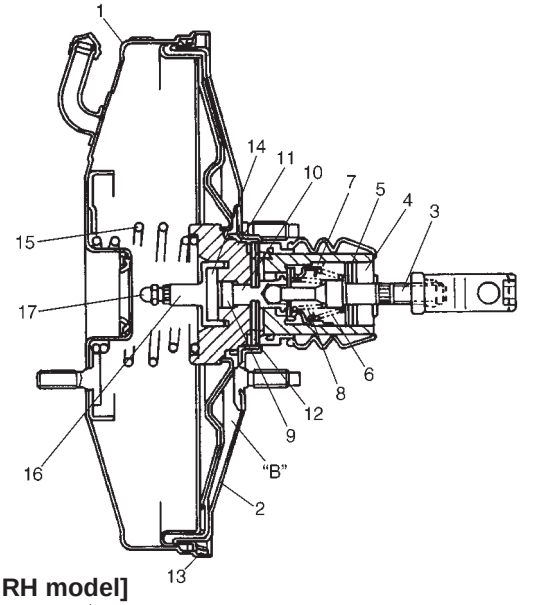
1. Cylinder body
2. Secondary piston
3. Spring
4. Stem
5. Retainer spring
6. Blank
7. Primary piston
8. Spring
9. Stem
10. Packing cup
11. Blank
12. Packing cup
13. Sleeve
14. O-ring
15. Blank
16. Packing cup
17. O-ring
18. Cap
19. To left front caliper and right rear caliper
20. To right front caliper and left rear caliper

BOOSTER ASSEMBLY

The booster is located between the master cylinder and the brake pedal. It is so designed that the force created when the brake pedal is depressed is mechanically increased combined with the engine vacuum. Its operation is as follows.

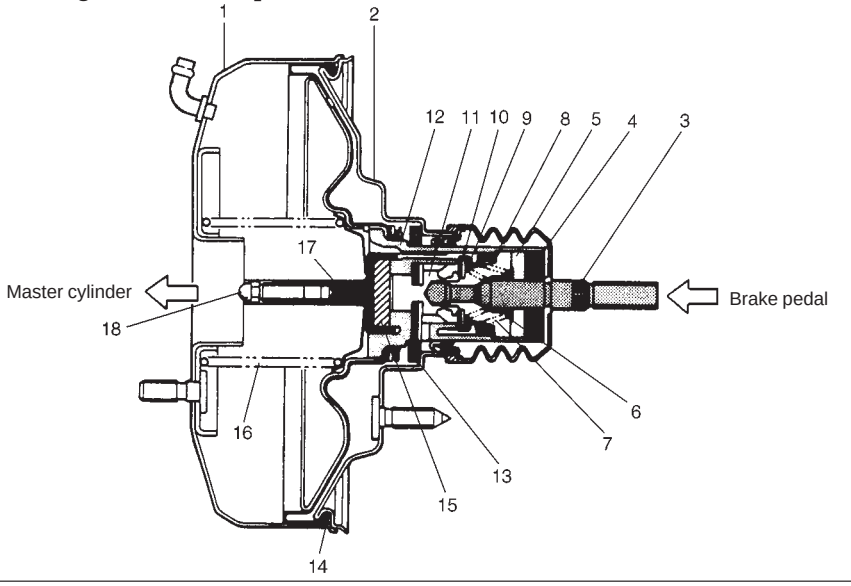
CAUTION:
When and after removing booster, never drop, deform or disassemble it.

[1.8L engine RH model]



1. Booster front shell
2. Booster rear shell
3. Operating rod
4. Air cleaner element
5. Air cleaner separator
6. Valve return spring
7. Popet spring retainer
8. Popet spring
9. Plunger plate
10. Plunger valve
11. Valve body
12. Key
13. Diaphragm
14. Reaction disc
15. Diaphragm return spring
16. Push rod
17. Push rod screw

[Other than 1.8L engine RH model]



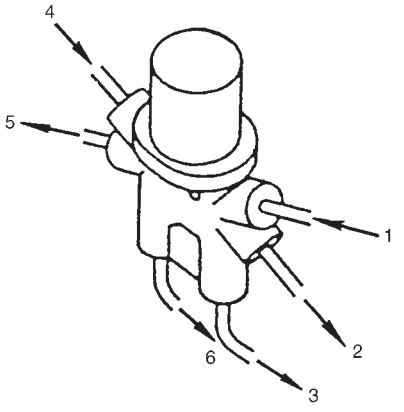
1. Booster No.1 body
2. Booster No.2 body
3. Valve operating rod
4. Air cleaner element
5. Air cleaner separator
6. Air valve spring retainer
7. Air valve return spring
8. Control valve spring retainer
9. Control valve spring
10. Booster control valve
11. Booster air valve
12. Booster piston
13. Valve stopper key
14. Booster diaphragm
15. Reaction disc
16. Booster piston return spring
17. Booster piston rod
18. Booster rod adjust screw

PROPORTIONING VALVE (P VALVE)

The proportioning valve is included within the brake circuit which connects the master cylinder and the wheel brakes. It is installed on dash panel under engine hood and controls the hydraulic pressure applied to the rear wheel brakes after predetermined pressure has been reached.

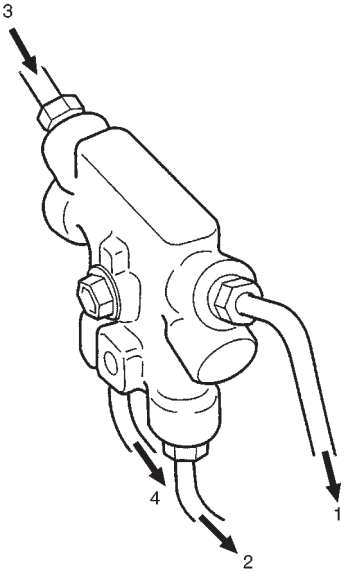
CAUTION:
Never disassemble proportioning valve. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.

[For vehicles not equipped with ABS]



1. From master cylinder (Primary)
2. To left front caliper
3. To right rear wheel cylinder or caliper
4. From master cylinder (Secondary)
5. To right front wheel caliper
6. To left rear wheel cylinder or caliper

[For vehicles equipped with ABS]

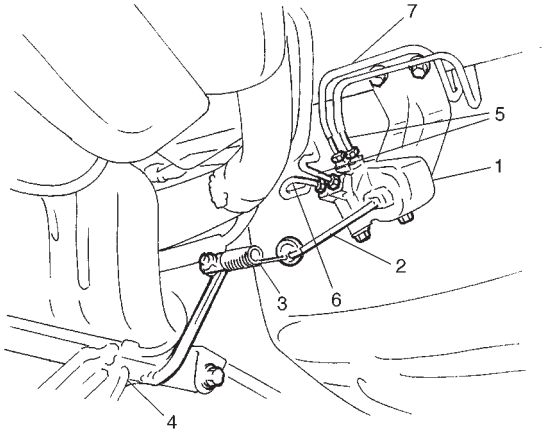


1. From master cylinder (Primary) and ABS hydraulic unit
2. To right rear wheel cylinder
3. From master cylinder (Secondary) and ABS hydraulic unit
4. To left rear wheel cylinder

LSPV (Load Sensing Proportioning Valve) ASSEMBLY

As shown below, LSPV is included within the brake circuit which connects the master cylinder and the rear wheel brake. It controls the hydraulic pressure applied to the rear wheel brake according to the loaded state of the vehicle (or weight of the load), whereby preventing the rear wheels from getting locked prematurely.
Also, LSPV has a sensor and such a structure as to control hydraulic pressure through its two systems (right & left rear brakes).

CAUTION:
Never disassemble LSPV. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.



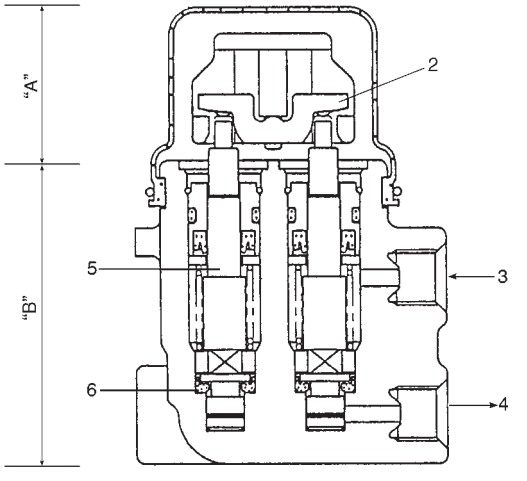
1. LSPV
2. LSPV lever
3. Spring
4. Control rod with LSPV stay
5. From master cylinder
6. To rear wheel cylinder or caliper (right side)
7. To rear wheel cylinder or caliper (left side)

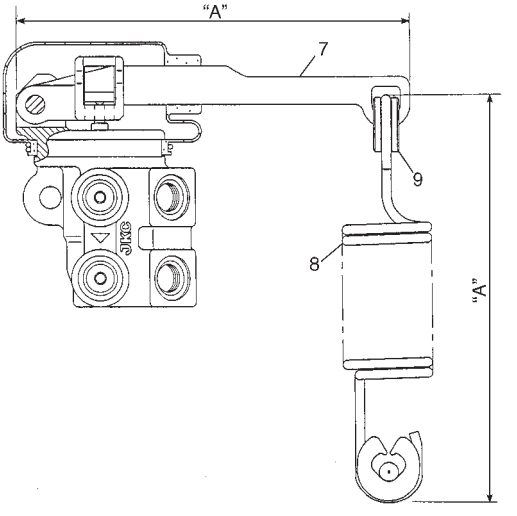
CONSTRUCTION

The LSPV components are grouped into two sections as follows.

"A": Sensor section
The main parts in this section are a lever and a spring which senses variation of the vehicle's height as affected by the loaded condition and converts it into the load.

"B": Hydraulic pressure control section
Included in this section are a plunger and valve mechanism to execute proportional control.





1. Blank
2. Equalizer
3. From master cylinder
4. To rear wheel brake
5. Plunger
6. Valve
7. LSPV lever
8. Sensor spring
9. Collar

"A": Sensor section
"B": Hydraulic pressure control section

DIAGNOSIS

ROAD TESTING BRAKES

Brakes should be tested on dry, clean, smooth and reasonably level roadway which is not crowned. Road test brakes by making brake applications with both light and heavy pedal forces at various speeds to determine if the vehicle stops evenly and effectively.
Also drive vehicle to see if it leads to one side or the other without brake application. If it does, check the tire pressure, front end alignment and front suspension attachments for looseness. See diagnosis chart for other causes.

BRAKE FLUID LEAKS

Check the master cylinder fluid levels. While a slight drop in reservoir level does result from normal lining wear, an abnormally low level indicates a leak in the system. In such a case, check the entire brake system for leakage. If even a slight evidence of leakage is noted, the cause should be corrected or defective parts should be replaced.

SUBSTANDARD OR CONTAMINATED BRAKE FLUID

Improper brake fluid, mineral oil or water in the fluid may cause the brake fluid to boil or the rubber components in the hydraulic system to deteriorate.

If primary piston cups are swollen, then rubber parts have deteriorated. This deterioration may also be evidenced by swollen wheel cylinder piston cups on the drum brake wheels.

If deterioration of rubber is evident, disassemble all hydraulic parts and wash with alcohol. Dry these parts with compressed air before assembly to keep alcohol out of the system. Replace all rubber parts in the system, including hoses. Also, when working on the brake mechanisms, check for fluid on the linings. If excessive fluid is found, replace the pads.

If master cylinder piston seals are satisfactory, check for leakage or excessive heat conditions. If condition is not found, drain fluid, flush with brake fluid, refill and bleed system.

The system must be flushed if there is any doubt as to the grade of fluid in the system or if fluid has been used which contained parts that have been subjected to contaminated fluid.

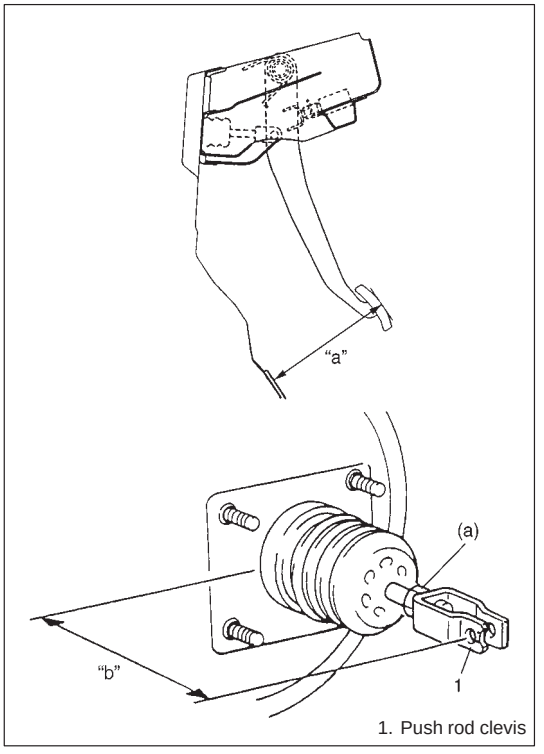
BRAKE DIAGNOSIS CHART A		
Condition	**Possible Cause**	**Correction**
Not enough braking force	○ Brake oil leakage from brake lines.	Locate leaking point and repair.
	○ Brake disc or pads stained with oil.	Clean or replace.
	○ Overheated brakes.	Determine cause and repair.
	○ Poor contact of shoes on brake drum, if equipped.	Repair for proper contact.
	○ Brake shoes linings stained with oil or wet with water, if equipped.	Replace.
	○ Badly worn brake pad linings.	Replace.
	○ Defective wheel cylinder, if equipped.	Repair or replace.
	○ Malfunctioning caliper assembly.	Repair or replace.
	○ Air in system.	Bleed system.
	○ Maladjusted sensor spring length of LSPV, if equipped.	Check or adjust.
	○ Broken sensor spring of LSPV, if equipped.	Replace.
	○ Defective collar of LSPV, if equipped.	Replace.
	○ Malfunctioning ABS (Anti-Lock Brake System), if equipped.	Consult “ABS HYDRAULIC UNIT OPERATION CHECK” in Section 5B.
Brake pull (Brakes not working in unison)	○ Pad linings and/or shoe linings are wet with water or stained with oil in some brakes.	Replace.
	○ Drum-to-shoe clearance out of adjustment in some brakes, if equipped. (Malfunctioning auto adjusting mechanism)	Check for inoperative auto adjusting mechanism.
	○ Disc and/or drum is out of round in some brakes.	Replace.
	○ Tires are inflated unequally.	Inflate equally.
	○ Malfunctioning caliper pistons and/or wheel cylinders.	Repair or replace.
	○ Disturbed front end alignment.	Adjust as prescribed.
	○ Unmatched tires on same axle.	Tires with approximately the same amount of tread should be used on the same axle.
	○ Restricted brake pipes or hoses.	Check for soft hoses and damaged lines. Replace with new hoses and new double-walled steel brake tubing.
	○ Malfunctioning caliper assembly.	Check for stuck or sluggish pistons and proper lubrication of caliper slide bush. Caliper should side.
	○ Loose suspension parts.	Check all suspension mountings.
	○ Loose calipers.	Check and torque bolts to specifications.

BRAKE DIAGNOSIS CHART A		
Condition	**Possible Cause**	**Correction**
Noise (high pitched squeak without brake applied)	○ Front lining worn out.	Replace linings.
Rear brake locked prematurely	○ Maladjusted sensor spring length of LSPV, if equipped. ○ Malfunctioning LSPV assembly, if equipped.	Check or adjust. Replace assembly.
Brake locks (For vehicles equipped with ABS)	○ Malfunctioning ABS, if equipped.	Consult “ABS HYDRAULIC UNIT OPERATION CHECK” in Section 5B.

BRAKE DIAGNOSIS CHART B		
Condition	**Possible Cause**	**Correction**
Excessive pedal travel (Pedal stroke too large)	○ Partial brake system failure.	Check brake systems and repair as necessary.
	○ Insufficient fluid in master cylinder reservoirs.	Fill reservoirs with approved brake fluid. Check for leaks and air in brake systems. Check warning light. Bleed system if required.
	○ Air in system (pedal soft/spongy).	Bleed system.
	○ Rear brake system not adjusted (malfunctioning auto adjusting mechanism) (For vehicles with rear drum brake).	Repair auto adjusting mechanism. Adjust rear brakes.
	○ Bend brake shoes (For vehicles with rear drum brake).	Replace brake shoes.
	○ Worn rear brake shoes (For vehicles with rear drum brake).	Replace brake shoes.
	○ Worn rear brake pad (For vehicles with rear disc brake).	Replace brake pad.
Dragging brakes (A very light drag is present in all brakes immediately after pedal is released)	○ Master cylinder pistons not returning correctly.	Repair master cylinder. (For LH steering vehicle) Replace master cylinder. (For RH steering vehicle)
	○ Restricted brake pipes or hoses.	Check for soft hoses or damaged pipes and replace with new hoses and/or new double-walled steel brake piping.
	○ Incorrect parking brake adjustment on rear brakes.	Check and adjust to correct specifications.
	○ Weakened or broken return springs in the brake (For vehicles with rear drum brake).	Replace.
	○ Sluggish parking-brake cables or linkage.	Repair or replace.
	○ Wheel cylinder or caliper piston sticking.	Repair as necessary.
	○ Badly worn piston seal in the caliper.	Replace piston seal.
	○ Malfunctioning ABS (if equipped).	Consult “ABS HYDRAULIC UNIT OPERATION CHECK” in Section 5B.

BRAKE DIAGNOSIS CHART B		
Condition	**Possible Cause**	**Correction**
Pedal pulsation (Pedal pulsates when depressed for braking.)	○ Damaged or loose wheel bearings.	Replace wheel bearings.
	○ Distorted steering knuckle or rear wheel spindle.	Replace knuckle or rear wheel spindle.
	○ Excessive disc lateral runout.	Check per instructions. If not within specifications, replace or machine the disc.
	○ Parallelism not within specifications.	Check per instructions. If not within specifications, replace or machine the disc.
	○ Rear drums out of round (For vehicles equipped with rear drum brake).	Check runout. Repair or replace drum as necessary.
NOTE: **For vehicle equipped with ABS, pulsation of fluid pressure may be felt through brake pedal while ABS is being operated. But it does not indicate any abnormality.**		
Braking noise	○ Glazed shoe linings, or foreign matters stuck to linings.	Repair or replace shoe linings.
	○ Worn or distorted shoe linings.	Replace shoe linings (or pads).
	○ Loose front wheel bearings.	Replace wheel bearing.
	○ Distorted backing plates or loose mounting bolts.	Replace or retighten securing bolts.

BRAKE DIAGNOSIS CHART C		
Condition	**Possible Cause**	**Correction**
Brake warning light lights after engine start	○ Parking brake applied.	Release parking brake and check if brake warning light turns off.
	○ Insufficient amount of brake fluid.	Add brake fluid.
	○ Brake fluid leaking from brake line.	Investigate leaky point, correct it and add brake fluid.
	○ Brake warning light circuit faulty.	Repair circuit.
Brake warning light turns on when brake is applied	○ Brake fluid leaking from brake line.	Investigate leaky point, correct it and add brake fluid.
	○ Insufficient amount of brake fluid.	Add brake fluid.
Brake warning light fails to turn on even when parking brake is applied	○ Brake warning light circuit faulty.	Replace bulb or repair circuit.
ABS warning light does not turn on for 2 sec. after ignition switch turns on	○ Bulb burnt out.	Check system referring to “DIAGNOSIS” in Section 5B.
	○ ABS warning light circuit open.	Check system referring to “DIAGNOSIS” in Section 5B.
	○ Malfunctioning ABS.	Check system referring to “DIAGNOSIS” in Section 5B.
ABS warning light remains on after ignition switch turns on for 2 sec.	○ Malfunctioning ABS.	Check system referring to “DIAGNOSIS” in Section 5B.



1. Push rod clevis

ON-VEHICLE SERVICE

BRAKE PEDAL FREE HEIGHT ADJUSTMENT

Check brake pedal free height.
If it is not within specification, check and adjust the following item 1) and 2).

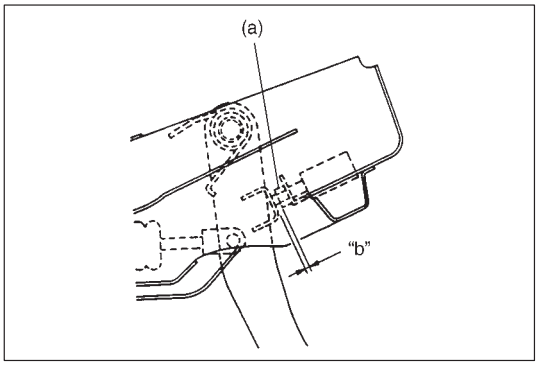
Brake pedal free height "a"
from asphalt sheet : 157 – 167 mm (6.18 – 6.57 in.)

1) Check measurement between booster mounting surface and center of clevis pin hole. when booster push rod clevis has been reinstalled, it is important that the measurement is adjusted.

   Length "b": 114.5 – 115.5 mm (4.51 – 4.55 in.)

   Tightening Torque
   (a): 25 N·m (2.5 kg-m, 18.5 lb-ft)

2) Check stop light switch position. Adjust it if it is out of specification.

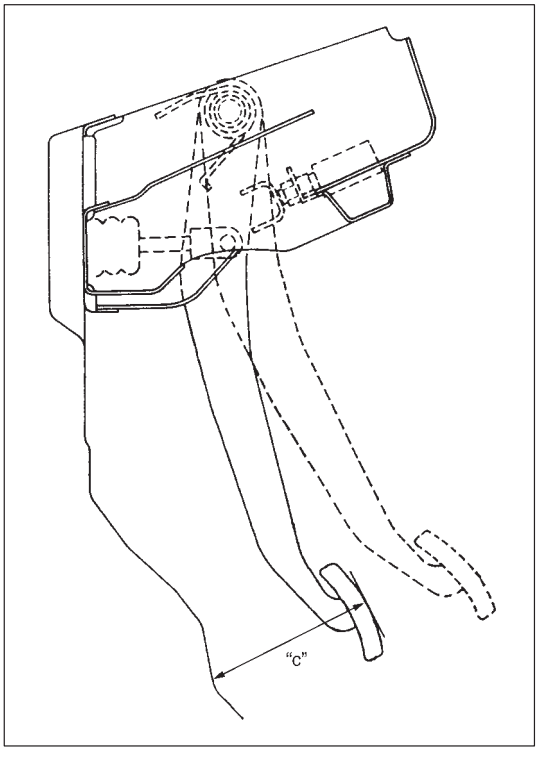


STOP LIGHT SWITCH ADJUSTMENT

Adjustment should be made as follows when installing switch.
Pull up brake pedal toward you and while holding it there, adjust switch position so that clearance between end of thread and brake pedal is specified. Then tighten lock nut to specified torque.

Clearance "b": 1.5 – 2.0 mm (0.06 – 0.08 in.)

Tightening Torque
(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)



EXCESSIVE PEDAL TRAVEL CHECK

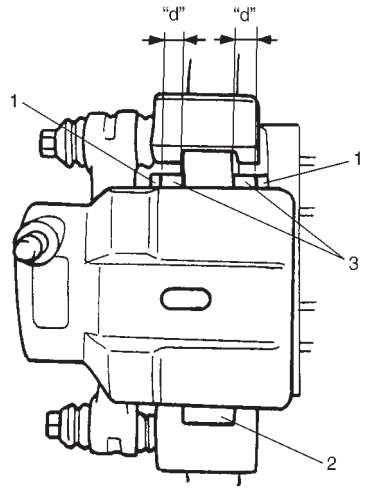
1) Start engine.
2) Depress brake pedal a few times.
3) With brake pedal depressed with approximately 30 kg (66 lbs) load, measure brake pedal to wall clearance "c".

   Clearance "c": Over 80 mm (3.15 in.)

4) If clearance "c" is less than specification, the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines.
   Should clearance "c" remain less than specification even after replacement of brake shoes and bleeding of system, other possible but infrequent cause is malfunction of rear brake shoe adjusters or booster push rod length out of adjustment.
   ○ See "BLEEDING BRAKES" in this section.
   ○ Remove brake drums for adjuster inspection. (See "DRUM AND COMPONENTS" in this section.) If defective, correct or replace.

FRONT BRAKE DISC INSPECTION

Refer to “FRONT DISC BRAKE INSPECTION” in this section for inspection point and procedure.

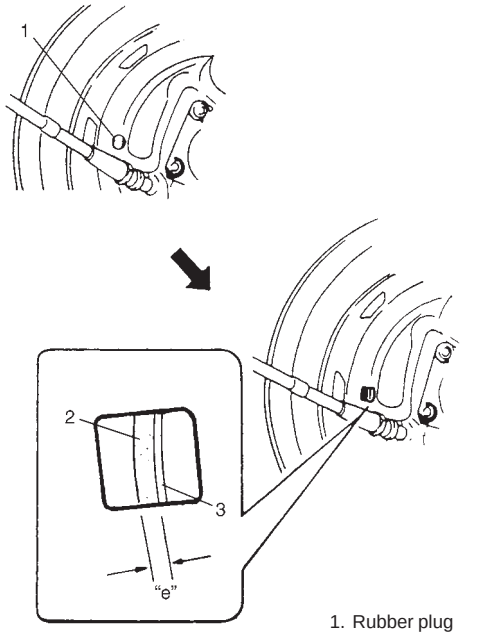


1. Pad rim
2. Disc
3. Lining

FRONT BRAKE PAD LINING INSPECTION

Inspect pad linings periodically according to maintenance schedule whenever wheels are removed (for tire rotation or other reason). Take a look through each end (or hole) of caliper and check lining thickness of outside and inside pads.
If lining is worn and its thickness (“d” in figure) is less than limit, all pads must be replaced at the same time.

Thickness “d”
Service limit: 1.0 mm (0.04 in.)



1. Rubber plug
2. Brake lining
3. Brake shoe rim

REAR BRAKE SHOE INSPECTION

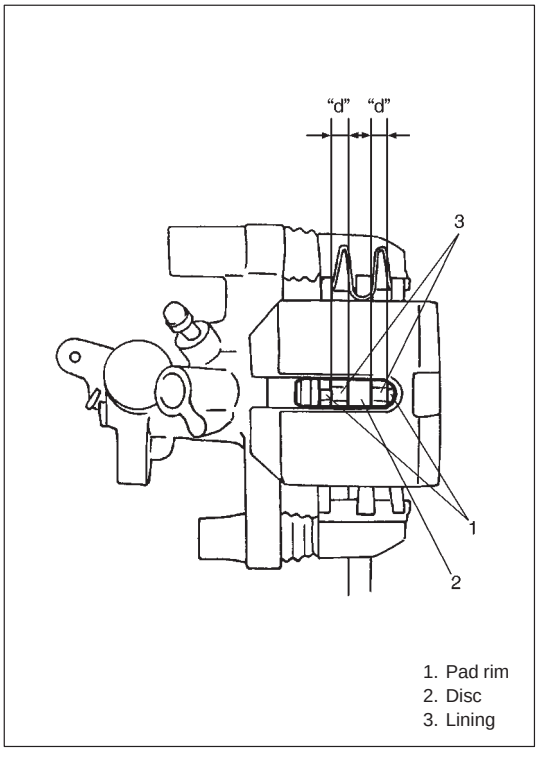
Inspection should be carried out on following points after brake pedal travel (pedal to wall clearance) check, even when pedal travel is normal.
Amount of brake shoe wear can be checked as follows.

1) Hoist vehicle.
2) Remove rubber plug from brake back plate.
3) Through hole of back plate, visually check for thickness of brake shoe lining. If lining thickness “e” is found less than limit, replace all shoes with new ones at the same time.

   Thickness “e”
   Service limit: 1.0 mm (0.04 in.)

REAR BRAKE DISC INSPECTION

Refer to “REAR DISC BRAKE INSPECTION” in this section for inspection point and procedure.

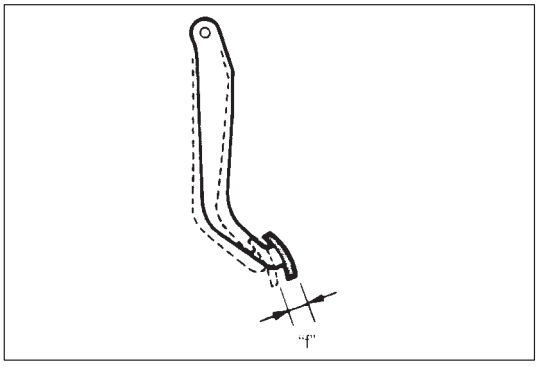


1. Pad rim
2. Disc
3. Lining

REAR BRAKE PAD LINING INSPECTION

Inspect pad linings periodically according to maintenance schedule whenever wheels are removed (for tire rotation or other reason). Take a look through the hole of caliper and check lining thickness of outside and inside pads.
If lining is worn and its thickness (“d” in figure) is less than limit, all pads must be replaced at the same time.

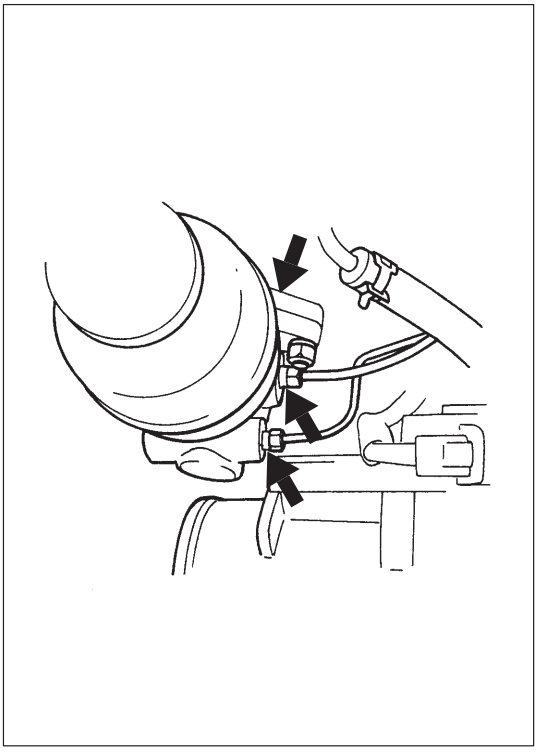
Thickness “d”
Service limit: 1.0 mm (0.04 in.)



BRAKE PEDAL PLAY INSPECTION

Pedal play should be within specification below.
If out of specification, check stop light switch for proper installation position and adjust if necessary.
Also check pedal shaft bolt and master cylinder pin installation for looseness and replace if defective.

Pedal play “f”: 1 – 8 mm (0.04 – 0.31 in.)



MASTER CYLINDER INSPECTION

[For 1.8L engine RH model]

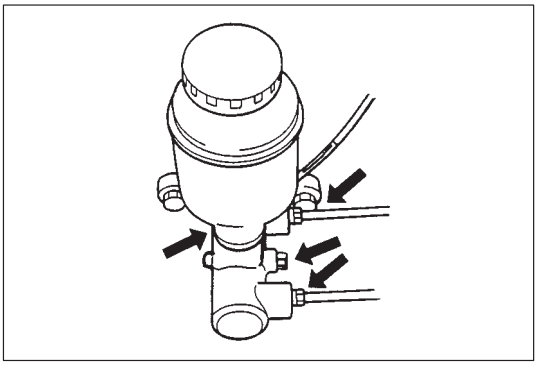
Check for a cracked master cylinder casting or brake fluid around the master cylinder. Leaks are indicated only if there is at least a drop of fluid. A damp condition is not abnormal.

CAUTION:

- **Brake master cylinder cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir tank and place it back in cylinder.**
- **Don't make as flaws and hitted marks on the piston, on which vacuum seal slides.**

WARNING:

Brake master cylinder cannot be disassembled. When any part of it other than primary piston as described in CAUTION above has been disassembled, or when anything faulty is found in it, it must be replaced as an assembly.



[Other than 1.8L engine RH model]

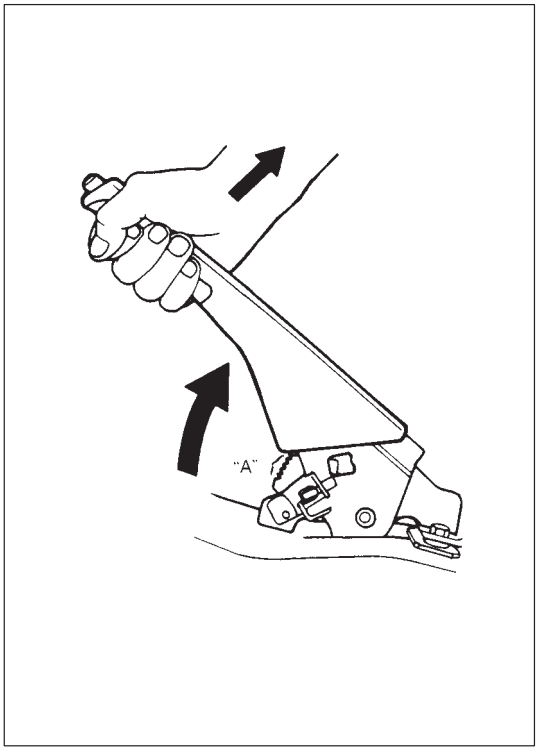
Check for a cracked master cylinder casting or brake fluid around the master cylinder. Leaks are indicated only if there is at least a drop of fluid. A damp condition is not normal.

REAR DRUM BRAKE SHOE ADJUSTMENT

Rear brake has self-adjusting mechanism but it does require adjustment for proper drum to shoe clearance when brake shoe has been replaced or brake drum has been removed for some other service.

Adjustment is automatically accomplished by depressing brake pedal 3 to 5 times with approximately 30 kg (66 lbs) load after all parts are installed.

Then check brake drum for dragging and brake system for proper performance. After lowering vehicle from hoist, brake test should be performed.



PARKING BRAKE INSPECTION AND ADJUSTMENT

a) Inspection

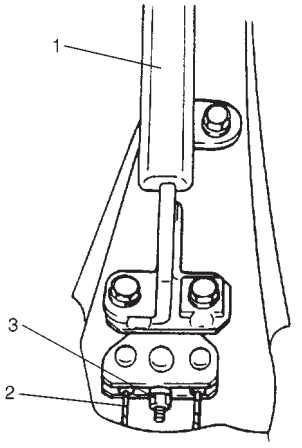
Hold center parking brake lever grip and pull it up.

Pulling force: 20 – 25 kg (44 – 55 lbs)
(for vehicles with drum brake)
10 – 15 kg (22 – 30 lbs)
(for vehicles with disc brake)

With parking brake lever pulled up as above, count ratchet notches in "A" as shown in figure.
There should be 3 to 5 notches.
Also, check if both right and left rear wheels are locked firmly.
To count number of notches easily, listen to click sounds that ratchet makes while pulling parking brake lever without pressing its button.
One click sound corresponds to one notch.

If number of notches is out of specification, adjust cable by referring to adjustment procedure described on the following step b) so as to obtain specified parking brake stroke.

NOTE:
Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking brake lever.



1. Parking brake lever
2. Brake cable
3. Self locking nut

b) Adjustment

NOTE:
Make sure for following conditions before cable adjustment.

- ○ **No air is trapped in brake system.**
- ○ **Brake pedal travel is proper.**
- ○ **Brake pedal has been depressed a few times with about 30 kg (66 lbs) load.**
- ○ **Parking brake lever has been pulled up few times.**

Pulling force: 20 – 25 kg (44 – 55 lbs)
(for vehicles with drum brake)
10 – 15 kg (22 – 30 lbs)
(for vehicles with disc brake)

- ○ **Rear brake pads are not worn out beyond limit.**

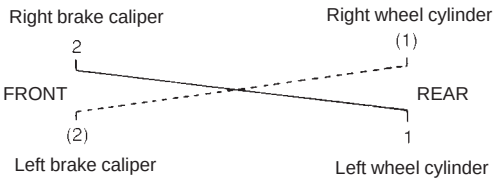
After confirming that above 5 conditions are all satisfied, adjust parking brake lever stroke by loosening or tightening self locking nut (3 in figure).

NOTE:
Check brake pads for dragging after adjustment.

Parking brake stroke: when lever is pulled up. **Pulling force:** **20 – 25 kg (44 – 55 lbs)** **(for vehicles with drum brake)** **10 – 15 kg (22 – 30 lbs)** **(for vehicles with disc brake)**	Within 3 – 5 notches

FLUSHING BRAKE HYDRAULIC SYSTEM

It is recommended that entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in hydraulic system.
Periodical change of brake fluid is also recommended.

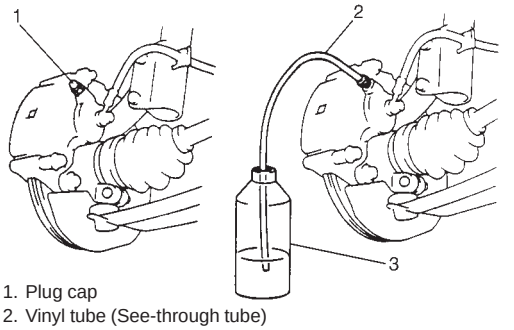


BLEEDING BRAKES

CAUTION:
Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

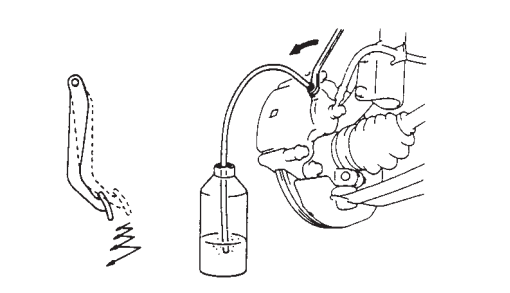
Bleeding operation is necessary to remove air whenever it entered hydraulic brake system.
Hydraulic lines of brake system are based on the diagonal split system. When a brake pipe or hose was disconnected at the wheel, bleeding operation must be performed at both ends of the line of the removed pipe or hose. When any joint part of the master cylinder or other joint part between the master cylinder and each brake (wheel) was removed, the hydraulic brake system must be bled at all 4 wheel brakes.

NOTE:
Perform bleeding operation starting with wheel cylinder farthest from master cylinder and then at front caliper of the same brake line. Do the same on the other brake line.

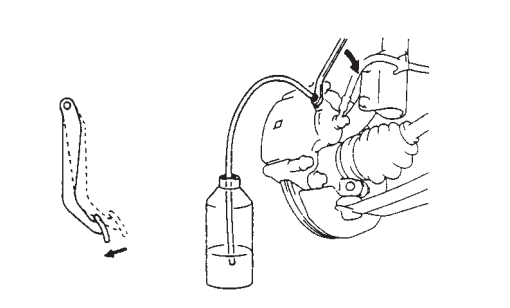


1. Plug cap
2. Vinyl tube (See-through tube)
3. Container

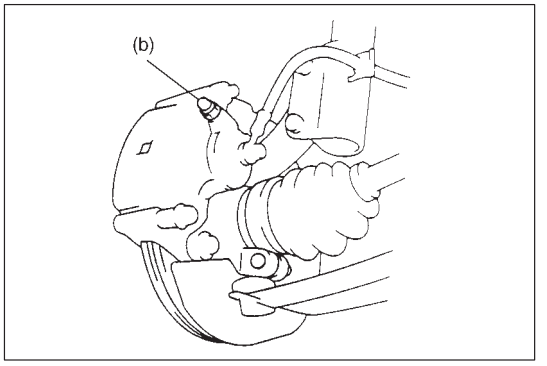
1) Fill master cylinder reservoir with brake fluid and keep at least one-half full of fluid during bleeding operation.
2) Remove bleeder plug cap.
   Attach a vinyl tube to bleeder plug, and insert the other end into container.


Depress brake pedal several times and with pedal depressed, loosen bleeder plug a little.

3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one-half turn.


With brake pedal depressed, retighten bleeder plug.

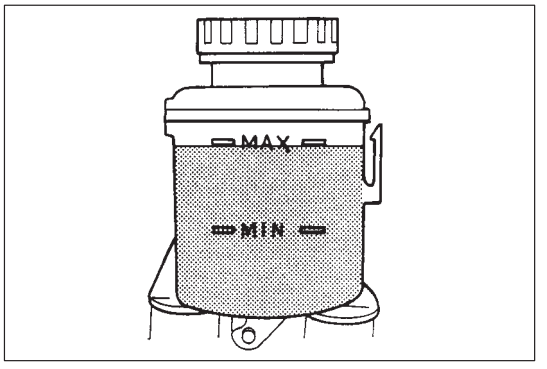
4) When fluid pressure in the cylinder is almost depleted, retighten bleeder plug.
5) Repeat this operation until there are no more air bubbles in hydraulic line.



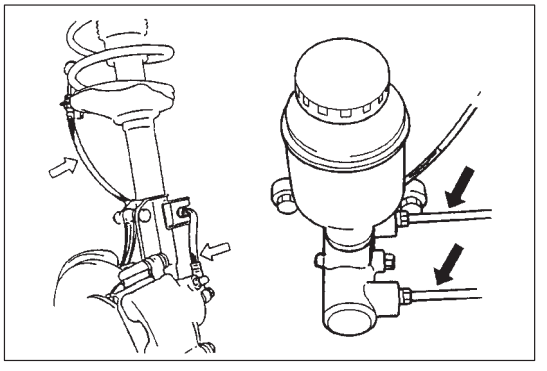
6) When bubbles stop, depress and hold brake pedal and tighten bleeder plug.

Tightening Torque
(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)

7) Then attach bleeder plug cap.
8) After completing bleeding operation, apply fluid pressure to pipe line and check for leakage.



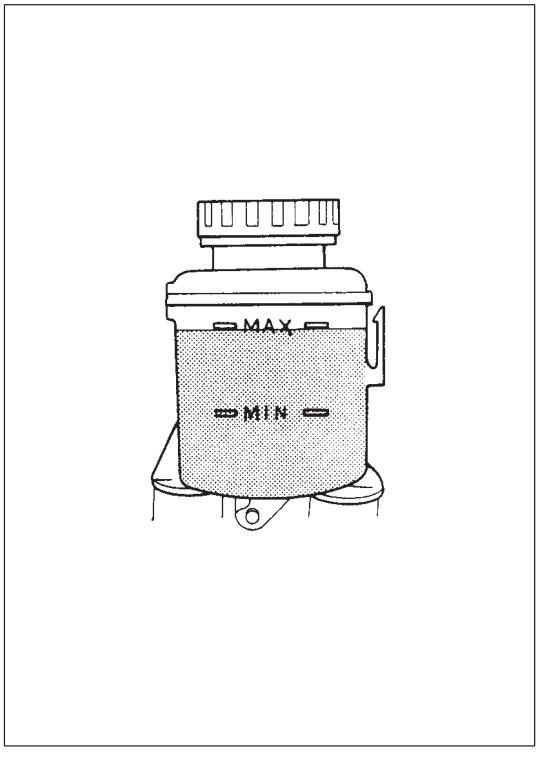
9) Replenish fluid into reservoir up to specified level.
10) Check brake pedal for “sponginess”. If found spongy, repeat entire procedure of bleeding.



BRAKE HOSE AND PIPE INSPECTION

The brake hose assembly should be checked for road hazard damage, for cracks and chafing of the outer cover, for leaks and blisters. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hose, it is necessary to replace it.

Inspect the pipe for damage, cracks, dents and corrosion. If any defect is found, replace it.



BRAKE FLUID LEVEL INSPECTION

Be sure to use particular brake fluid either as indicated on reservoir cap of that vehicle or recommended in owner’s manual which comes along with that vehicle.
Use of any other fluid is strictly prohibited.
Fluid level should be between MIN and MAX lines marked on reservoir.
When warning light lights sometimes during driving, replenish fluid to MAX line.
When fluid decreases quickly, inspect brake system for leakage. Correct leaky points and then refill to specified level.

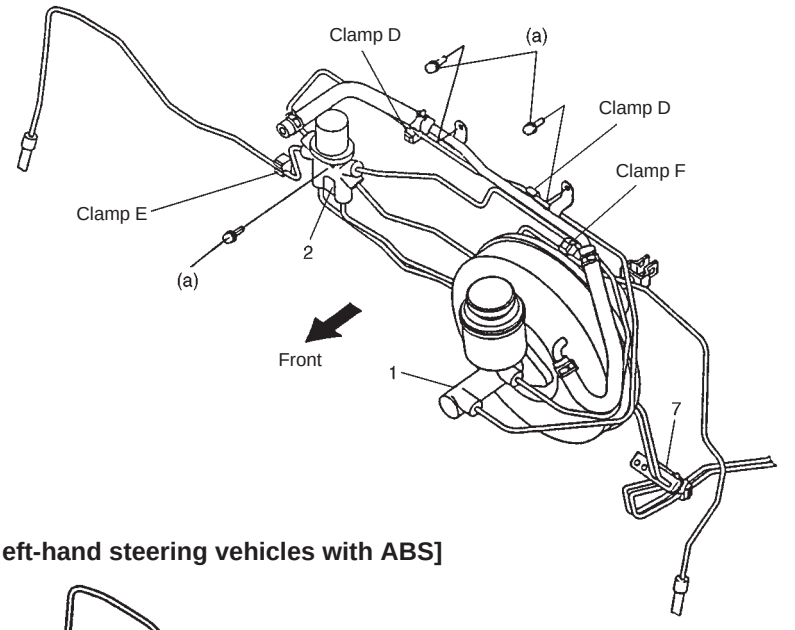
CAUTION:
Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic brake system and water mixed into brake fluid will lower fluid boiling point. Keep all fluid containers capped to prevent contamination.

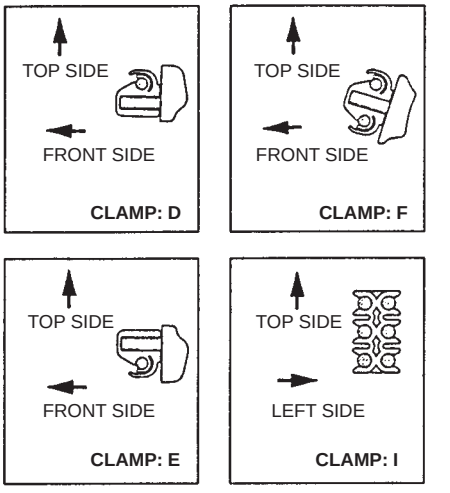
BRAKE HOSE/PIPE

REMOVE AND INSTALL FRONT BRAKE HOSE/PIPE

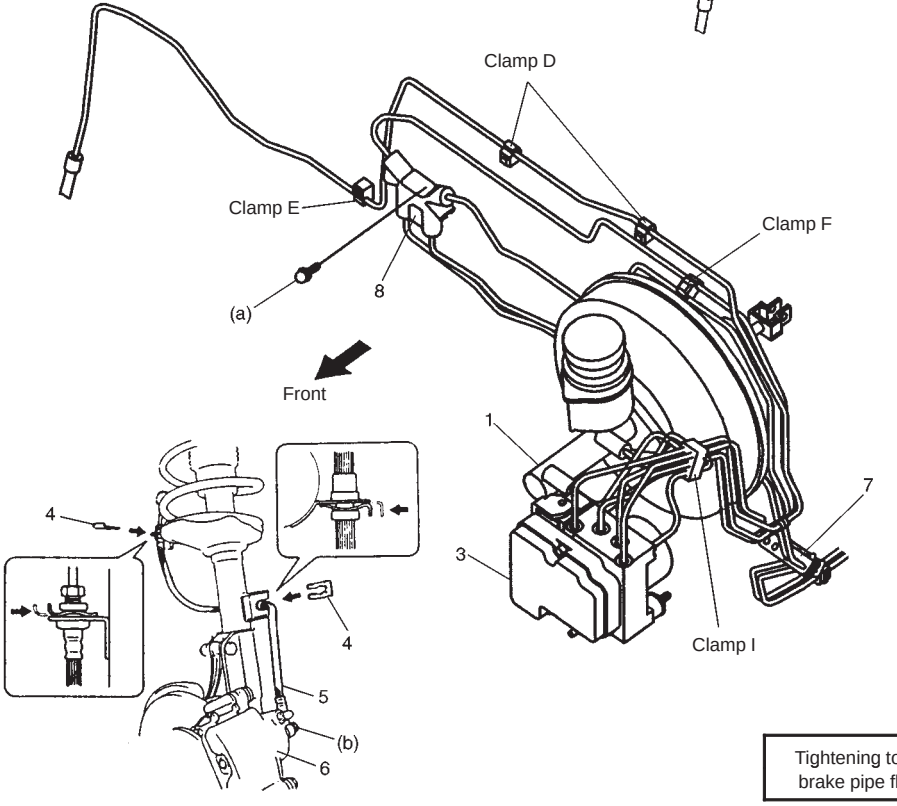
1) Raise, suitably support vehicle and remove wheel if necessary.
2) Clean dirt and foreign material from both hose ends or pipe end fittings. Remove brake hose or pipe.
3) Install it by reversing removal procedure, noting the following points.
   For installation, make sure that steering wheel is in straightforward position and hose has no twist or kink. Check to make sure that hose doesn't contact any part of suspension, both in extreme right and extreme left turn conditions. If it does at any point, remove and correct. Fill and maintain brake fluid level in reservoir. Bleed brake system.

[For left-hand steering vehicles without ABS]





[For left-hand steering vehicles with ABS]

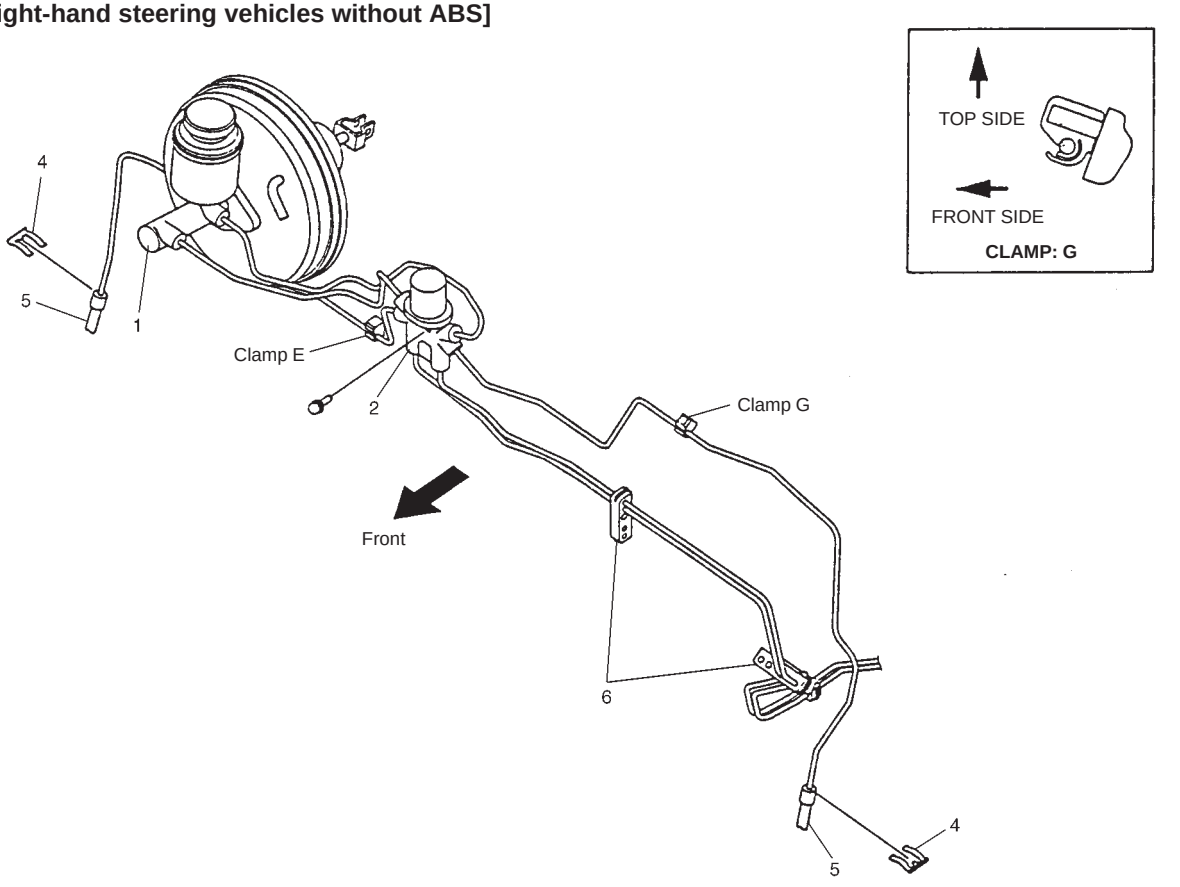


1. Master cylinder
2. P (Proportioning) valve (shown) or 6-way joint (for vehicles with LSPV, not shown)
3. ABS hydraulic unit (if equipped)
4. E-ring
5. Flexible hose
6. Brake caliper
7. Clamp
8. 4-way joint (for vehicles with LSPV) or P (Proportioning) valve

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

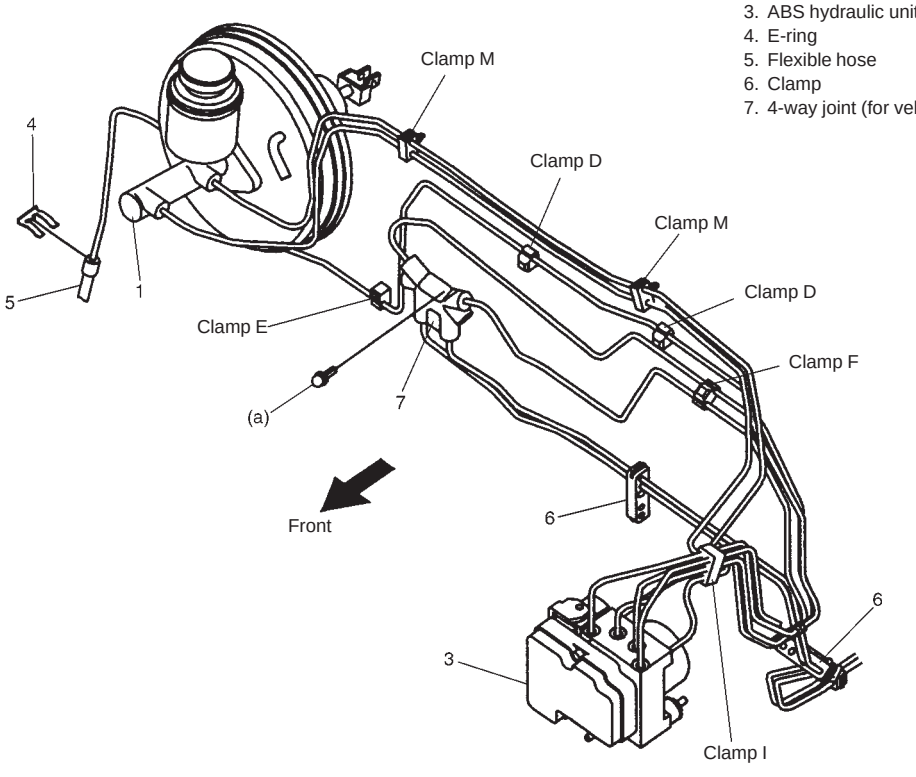
Tightening torque for brake pipe flare nuts	N·m	kg-m	lb-ft
	16	1.6	11.5

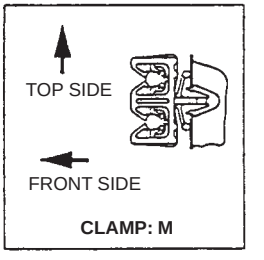
[For right-hand steering vehicles without ABS]



[For right-hand steering vehicles with ABS]

1. Master cylinder
2. P (Proportioning) valve (shown)
   or 6-way joint (for vehicles with LSPV, not shown)
3. ABS hydraulic unit
4. E-ring
5. Flexible hose
6. Clamp
7. 4-way joint (for vehicles with LSPV) or P (Proportioning) valve





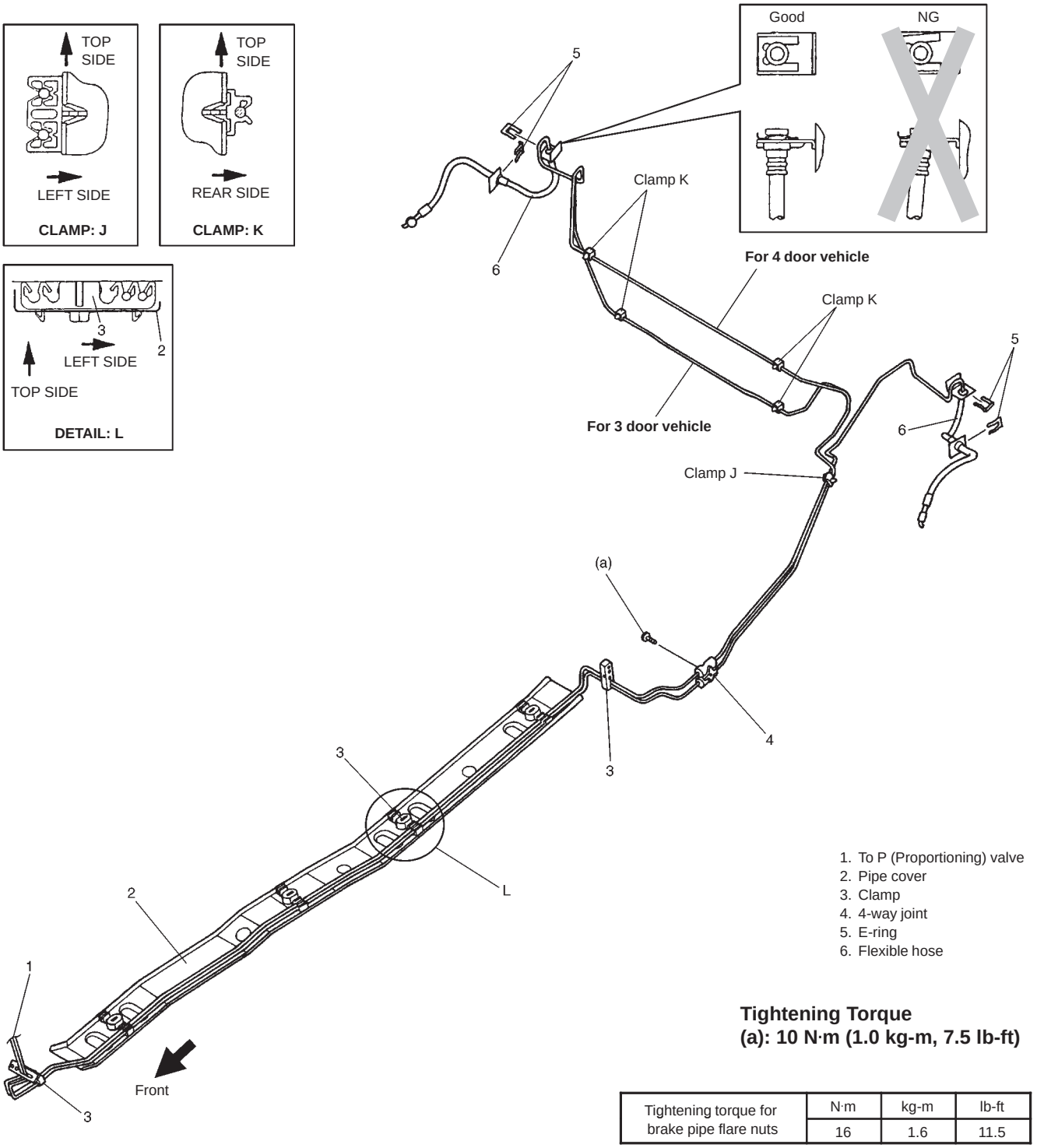
For clamp D, E, F, H and I, refer to figure of left-hand steering vehicle.

NOTE:
For flexible hose installation and each tightening torque, refer to figure of left-hand steering vehicle.

REMOVE AND INSTALL REAR BRAKE HOSE/PIPE

1) Raise, suitably support vehicle and remove wheel if necessary.
2) Clean dirt and foreign material from both hose ends or pipe end fittings. Remove brake hose or pipe.
3) Install it by reversing removal procedure, noting the following points.
   - ○ Install clamps properly referring to figure below.
   - ○ Never reuse pipe cover (protector) nut once removed. Be sure to use a new one.
   - ○ When installing hose, make sure that it has no twist or kink.
   - ○ Fill and maintain brake fluid level in reservoir and bleed brake system.

[For vehicles without LSPV]

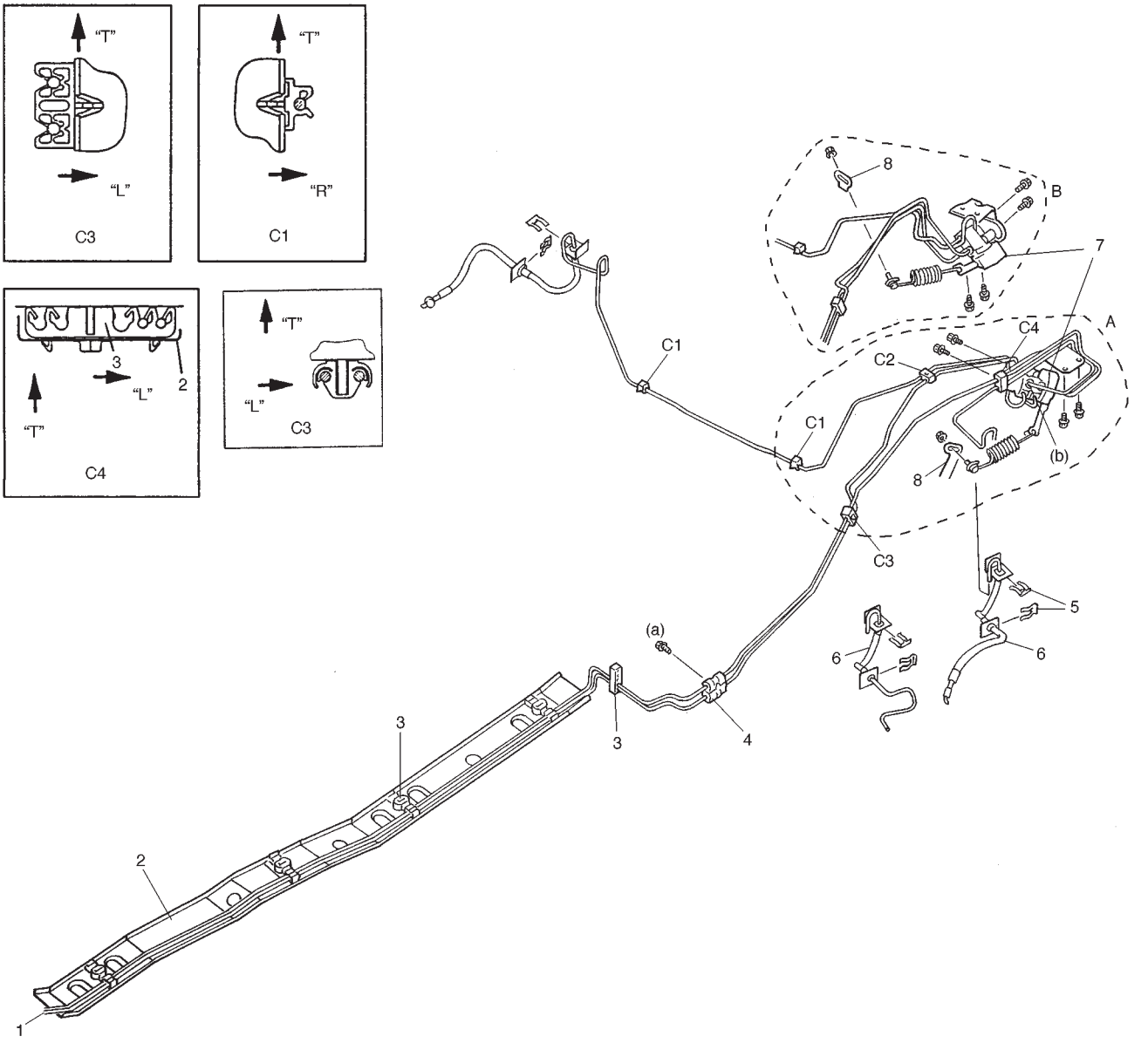


1. To P (Proportioning) valve
2. Pipe cover
3. Clamp
4. 4-way joint
5. E-ring
6. Flexible hose

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

Tightening torque for brake pipe flare nuts	N·m	kg-m	lb-ft
	16	1.6	11.5

[For vehicles with LSPV]



"T" : Top side
"L" : Left side
"R" : Right side

1. To P valve, 4 or 6-way joint
2. Pipe cover
3. Clamp
4. 4-way joint
5. E-ring
6. Flexible hose
7. LSPV
8. Control rod

A: 4 Door, WAGON model
B: 3 Door model

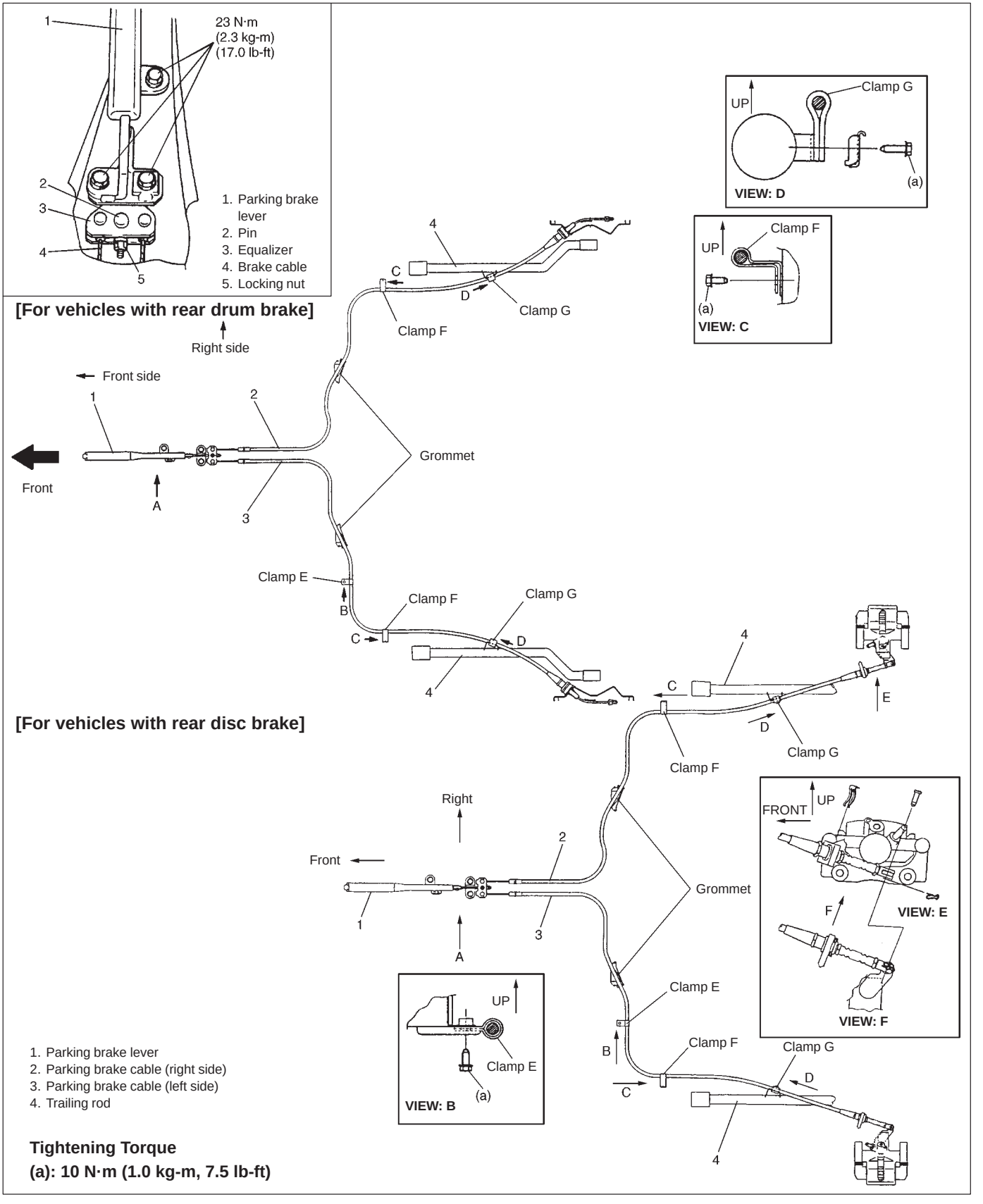
Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)
(b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

PARKING BRAKE LEVER/CABLE

PARKING BRAKE ROUTING

NOTE:

Block wheels when servicing vehicle with parking brake released.



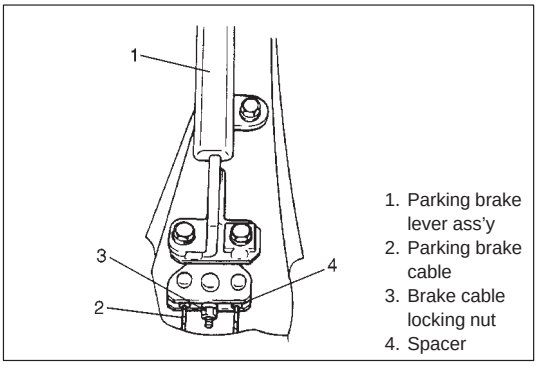
REMOVE AND INSTALL PARKING BRAKE LEVER

REMOVAL

NOTE:
See NOTE at the beginning of this section.

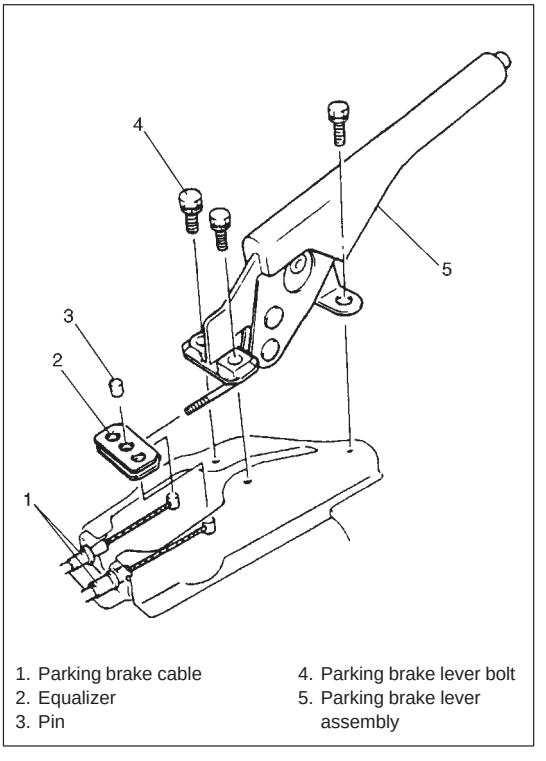
1) Remove parking brake lever cover.
2) Disconnect lead wire of parking brake switch at coupler.

NOTE:
Don't disassemble parking brake lever switch. It must be removed and installed as a complete switch assembly.



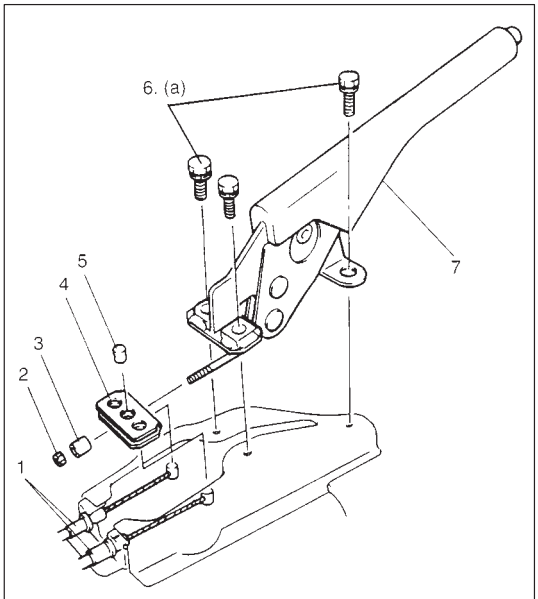
1. Parking brake lever ass'y
2. Parking brake cable
3. Brake cable locking nut
4. Spacer

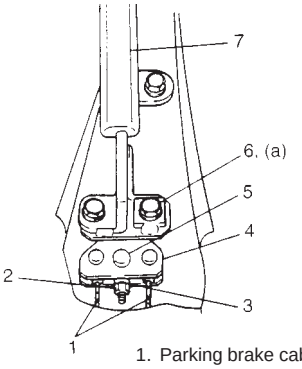
3) Remove parking brake cable locking nut and spacer.



1. Parking brake cable
2. Equalizer
3. Pin
4. Parking brake lever bolt
5. Parking brake lever assembly

4) Remove parking brake lever bolts and then remove parking brake lever assembly from equalizer.
5) Remove equalizer from parking brake cable.





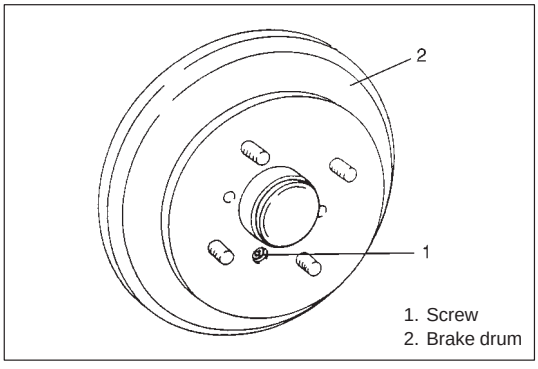
1. Parking brake cable
2. Brake cable locking nut
3. Spacer
4. Equalizer
5. Pin
6. Parking brake lever bolt
7. Parking brake lever assembly

INSTALLATION

1) Install in reverse order of REMOVAL procedure.

   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

2) After all parts are installed, parking brake lever needs to be adjusted. Refer to “PARKING BRAKE INSPECTION AND ADJUSTMENT” in this section.
3) Check rear brakes for dragging and brake system for proper performance.



1. Screw
2. Brake drum

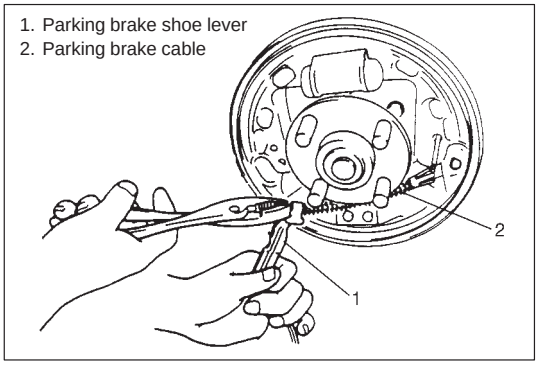
REMOVE AND INSTALL PARKING BRAKE CABLE

REMOVAL

NOTE:
See NOTE at the beginning of this section.

[For vehicles with rear drum brake]

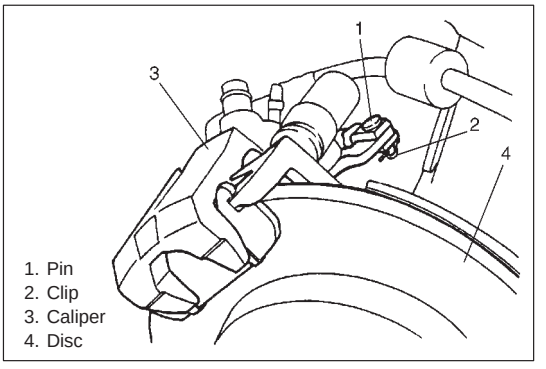
1) Remove brake drum by referring to steps 1) to 6) of “REMOVAL” under “REMOVE AND INSTALL BRAKE DRUM” in this section.



2) Disconnect parking brake cable from brake shoe lever by referring to steps 2) & 4) of “REMOVAL” under “REMOVE AND INSTALL BRAKE SHOE” in this section.
3) Disconnect brake cable from brake back plate by referring to step 8) of “REMOVAL” under “REMOVE AND INSTALL BRAKE BACK PLATE” in this section.

   NOTE:
   When it is necessary to remove both right and left parking brake cable, repeat above steps 1) to 3) on right and left wheels.

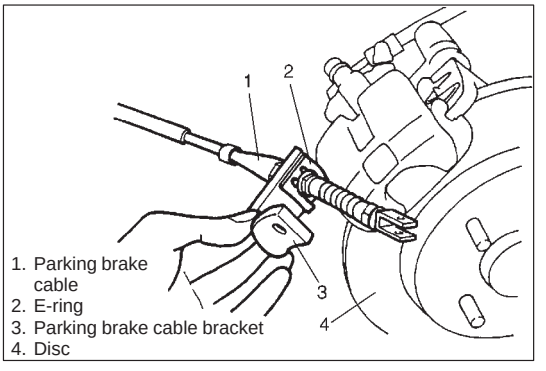
4) Disconnect cable from parking brake lever by referring to steps 1), 2) and 3) of “REMOVAL” under “REMOVE AND INSTALL PARKING BRAKE LEVER” in this section.
5) Remove cable from vehicle body.



1. Pin
2. Clip
3. Caliper
4. Disc

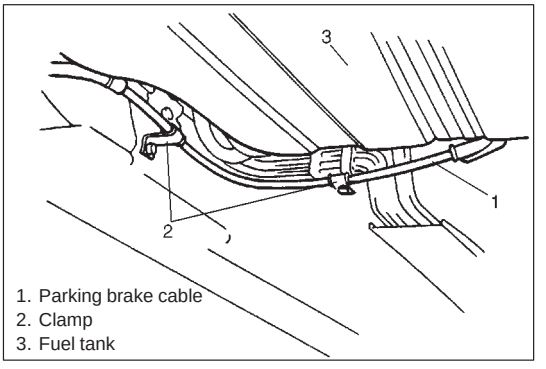
[For vehicles with rear disc brake]

1) Disconnect cable from parking brake lever by referring to steps 1), 2) and 3) of “REMOVAL” under “REMOVE AND INSTALL PARKING BRAKE LEVER” in this section.
2) Hoist vehicle and remove rear wheels.
3) Remove parking brake cable clip and pin at rear caliper.



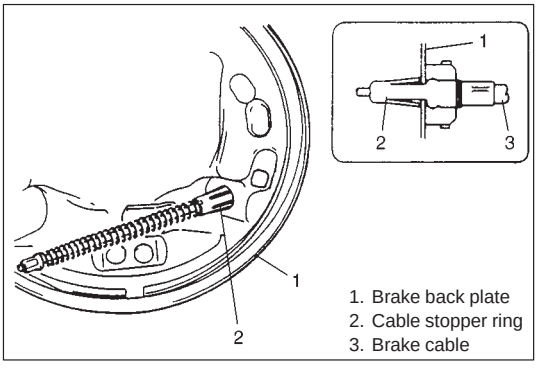
1. Parking brake cable
2. E-ring
3. Parking brake cable bracket
4. Disc

4) Remove parking brake cable bracket from caliper.
5) Remove parking brake cable E-ring.



1. Parking brake cable
2. Clamp
3. Fuel tank

6) Remove parking brake cable clamps.
7) Remove parking brake cable.



1. Brake back plate
2. Cable stopper ring
3. Brake cable

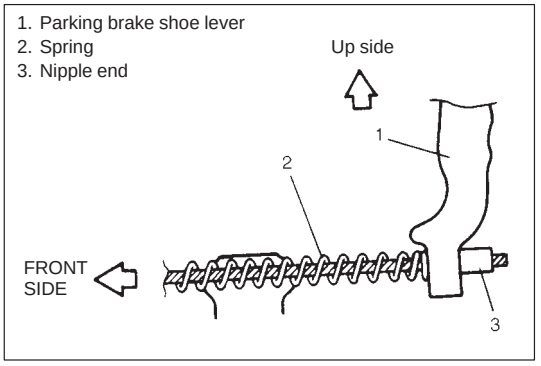
INSTALLATION

NOTE:
See NOTE at the beginning of this section.

[For vehicles with rear drum brake]

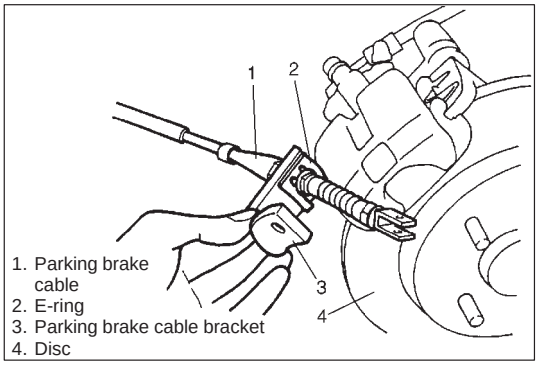
Install parts in reverse order of removal procedure, noting the following.

○ Install brake cable stopper ring to brake back plate securely as shown in figure.



○ Install brake cable spring and nipple end to parking brake shoe lever securely as shown.

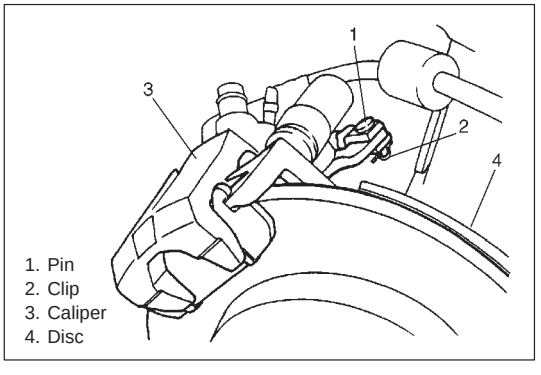
○ For brake shoe installation, refer to steps 1) and 2) of “INSTALLATION” under “REMOVAL AND INSTALL BRAKE SHOE” in this section.
○ For brake drum installation, refer to steps 1) and 7) of “INSTALLATION” under “REMOVAL AND INSTALL BRAKE DRUM” in this section.
○ For proper routing and secure clamping of parking brake cable. Refer to figure in “PARKING BRAKE ROUTING”.
○ For installation of cable to parking brake lever, refer to “INSTALLATION” under “REMOVAL AND INSTALL PARKING BRAKE LEVER” in this section.
○ Upon completion of installation, adjust cable by referring to “PARKING BRAKE INSPECTION AND ADJUSTMENT” in this section. Then check brake drum for dragging and brake system for proper performance. After removing vehicle from hoist, brake test should be performed.



[For vehicles with rear disc brake]
Install parts in reverse order of removal procedure, noting the following.

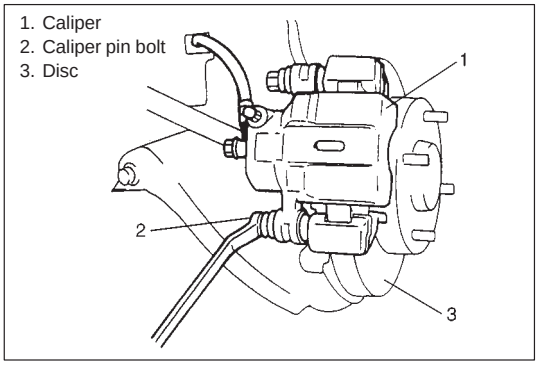
○ Install parking brake cable E-ring to caliper’s parking brake cable bracket securely. Also note the direction of E-ring by referring to figure in “PARKING BRAKE ROUTING” when fastening.

Tightening Torque for parking brake cable bracket bolt
46 N·m (4.6 kg-m, 33.0 lb-ft)



○ Install parking brake cable clip and pin securely. Also note the direction of pin when fastening.

○ For proper routing and secure clamping of parking brake cable, refer to figure in “PARKING BRAKE ROUTING”.
○ For installation of cable to parking brake lever, refer to “INSTALLATION” under “REMOVE AND INSTALL PARKING BRAKE LEVER” in this section.
○ Upon completion of installation, adjust cable by referring to “PARKING BRAKE INSPECTION AND ADJUSTMENT” in this section. Then check rear brake for dragging and brake system for proper performance. After removing vehicle from hoist, brake test should be performed.

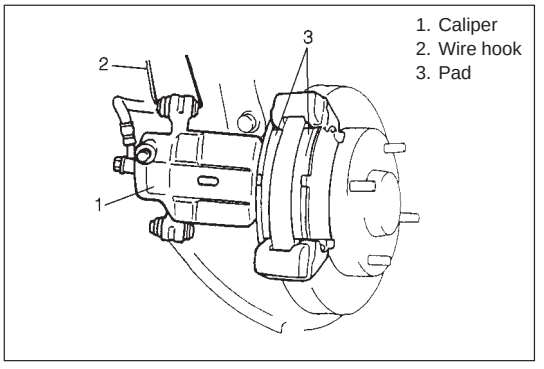


FRONT DISC BRAKE

REMOVE AND INSTALL PAD (SHOE &LINING)

REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove caliper pin bolts.



3) Remove caliper from caliper carrier.

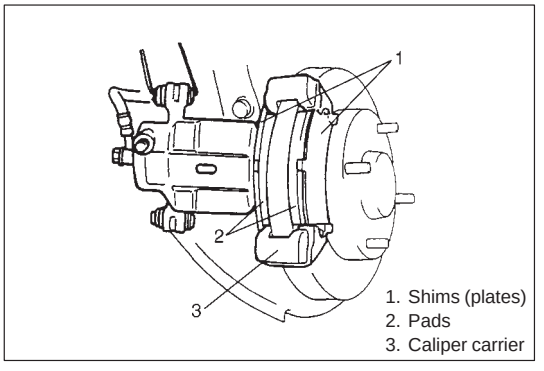
NOTE:
Hang removed caliper with a wire hook or the like so as to prevent brake hose from bending and twisting excessively or being pulled.
Don't operate brake pedal with pads removed.

4) Remove pads.

INSTALLATION

NOTE:
See NOTE at the beginning of this section.

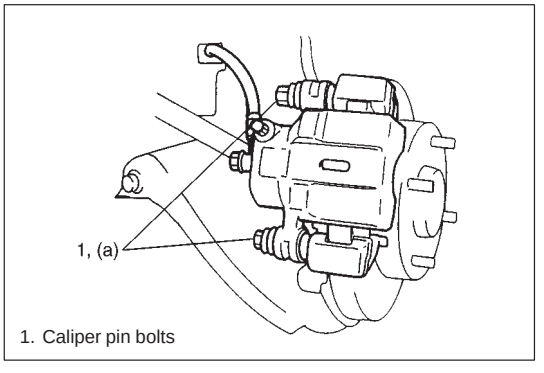
1) Install pad shims (plates) and pads.



2) Install caliper and torque caliper pin bolts to specification.

NOTE:
Make sure that boots are fit into groove securely.

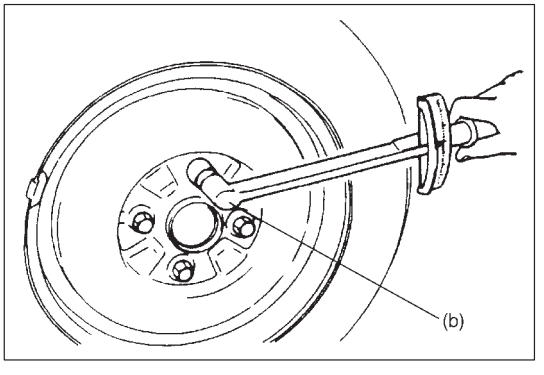
Tightening Torque
(a): 22 N·m (2.2 kg-m, 16.0 lb-ft)

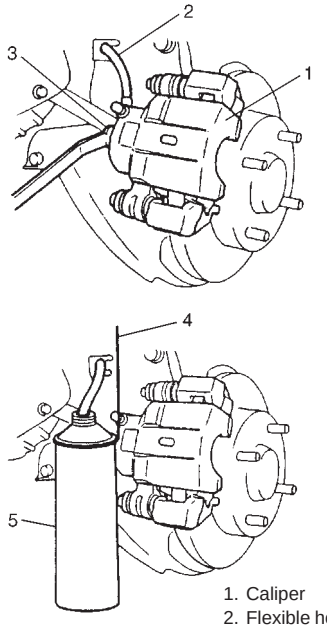


3) Torque front wheel nuts to specification.

Tightening Torque
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

4) Upon completion of installation, perform brake test.



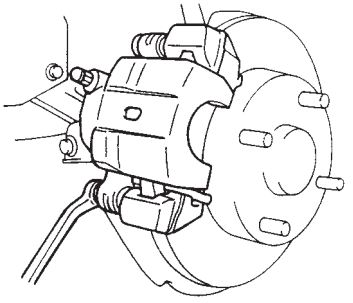


1. Caliper
2. Flexible hose
3. Hose mounting bolt
4. Wire hook
5. Container

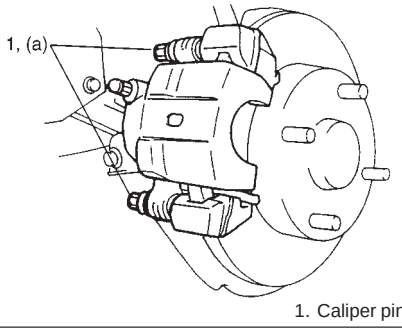
REMOVE AND INSTALL CALIPER ASSEMBLY

REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove brake flexible hose mounting bolt from caliper. As this will allow fluid to flow out of hose, have a container ready beforehand.



3) Remove caliper pin bolts.
4) Remove caliper from carrier.



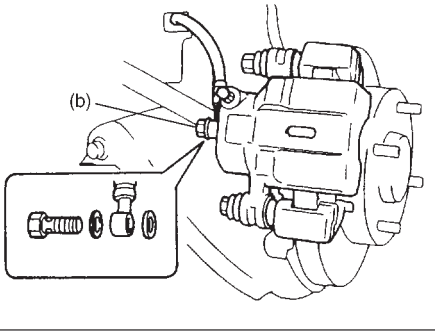
1. Caliper pin bolts

INSTALLATION

1) Install caliper to caliper carrier.
2) Torque caliper pin bolts to specification.

NOTE:
Make sure that boots are fit into groove securely.

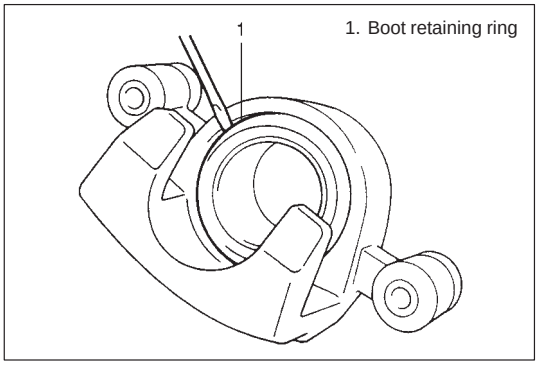
Tightening Torque
(a): 22 N·m (2.2 kg-m, 16.0 lb-ft)



3) Install brake flexible hose as shown and torque hose mounting bolt to specification.

Tightening Torque
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

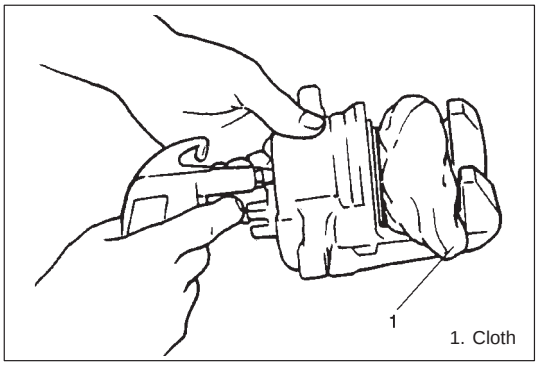
4) Torque wheel nuts to specification. (Refer to “TORQUE SPECIFICATION” in this section.)
5) After completing installation, fill reservoir with brake fluid and bleed brake system. Perform brake test and check each installed part for oil leakage.



REMOVE AND INSTALL SEAL, PISTON, DUST BOOT AND BLEEDER PLUG

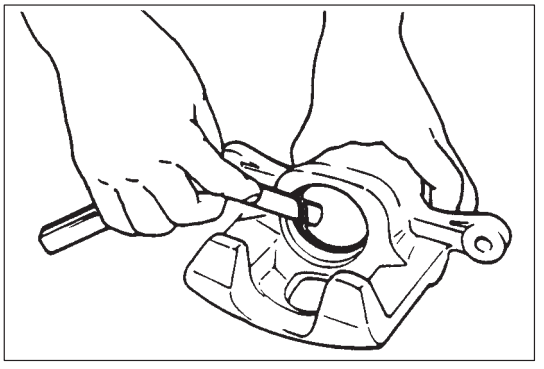
REMOVAL

1) Before disassembly, clean all around caliper with brake fluid.
2) Remove piston boot retaining ring and boot from caliper; pry off with a flat-bladed tool. Be careful not to damage boot.



3) Blow compressed air into cylinder through bolt hole where flexible hose was fitted. With this air pressure, piston can be pushed out of cylinder.

WARNING:
Do not apply too highly compressed air which will cause piston to jump out of cylinder. It should be taken out gradually with moderately compressed air. Do not place your fingers in front of piston when using compressed air.



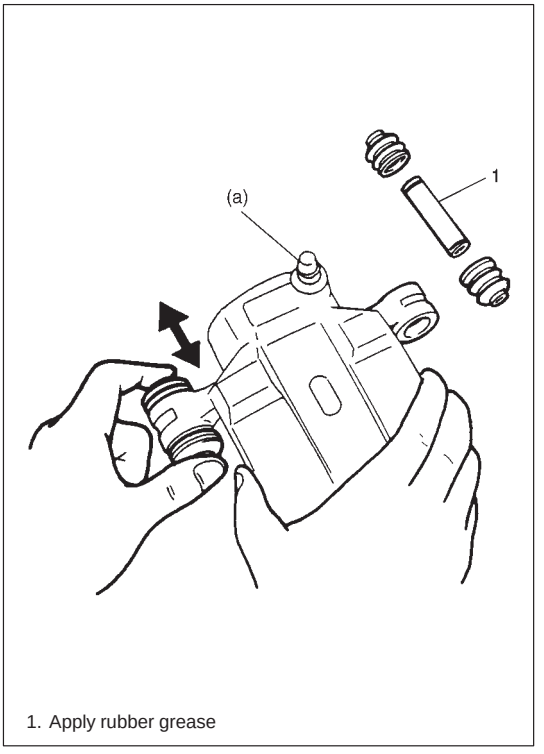
4) Remove piston seal using a thin blade like a thickness gauge, etc.

NOTE:
Be careful not to damage inside (bore side) of cylinder.

5) Remove bleeder plug and cap from caliper.

INSTALLATION

CAUTION:
- **Wash each part cleanly before installation in the same fluid as the one used in master cylinder reservoir.**
- **Never use other fluid or thinner.**
- **Before installing piston and piston seal to cylinder, apply fluid to them.**
- **After reassembling brake lines, bleed air from them.**



1. Apply rubber grease

Slide Bush, Boot and Bleeder Plug

1) Check that slide bushes and boots for wear, corrosion, damage, movement or deterioration. If it is found faulty, correct or replace.
   ○ Apply rubber grease to bush outer surface. And then make sure that each bush slides easily through each caliper bolt hole.

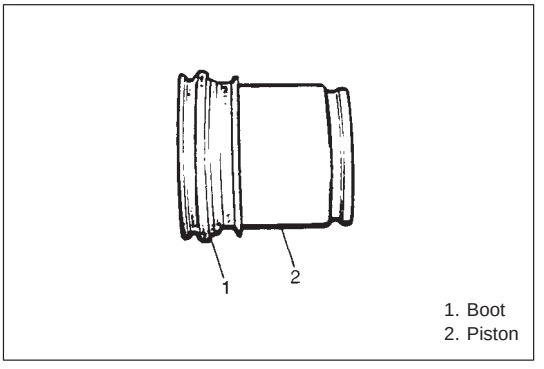
   NOTE:
   Where temperature gets as low as −30°C (−22°F) in cold weather, use rubber grease whose viscosity varies very little even at −40°C (−40°F).

2) Tighten bleeder plug to specified torque and install cap.

   Tightening Torque
   (a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

Piston Seal

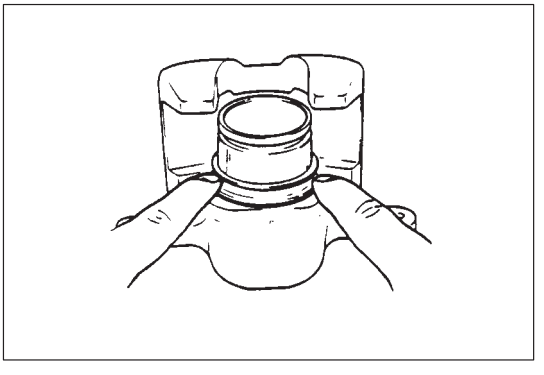
3) Piston seal is used to seal piston and cylinder and to adjust clearance between pad and disc. Replace with a new one at every overhaul. Fit piston seal into groove in cylinder taking care not to twist it.



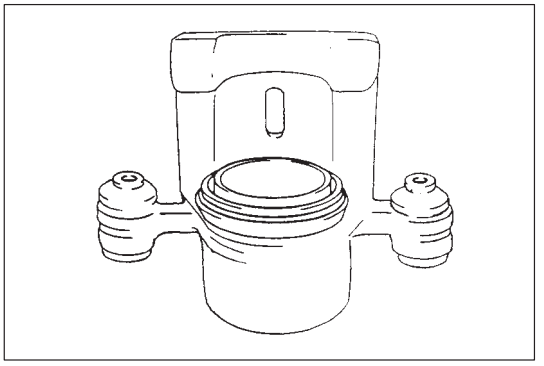
1. Boot
2. Piston

Piston and Boot

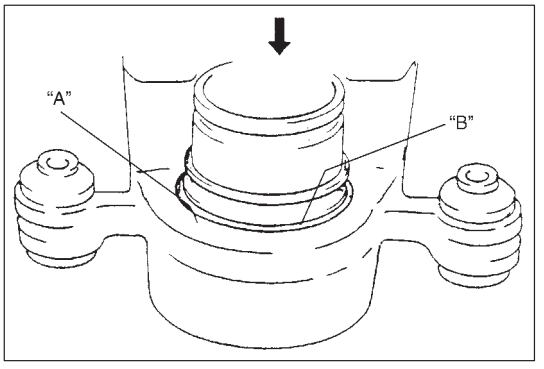
4) Before inserting piston into cylinder, install boot onto piston as shown.



5) Fit boot as it is in figure into boot groove in cylinder with fingers.



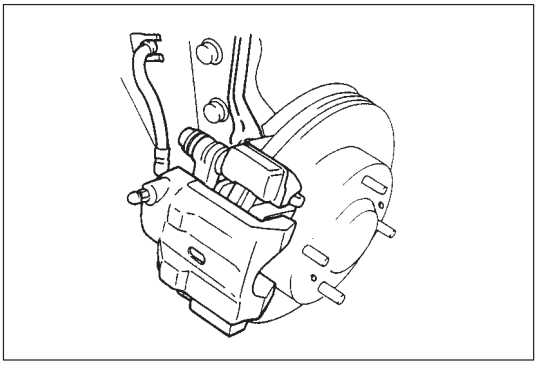
6) Insert piston into cylinder by hand and fit boot in boot groove in piston.



7) To confirm that boot is fitted in its groove in cylinder properly, pull piston out of cylinder a little but do not take it all out.

   NOTE:
   Boot's face "B" should be at the same level from cylinder's face "A" all around.

8) Insert piston into cylinder by hand.
9) Install piston boot retaining ring.

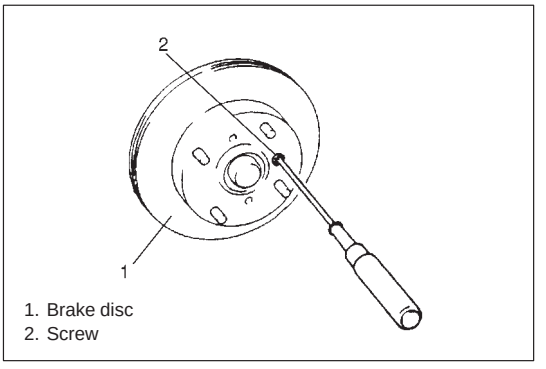


REMOVE AND INSTALL DISC

REMOVAL

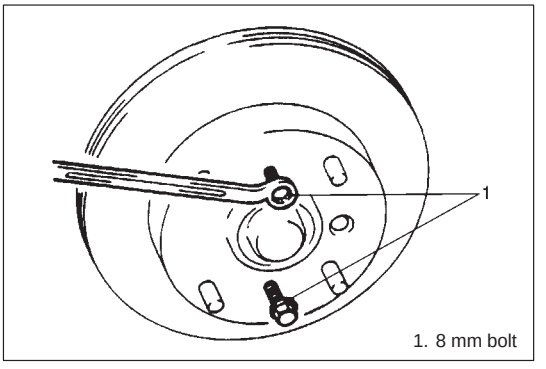
1) Hoist vehicle and remove wheel.
2) Remove caliper assembly by loosening carrier bolts (2 pieces).

CAUTION:
During removal, be careful not to damage brake flexible hose and not to depress brake pedal.



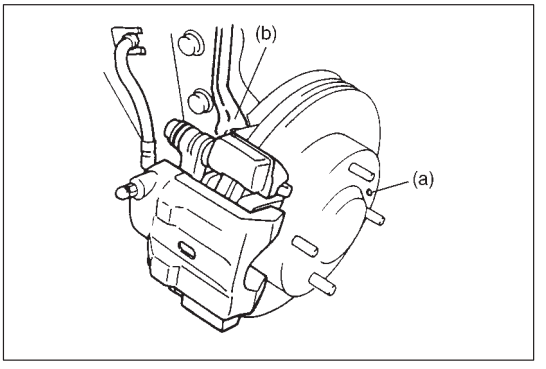
1. Brake disc
2. Screw

3) Remove brake disc screw (If equipped).



1. 8 mm bolt

4) Pull brake disc off by using 8 mm bolts (2 pieces).

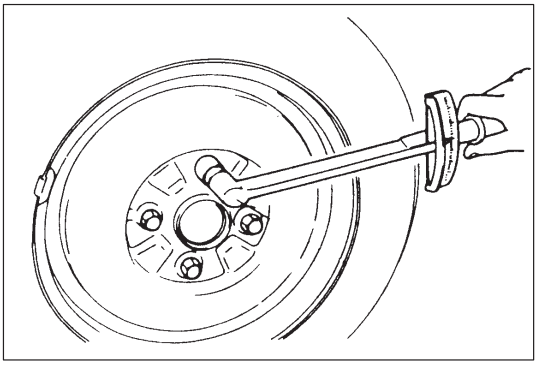


INSTALLATION

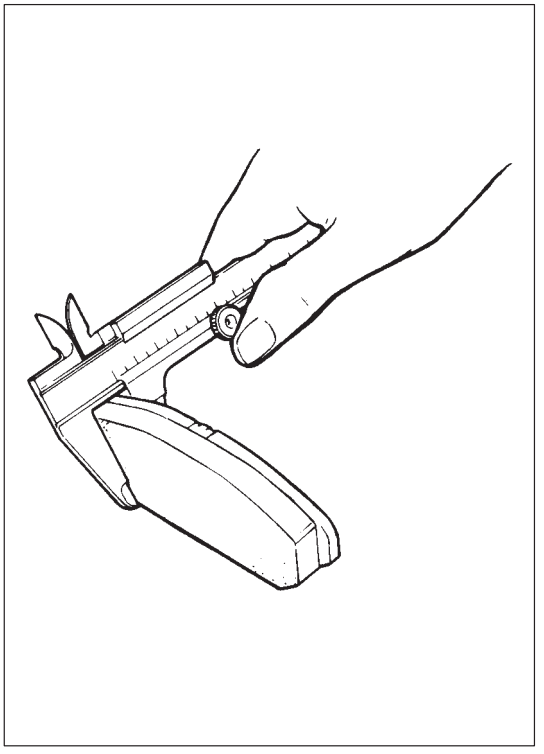
NOTE:
See NOTE at the beginning of this section.

1) Install disc to wheel hub.
2) Install caliper assembly to steering knuckle.
3) Torque caliper carrier bolts to specification.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)



4) Torque front wheel nuts to specification.
5) Upon completion of installation, perform brake test.



FRONT DISC BRAKE INSPECTION

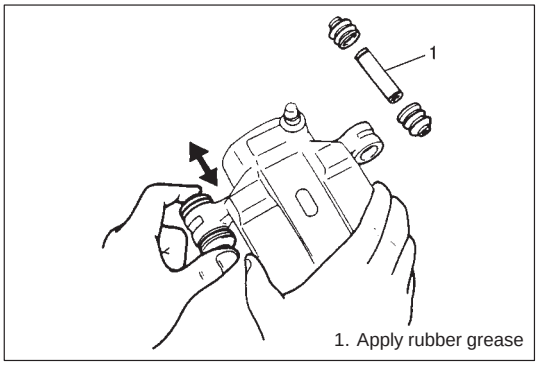
INSPECT BRAKE PAD LINING

Check pad lining for wear. When wear exceeds limit, replace with new one.

CAUTION:
Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.

Pad thickness (lining + pad rim)
Standard : 15 mm (0.59 in.) . . . . . for ventilated disc
14 mm (0.55 in.) . . . . . for solid disc
LImit : 6 mm (0.24 in.)

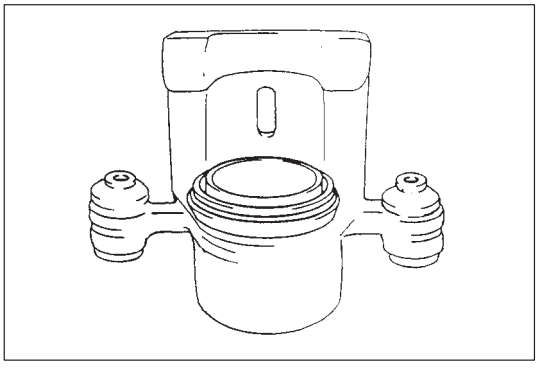
NOTE:
When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.



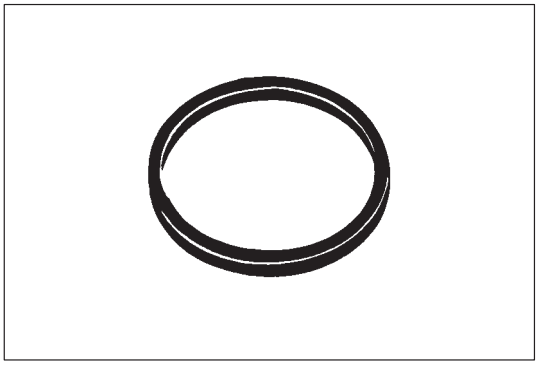
1. Apply rubber grease

INSPECT BRAKE CALIPER INNER PARTS

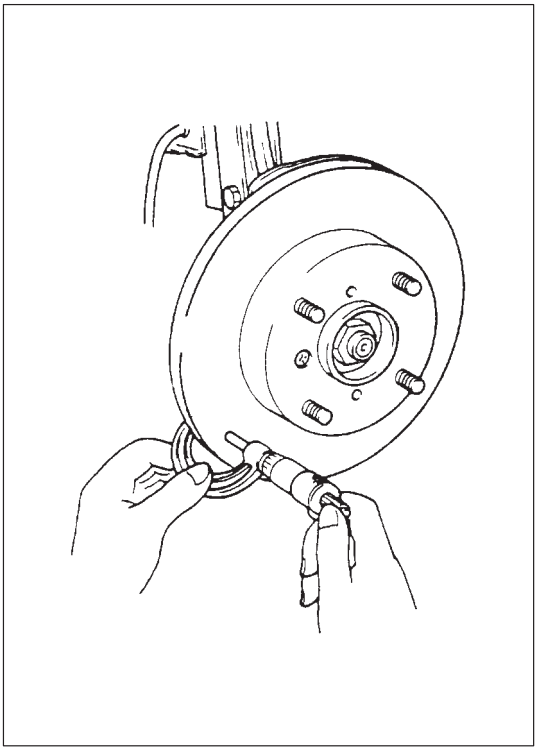
Cylinder Slide Bush
Check slide bush for smooth movement as shown.
If it is found faulty, correct or replace. Apply rubber grease to bush outer surface. Rubber grease should be the one whose viscosity is less affected by such low temperature as –40°C (–40°F).



Bush Dust Boot and Cylinder Boot
Check boots for breakage, crack and damage. If defective, replace.



Piston Seal
Excessive or uneven wear of pad lining may indicate unsmooth return of the piston. In such a case, replace rubber seal.



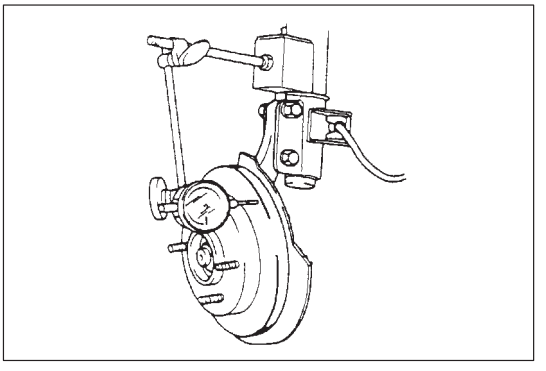
INSPECT BRAKE DISC

Before this inspection, brake pads must be removed referring to steps 1) to 4) of "REMOVAL" under "REMOVE AND INSTALL PAD" in this section.

Check disc surface for scratches in wearing parts.
Scratches on disc surface noticed at the time of specified inspection or replacement are normal and disc is not defective unless they are serious.
But when there are deep scratches or scratches all over disc surface, replace it. When only one side is scratched, polish and correct that side.

Disc thickness
<For ventilated disc>
Standard : 20 mm (0.79 in.)
Limit : 18 mm (0.71 in.)

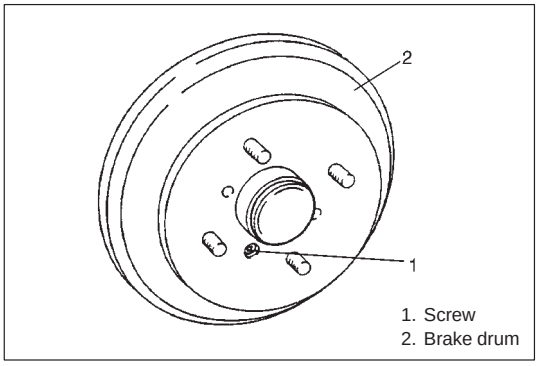
<For solid disc>
Standard : 12 mm (0.47 in.)
Limit : 10 mm (0.39 in.)



To measure deflection of disc, take measurement at 2 points on its periphery and center with dial gauge while rotating it.

Limit on disc deflection: 0.1 mm (0.0039 in.)

NOTE:
Check front wheel bearing for looseness before measurement.



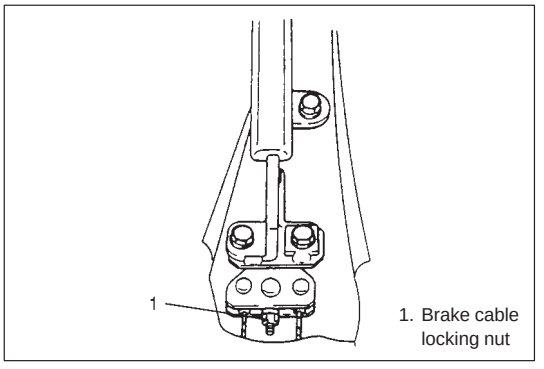
1. Screw
2. Brake drum

DRUM AND COMPONENTS

REMOVE AND INSTALL BRAKE DRUM

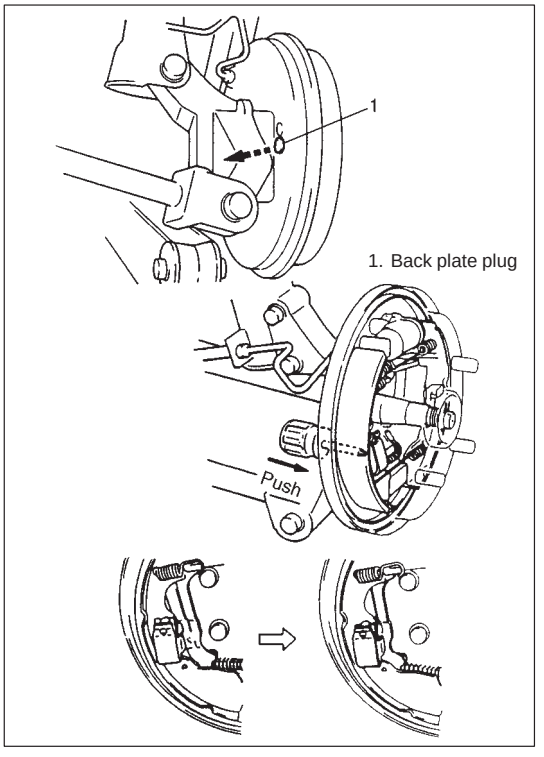
REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove brake drum screws (2 pieces).



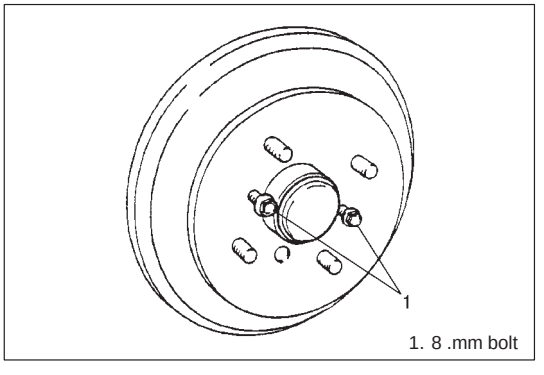
1. Brake cable locking nut

3) Release parking brake lever.
4) Remove parking brake lever cover and loosen parking brake cable locking nut.



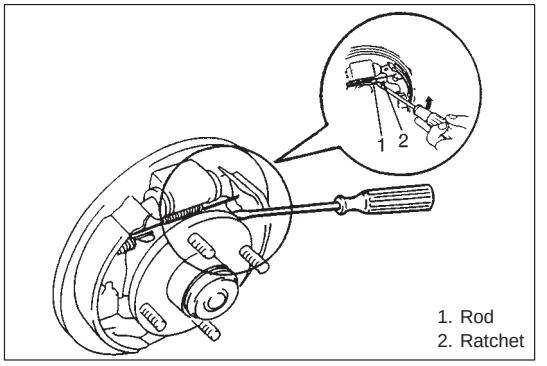
1. Back plate plug

5) Remove back plate plug attached to the back side of brake back plate so as to increase clearance between brake shoe and brake drum.
   Insert a screwdriver into plug hole till its tip contacts shoe hold down spring and push screwdriver in the arrow direction.
   With this push, hold down spring is pushed up and releases parking shoe lever from hold down spring, resulting in larger clearance.



1. 8 .mm bolt

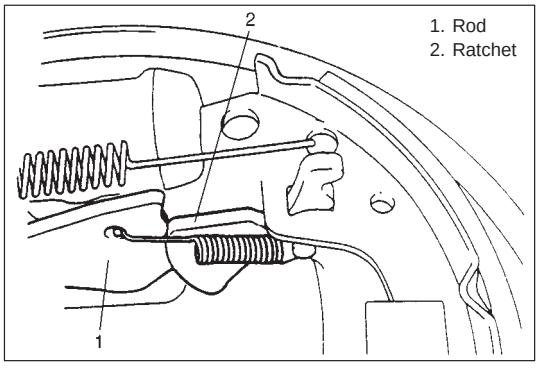
6) Pull brake drum off by using 8 mm bolts (2 pieces).



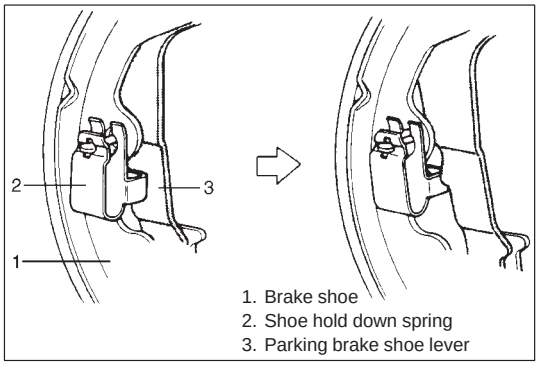
INSTALLATION

NOTE:
See NOTE at the beginning of this section.

1) Before installing brake drum, to maximize brake shoe-to-drum clearance, put screwdriver between rod and ratchet and push down ratchet as shown in figure.

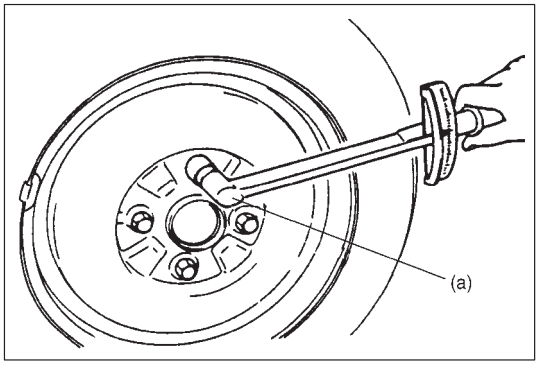


NOTE:
The figure show ratchet position where brake shoe-to-drum clearance is maximum.



2) Put brake shoe hold down spring back to its original position as shown. (Put shoe hold down spring in place by moving shoe lever so that shoe lever comes to the side of shoe hold down spring.)

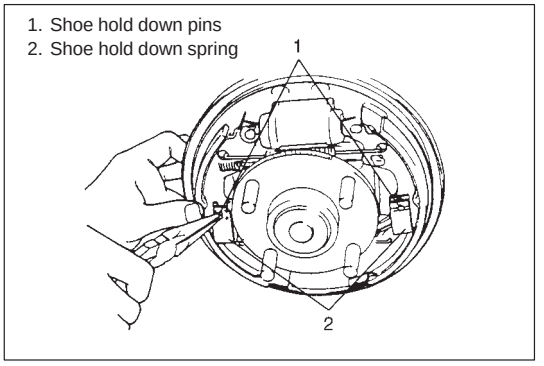
3) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
4) Tighten brake drum screws.
5) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
   Adjust parking brake cable.
6) Install parking brake lever cover.



7) Install wheel and tighten wheel nuts to specified torque.

   Tightening Torque
   (a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

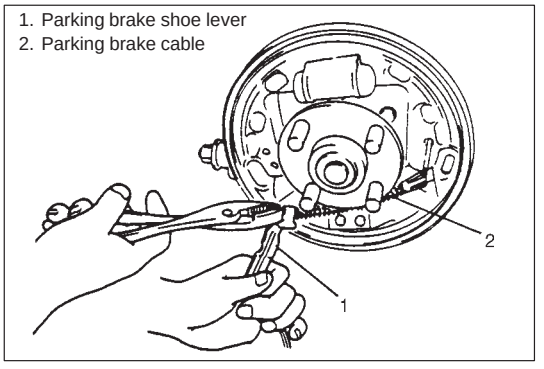
8) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).



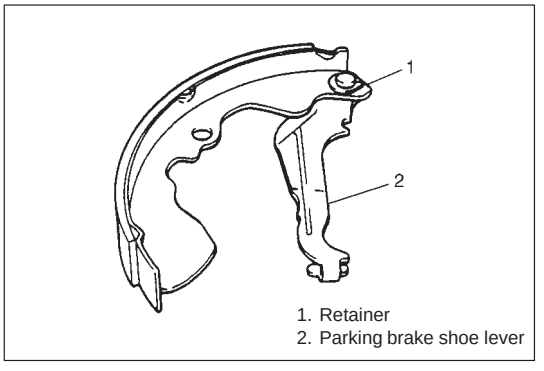
REMOVE AND INSTALL BRAKE SHOE

REMOVAL

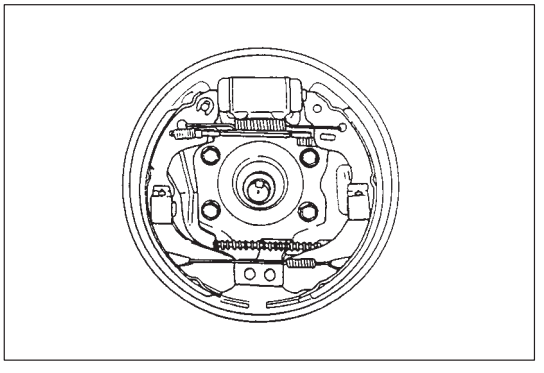
1) Perform steps 1) to 6) of “REMOVAL” under “REMOVE AND INSTALL BRAKE DRUM” in this section.
2) Remove shoe hold down springs by turning shoe hold down pins.
3) Remove return springs, brake shoes and strut.



4) Disconnect parking brake shoe lever from parking brake cable.

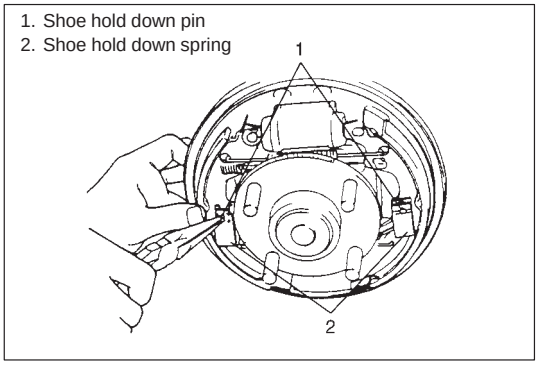


5) Remove parking brake shoe lever from shoe rim.

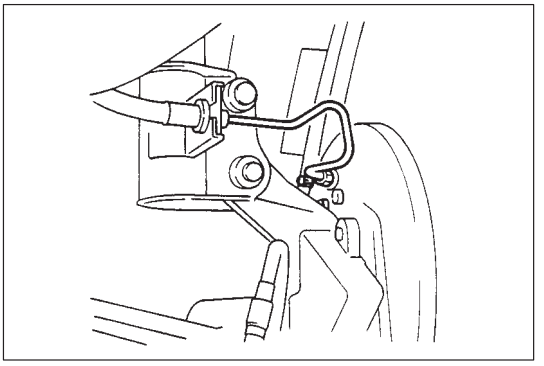


INSTALLATION

1) Assemble parts as shown in reverse order of removal.



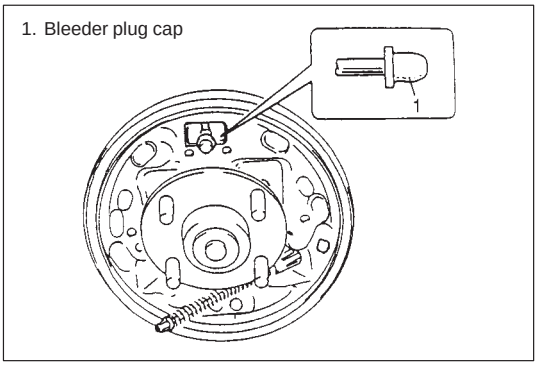
2) Install shoe hold down springs by pushing them down in place and turning hold down pins.
3) For procedure hereafter, refer to steps 1) to 8) of “INSTALLATION” under “REMOVE AND INSTALL BRAKE DRUM” in this section.



REMOVE AND INSTALL WHEEL CYLINDER

REMOVAL

1) Perform steps 1) to 6) of “REMOVAL” under “REMOVE AND INSTALL BRAKE DRUM” in this section.
2) Perform steps 2) to 4) of “REMOVAL” under “REMOVE AND INSTALL BRAKE SHOE” in this section.
3) Loosen brake pipe flare nut but only within the extent that fluid does not leak.



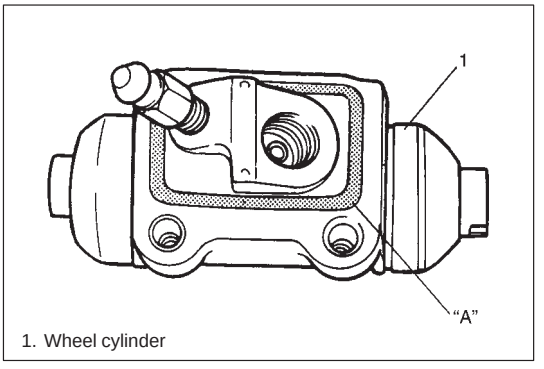
1. Bleeder plug cap

4) Remove wheel cylinder mounting bolts. Disconnect brake pipe from wheel cylinder and put bleeder plug cap onto pipe to prevent fluid from spilling.

INSTALLATION

1) Apply water tight sealant to joint seam of wheel cylinder and brake back plate. Then take off breather plug cap from brake pipe and connect pipe to wheel cylinder just enough to prevent fluid from leaking.

   “A”: Sealant 99000-31090



1. Wheel cylinder

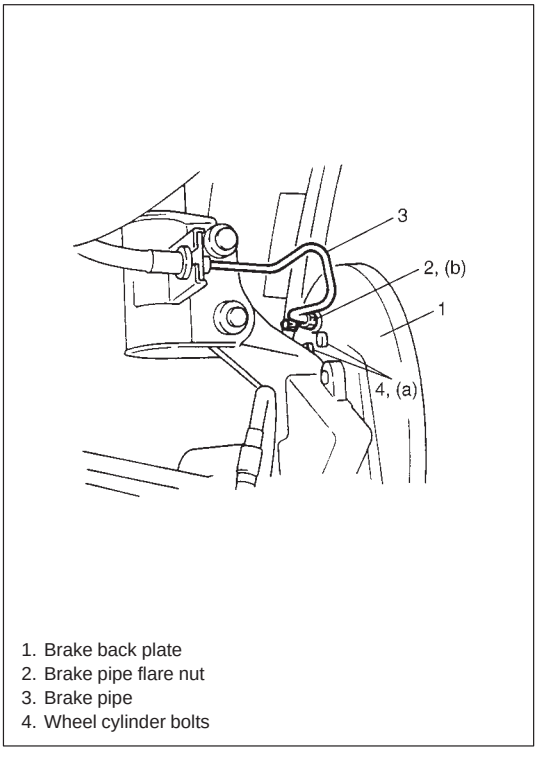
2) Tighten wheel cylinder to brake back plate to specified torque.

   Tightening Torque
   (a): 12 N·m (1.2 kg-m, 9.0 lb-ft)

3) Torque flare nut of brake pipe which was connected in step 1) to specification.

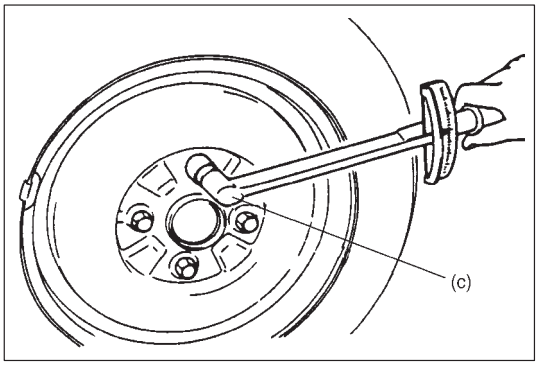
   Tightening Torque
   (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

4) Install bleeder plug cap taken off from pipe back to bleeder plug.



1. Brake back plate
2. Brake pipe flare nut
3. Brake pipe
4. Wheel cylinder bolts

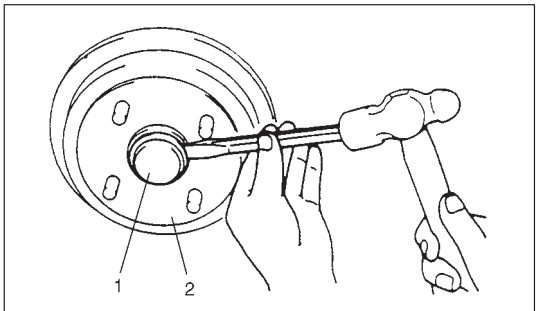
5) Install brake shoes, referring to steps 1) and 2) of “INSTALLATION” under “REMOVE AND INSTALL BRAKE SHOE” in this section.
6) Install brake drum, referring to steps 1) to 4) of “INSTALLATION” under “REMOVE AND INSTALL BRAKE DRUM” in this section.
7) Fill reservoir with brake fluid and bleed brake system by referring to “BLEEDING BRAKES” in this section.
8) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
   Adjust parking brake cable. Refer to “PARKING BRAKE INSPECTION AND ADJUSTMENT” in this section.
9) Install parking brake lever cover.



10) Install wheel and tighten wheel nuts to specified torque.

    Tightening Torque
    (c): 85 N·m (8.5 kg-m, 61.5 lb-ft)

11) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).
12) Check each installed part for oil leakage.

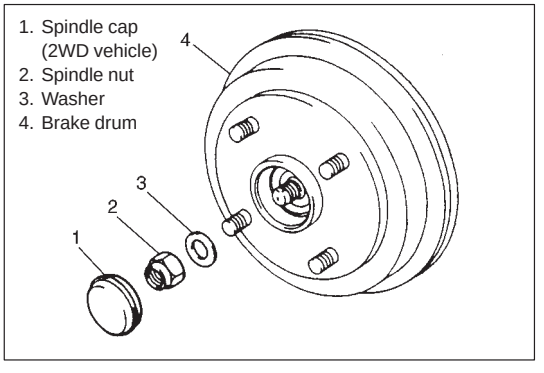


1. Spindle cap (2WD vehicle)
2. Brake drum

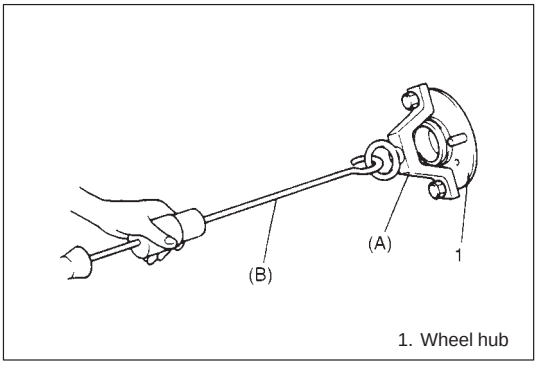
REMOVE AND INSTALL BRAKE BACK PLATE

REMOVAL

1) Hoist vehicle and remove wheel.
2) For 2WD vehicle, remove spindle cap by hammering lightly at 3 locations around it so as not to deform or cause damage to seating part of cap.



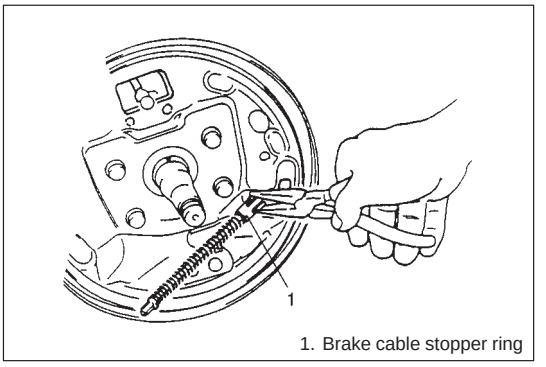
3) Uncaulk spindle nut and remove spindle nut and washer.
   For 4WD vehicle, pull up parking brake lever fully and loosen spindle nut (drive shaft nut).
4) Perform Steps 2) to 6) of “REMOVAL” under “REMOVE AND INSTALL BRAKE DRUM” in this section.



1. Wheel hub

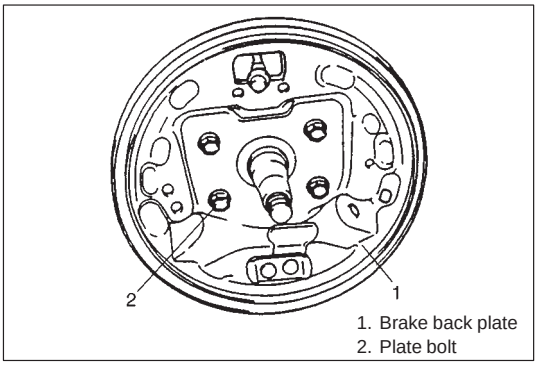
5) Pull wheel hub off by using special tools.

Special Tool
(A): 09943-17912
(B): 09942-15511



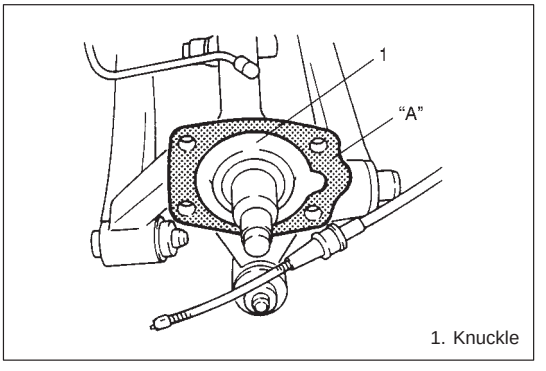
1. Brake cable stopper ring

6) Perform steps 2) to 4) of “REMOVAL” under “REMOVE AND INSTALL BRAKE SHOE” in this section.
7) Perform steps 3) and 4) of “REMOVAL” under “REMOVE AND INSTALL WHEEL CYLINDER” in this section.
8) Remove cable from brake back plate by squeezing parking brake cable stopper ring.



1. Brake back plate
2. Plate bolt

9) Remove brake back plate.

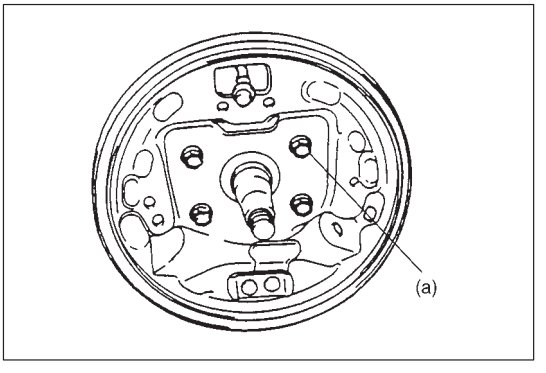


1. Knuckle

INSTALLATION

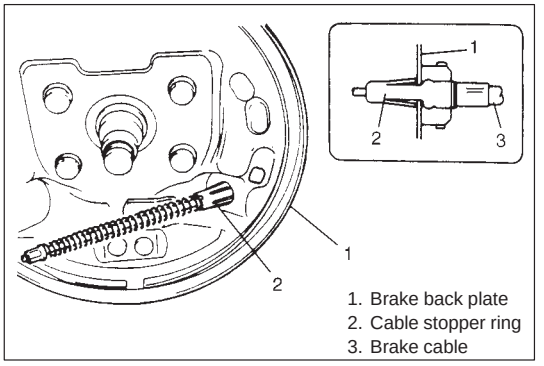
1) Apply water tight sealant to mating surfaces of brake back plate and rear knuckle.

“A”: Sealant 99000-31090



2) Install brake back plate and tighten back plate bolts to specified torque.

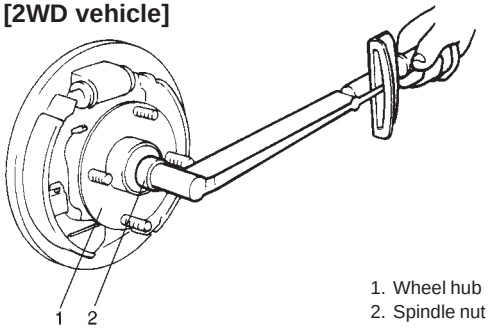
Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.0 lb-ft)



1. Brake back plate
2. Cable stopper ring
3. Brake cable

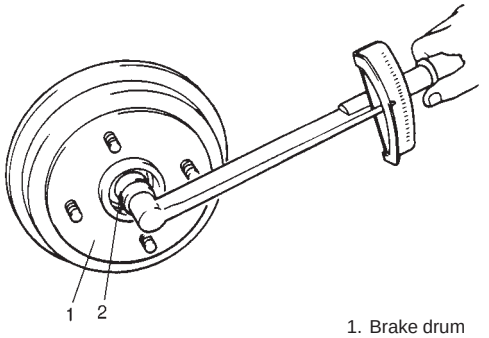
3) Install parking brake cable to brake plate.

[2WD vehicle]



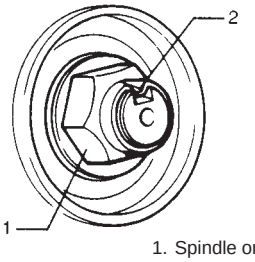
1. Wheel hub
2. Spindle nut

[4WD vehicle]



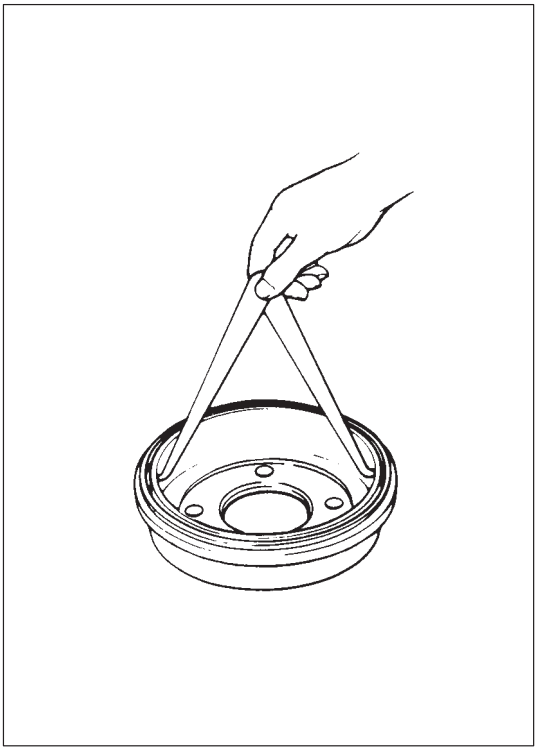
1. Brake drum
2. Drive shaft nut

[2WD/4WD vehicle]



1. Spindle or drive shaft nut
2. Caulked

4) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut to specified torque by referring to steps 1) to 4) of “INSTALLATION” under “REMOVE AND INSTALL WHEEL CYLINDER” in this section.
5) Install brake shoes, referring to steps 1) and 2) of “INSTALLATION” under “REMOVE AND INSTALL BRAKE SHOE” in this section.
6) Install wheel hub assembly, washer and new spindle nut (new drive shaft nut).
   For 2WD vehicle, perform Steps 4) to 7) of “INSTALLATION” under “REMOVE AND INSTALL WHEEL HUB (WHEEL BEARING) ASSEMBLY AND WHEEL STUD (HUB BOLT)” in Section 3E.
   For 4WD vehicle, perform Steps 3) to 7) of “INSTALLATION” under “REMOVE AND INSTALL WHEEL HUB, WHEEL STUD/WHEEL BEARING OUTSIDE INNER RACE” in Section 3E1.
7) For procedure hereafter, refer to steps 7) to 12) of “INSTALLATION” under “REMOVE AND INSTALL WHEEL CYLINDER” in this section.



BRAKE DRUM AND COMPONENTS INSPECTION

INSPECT BRAKE DRUM

Inspect drum for cleanliness. Check wear of its braking surface by measuring its inside diameter.

Brake drum ID
Standard : 200 mm (7.87 in.)
Service limit : 202 mm (7.95 in.)

Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.

Cracked, Scored, or Grooved Drum

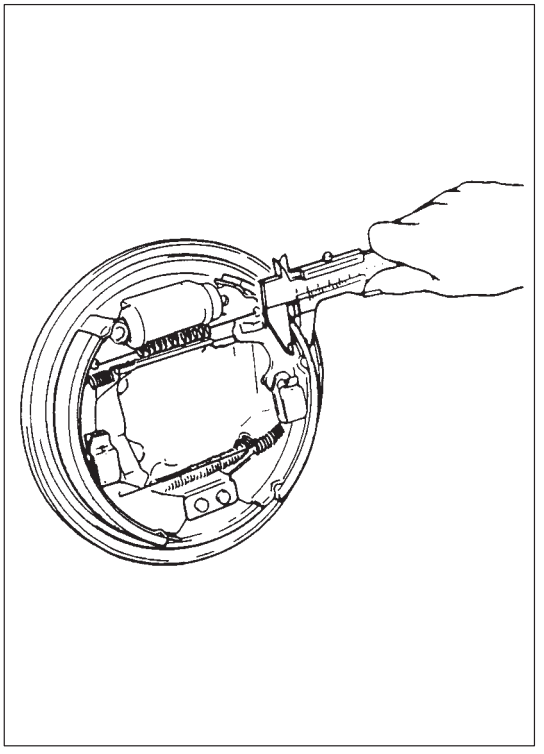
A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum.

Smooth up any slight scores. Heavy or extensive scoring will cause excessive brake lining wear and it will probably be necessary to re-surface drum braking surface.

If brake linings are slightly worn and drum is grooved, drum should be polished with fine emery cloth but should not be turned.

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.



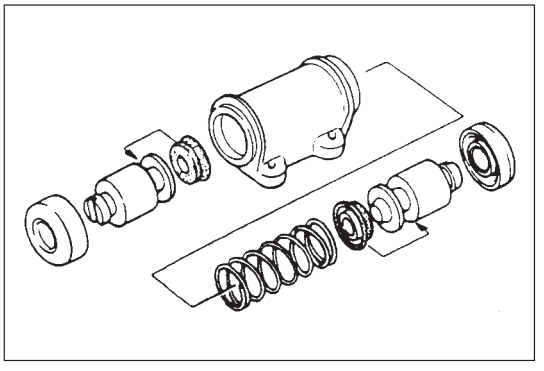
INSPECT BRAKE SHOE & LINING

Where lining is worn out beyond service limit, replace shoe.

Brake lining thickness (lining + shoe rim)
Standard : 6.1 mm (0.24 in.)
Service limit : 2.8 mm (0.11 in.)

If one of brake linings is worn to service limit, all linings must be replaced at the same time.

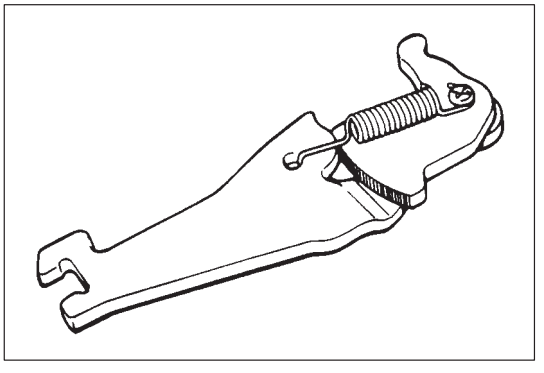
NOTE:
Never polish lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage drum. When it is required to correct lining, replace it with a new one.



INSPECT WHEEL CYLINDER

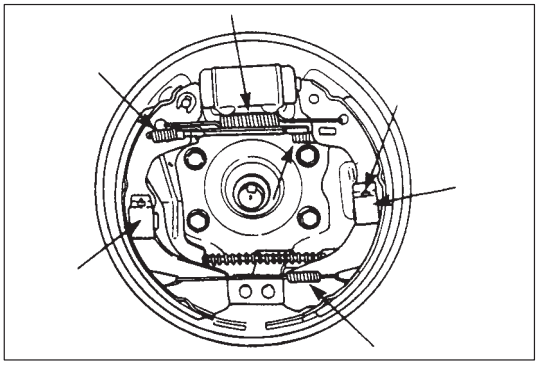
Inspect wheel cylinder disassembled parts for wear, cracks, corrosion or damage.

NOTE:
Clean wheel cylinder components with brake fluid.



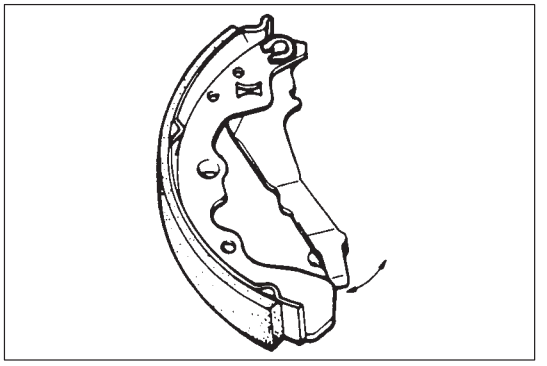
INSPECT BRAKE STRUT

Inspect ratchet of strut for wear or damage.



INSPECT SPRINGS

Inspect for damage or weakening.
Inspect each part with arrow for rust. If found defective, replace.



INSPECT PARKING SHOE LEVER

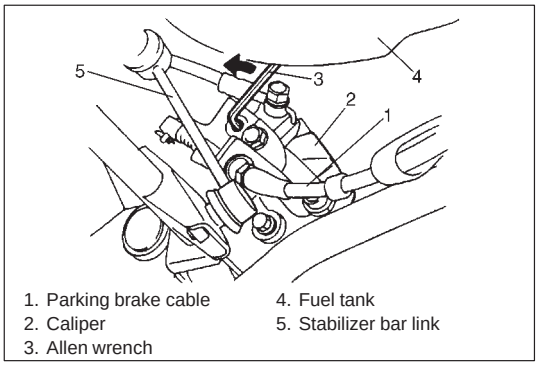
Inspect brake shoe lever for free movement against brake shoe web. If defective, correct or replace.

REAR DISC BRAKE

REMOVE AND INSTALL PAD (SHOE & LINING)

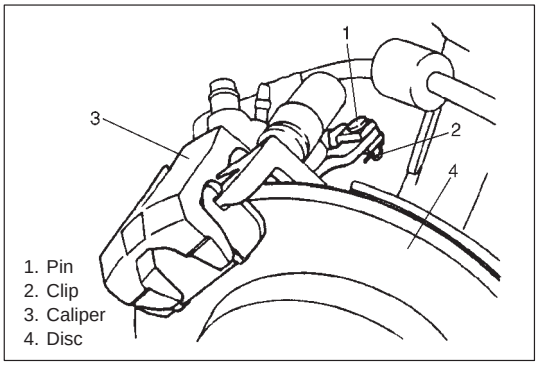
REMOVAL

1) Hoist vehicle, remove wheel and release parking brake.



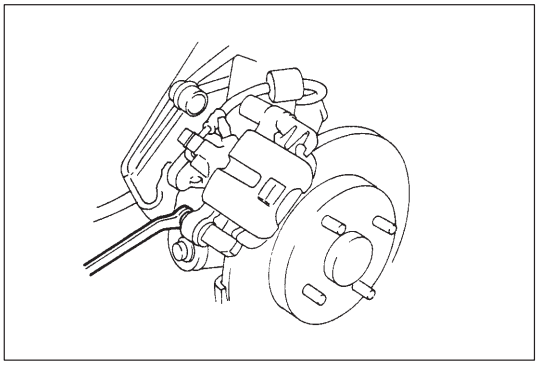
1. Parking brake cable
2. Caliper
3. Allen wrench
4. Fuel tank
5. Stabilizer bar link

2) Remove manual adjustment gear cover.
3) Turn manual adjustment gear counterclockwise with an Allen wrench so to have piston and brake pads away from the disc.

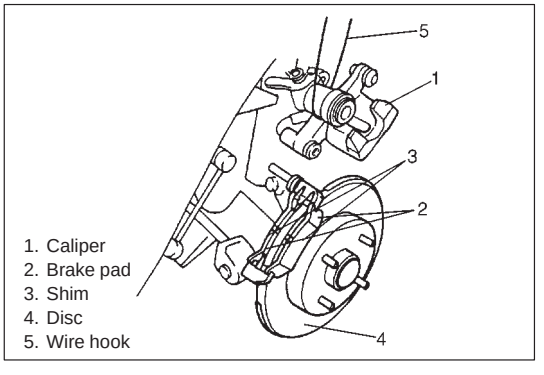


1. Pin
2. Clip
3. Caliper
4. Disc

4) Remove parking brake cable clip and pin.



5) Remove parking brake cable bracket from caliper.
6) Pull cap out of caliper pin bolt and remove caliper pin bolt.



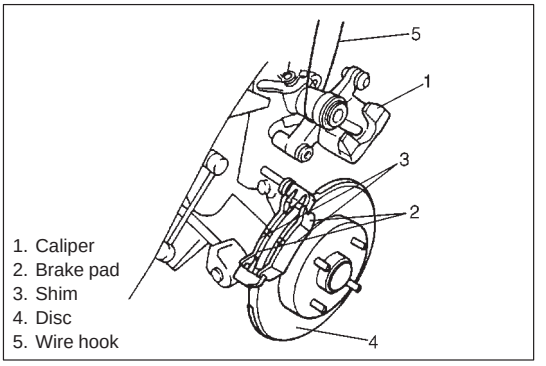
1. Caliper
2. Brake pad
3. Shim
4. Disc
5. Wire hook

7) Remove caliper from caliper carrier.

NOTE:
Hang removed caliper with a wire hook or the like so as to prevent brake hose from bending and twisting excessively or being pulled. Don't operate brake pedal with pads removed.

8) Remove pads with shims.

NOTE:
When removing pads, don't lose spring and antirattle spring.



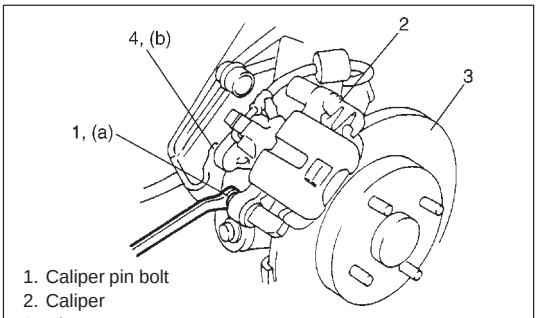
1. Caliper
2. Brake pad
3. Shim
4. Disc
5. Wire hook

INSTALLATION

NOTE:
See NOTE at the beginning of this section.

1) Install antirattle spring, pad shims (plates), pads, and pad retract spring.

   NOTE:
   Do not forget to install pad retract spring.



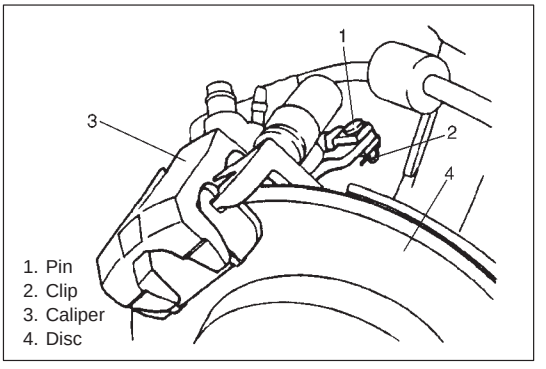
1. Caliper pin bolt
2. Caliper
3. Disc
4. Parking brake cable bracket bolt

2) Install caliper.
3) Then torque caliper pin bolt.

   Tightening Torque
   (a) : 38 N·m (3.8 kg-m, 27.5 lb-ft)

4) Install cap to caliper pin bolt.
5) Install parking brake cable bracket to caliper.

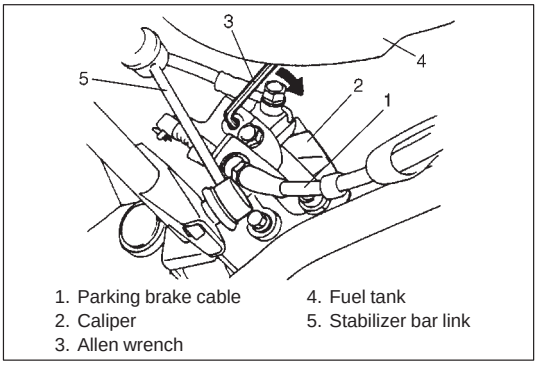
   Tightening Torque
   (b) : 46 N·m (4.6 kg-m, 33.0 lb-ft)



1. Pin
2. Clip
3. Caliper
4. Disc

6) Install parking brake cable clip and pin.

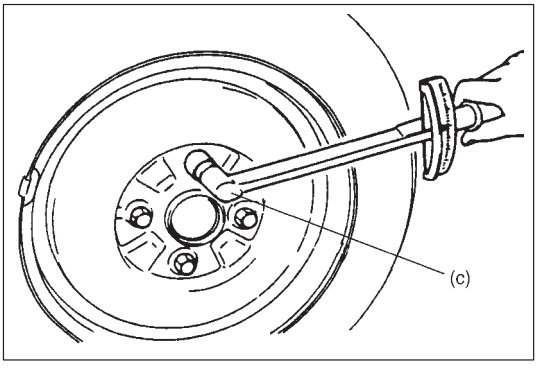
   NOTE:
   Make sure that the direction of pin is in specified direction.



1. Parking brake cable
2. Caliper
3. Allen wrench
4. Fuel tank
5. Stabilizer bar link

7) Turn manual adjustment gear clockwise with an Allen wrench until the caliper's piston pushes lightly the pad to the disc. Then turn manual adjustment gear 1/3 turn counterclockwise.

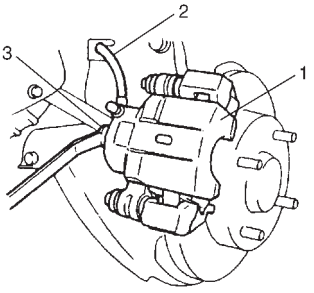
   NOTE:
   ○ **Check that the brake does not drag after all installations are done.**
   ○ **Do not forget to plug manual adjustment gear hole.**

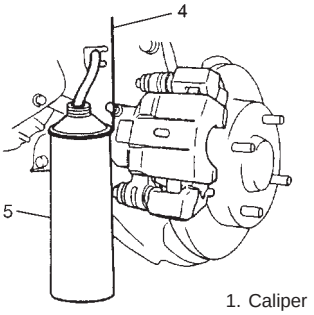


8) Torque rear wheel nuts to specification.

   Tightening Torque
   (c) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

9) Upon completion of installation, perform brake test.



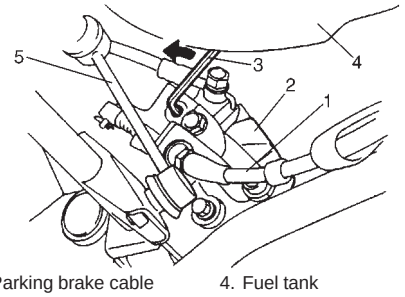


1. Caliper
2. Flexible hose
3. Hose mounting bolt
4. Wire hook
5. Container

REMOVE AND INSTALL CALIPER ASSEMBLY

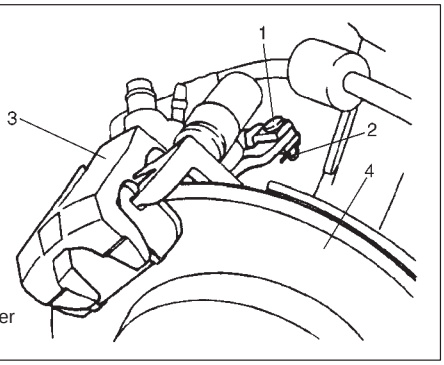
REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove brake flexible hose mounting bolt from caliper. As this will allow fluid to flow out of hose, have a container ready beforehand.



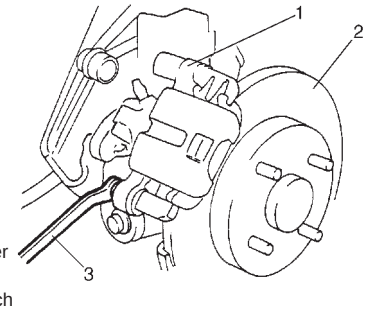
1. Parking brake cable
2. Caliper
3. Allen wrench
4. Fuel tank
5. Stabilizer bar link

3) Remove manual adjustment gear cover.
4) Turn manual adjustment gear counterclockwise with an Allen wrench so to have the piston away from the disc.



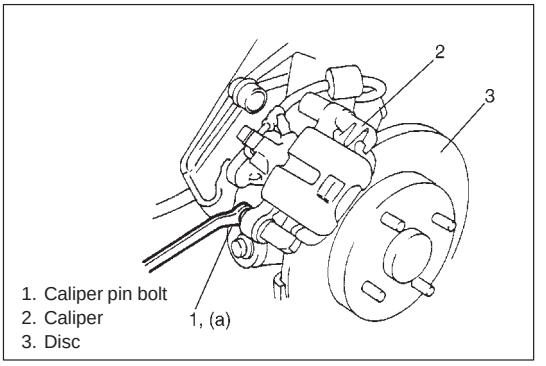
1. Pin
2. Clip
3. Caliper
4. Disc

5) Remove parking brake cable clip and pin.



1. Caliper
2. Disc
3. Wrench

6) Remove parking brake cable bracket from caliper.
7) Pull cap out of caliper pin bolt and remove caliper pin bolt.
8) Remove caliper from caliper carrier.
9) Remove caliper carrier.



1. Caliper pin bolt
2. Caliper
3. Disc

INSTALLATION

1) Install caliper carrier to knuckle.

   Tightening Torque for caliper carrier
   50 N·m (5.0 kg-m, 36.0 lb-ft)

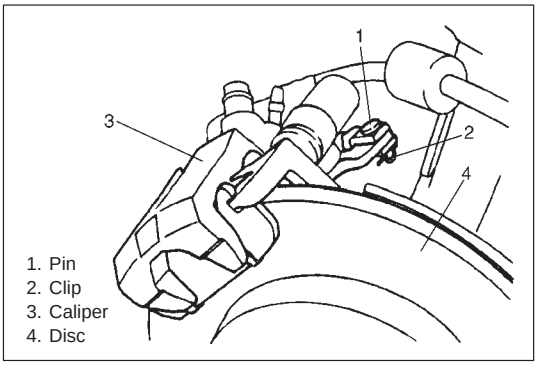
2) Install caliper to caliper carrier.
3) Install caliper pin bolt.

   Tightening Torque
   (a) : 38 N·m (3.8 kg-m, 27.5 lb-ft)

   NOTE:
   Make sure that boots are fit into groove securely.

4) Install cap to caliper pin bolt.
5) Install parking brake cable bracket to caliper.

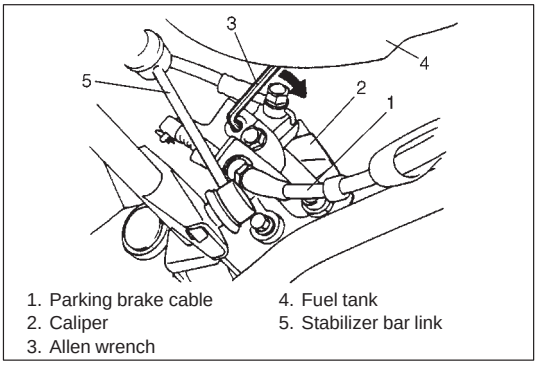
   Tightening Torque for bracket bolt
   46 N·m (4.6 kg-m, 33.0 lb-ft)



1. Pin
2. Clip
3. Caliper
4. Disc

6) Install parking brake cable clip and pin.

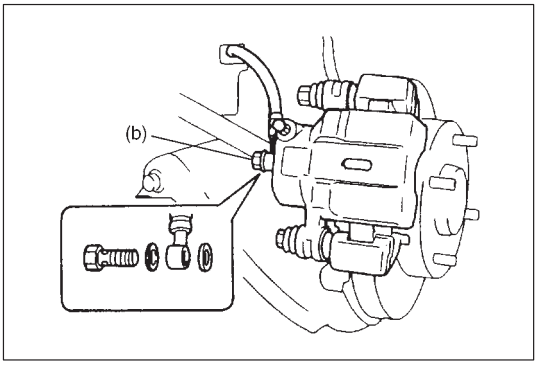
   NOTE:
   Make sure that the direction of pin is in specified direction.



1. Parking brake cable
2. Caliper
3. Allen wrench
4. Fuel tank
5. Stabilizer bar link

7) Turn manual adjustment gear clockwise with an Allen wrench until the caliper's piston pushes lightly the pad to the disc. Then turn manual adjustment gear 1/3 turn counterclockwise.

   NOTE:
   Check that the brake does not drag after all installations are done.



8) Install brake flexible hose as shown and torque hose mounting bolt to specification.

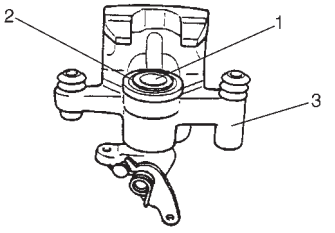
   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

9) Torque wheel nuts to specification by referring to "TORQUE SPECIFICATION" in this section.
10) After completing installation, fill reservoir with brake fluid and bleed brake system. Perform brake test and check each installed part for oil leakage.

REMOVE AND INSTALL SEAL, PISTON, BOOT, BLEEDER PLUG AND PARKING BRAKE CAM

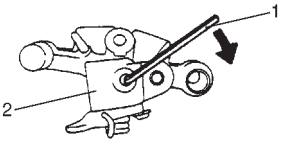
REMOVAL

1) Before disassembly, clean all around caliper with brake fluid.



1. Piston
2. Piston boot
3. Caliper

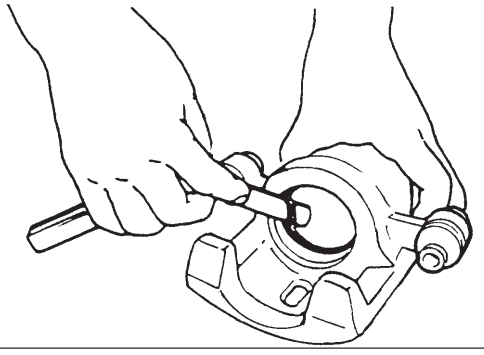
2) Remove piston boot around the piston.



1. Allen wrench
2. Caliper ass'y

3) Remove piston by turning the manual adjustment gear clockwise with an Allen wrench until the manual adjustment gear can be turned very lightly. Then pull out piston from caliper.

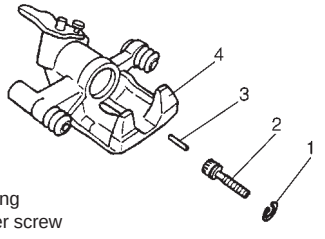
CAUTION:
Do not disassemble parts inside the piston.
If those parts are defective, replace piston as an assembly.



4) Remove piston seal using a thin blade like a thickness gauge, etc.

NOTE:
Be careful not to damage inside (bore side) of cylinder.

5) Remove bleeder plug and cap from caliper.

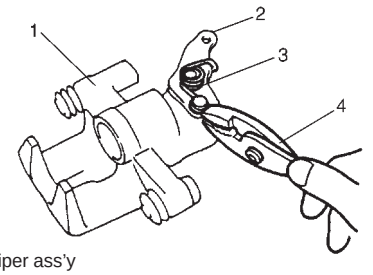


1. Snap ring
2. Adjuster screw
3. Rod
4. Caliper ass'y

6) Remove adjuster screw by first removing snap ring using special tool.

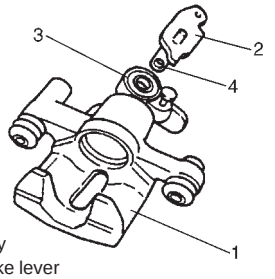
Special tool:
09952-76011

7) Then pull out adjuster screw.



1. Caliper ass'y
2. Parking brake lever
3. Parking brake return spring
4. Plier

8) Remove parking brake return spring.

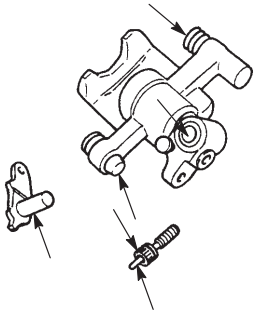


1. Caliper ass'y
2. Parking brake lever
3. Lever shaft seal
4. Cam

9) Remove lever with push rod and lever shaft seal.

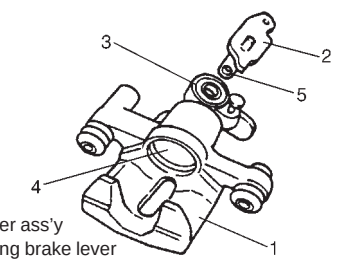
INSTALLATION

CAUTION:
- **Wash each part cleanly before installation in the same fluid as the one used in master cylinder reservoir.**
- **Never use thinner or other fluid.**
- **Before installing piston and seal to cylinder, apply fluid to them.**
- **After reassembling brake lines, bleed air from them.**



NOTE:
Where temperature gets as low as –30·C (–22·F) in cold weather, use rubber grease whose viscosity varies very little even at –40·C (–40·F).

Before installation apply rubber grease to arrowed location.

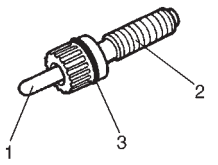


1. Caliper ass'y
2. Parking brake lever
3. Boot
4. Cylinder
5. Cam

1) Install new lever shaft seal and lever to caliper.

NOTE:
The cam of lever should face the cylinder of caliper.

Apply ample amount of rubber grease to the cam and inside surface of lever shaft seal.
See NOTE at the beginning of this installation.

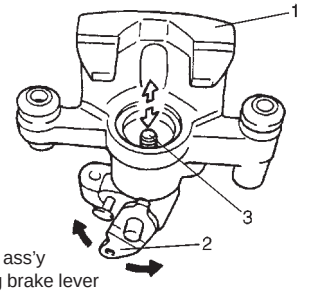


1. Push rod
2. Adjuster screw
3. O-ring

2) Install push rod and new O-ring to adjuster screw.
Apply ample amount of rubber grease to push rod and adjuster screw.
See NOTE at the beginning of this installation.

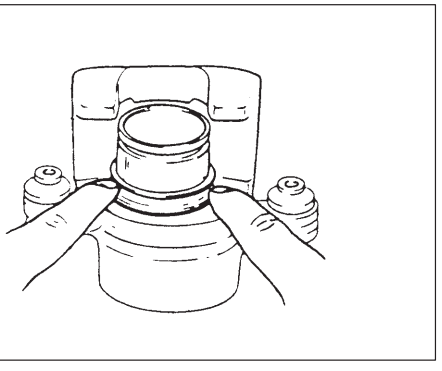
3) Install adjuster screw ass'y to caliper.

NOTE:
Do not forget to install snap ring.



1. Caliper ass'y
2. Parking brake lever
3. Adjuster screw

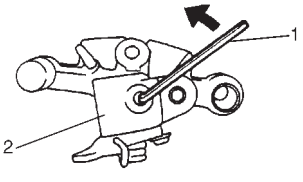
4) When pressing screw part of adjuster screw by hand, turn lever lightly in its full turn.
Check that the adjuster screw moves up and down.



5) Install new piston seal to caliper.

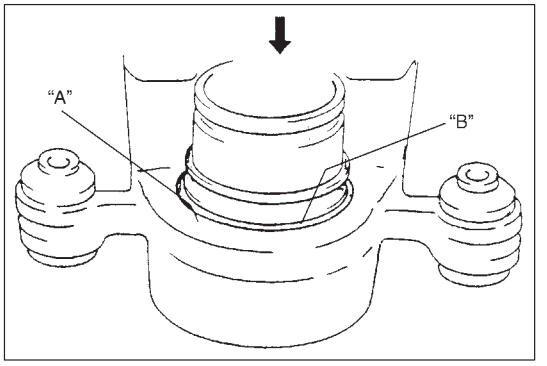
NOTE:
Moisten piston seal with the fluid same as the one in master cylinder.

6) With new piston boot fitted to the lower part of piston, fit the piston boot to caliper's groove.
Apply rubber grease to inside surface (where it meet the piston) of piston boot.
See NOTE at the beginning of this installation.



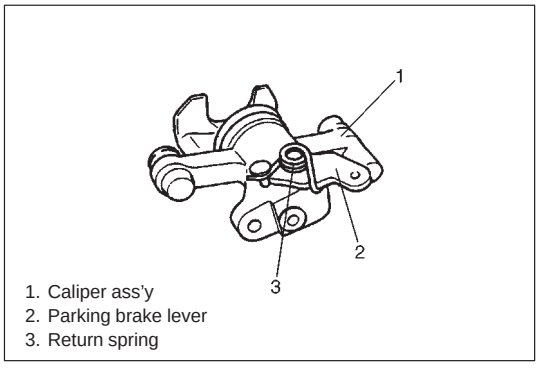
1. Allen wrench
2. Caliper ass'y

7) Turn manual adjustment gear counterclockwise until it stops to fit the piston in cylinder.



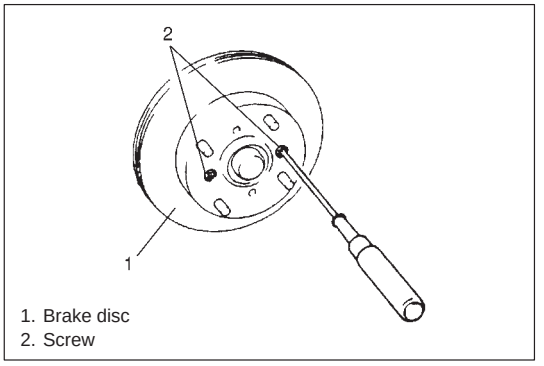
8) Once the piston is fitted all the way down, confirm that the boot is fitted properly in the groove of caliper's cylinder by turning manual adjustment gear clockwise to have the piston move up about halfway.

NOTE:
Boot's face "B" should be at the same level from cylinder's face "A" all around.



1. Caliper ass'y
2. Parking brake lever
3. Return spring

9) Have the piston back to the bottom of cylinder.
10) Install parking brake return spring.



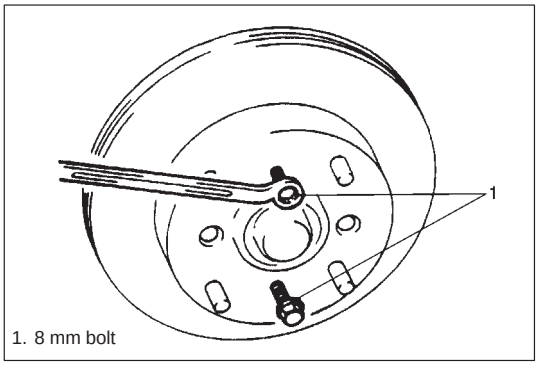
1. Brake disc
2. Screw

REMOVE AND INSTALL DISC

REMOVAL

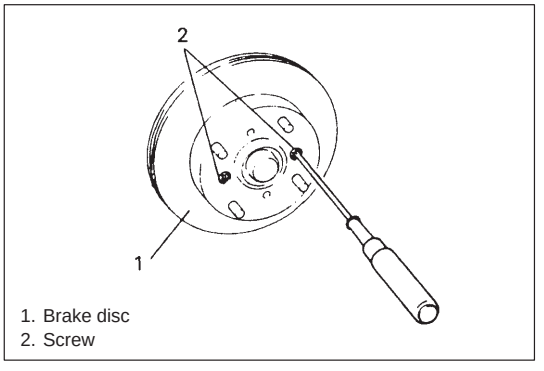
1) Hoist vehicle, remove wheel and pull parking brake lever.
2) Remove brake disc screws (2 pieces).
3) Release parking brake lever.

4) Follow step 2) to 8) of “REMOVAL” under “REMOVE AND INSTALL PAD (SHOE & LINING)” in this section.



1. 8 mm bolt

5) Pull brake disc off by using 8 mm bolts (2 pieces).

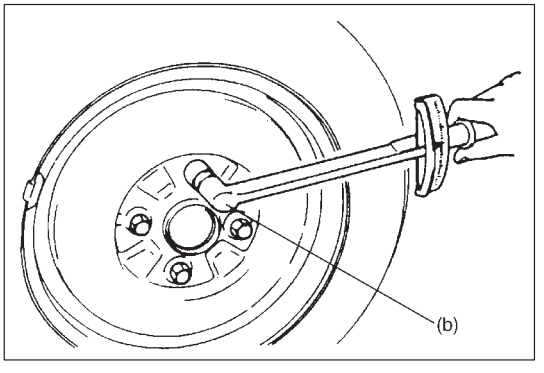


1. Brake disc
2. Screw

INSTALLATION

NOTE:
See NOTE at the beginning of this section.

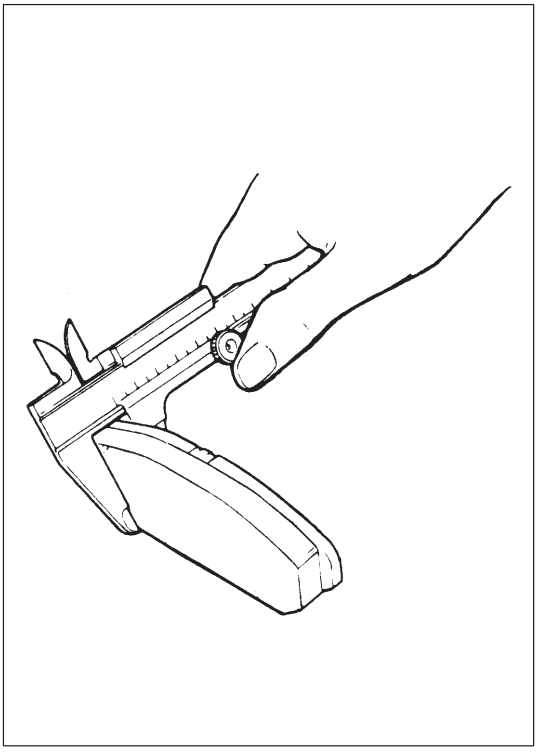
1) Install disc to wheel hub.
2) Follow step 1) thru 7) of “INSTALLATION” under “REMOVE AND INSTALL PAD (SHOE & LINING)” in this section.
3) Pull parking brake lever and install brake disc screws.



4) Torque rear wheel nuts to specification.

   Tightening Torque
   (b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

5) Upon completion of installation, perform brake test.



REAR DISC BRAKE INSPECTION

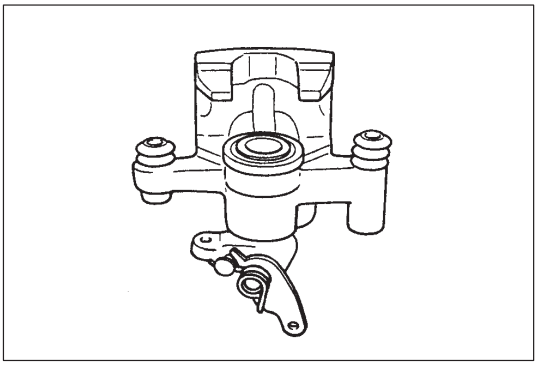
INSPECT BRAKE PAD LINING

Check pad lining for wear. When wear exceeds limit, replace with new one.

CAUTION:
Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.

Pad thickness (lining + pad rim)
Standard : 12 mm (0.47 in.)
Limit : 5.5 mm (0.20 in.)

NOTE:
When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.

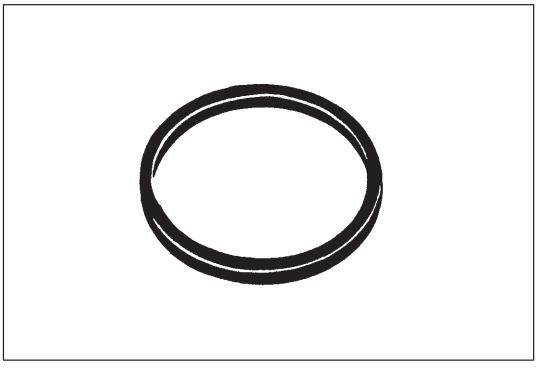


INSPECT BRAKE CALIPER INNER PARTS

Guide Pin Boot and Cylinder Boot

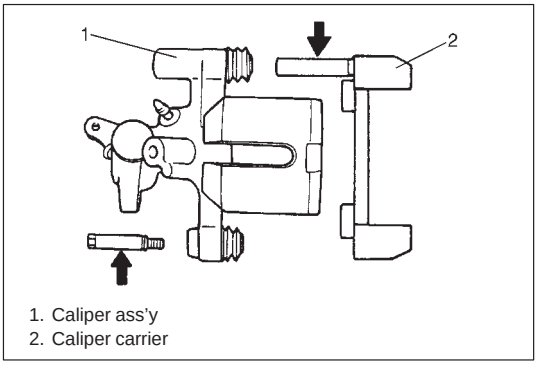
Check boots for breakage, crack and damage. If defective, replace. Apply rubber grease to inside surface of piston boot (where it meets the piston), guide pin boot and rubber bush.

NOTE:
Where temperature gets as low as –30·C (–22·F) in cold weather, use rubber grease whose viscosity varies very little even at –40·C (–40·F).



Piston Seal

Excessive or uneven wear of pad lining may indicate unsmooth return of the piston. In such a case, replace rubber seal.

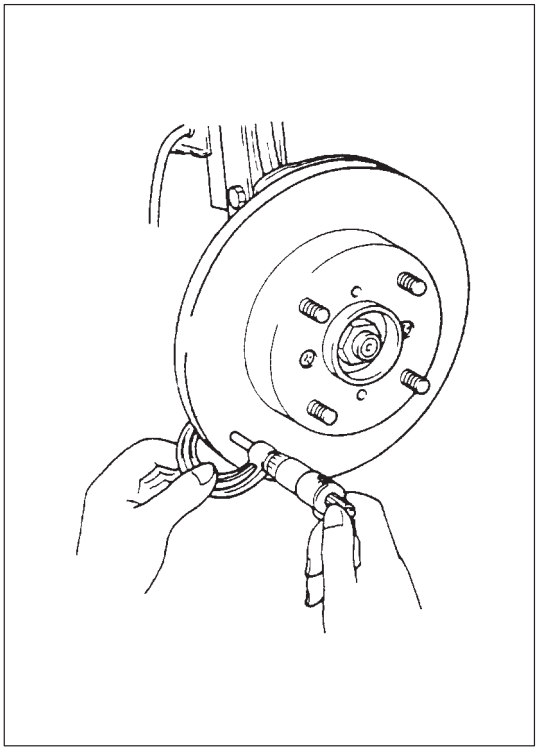


1. Caliper ass'y
2. Caliper carrier

Caliper Pin Bolt and Caliper Carrier Pin

Caliper pin bolt and caliper carrier pin for smooth movement in thrust direction of caliper.

If it is found faulty, correct or replace. Apply rubber grease to caliper pin bolt and caliper carrier pin outer surface. Rubber grease should be the one whose viscosity is less affected by such low temperature as –40·C (–40·F).

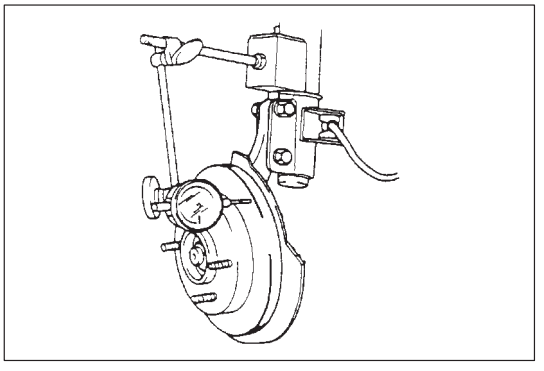


INSPECT BRAKE DISC

Before this inspection, brake pads must be removed (according to step 1) to 8) of “REMOVAL” under “REMOVE AND INSTALL PAD (SHOE & LINING)” of “REAR DISC BRAKE” in this section.

Check disc surface for scratches in wearing parts.
Scratches on disc surface noticed at the time of specified inspection or replacement are normal and disc is not defective unless they are serious.
But when there are deep scratches or scratches all over disc surface, replace it. When only one side is scratched, polish and correct that side.

Disc thickness
Standard :10 mm (0.39 in.)
Limit : 8 mm (0.31 in.)



To measure deflection of disc, take measurement at 2 points on its periphery and center with dial gauge while rotating it.

Limit on disc deflection: 0.1 mm (0.0039 in.)

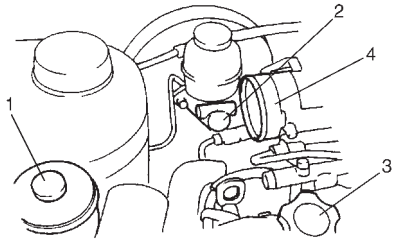
NOTE:
Check front wheel bearing for looseness before measurement.

MASTER CYLINDER REPAIR

REMOVE AND INSTALL MASTER CYLINDER ASSEMBLY

REMOVAL

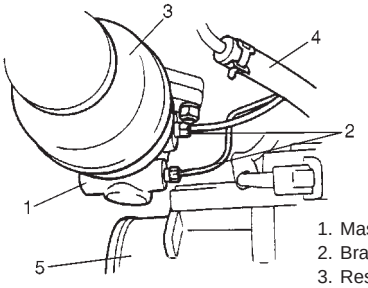
NOTE:
Do not allow brake fluid to get on painted surfaces.



1. Power steering fluid reservoir
2. Master cylinder
3. Oil filler cap
4. Throttle body

[1.8L engine RH model]

1) Disconnect air flow meter coupler.
2) Remove air cleaner outlet hose.

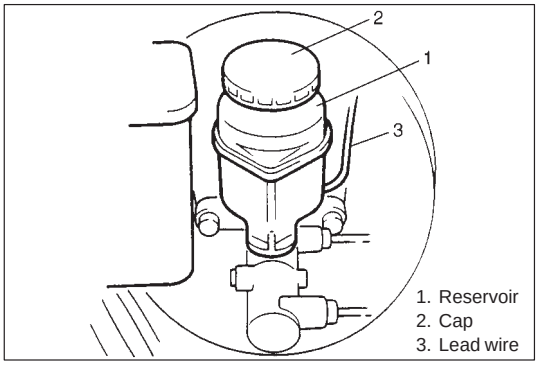


1. Master cylinder
2. Brake pipe
3. Reservoir tank
4. Vacuum hose
5. Throttle body

3) Disconnect reservoir lead wire at coupler.
4) Clean around reservoir cap and take out fluid with syringe or such.
5) Depress brake pedal several times for removal convenience.
6) Disconnect two brake pipes from master cylinder as shown.
7) Remove two attaching nuts.
8) Remove master cylinder.

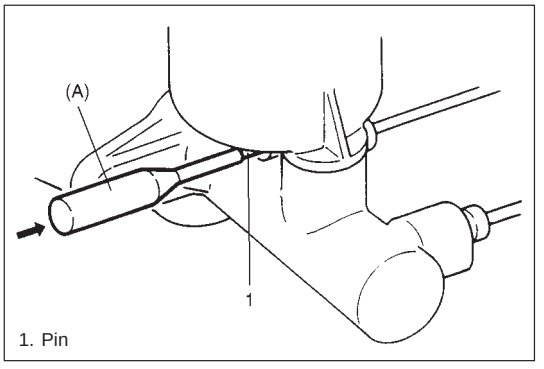
CAUTION:
- **Brake master cylinder cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir tank and replace it in cylinder.**
- **Don't make as flaws and hitted marks on the piston, on which vacuum seal slides.**

WARNING:
Brake master cylinder cannot be disassembled. When any part of it other than primary piston as described in CAUTION above has been disassembled, or when anything faulty is found in it, it must be replaced as an assembly.



[Other than 1.8L engine RH model]

1) Disconnect reservoir lead wire at coupler.
2) Clean outside of reservoir.
3) Take out fluid with syringe or such.

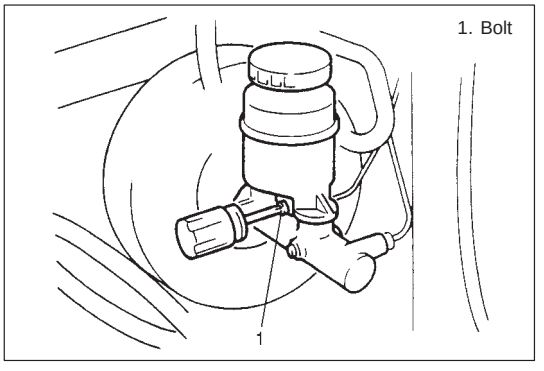


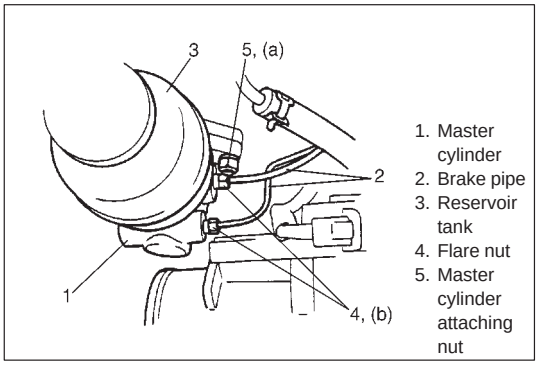
4) Remove reservoir pin or bolt. Use special tool for pin removal.

   Special Tool
   (A): 09922-85811

5) Remove reservoir.

> **CAUTION:**
> **Brake fluid is extremely damaging to paint.**
> **Do not allow brake fluid to get on painted surfaces.**





INSTALLATION

NOTE:
See NOTE at the beginning of this section.

[1.8L engine RH model]

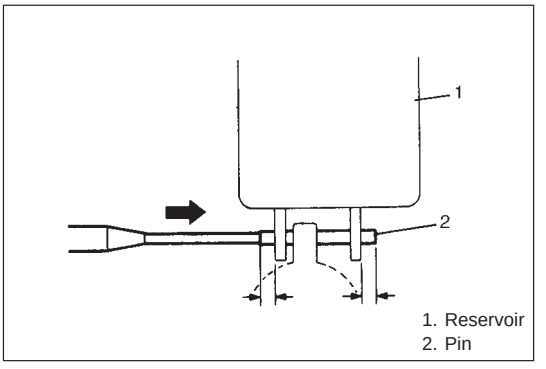
1) Install master cylinder and torque attaching nuts to specification.
2) Attach two hydraulic lines and torque flare nuts to specification.

   Tightening torque
   (a): 13 N·m (1.3 kg-m, 9.0 lb-ft)
   (b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

3) Fill reservoir with specified brake fluid.
   Connect reservoir lead wire coupler.
4) After installing, check brake pedal play and bleed air from system. For bleeding procedure, refer to “BLEEDING BRAKES” in this manual.
5) Install air cleaner outlet hose (and connect air flow meter coupler).
6) Perform brake test and check each installed part for fluid leakage.

[Other than 1.8L engine RH model]

1) When using new grommets, lubricate them with the same fluid as the one to fill reservoir with. Then press-fit grommets to master cylinder. Grommets must be seated in place.

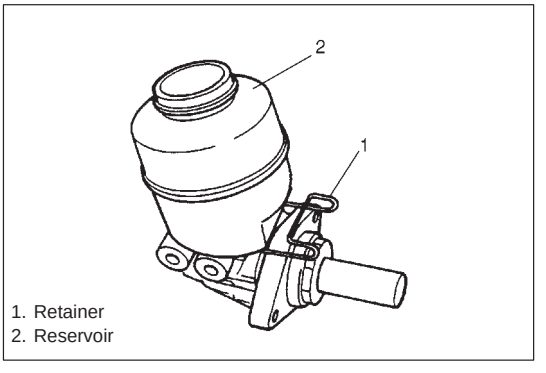


1. Reservoir
2. Pin

2) Install reservoir on master cylinder with pin or bolt.

NOTE:
when inserting pin, drive till both of its ends at the right and left of reservoir become the same length.

3) Install EVAP canister to its bracket, if removed.
4) Connect reservoir lead wire.
5) Fill reservoir with special fluid.
6) Upon completion of installation, check for fluid leakage.



1. Retainer
2. Reservoir

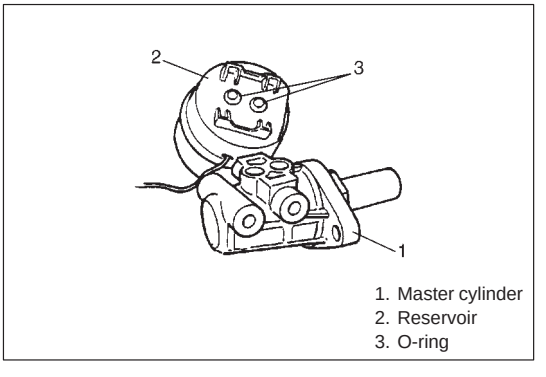
REMOVE AND INSTALL MASTER CYLINDER RESERVOIR

REMOVAL

NOTE:
Do not allow brake fluid to get on painted surfaces.

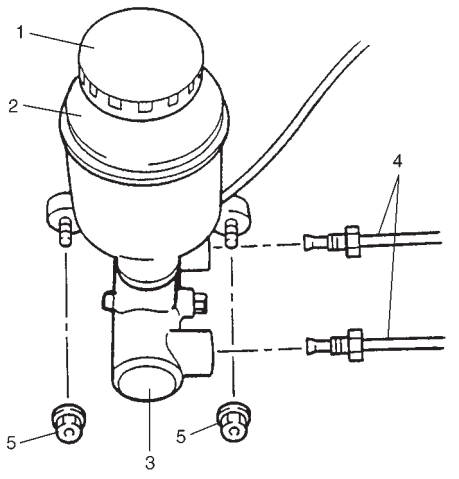
[1.8L engine RH model]

1) Remove master cylinder. Refer to “REMOVAL” under “REMOVE AND INSTALL MASTER CYLINDER ASSEMBLY” in this section.
2) Remove retainer as shown.



1. Master cylinder
2. Reservoir
3. O-ring

3) Remove reservoir.



1. Reservoir Cap
2. Reservoir
3. Master cylinder
4. Brake pipes
5. Attaching nuts

[Other than 1.8L engine RH model]

1) Disconnect reservoir lead wire at coupler.
2) Clean around reservoir cap and take out fluid with syringe or such.
3) Disconnect brake pipes from master cylinder.

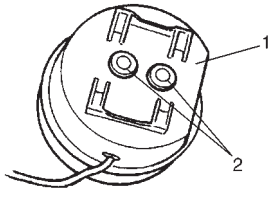
> **CAUTION:**
> **Brake fluid is extremely damaging to paint.**
> **Do not allow brake fluid to get on painted surfaces.**

4) Remove master cylinder attaching nuts.
5) Remove master cylinder.

INSTALLATION

NOTE:

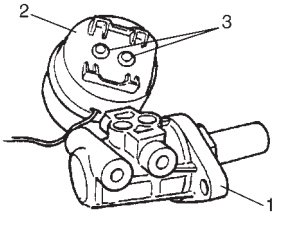
- **See NOTE at the beginning of this section.**
- **Use new O-rings.**
- **Check clearance between booster piston rod and primary piston referring to "INSPECT/ADJUST CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON" under "BRAKE BOOSTER INSPECTION AND ADJUSTMENT" in this section.**



1. Reservoir
2. O-ring

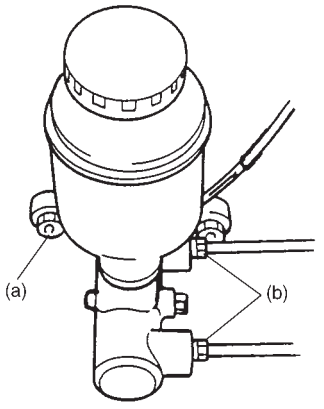
[1.8L engine RH model]

1) When installing new O-rings, lubricate them with the same fluid as the one to fill reservoir with. Then install O-rings to reservoir. O-rings must be seated in place.



1. Master cylinder
2. Reservoir tank
3. O-ring

2) Install reservoir with O-rings to master cylinder and fix it with retainer.
3) Install master cylinder. Refer to "INSTALLATION" under "REMOVE AND INSTALL MASTER CYLINDER ASSEMBLY" in this section.



[Other than 1.8L engine RH model]

1) Install master cylinder as shown and torque attaching nuts to specification.

   Tightening Torque
   (a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

2) Attach hydraulic lines and torque flare nuts to specification.

   Tightening Torque
   (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

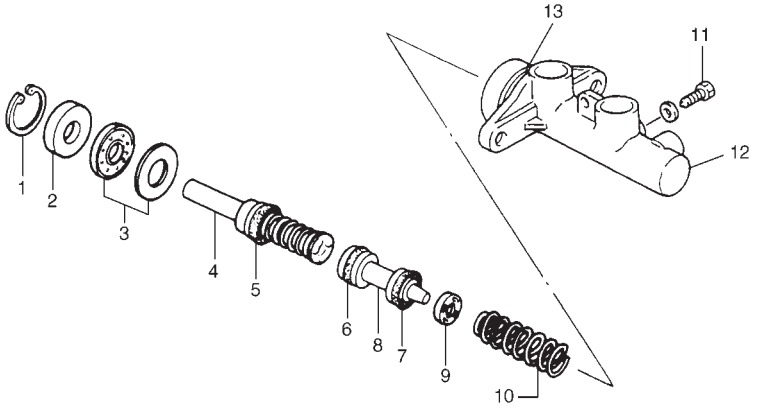
3) Connect reservoir lead wire.
4) Fill reservoir with specified brake fluid.
5) After installing, bleed air from system (Refer to “BLEEDING BRAKES” in this section) and check brake pedal height and play.
6) Perform brake test and check each installed part for fluid leakage.

DISASSEMBLE AND ASSEMBLE MASTER CYLINDER

WARNING:
1.8L engine RH model's brake master cylinder cannot be disassembled. When any part of it other than primary piston as described in CAUTION above has been disassembled, or when anything faulty is found in it, it must be replaced as an assembly.

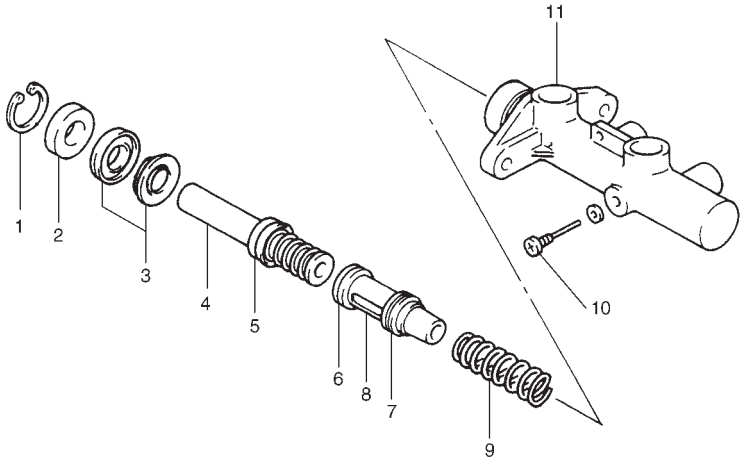
CAUTION:
1.8L engine RH model's brake master cylinder cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir tank and place it back in cylinder.

[For vehicles not equipped with ABS]

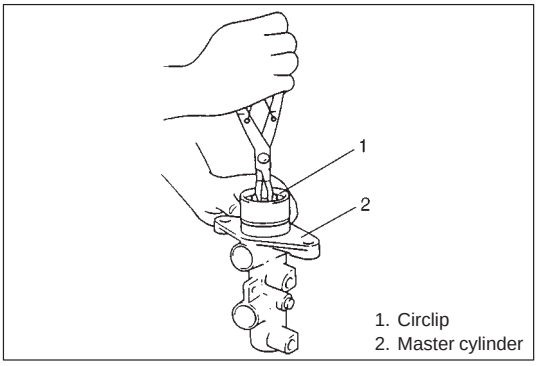


1. Piston stopper circlip
2. Piston stopper
3. Cylinder cup and plate
4. Primary piston
5. Piston cup
6. Secondary piston pressure cup
7. Piston cup
8. Secondary piston
9. Return spring secondary seat
10. Secondary piston return spring
11. Secondary piston stopper bolt
12. Master cylinder body
13. O-ring

[For vehicles equipped with ABS]



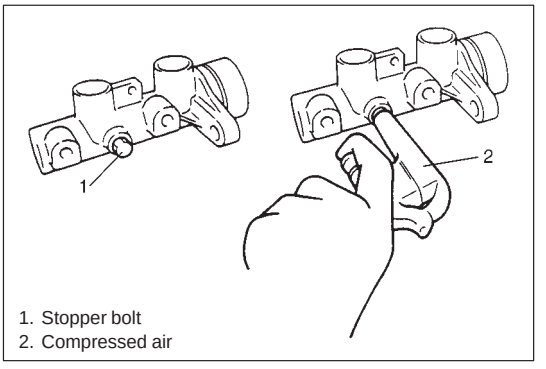
1. Piston stopper circlip
2. Piston guide
3. Cup and retainer
4. Primary piston
5. Piston cup
6. Secondary piston pressure cup
7. Piston cup
8. Secondary piston
9. Secondary piston return spring
10. Piston stopper bolt (Supply valve stopper)
11. Master cylinder body



1. Circlip
2. Master cylinder

DISASSEMBLY

1) Remove circlip.
2) Remove primary piston.



1. Stopper bolt
2. Compressed air

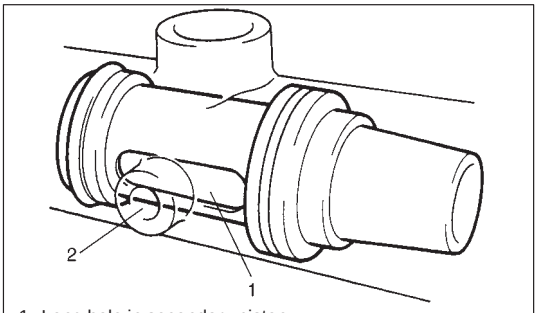
3) Remove piston stopper bolt. Then remove secondary piston by blowing compressed air into hole from which piston stopper bolt was removed.
   Be cautious during removal as secondary piston jumps out.

ASSEMBLY

NOTE:

- **See NOTE at the beginning of this section.**
- **Before assembling, wash each part in fluid recommended to use for that vehicle.**

1) Assemble secondary piston as shown on previous page.

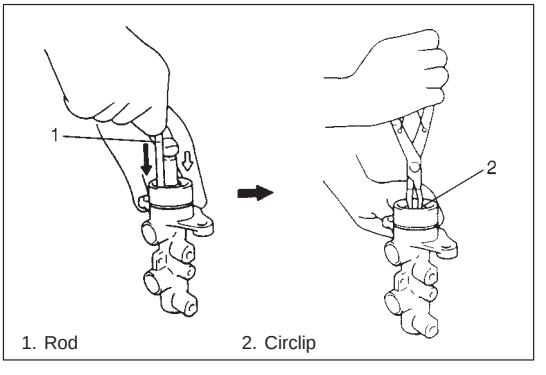


1. Long hole in secondary piston
2. Stopper bolt hole

2) Install secondary piston assembly into cylinder.

   NOTE:
   For vehicles equipped with ABS, align long hole in secondary piston with stopper bolt hole in master cylinder body when installing it.

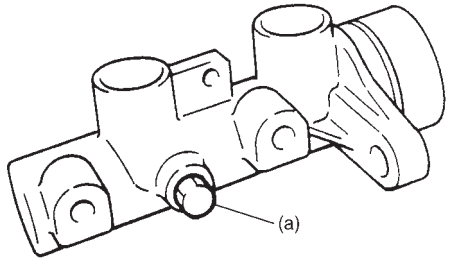
3) Install primary piston assembly into cylinder.



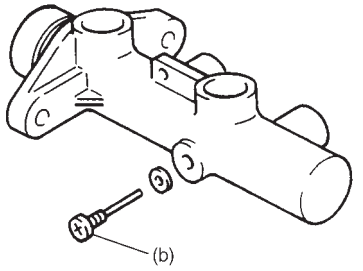
1. Rod
2. Circlip

4) Depress, and install circlip.

[For vehicles not equipped with ABS]



[For vehicles equipped with ABS]

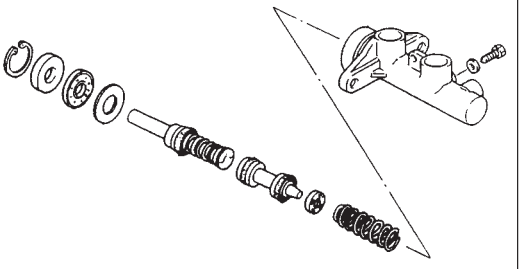


5) Install piston stopper bolt with pistons pushed in all the way and tighten it to specified torque.

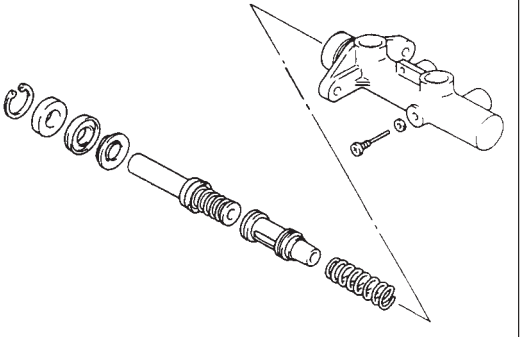
   Tightening Torque
   (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)
   (b): 2.5 N·m (0.25 kg-m, 2.0 lb-ft)

6) For installation on vehicle, refer to “INSTALLATION” under “REMOVE AND INSTALL MASTER CYLINDER ASSEMBLY” in this section.

[For vehicles not equipped with ABS]



[For vehicles equipped with ABS]



MASTER CYLINDER INSPECTION

WARNING:
1.8L engine RH model's brake master cylinder cannot be disassembled. When any part of it other than primary piston as described in CAUTION above has been disassembled, or when anything faulty is found in it, it must be replaced as an assembly.

CAUTION:
1.8L engine RH model's brake master cylinder cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir tank and place it back in cylinder.

INSPECT MASTER CYLINDER

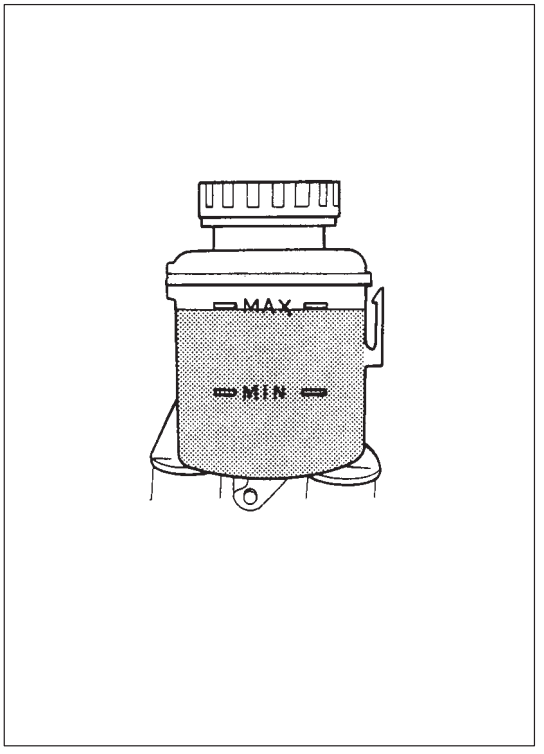
Inspect all disassembled parts for wear or damage, and replace parts if necessary.

NOTE:
○ **Wash disassembled parts with brake fluid.**
○ **Do not reuse piston cups.**

Inspect master cylinder bore for scoring or corrosion. It is best to replace corroded cylinder. Corrosion can be identified as pits or excessive roughness.

NOTE:
Polishing bore of master cylinder with cast aluminum body with anything abrasive is prohibited, as damage to cylinder bore may occur.

Rinse cylinder in clean brake fluid. Shake excess rinsing fluid from cylinder. Do not use a cloth to dry cylinder, as lint from cloth cannot be kept from cylinder bore surfaces.



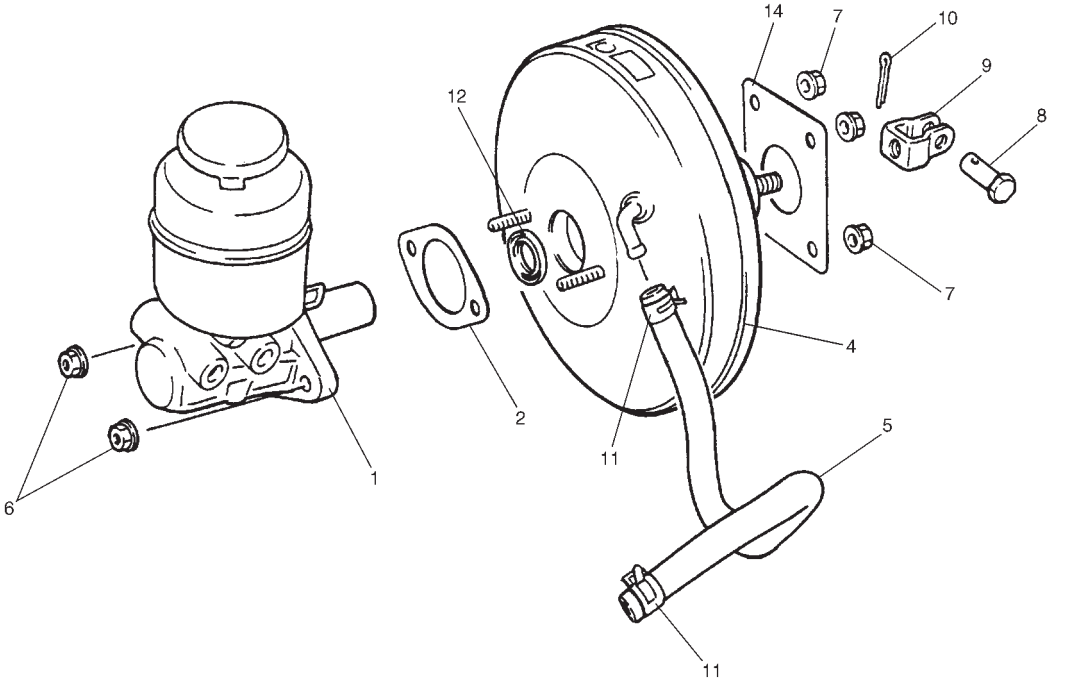
FILL RESERVOIR

NOTE:
Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use container which has been used for mineral oil or which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic brake system and water will mix with brake fluid, lowering fluid boiling point. Keep all fluid containers capped to prevent contamination.

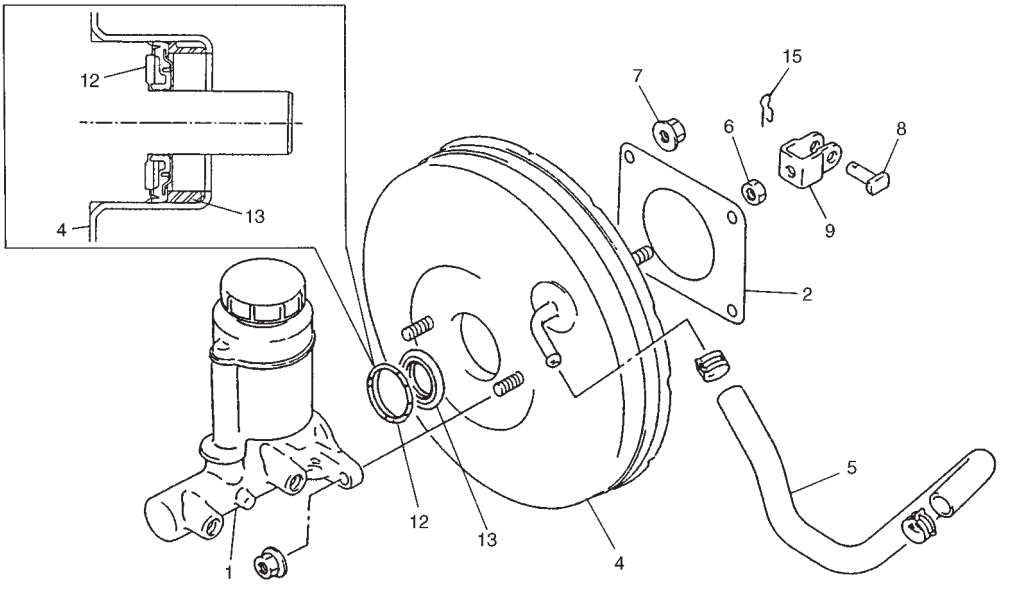
Fluid to fill reservoir with is indicated on reservoir cap of that vehicle with embossed letters or in owner's manual supplied with it.
Add fluid up to "MAX" line.

BRAKE BOOSTER

[1.8L engine RH model]



[Other than 1.8L engine RH model]



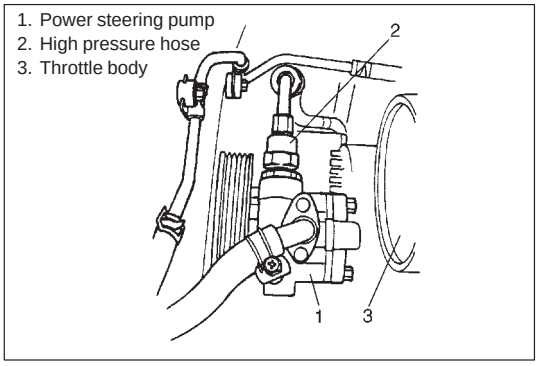
1. Brake master cylinder ass'y
2. Gasket
3. Blank
4. Booster ass'y
5. Brake vacuum hose
6. Nut
7. Nut
8. Clevis pin
9. Push rod clevis
10. Cotter pin
11. Clamp
12. Push rod seal
13. Push rod retainer
14. Packing
15. Clip

REMOVE AND INSTALL BOOSTER

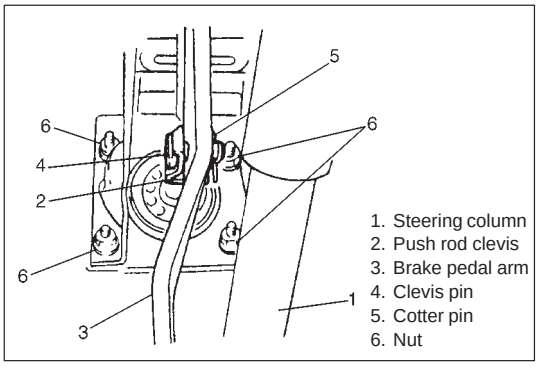
REMOVAL

[1.8L engine RH model]

1) Remove master cylinder assembly, referring to "REMOVE AND INSTALL MASTER CYLINDER ASSEMBLY" under "MASTER CYLINDER REPAIR" in this section.
2) Empty power steering fluid reservoir by a syringe or such.



3) Detach power steering pump high pressure hose from power steering pump. As fluid flows out of disconnected joint, have a container under joint or plug the hose.
4) Remove throttle body. Refer to "THROTTLE BODY AND INTAKE MANIFOLD" in Section 6A3.
5) Detach booster vacuum hose from booster.



6) Disconnect push rod clevis from brake pedal arm.
7) Remove attaching nuts and then remove booster.

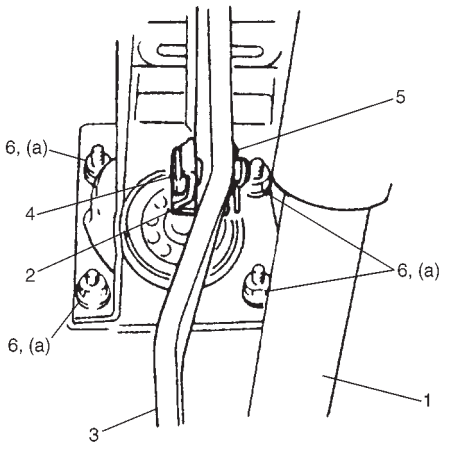
WARNING:
Never disassemble booster assembly. If it is found faulty, replace it with new assembly.

[Other than 1.8L engine RH model]
1) Remove master cylinder assembly, referring to "MASTER CYLINDER REPAIR" in this section.
2) Disconnect vacuum hose from booster and remove EVAP canister bracket.
3) Disconnect push rod clevis pin from brake pedal arm.
4) Remove attaching nuts and then booster.

CAUTION:
Never disassemble brake booster. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.

INSTALLATION

NOTE:
- ○ **See NOTE at the beginning of this section.**
- ○ **Check length of push rod clevis.**
- ○ **Before installing master cylinder, check booster piston rod by referring to "INSPECT/ADJUST CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON" under "BRAKE BOOSTER INSPECTION AND ADJUSTMENT" in this section.**
- ○ **Apply silicone grease to booster push rod seal and master cylinder piston.**



1. Steering column
2. Push rod clevis
3. Brake pedal arm
4. Clevis pin
5. Cotter pin
6. Nut

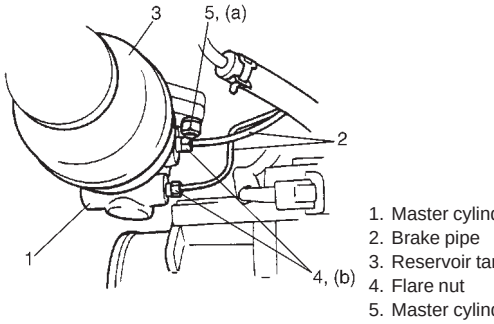
[1.8L engine RH model]

1) Install booster to dash panel as shown. Then connect booster push rod clevis to pedal arm with clevis pin and cotter pin.
2) Torque booster attaching nuts to specification.

Tightening torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

3) Connect booster vacuum hose to booster.
4) Install throttle body. Refer to “THROTTLE BODY AND INTAKE MANIFOLD” in Section 6A3.

5) Install power steering pump high pressure hose to power steering pump.
6) Fill power steering fluid reservoir with specified fluid. Refer to Section 3B1. Also follow “AIR BLEEDING PROCEDURE” in Section 3B1.

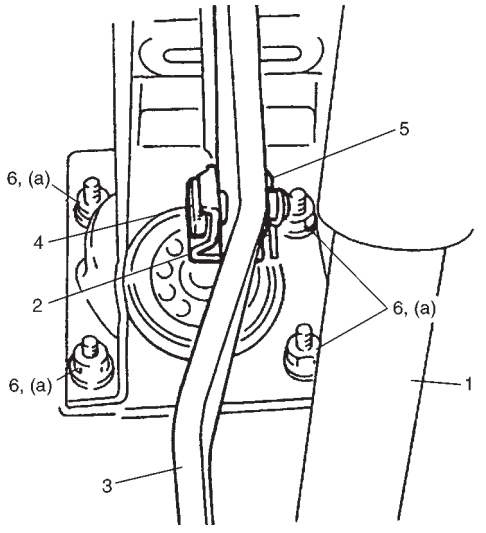


1. Master cylinder
2. Brake pipe
3. Reservoir tank
4. Flare nut
5. Master cylinder attaching nut

7) Install master cylinder, referring to “MASTER CYLINDER REPAIR” in this section.

Tighten Torque
(a): 13 N·m (1.3 kg-m, 9.0 lb-ft)
(b): 16 N·m (1.6kg-m, 12.0 lb-ft)

8) After installing, check pedal height and play.
9) After all service works are done, start engine and check that there exists no leakage around power steering system.



1. Steering column
2. Push rod clevis
3. Brake pedal arm
4. Clevis pin
5. Clip
6. Nut

[Other than 1.8L engine RH model]

1) Install booster to dash panel as shown. Then connect booster push rod clevis to pedal arm with clevis pin and clip.
2) Tighten booster attaching nuts to the specified torque.

   Tightening torque
   (a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

3) Connect brake vacuum hose to brake booster.
4) Install push rod seal to master cylinder, push rod sleeve (if equipped) to brake booster.
   Refer to figure for correct installation.
   Install master cylinder, referring to “MASTER CYLINDER REPAIR” in this section.
5) After installing, check.

BRAKE BOOSTER INSPECTION AND ADJUSTMENT

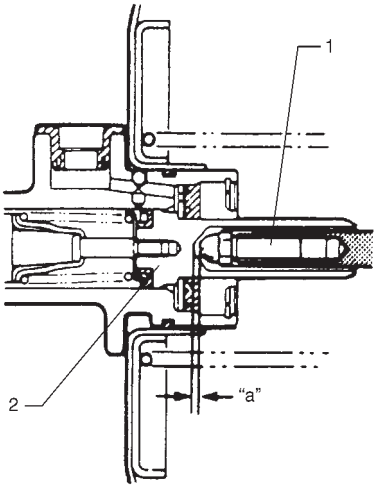
INSPECT BOOSTER PARTS

RUBBER PARTS

Wipe fluid from rubber parts and carefully inspect each rubber part for cuts, nicks or other damage.
If there is any question as to serviceability of rubber parts, replace them.

METAL PARTS

Badly damaged items, or those which would take extensive work or time to repair, should be replaced. In case of doubt, install new parts.

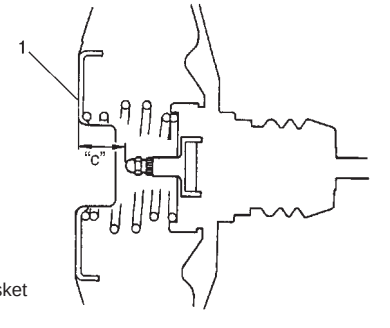


1. Booster piston rod
2. Master cylinder piston

INSPECT/ADJUST CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON

The length of booster piston rod is adjusted to provide specified clearance "a" between piston rod end and master cylinder piston.

- ○ Before measuring clearance, push piston rod several times so as to make sure reaction disc is in place.
- ○ Keep inside of booster at atmospheric pressure for measurement.
- ○ Remove piston (push) rod seal from booster, if equipped.

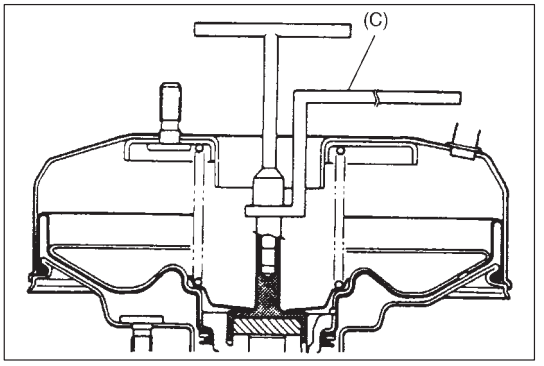


1. Gasket

[1.8L engine RH model]

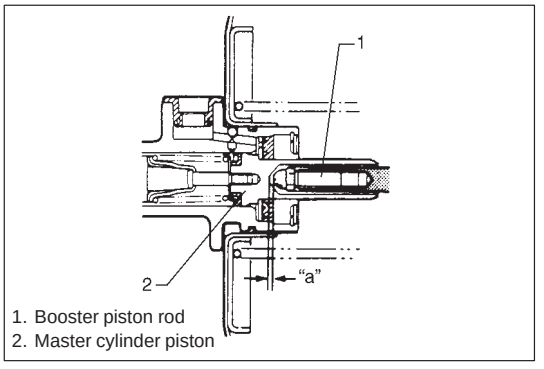
1) Remove piston rod seal from booster.
2) Measure depth of piston rod, i.e. distance between piston rod and mating surface of booster-to-master cylinder (including spacer and two gaskets).

Depth of piston rod "c" : 23.2 – 23.4 mm (0.91 – 0.92 in.) with gasket



3) If measurement is out of specified value, adjust depth by turning adjusting screw of piston rod.

Special Tool
(C): 09952-16020

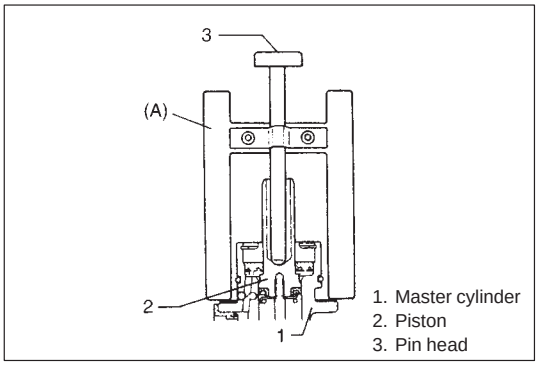


1. Booster piston rod
2. Master cylinder piston

Reference

When adjusted as above, if negative pressure is applied to booster with engine at idle, piston to piston rod clearance "a" should become the specified range below.

Piston-to-piston rod clearance "a": 0 mm (0 in.)

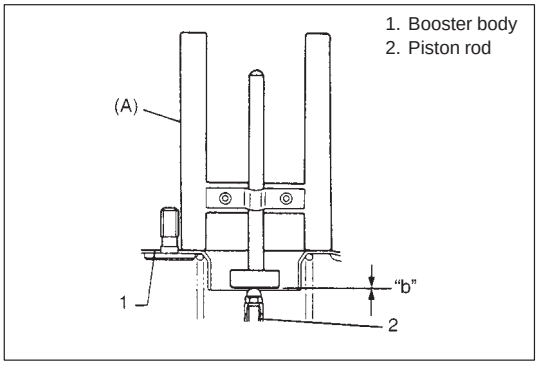


1. Master cylinder
2. Piston
3. Pin head

[Other than 1.8L engine RH model]
For Vehicle Not Equipped with ABS

1) Set special tool (A) on master cylinder and push pin until contacts piston.

Special Tool
(A): 09950-96010

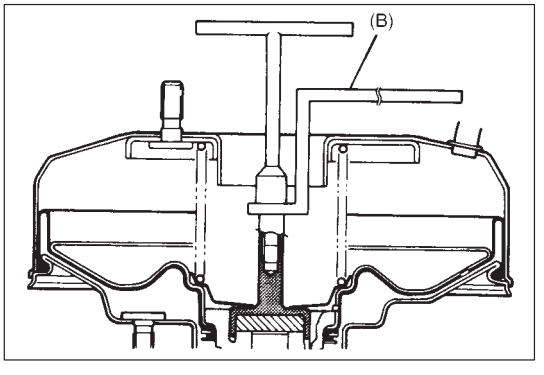


1. Booster body
2. Piston rod

2) Turn special tool upside down and place it on booster. Adjust booster piston rod length until rod end contacts pin head.

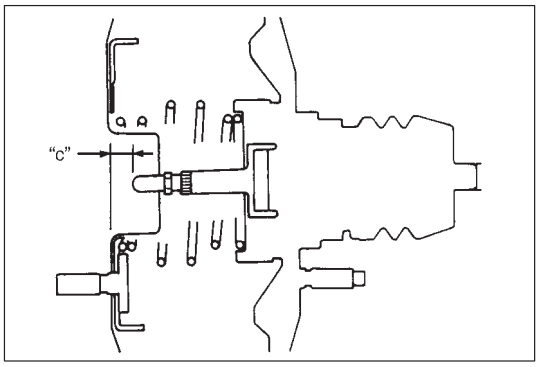
Clearance "b" (Between special tool and piston rod): 0 mm (0 in.)

Special Tool
(A): 09950-96010



3) Adjust clearance by turning adjusting screw of piston rod.

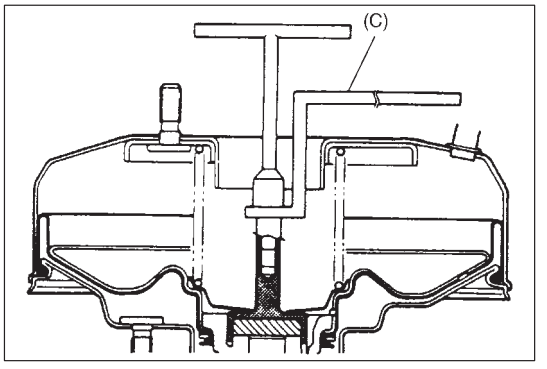
Special Tool
(B): 09952-16010



[For Vehicle Equipped with ABS]

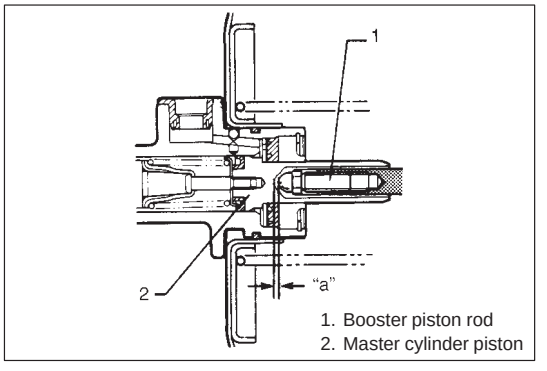
1) Remove piston rod seal from booster.
2) Measure depth of piston rod, i.e. distance between piston rod and mating surface of booster-to-master cylinder.

   Depth of piston rod "c": 9.63 – 9.87 mm (0.38 – 0.39 in.)



3) If measurement is out of specified value, adjust depth by turning adjusting screw of piston rod.

   Special Tool
   (C): 09952-16020



Reference

When adjusted as above, if negative pressure is applied to booster with engine at idle, piston to piston rod clearance "a" should become the specified range below.

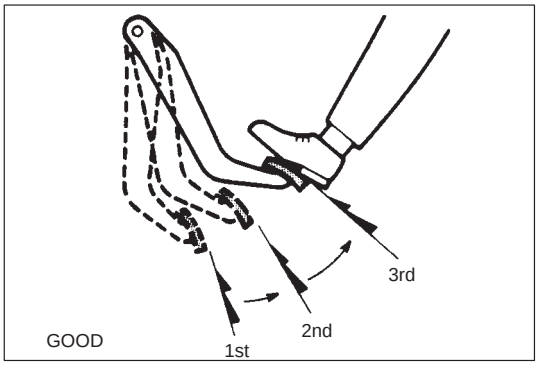
Piston-to-piston rod clearance "a":
0.25 – 0.50 mm (0.010 – 0.020 in.) for vehicle without ABS
0 mm (0 in.) for vehicle with ABS

INSPECT BOOSTER OPERATION

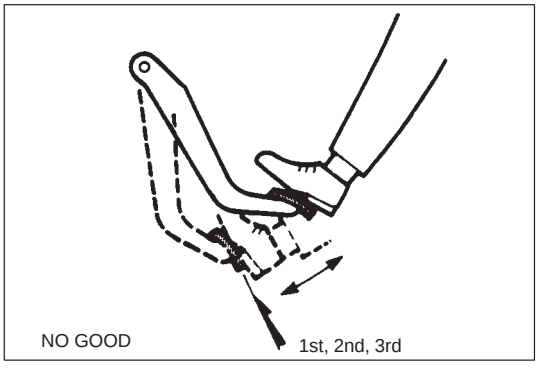
There are two ways to perform this inspection, with and without a tester. Ordinarily, it is possible to roughly determine its condition without using a tester.

NOTE:
For this check, make sure that no air is in hydraulic line.

INSPECTION WITHOUT TESTER
Check Air Tightness
1) Start engine.
2) Stop engine after running for 1 to 2 minutes.

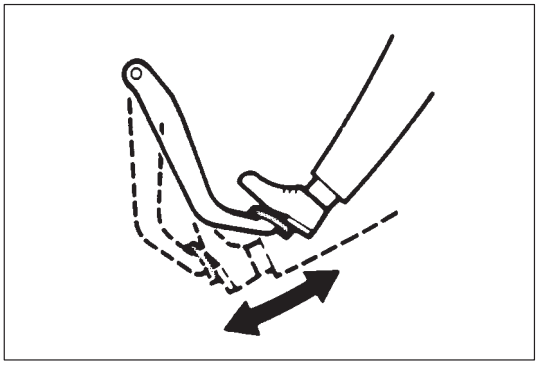


3) Depress brake pedal several times with the same load as in ordinary braking and observe pedal travel. If pedal goes down deep the first time but its travel decreases as it is depressed the second and more times, air tightness is obtained.

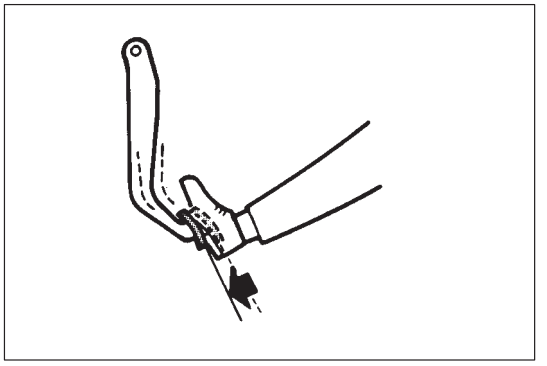


4) If pedal travel doesn't change, air tightness isn't obtained.

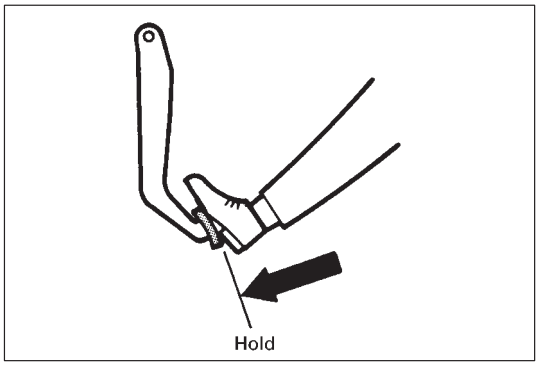
   NOTE:
   If defective, inspect vacuum lines and sealing parts, and replace any faulty part.
   When this has been done, repeat the entire test.



Check Operation
1) With engine stopped, depress brake pedal several times with the same load and make sure that pedal travel doesn't change.

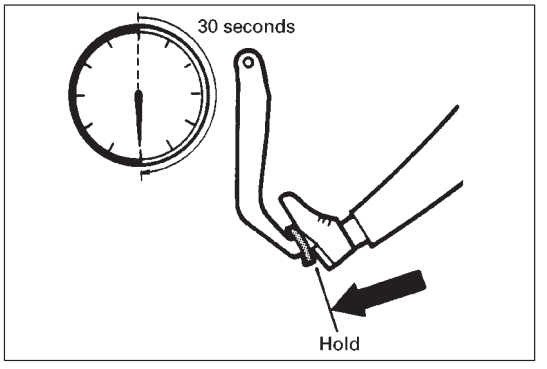


2) Start engine while depressing brake pedal. If pedal travel increases a little, operation is satisfactory. But no change in pedal travel indicates malfunction.

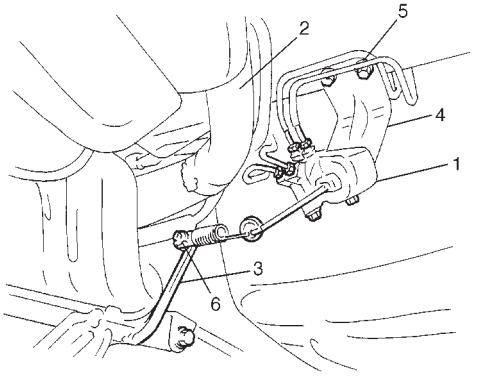


Check Air Tightness Under Load

1) With engine running, depress brake pedal. Then stop engine while holding brake pedal depressed.



2) Hold brake pedal depressed for 30 seconds. If pedal height does not change, condition is good. But it isn't if pedal rises.



1. LSPV assembly
2. Fuel filler neck
3. LSPV stay
4. LSPV bracket
5. Bracket bolt
6. Adjusting nut

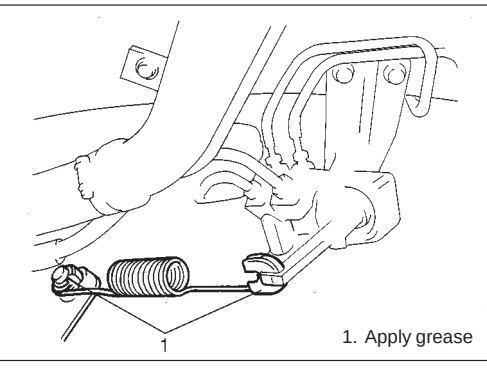
LSPV (Load Sensing Proportioning Valve)

REMOVE AND INSTALL LSPV

REMOVAL

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Hoist vehicle.
3) Disconnect brake pipes from LSPV.
4) Remove bracket bolts and adjusting nut.
5) Remove LSPV assembly from vehicle body.

CAUTION:
LSPV assembly must not be disassembled.
Replace with new one if found defective.



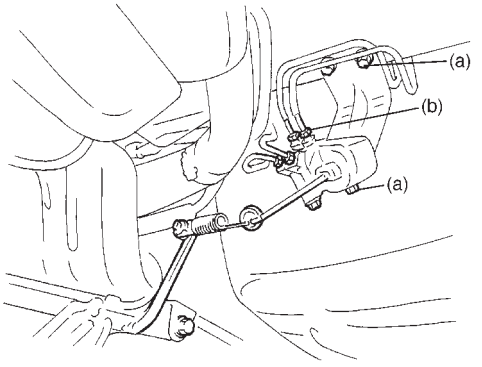
1. Apply grease

INSTALLATION

CAUTION:
Refer to above CAUTION.

Install by reversing removal procedure, noting the following.

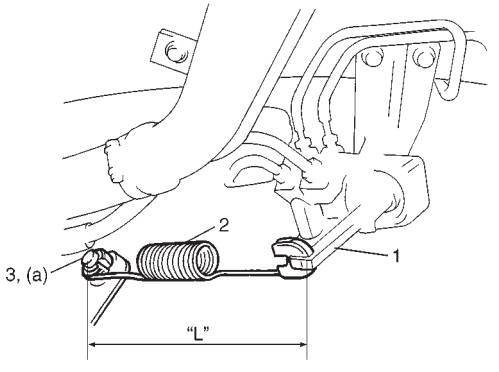
1) Apply multi-purpose grease to upper and lower joint of coil spring.



2) Torque each bolt and nut to specification as indicated respectively in figure.

Tightening Torque
(a):23 N·m (2.3 kg-m, 17.0 lb-ft)
(b):16 N·m (1.6 kg-m, 11.5 lb-ft)

3) Upon completion of installation, fill reservoir tank with specified fluid and bleed air from brake system.
4) After bleeding air, check that LSPV is installed properly, referring to the following “AFTER-INSTALLATION INSPECTION & ADJUSTMENT”.



1. LSPV lever
2. Spring
3. Adjusting nut

AFTER-INSTALLATION INSPECTION & ADJUSTMENT

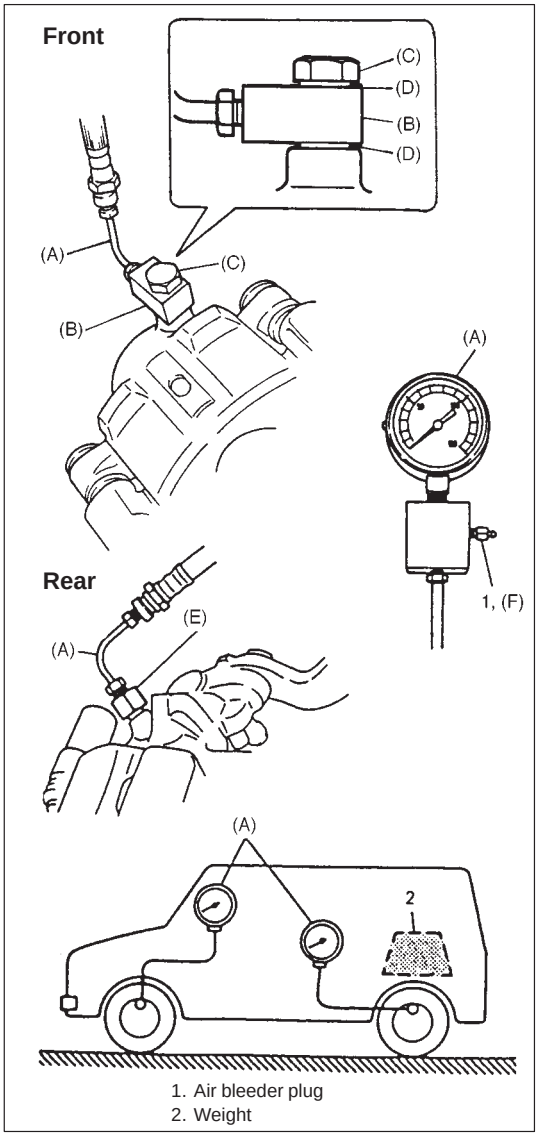
Confirm the following before inspection and adjustment.
○ Fuel tank is filled with fuel fully.
○ Vehicle is equipped with spare tire, tools, jack and jack handle.
○ Vehicle is free from any other load.
With vehicle in above conditions;
1) Place it on level floor.
2) Push up LSPV lever with finger till it stops and measure length of coil spring (“L” in figure) as it is pulled.
3) Spring length “L” should be the value specified below.

Spring length “L”
3 Door : 165 mm (6.5 in.)
4 Door : 160 mm (6.3 in.)
WAGON : 150 mm (5.9 in.)

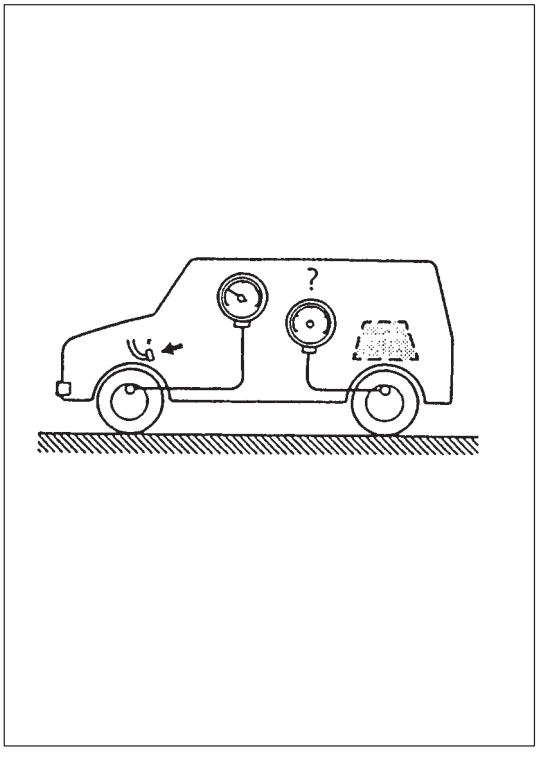
4) If it isn’t, adjust it to specification by changing bolt (a) tightening positions as shown. After adjustment, tighten adjusting nut to specified torque.

Tightening Torque:
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

NOTE:
Check to make sure that LSPV body and brake pipe joints are free from fluid leakage. Replace defective parts, if any.



1. Air bleeder plug
2. Weight



FLUID PRESSURE TEST

Test procedure for LSPV assembly is as follows.
Before testing, confirm the following.

○ Fuel tank is filled with fuel fully.
○ Vehicle is equipped with spare tire, tools, jack and jack handle.

1) Place vehicle on level floor and set 200 kg (442 lbs) weight slowly on axle housing center.
2) Install special tool to front and rear brake.

NOTE:
Pressure gauge should be connected to breather of front (left side brake) and rear (right side brake).
After testing front left side and rear right side, test front right side and rear left side in the same way.

Special Tool
Front brake
(A): 09956-02310
(B): 09952-36320
(C): 09360-10026 (Union bolt as spare part)
(D): 09161-10009 (Washer as spare part)

Rear brake
(A): 09956-02310
(E): 09952-36310
(F): 55473-82030 (Air bleeder plug as a spare part)

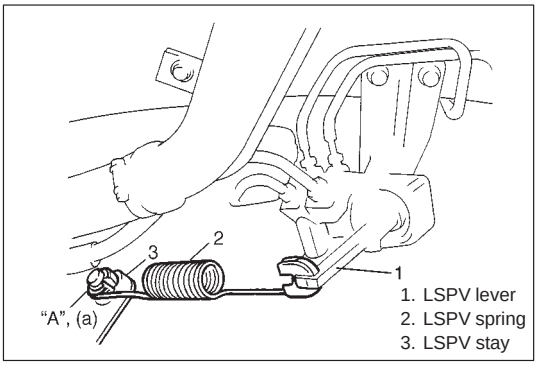
NOTE:
Special tool (B) or (E) is used instead of thread diameter 10 mm attachment of special tool (A).
So remove the attachment from (A) and install (B) or (E) as shown.

3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below.

Front brake	Rear brake		
5,000 kPa 50 kg/cm^2 711 psi	3 Door		3,200–3,600 kPa 32–36 kg/cm^2 455–512 psi
	4 Door	1.3ℓ, 1.6ℓ 2WD	3,500–3,900 kPa 35–39 kg/cm^2 498–555 psi
		1.6ℓ 4WD, 1.8ℓ	3,900–4,300 kPa 39–43 kg/cm^2 555–611 psi
	WAGON	1.3ℓ, 1.6ℓ	4,300–4,700 kPa 43–47 kg/cm^2 611–668 psi
		1.8ℓ	4,800–5,200 kPa 48–52 kg/cm^2 683–739 psi

As done above, apply 100 kg/cm^2 pressure to front brake and check that rear brake pressure then is within specification as given below.

Front brake	Rear brake		
10,000 kPa 100 kg/cm^2 1422 psi	3 Door		4,600–5,000 kPa 46–50 kg/cm^2 654–711 psi
	4 Door	1.3ℓ, 1.6ℓ 2WD	5,000–5,400 kPa 50–54 kg/cm^2 711–768 psi
		1.6ℓ 4WD, 1.8ℓ	5,400–5,800 kPa 54 – 58 kg/cm^2 768–825 psi
	WAGON	1.3ℓ, 1.6ℓ	5,800–6,200 kPa 58–62 kg/cm^2 825–882 psi
		1.8ℓ	7,200–7,600 kPa 72–76 kg/cm^2 1024–1081 psi



4) If rear brake pressure is not within specification, adjust it by changing bolt "A" tightening position as follows.

Tightening Torque
(a):23 N·m (2.3 kg-m, 17.0 lb-ft)

- ○ If rear brake pressure is higher than specification, move bolt "A" rearward and if it is lower, forward.
- ○ Repeat steps 3) and 4) until rear brake pressure is within specification.
- ○ After adjustment, be sure to torque nut to specification.

5) Upon completion of fluid pressure test, bleed brake system and perform brake test.

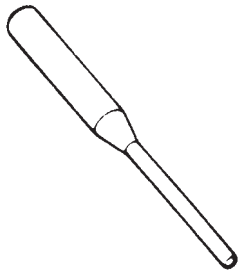
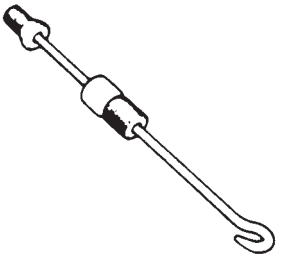
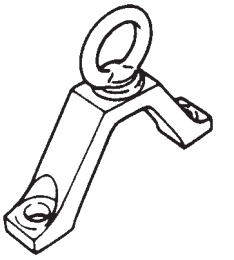
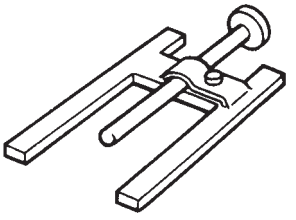
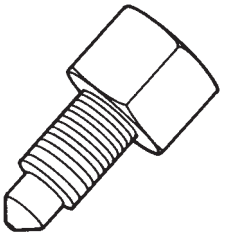
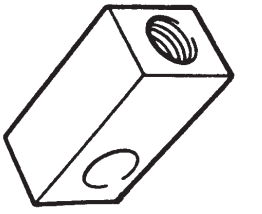
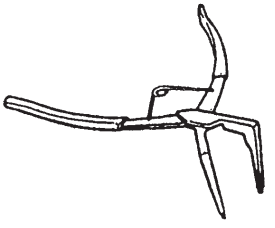
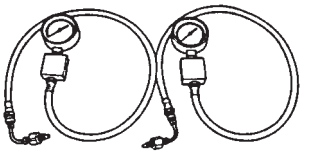
TORQUE SPECIFICATION

Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
Brake caliper pin bolt		22	2.2	16.0
Brake caliper carrier bolt		85	8.5	61.5
Front brake flexible hose bolt		23	2.3	17.0
Rear brake caliper pin bolt		38	3.8	27.5
Rear brake caliper carrier bolt		50	5.0	36.0
Rear brake flexible hose bolt		23	2.3	17.0
Rear brake bolt (Brake back plate bolt)		50	5.0	36.0
Master cylinder nut or booster nut		13	1.3	9.5
Brake pipe 4-way/6-way joint bolt		10	1.0	7.5
Proportioning valve bolt				
Brake pipe flare nut		16	1.6	11.5
Brake pedal shaft nut		23	2.3	17.0
Rear spindle nut		175	17.5	126.5
Wheel nut		85	8.5	61.5
Parking brake cable bracket bolt		46	4.6	33.0
Parking brake lever bolt		23	2.3	17.0
Brake bleeder plug	(Front caliper)	10	1.0	7.5
	(Rear wheel cylinder and caliper)	8	0.8	6.0
LSPV bolt/LSPV bracket bolt		23	2.3	17.0
LSPV adjusting nut				

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir tank cap or described in owner's manual of vehicle	○ To fill master cylinder reservoir. ○ To clean and apply to inner parts of master cylinder caliper, wheel cylinder and brake caliper when they are disassembled.
Water tight sealant	SEALING COMPOUND 366E 99000-31090	○ To apply to mating surfaces of brake back plate and rear knuckle. ○ To apply to joint seam of wheel cylinder and brake back plate.

SPECIAL TOOL

 09922-85811 Connector pin remover	 09942-15511 Sliding hammer	 09943-17912 Brake drum remover (Front wheel hub remover)	 09950-78220 Flare nut wrench (10 mm)
 09950-96010 Booster piston rod gauge (For vehicle without ABS)	 09952-16010 (For vehicle without ABS) 09952-16020 (For vehicle with ABS) Booster piston rod adjuster	 09952-36310 Fluid pressure gauge attachment (7 mm)	 09952-36320 Fluid pressure gauge attachment
 09952-76011 Snap ring pliers	 09956-02310 Fluid pressure gauge		

SECTION 5B

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

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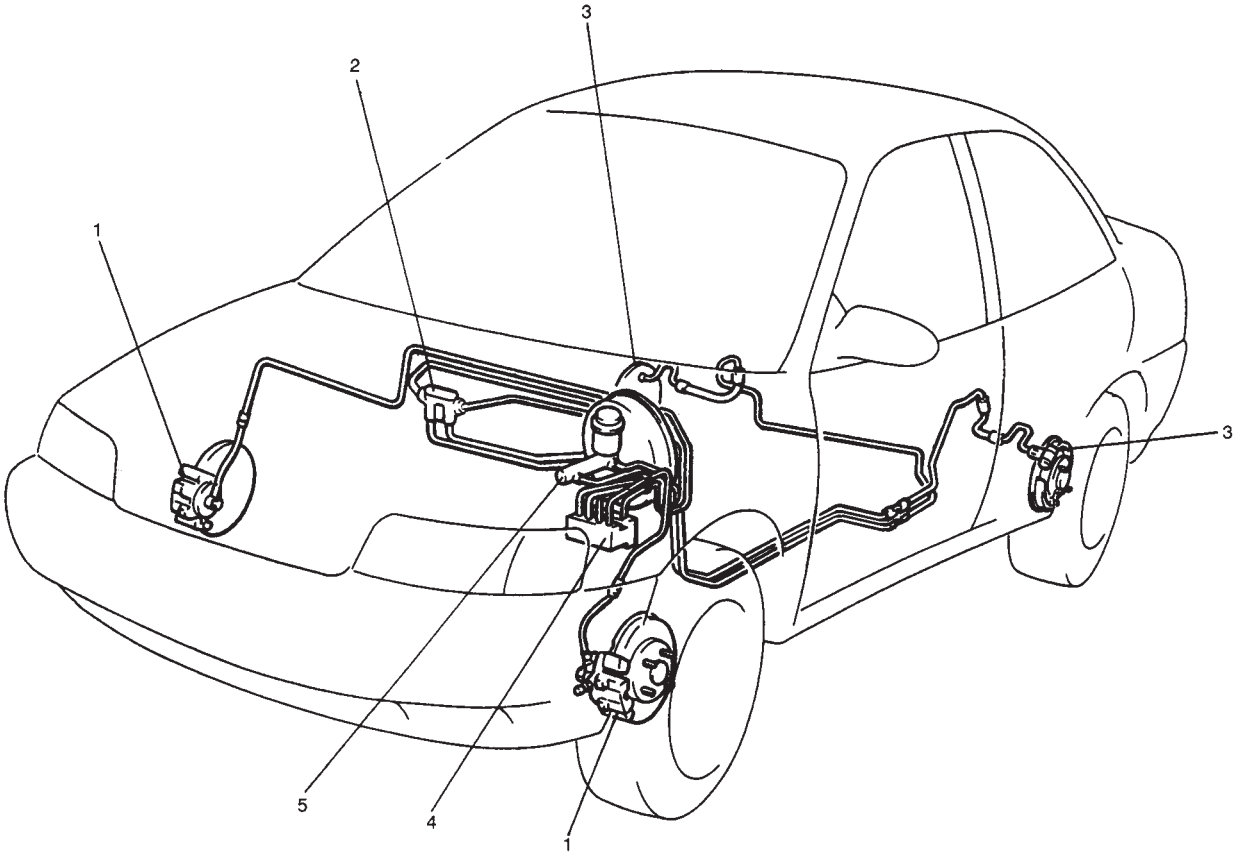
GENERAL DESCRIPTION

The ABS (Antilock Brake System) controls the fluid pressure applied to the wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied. This ABS is a 4-wheel type which controls the fluid pressure applied to the wheel cylinder of each of the four brakes to prevent each wheel from getting locked.

The component parts of this ABS includes the following parts in addition to those of the conventional brake system.

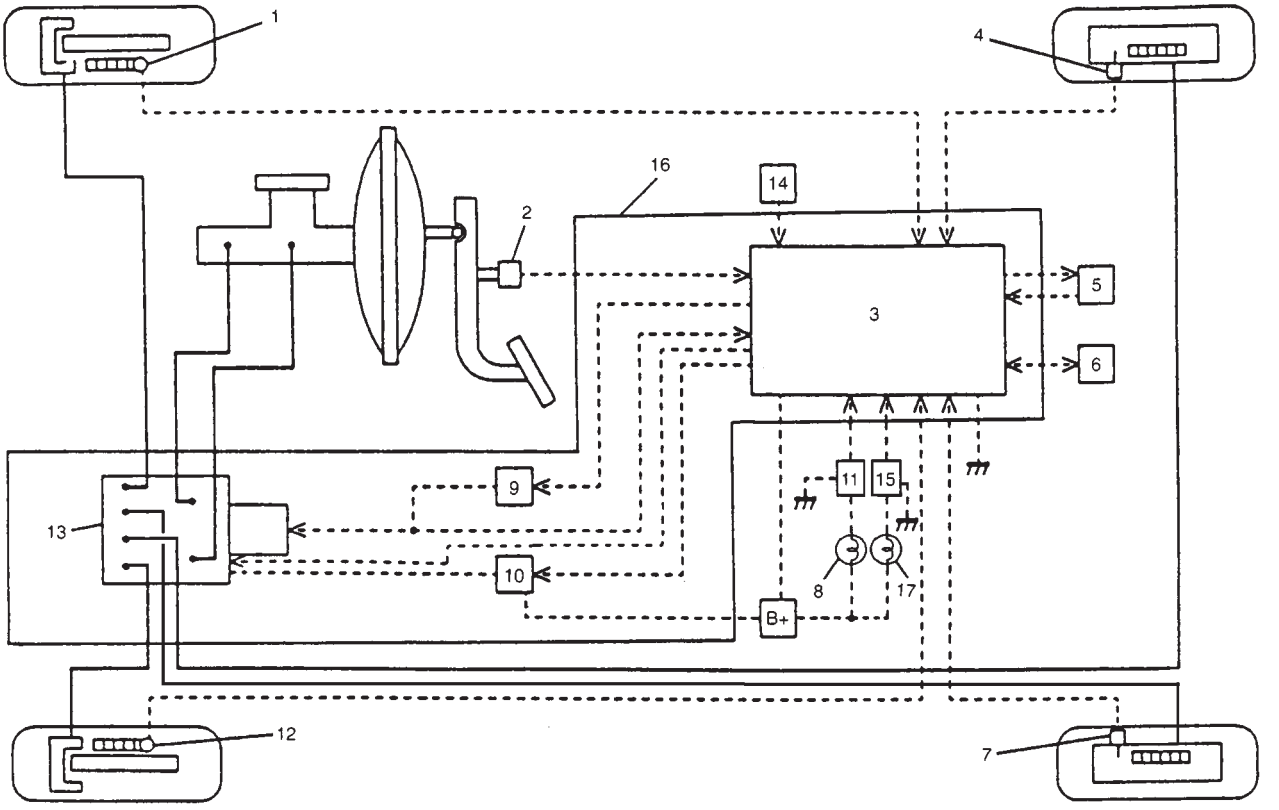
- ○ Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- ○ In this ABS, ABS hydraulic unit (actuator assembly), ABS control module, pump motor relay and fail-safe relay are combined as one component.
- ○ ABS control module which sends operation signal to ABS hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
- ○ ABS hydraulic unit which operates according to signal from ABS control module to control fluid pressure applied to wheel cylinder of each of 4 wheels.
- ○ Fail-safe (solenoid valve) relay which supplies power to solenoid valve in ABS hydraulic unit and pump motor relay.
- ○ Pump motor relay which supplies power to pump motor in ABS hydraulic unit.
- ○ ABS warning lamp which lights to inform abnormality when system fails to operate properly.
- ○ G sensor which detects body deceleration speed (4WD vehicle only).

The ABS for wagon model is equipped with Electronic Brake force Distribution (EBD) system that controls a fluid pressure of rear wheels to best condition, which is the same function as that of proportioning valve, by the signal from wheel sensor independently of change of load due to load capacity and so on. And if the EBD system fails to operate properly, the brake warning lamp lights to inform abnormality.

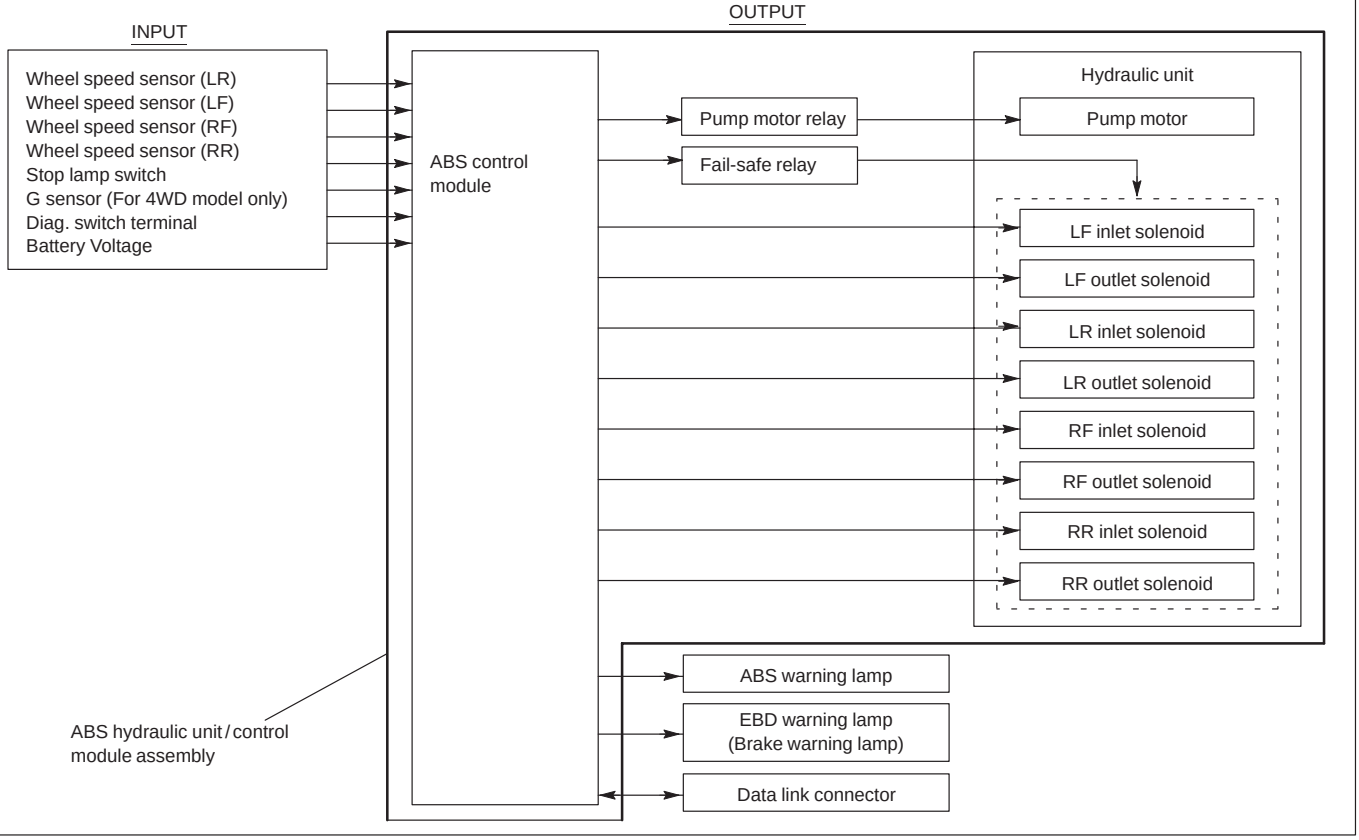


1. Front disc brake
2. 4-way joint (for vehicle with LSPV) or Proportioning valve
3 Rear drum brake
4. ABS hydraulic unit
5. Brake master cylinder

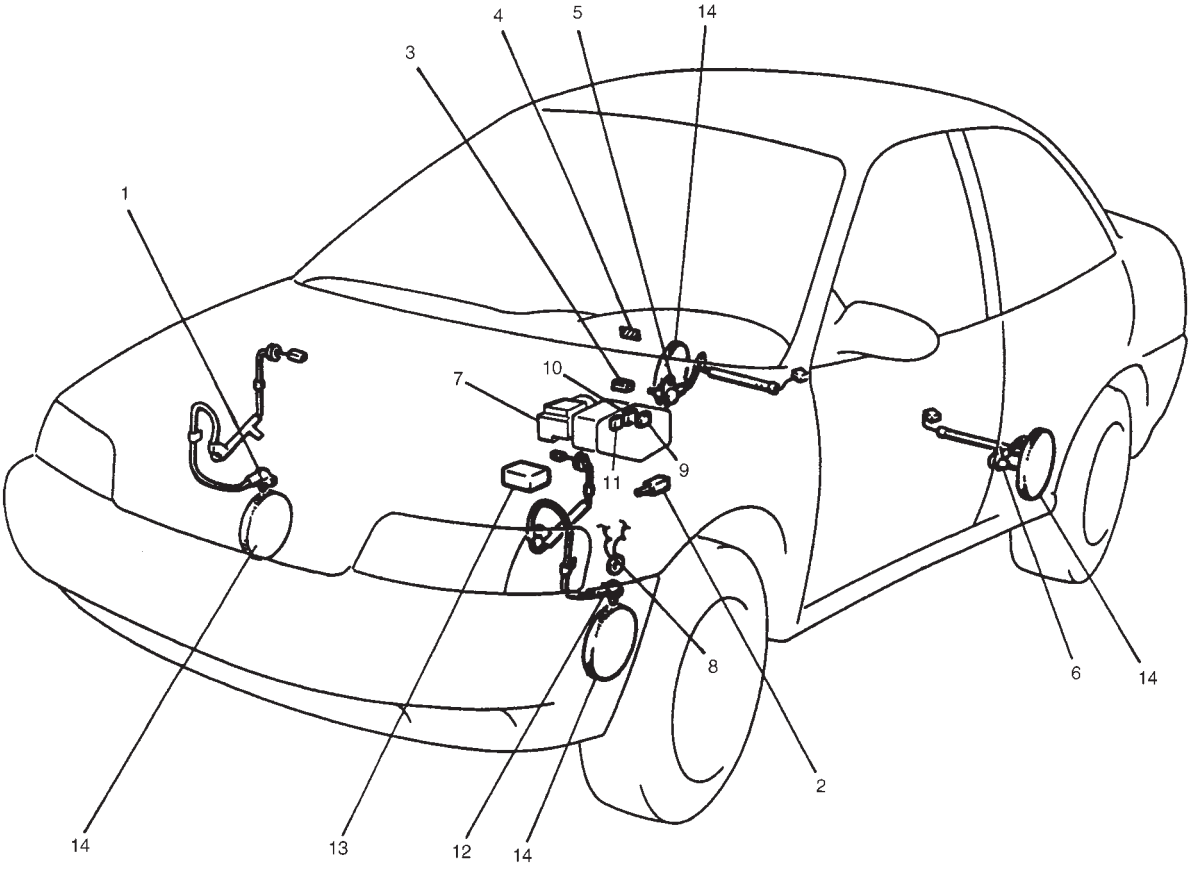
SYSTEM SCHEMATIC



1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. ABS control module
4. Wheel speed sensor (Right-rear)
5. DIAG-2 connector
6. Data link connector
7. Wheel speed sensor (Left-rear)
8. ABS warning lamp
9. ABS pump motor relay
10. ABS fail-safe relay (Solenoid valve relay)
11. ABS warning lamp relay
12. Wheel speed sensor (Left-front)
13. ABS hydraulic unit
14. G sensor (4WD vehicle only)
15. EBD warning lamp relay (if equipped)
16. ABS hydraulic unit/control module assembly (with ABS pump motor & fail-safe relays)
17. EBD warning lamp (Brake warning lamp)



ABS COMPONENT PARTS LOCATION



1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. Data link connector
4. ABS warning lamp
5. Wheel speed sensor (Right-rear)
6. Wheel speed sensor (Left-rear)
7. ABS hydraulic unit/control module assembly
8. Grounds for ABS control module
9. ABS warning lamp relay
10. DIAG-2 connector
11. EBD warning lamp relay (if equipped)
12. Wheel speed sensor (Left-front)
13. G sensor (4WD vehicle only)
14. Wheel speed sensor rotor (ring)

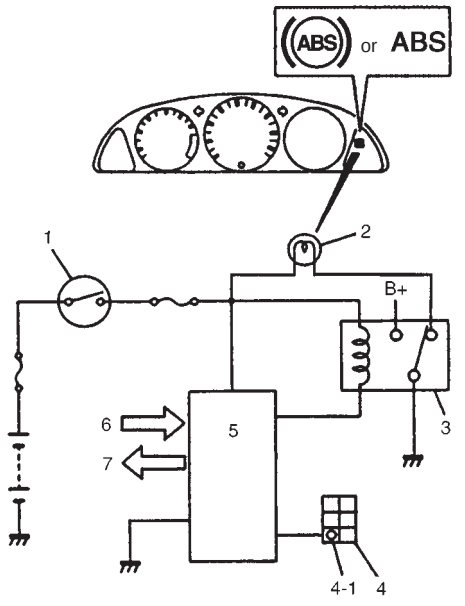
ABS HYDRAULIC UNIT/CONTROL MODULE ASSEMBLY

ABS control module is a component of ABS hydraulic unit/control module assembly and has the following functions.

Self-Diagnosis Function

ABS control module diagnoses conditions of the system component parts (whether or not there is any abnormality) all the time and indicates the results (warning of abnormality occurrence and DTC) through the ABS warning lamp and outputs it through the diagnosis output terminal as described below.

1) When ignition switch is turned to ON position, ABS warning lamp lights for 2 seconds to check its bulb and circuit.
2) When no abnormality has been detected (the system is in good condition), ABS warning lamp turns OFF after 2 seconds.
3) When the vehicle starts to move after the ignition switch is turned to ON position (more than one wheel speed sensor signals are inputted), solenoid valves and motors of ABS hydraulic unit operate once one after another for electrical check. During this check, motor operation sound may be heard but that means nothing abnormal.



1. Ignition switch
2. ABS warning lamp
3. ABS warning lamp relay
4. DIAG-2 connector

4-1. Diagnosis switch terminal

5. ABS hydraulic unit/control module assembly
6. Sensed information
7. Output

4) When an abnormality in the system is detected, ABS warning lamp lights and the area where that abnormality lies is stored in the memory of EEPROM in ABS control module.
5) When diagnosis switch terminal of DIAG-2 connector (monitor connector) is grounded, the abnormal area is output as DTC from Diag. output terminal. When DTC output is normal DTC 12 or history DTC only, it is also indicated by flashing of ABS warning lamp. (Refer to the table below.)

SYSTEM CONDITION		DTC OUTPUT	
		DIAGNOSIS OUTPUT TERMINAL	"ABS" WARNING LAMP
In good condition at present	No trouble in the past	DTC 12	DTC 12
	Trouble occurred in the past	History DTC	History DTC
Abnormality exists at present	No trouble in the past	Current DTC	Lighting
	Trouble occurred in the past	Current and history DTCs	Lighting

For procedure to clear all DTC's, refer to the item "Diagnostic Trouble Code Clearance" in this section.

Also ABS control module turns ON EBD warning lamp (brake warning lamp) depending on the trouble that detected by the module and EBD warning lamp does not indicate DTC as well as "ABS" warning lamp.

Fail-Safe Function

When an abnormality occurs (an abnormal DTC is detected), ABS control module turns OFF the fail-safe relay which supplies power to ABS hydraulic unit. Thus, with ABS not operating, brakes function just like the brake system of the vehicle not equipped with ABS.

DIAGNOSIS

To ensure that the trouble diagnosis is done accurately and smoothly, observe “Precautions in Diagnosing Troubles” and follow “ABS Diagnostic Flow Table”.

PRECAUTION IN DIAGNOSING TROUBLES

○ If the vehicle was operated in any of the following ways, ABS warning light may light momentarily but this does not indicate anything abnormal in ABS.
  – The vehicle was driven with parking brake pulled.
  – The vehicle was driven with brake dragging.
  – The vehicle was stuck in mud, sand, etc.
  – Wheel spin occurred while driving.
  – Wheel(s) was rotated while the vehicle was jacked up.

○ Be sure to read “Precautions for Electronic Circuit Service” in Section 0A before inspection and observe what is written there.

○ Be sure to use the trouble diagnosis procedure as described in the flow table. Failure to follow the flow table may result in incorrect diagnosis. (Some other diagnostic trouble code may be stored by mistake in the memory of ABS control module during inspection.)

ABS DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	Perform customer complaint analysis, problem symptom confirmation and diagnostic trouble code check record and clearance. Is there any trouble code?	Go to step 2.	Go to step 5.
2	Perform driving test. Is trouble symptom identified?	Go to step 3.	Go to step 6.
3	Check diagnostic trouble code. Is it malfunction code?	Go to step 4.	Go to step 5.
4	Inspect and repair referring to applicable diagnostic trouble code table in this section. Then perform final confirmation test after clearing diagnostic trouble code. Is trouble recur?	Go to step 7.	END.
5	Inspect and repair referring to DIAGNOSIS in “BRAKES” section. Then perform final confirmation test after clearing diagnostic trouble code. Is trouble recur?	Go to step 7.	END.
6	Check for intermittent problems referring to INTERMITTENT AND POOR CONNECTION in “GENERAL INFORMATION” section and related circuit of trouble code recorded in step 1. Then perform final confirmation test after clearing diagnostic trouble code. Is trouble recur?	Go to step 7.	END.
7	Perform diagnostic trouble code check record and clearance. Is there any trouble code?	Go to step 2.	Go to step 5.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such a questionaire form as shown below will facilitate collecting information to the point required for proper analysis and diagnosis.

CUSTOMER QUESTIONNAIRE (EXAMPLE)

Customer's name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

Problem Symptoms	○ ABS warning light abnormal: fails to turn on/fails to go off/flashes ○ Abnormal noise while vehicle is running: from motor, from valve, other_____ ○ Wheel is locked at braking: ○ Pump motor does not stop (running): ○ Braking does not work: ○ Other_____
Frequency of occurrence	○ Continuous/Intermittent (times a day, a month)/ other_____
Conditions for Occurrence of Problem	○ Vehicle at stop & ignition switch ON: ○ When starting: at initial start only/at every start/Other_____ ○ Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other_____ ○ Road surface condition: Paved road/rough road/snow-covered road/ other_____ ○ Chain equipment:
Environmental Condition	○ Weather: fair/cloudy/rain/snow/other_____ ○ Temperature: ·F (·C)
Diagnostic Trouble Code	○ First check: Normal code/malfunction code ( ) ○ Second check after test drive: Normal code/malfunction code ( )

2. PROBLEM SYMPTOM CONFIRMATION

Check if what the customer claimed in Step 1 is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.) When ABS warning lamp is not operated correctly, proceed to “Diagnostic Flow Table-A, B or C”.

3. DIAGNOSTIC TROUBLE CODE (DTC) CHECK, RECORD AND CLEARANCE

Perform “Diagnostic Trouble Code Check”, record it and then clear it referring to “Diagnostic Trouble Code Clearance” in this section.

If the malfunction DTC which was once displayed and then cleared cannot be detected (indicated) again when the ignition switch is turned ON position, attempt to diagnose the trouble based on the DTC recorded in this step may mislead the diagnosis or make diagnosing difficult. Proceed to Step 4 to check ABS control module for proper self-diagnosis function.

If the malfunction DTC which was once displayed and then cleared can be detected (indicated) again when ignition switch is turned ON position, proceed to Step 5.

4. DRIVING TEST

Test drive the vehicle at 40 km/h (25.0 mile/h) for more than a minute and check if any trouble symptom (such as abnormal lighting of ABS warning lamp) exists.

If the malfunction DTC is confirmed again at ignition switch is ON position, driving test as described in above is not necessary. Proceed to Step 5.

5. DIAGNOSTIC TROUBLE CODE CHECK

Recheck diagnostic trouble code referring to “DTC CHECK”.

6. DIAGNOSTIC TROUBLE CODE FLOW TABLE

According to Diagnostic flow table for the diagnostic trouble code confirmed in Step 5, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ABS control module or other part and repair or replace faulty parts.

7. “DIAGNOSIS” IN SECTION 5

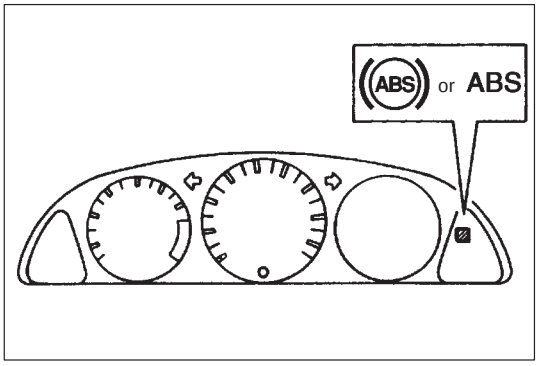
Check the parts or system suspected as a possible cause referring to “Diagnosis” in Section 5 and based on symptoms appearing on the vehicle (symptoms obtained through Steps 1, 2 and 4) and repair or replace faulty parts, if any.

8. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “INTERMITTENT TROUBLE” in Section 0A and related circuit of trouble code recorded in Step 3.

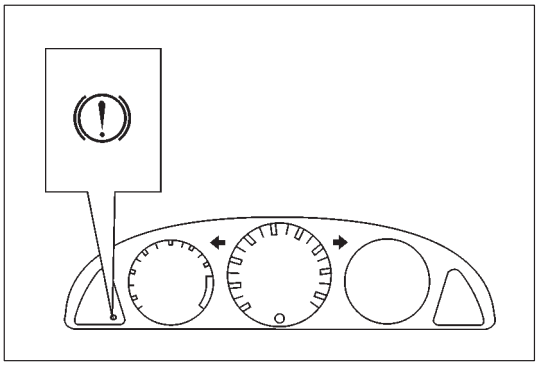
9. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that a normal code is indicated.



ABS WARNING LAMP CHECK

Turn the ignition switch to “ON” position and check that “ABS” warning lamp lights for about 2 seconds and then goes “OFF” position. If anything faulty is found, advance to Diagnostic flow table-A, B or C.

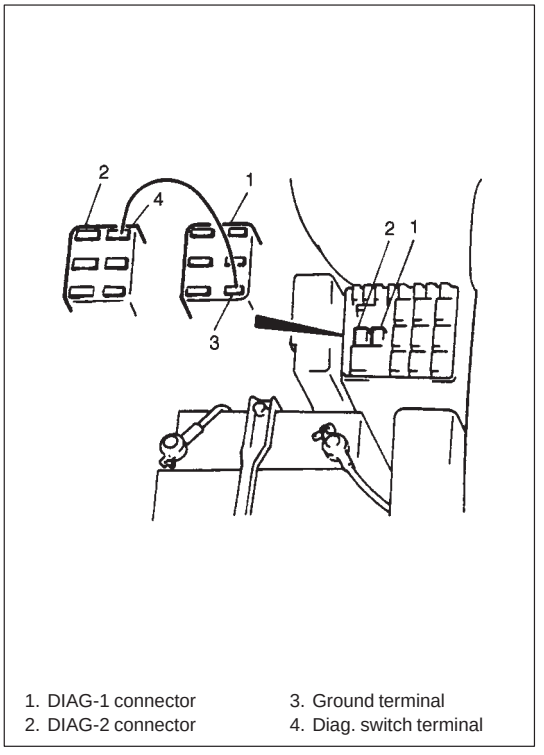


EBD WARNING LAMP (BRAKE WARNING LAMP) CHECK

NOTE:

Perform this check on a level place.

1) Turn ignition switch ON with parking brake applied.
2) Check that brake warning lamp is turned ON.
3) Release parking brake with ignition switch ON and check that EBD warning lamp (brake warning lamp) goes off.
   If it doesn’t go off, go to “TABLE-E” in this section.

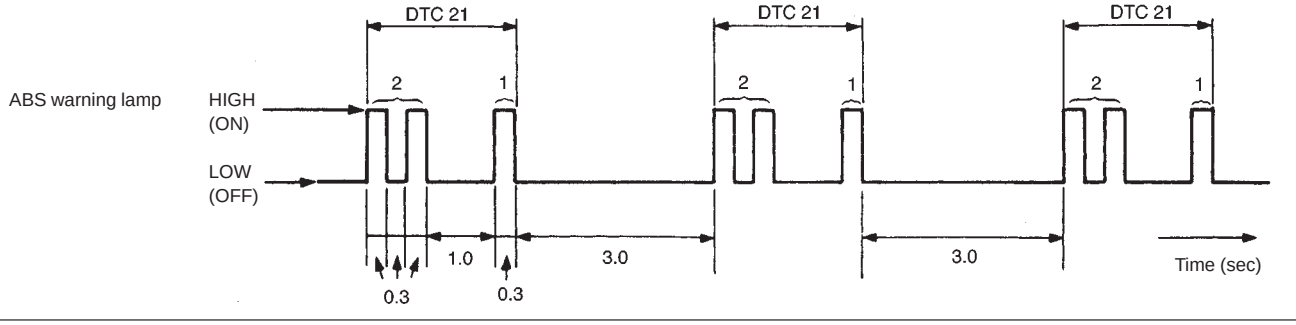


1. DIAG-1 connector
2. DIAG-2 connector
3. Ground terminal
4. Diag. switch terminal

DTC CHECK (USING ABS WARNING LAMP)

1) Using service wire, connect diagnosis switch terminal of DIAG-2 connector to ground.
2) Turn ignition switch to ON position.
3) Read flashing of ABS warning lamp which represents DTC as shown in example below and write it down. When more than 2 DTC’s are stored in memory, deflection and flashing for each DTC is repeated three times starting with the smallest DTC number in increasing order.
   For details of DTC, refer to “DTC Table”.

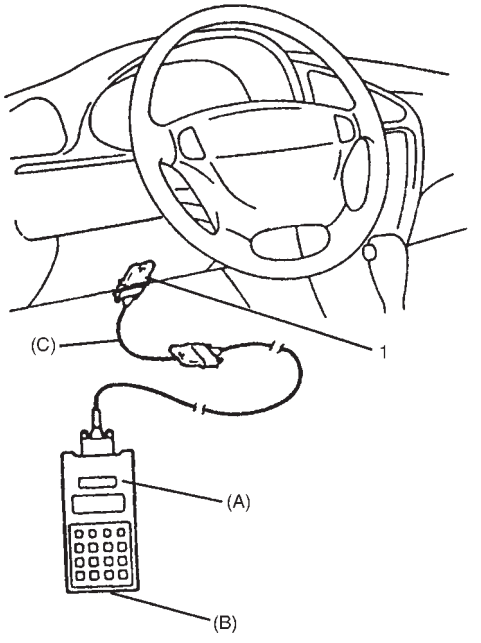
Example: When right-front wheel speed sensor circuit opens (DTC 21)



NOTE:

○ **ABS warning lamp indicates only DTC's described in "DTC Table", DTC 12 which means that no malfunction DTC is stored and history DTC which indicates history trouble area.**
When there is a current trouble, ABS warning lamp remains ON and therefore DTC is not indicated.

4) After completing the check, turn ignition switch to OFF position and disconnect service wire from diagnosis connectors.



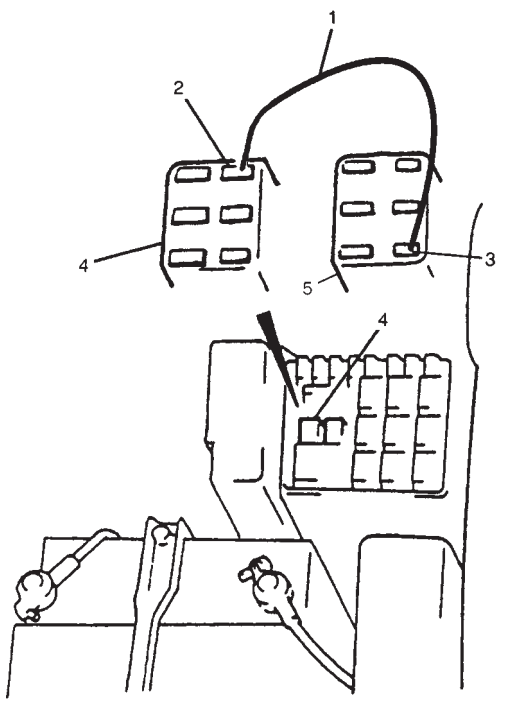
1. Data link connector

DTC CHECK (USING SCAN TOOL)

1) After setting mass storage cartridge to SUZUKI scan tool, connect SUZUKI scan tool to data link connector.

Special Tools
(A): 09931-76011
(B): Mass storage cartridge (Ver. 1.5 or later)
(C): 09931-76030

2) Turn ignition switch to ON position.
4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.



1. Service wire
2. Diagnosis switch terminal
3. Ground terminal
4. DIAG-2 connector
5. DIAG-1 connector

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

WARNING:

- **When performing a road test, select a safe place where there is neither any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road to avoid accident.**

After repair or replace malfunction part(s), clear all DTC's by performing described procedure below.

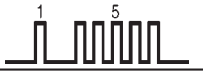
1) Turn ignition switch OFF.
2) Using service wire, connect diag. switch terminal of DIAG-2 connector to ground terminal of DIAG-1 connector.
3) With connection described in above Step 2) maintained, turn ignition switch ON.
4) Repeat on/off operation of service wire at diag. ground terminal at least 5 times within 10 seconds.

   NOTE:
   Service wire ON time must be for 0.1 second and more.

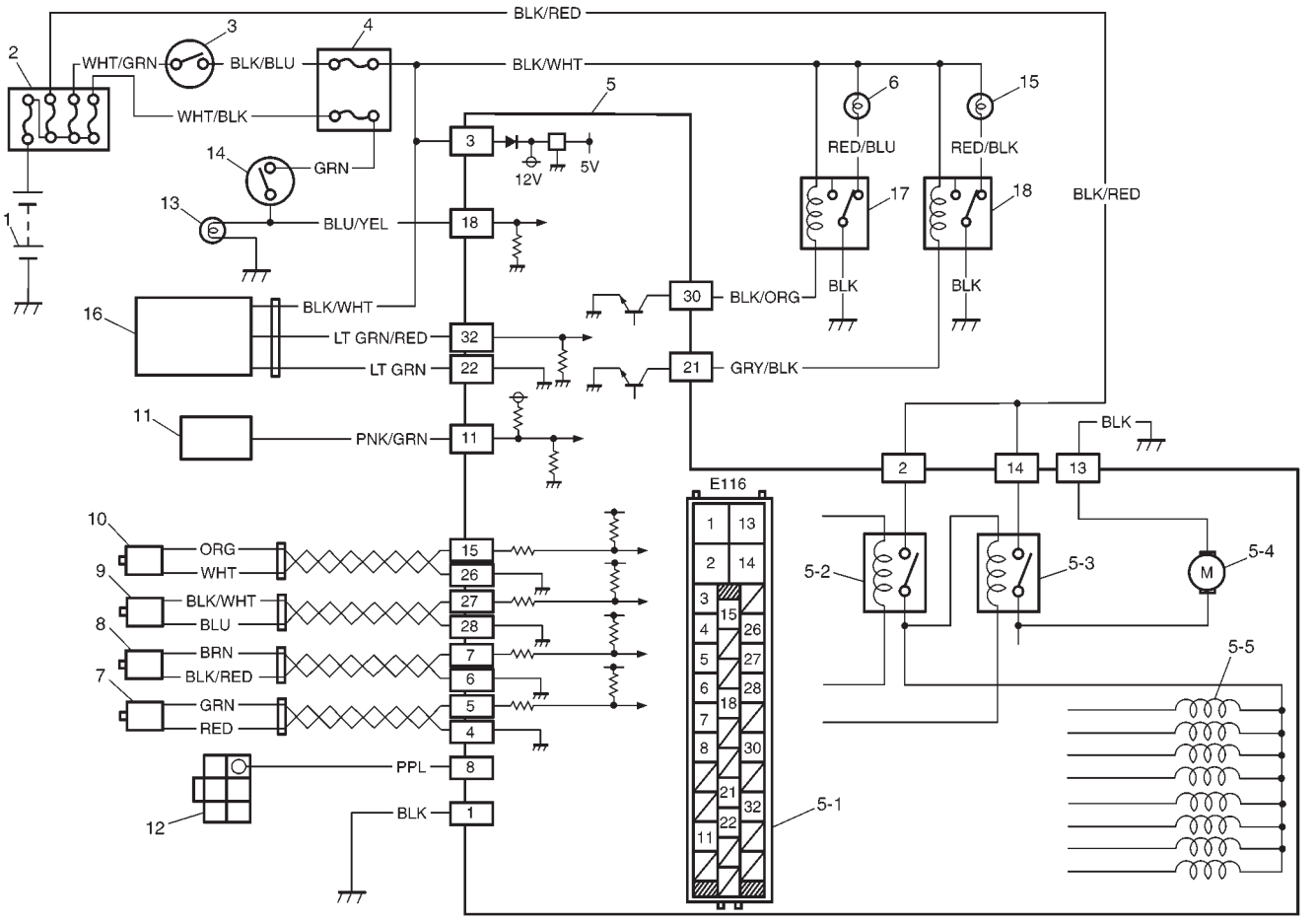
5) Turn ignition switch OFF and disconnect service wire from DIAG-2 connector.
6) Perform DRIVING TEST and DTC CHECK and confirm that normal DTC (DTC 12) is displayed; not malfunction DTC.

   NOTE:
   It is also possible to clear DTC by using SUZUKI scan tool. Refer to Cartridge Manual for procedure to clear DTC.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC (displayed on SUZUKI scan tool)	DTC (indicated by ABS warning lamp)	VOLTMETER INDICATION (or ABS warning lamp flashing pattern)	DIAGNOSTIC AREA	
–	12		Normal	
C1013	13		ABS hydraulic unit/control module assembly	
C1015	15		G sensor	
C1021	21		Right-front	Wheel speed sensor circuit and rotor
C1025	25		Left-front	
C1031	31		Right-rear	
C1035	35		Left-rear	
C1022	22		Right-front	
C1026	26		Left-front	
C1032	32		Right-rear	
C1036	36		Left-rear	
C1041	41		Right-front	Inlet solenoid circuit
C1042	42			Outlet solenoid circuit
C1045	45		Left-front	Inlet solenoid circuit
C1046	46			Outlet solenoid circuit
C1051	51		Right-rear	Inlet solenoid circuit
C1052	52			Outlet solenoid circuit
C1055	55		Left-rear	Inlet solenoid circuit
C1056	56			Outlet solenoid circuit
C1057	57		Solenoid and pump motor power source circuit	
C1061	61		ABS pump motor (in hydraulic unit) circuit	
C1063	63		ABS fail-safe relay circuit	
C1071	71		ABS control module	Internal malfunction

SYSTEM CIRCUIT



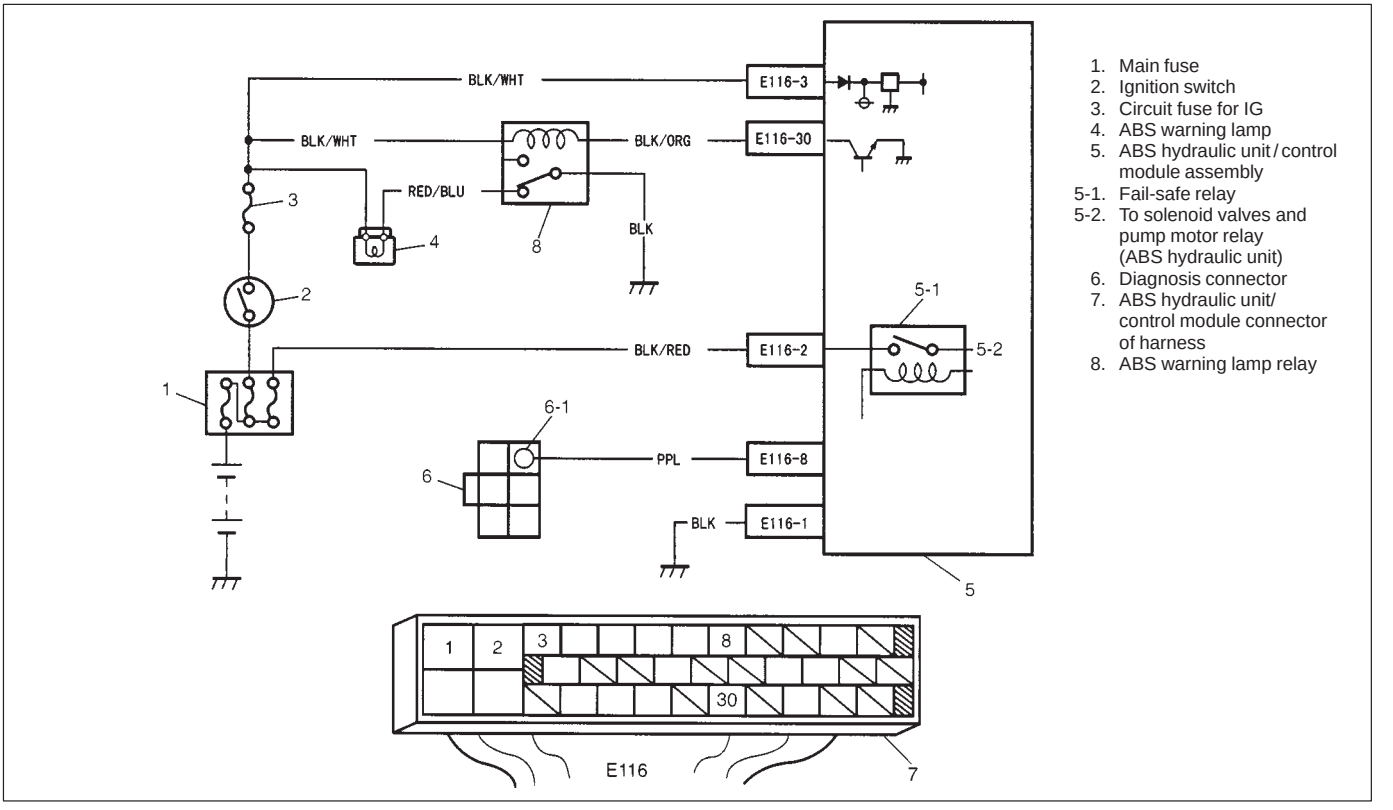
Wire color

BLK	: Black	BLU	: Blue	LT GRN/RED	: Light green/Red	RED/BLU	: Red/Blue
BLK/BLU	: Black/Blue	BLU/YEL	: Blue/Yellow	ORG	: Orange	RED/BLK	: Red/Black
BLK/RED	: Black/Red	BRN	: Brown	PNK/GRN	: Pink/Green	WHT	:White
BLK/ORG	: Black/Orange	GRN	: Green	PPL	: Purple	WHT/BLK	: White/Black
BLK/WHT	: Black/White	LT GRN	: Light green	RED	: Red	WHT/GRN	: White/Green

1. Battery
2. Main fuses
3. Ignition switch
4. Circuit fuses
5. ABS hydraulic unit / control module
5-1. Terminal arrangement for ABS hydraulic unit / control module assembly
5-2. ABS fail-safe relay (Solenoid valve relay)
5-3. ABS pump motor relay
5-4. Pump motor
5-5. Solenoid valves
6. ABS warning lamp
7. Right-rear wheel speed sensor
8. Left-rear wheel speed sensor
9. Right-front wheel speed sensor
10. Left-front wheel speed sensor
11. Data link connector
12. Diagnosis connector
13. Stop lamp
14. Stop lamp switch
15. EBD warning lamp (Brake warning lamp) (if equipped)
16. G sensor (For 4WD model only)
17. ABS warning lamp relay
18. EBD warning lamp relay (if equipped)

TERMINAL		CIRCUIT	TERMINAL		CIRCUIT
E116	1	Ground (For ABS control module)	E116	18	Stop lamp switch
	2	ABS fail-safe relay		19	—
	3	Ignition switch		20	—
	4	Right-rear wheel speed sensor (–)		21	EBD warning lamp
	5	Right-rear wheel speed sensor (+)		22	G sensor ground (For 4WD model only)
	6	Left-rear wheel speed sensor (–)		23	—
	7	Left-rear wheel speed sensor (+)		24	—
	8	Diagnosis switch terminal		25	—
	9	—		26	Left-front wheel speed sensor (–)
	10	—		27	Right-front wheel speed sensor (+)
	11	Data link connector		28	Right-front wheel speed sensor (–)
	12	—		29	—
	13	Ground (For ABS pump motor)		30	ABS warning lamp
	14	ABS pump motor relay		31	—
	15	Left-front wheel speed sensor (+)		32	G sensor signal (For 4WD model only)
	16	—		33	—
	17	—		34	—

TABLE – A ABS WARNING LAMP CIRCUIT CHECK – LAMP DOES NOT COME "ON" AT IGNITION SWITCH ON



1. Main fuse
2. Ignition switch
3. Circuit fuse for IG
4. ABS warning lamp
5. ABS hydraulic unit/control module assembly

5-1. Fail-safe relay
5-2. To solenoid valves and pump motor relay (ABS hydraulic unit)

6. Diagnosis connector
7. ABS hydraulic unit/control module connector of harness
8. ABS warning lamp relay

CIRCUIT DESCRIPTION

Operation (ON/OFF) of the ABS warning lamp is controlled by the ABS control module and ABS lamp relay.
If the Antilock brake system is in good condition, the ABS control module turns the ABS warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds only and then turns it OFF. If an abnormality in the system is detected, the lamp is turned ON by ABS control module. Also, it is turned ON by ABS warning lamp relay when the connector of the ABS control module was disconnected.

INSPECTION

STEP	ACTION	YES	NO
1	1) Turn ignition switch ON. Do other warning lamp come ON?	Go to step 2.	Go to step 5.
2	1) Disconnect ABS hydraulic unit/control module connector. Does ABS warning lamp light with ignition switch ON?	Replace ABS hydraulic unit/control module assembly.	Go to step 3.
3	1) Connect "BLK" wire terminal of ABS warning lamp relay to ground using service wire. Does ABS warning lamp light with ignition switch ON?	"BLK" circuit open.	Go to step 4.
4	1) Remove combination meter. Is bulb of ABS warning lamp in good condition?	"BLK/ORG" circuit shorted to ground. If OK, replace ABS warning lamp relay.	Replace bulb.
5	Is IG fuse in good condition?	Open in "RED/BLU" wire to combination meter or poor connection.	Repair and replace.

TABLE – B ABS WARNING LAMP CIRCUIT CHECK – LAMP COMES "ON" STEADY

Refer to TABLE – A for System Circuit Diagram and Circuit Description.

INSPECTION

STEP	ACTION	YES	NO
1	Perform diagnostic trouble code check. Is there any DTC (including code No.12, NO CODES on SUZUKI scan tool) exists?	Go to step 2.	Go to step 3.
2	Is malfunction DTC (other than code No.12) exists at step 1?	Go to step 7 of ABS diagnostic flow table in this section.	Go to step 3.
3	1) Disconnect ABS hydraulic unit/control module connector (1). (See Fig. 1) 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals "E116-30", "E116-3" and "E116-1". 3) If OK, turn ignition switch ON and measure voltage at terminal "E116-3" of connector. Is it 10 – 14 V?	Go to step 4.	"BLK/WHT" circuit open.
4	1) With ABS control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal "E116-30" of disconnected connector to ground using service wire. Does "ABS warning lamp" turn off?	Go to step 5.	"BLK/ORG" circuit or "BLK/WHT" circuit between ABS warning lamp relay and dot closure open. "RED/BLU" circuit shorted to ground. If wire and connection are OK, replace ABS warning lamp relay.
5	1) Measure resistance from connector terminal "E116-1" to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"BLK" circuit open.

Fig. 1

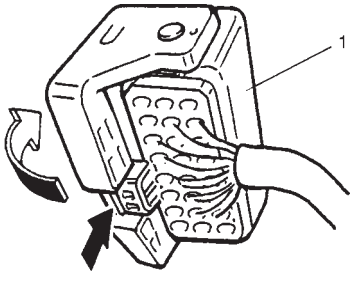


TABLE – C ABS WARNING LAMP CIRCUIT CHECK – THE LAMP FLASHES CONTINUOUSLY WHILE IGNITION SWITCH IS ON POSITION

Refer to TABLE – A for System Circuit Diagram.

CIRCUIT DESCRIPTION

When the diagnosis switch terminal is shorted or connected to the ground with the ignition switch ON position, the diagnostic trouble code (DTC) is indicated by flashing of the ABS warning lamp only in the following cases.

○ Normal DTC (12) is indicated if no malfunction DTC is detected in the ABS.

○ A history malfunction DTC is indicated by flashing of the lamp if a current malfunction DTC is not detected at that point although a history malfunction DTC is stored in memory.

INSPECTION

STEP	ACTION	YES	NO
1	Is diag. switch terminal (1) of DIAG-2 connector (2) connected to ground terminal (3) of DIAG-1 connector (4) via service wire (5)? (See Fig. 1)	Go to step 3.	Go to step 2.
2	1) Ignition switch ON. 2) Measure voltage between diag. switch terminal and ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"PPL" wire circuit shorted to ground.
3	1) Ignition switch ON. 2) Does flashing of ABS warning lamp indicate DTC (DTC 12 or history DTC)?	Go to step 7 of ABS diagnostic flow table in this section.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

Fig. 1

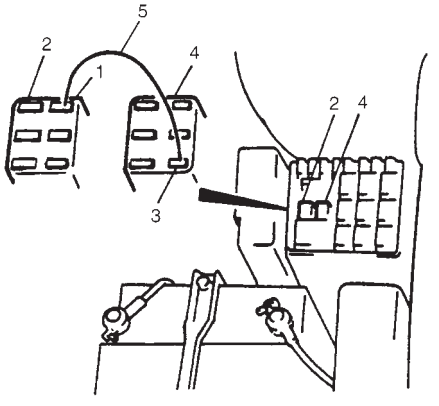


TABLE – D CODE (DTC) IS NOT OUTPUTTED EVEN WITH DIAGNOSIS SWITCH TERMINAL CONNECTED TO GROUND

Refer to TABLE – A for System Circuit Diagram.

CIRCUIT DESCRIPTION

When the diag. switch terminal is connected to the ground with the ignition switch turned ON, the ABS control module outputs a diagnostic trouble code by flashing ABS warning lamp.

INSPECTION

STEP	ACTION	YES	NO
1	Is it shorted diag. switch terminal (1) of DIAG-2 connector (2) and ground terminal (3) of DIAG-1 connector (4) by service wire (5) properly? (See Fig. 1)	Go to step 2.	Connect service wire securely.
2	1) Disconnect service wire. 2) Disconnect ABS hydraulic unit/control module connector (1). (See Fig. 2) 3) Measure resistance between diag. switch terminal and connector terminal “E116-8”. Is it infinite (∞)?	“PPL” circuit open.	Go to step 3.
3	1) Measure resistance between ground terminal (3) of DIAG-1 connector (4) and body ground. Is continuity indicated?	Go to step 4.	“BLK” circuit open or poor connection.
4	1) Check for proper connection to ABS hydraulic unit/control module at terminal “E116-8”. 2) If OK, then check ABS warning lamp circuit referring to “TABLE A, B and C”. Is it in good condition?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Repair ABS warning lamp circuit.

Fig. 1

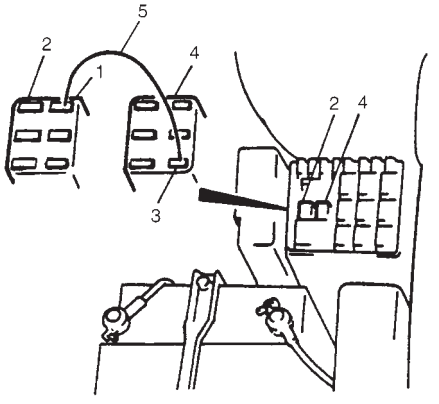


Fig. 2

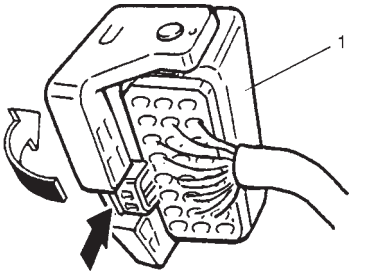
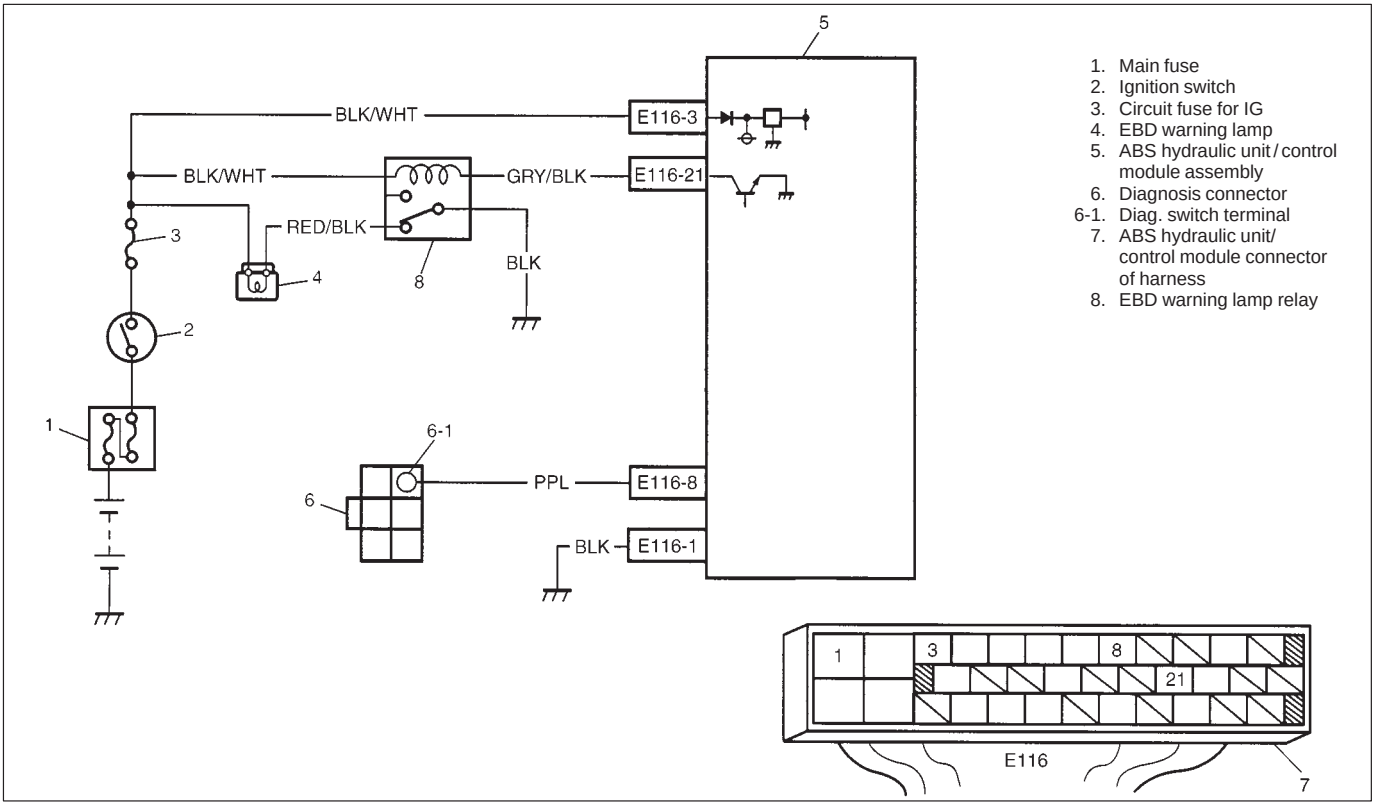


TABLE – E EBD WARNING LAMP (BRAKE WARNING LAMP) CHECK (IF EQUIPPED) – LAMP COMES "ON" STEADY



CIRCUIT DESCRIPTION

EBD warning lamp (brake warning lamp) is controlled by parking brake switch, brake fluid level switch and ABS control module/hydraulic unit assembly and EBD warning lamp relay.

INSPECTION

STEP	ACTION	YES	NO
1	1) Make sure that: ○ Parking brake is completely released. ○ Brake fluid level is upper than the minimum level. Are the check results OK?	Go to step 2.	Release parking brake completely and/or replenish brake fluid.
2	Does "ABS" warning lamp come on?	Perform "TABLE B" previously outlined.	Go to step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals "E116-21". 3) If OK, apply chocks to wheels and select gear in neutral position (P range for A/T). 4) Keep brake pedal depressed and start engine. Release parking brake. 5) Connect terminal "E116-21" of disconnected connector to ground using service wire. Does EBD warning lamp (brake warning lamp) turn off?	Substitute a known-good ABS hydraulic unit/control module assembly and re-check.	"GRY/BLK" circuit or "BLK/WHT" circuit between EBD warning lamp relay and dot closure open. "RED/BLK" circuit shorted to ground. If wire and connection are OK, replace EBD warning lamp relay.

DTC C1013 (DTC 13) – SYSTEM SPECIFICATIONS DIFFERENT FROM ABS CONTROL MODULE SPECIFICATIONS

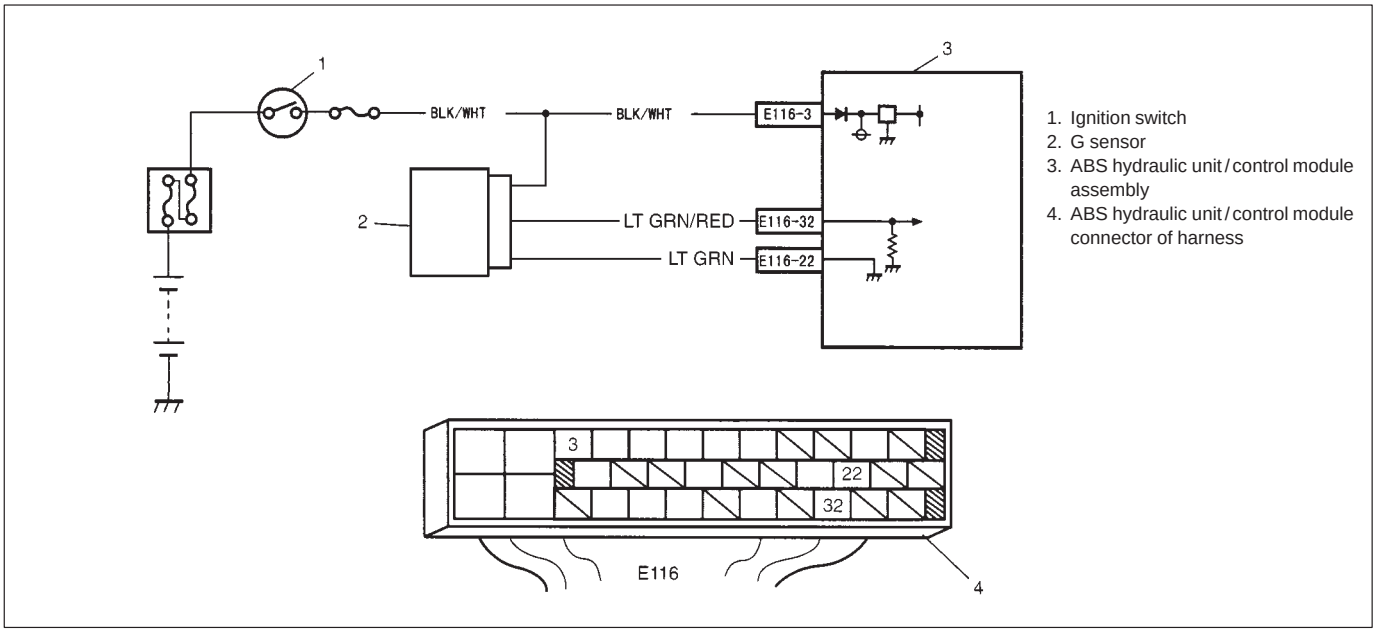
DESCRIPTION

When abnormal signal is inputted to a no-used terminal of control module while running or wrong ABS hydraulic unit/control module assembly is installed, this DTC will be set.

INSPECTION

1) Ignition switch OFF.
2) Check for proper connection from harness to control module.
3) If OK, substitute a known-good and correct specifications ABS hydraulic unit/control module assembly.
4) Recheck system.

DTC C1015 (DTC 15) – G SENSOR CIRCUIT



DESCRIPTION

2WD Vehicle

2WD vehicle is not equipped with a G sensor. When an ABS control module for 4WD vehicle is installed to the 2WD vehicle, this DTC is set as G sensor signal is not inputted.

4WD Vehicle

While a 4WD vehicle is at stop or running, if the potential difference between the sensor signal terminal “E116-32” and the sensor ground terminal “E116-22” is not within the specified voltage value, or if the signal voltage while at a stop does not vary from that while running, this DTC is set.
Therefore, this DTC may be set when a 4WD vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.

INSPECTION

2WD Vehicle

STEP	ACTION	YES	NO
1	Substitute a known-good ABS control module for 2WD vehicle and recheck.	–	–

4WD Vehicle

STEP	ACTION	YES	NO
1	Is G sensor installed floor securely?	Go to step 2.	Tighten sensor or bracket screw securely. If not, using new screw.
2	1) Ignition switch OFF. 2) Remove G sensor with bracket. 3) Check for proper connection to G sensor. 4) If OK, then check G sensor referring to item INSPECTION of G sensor in this section. Is it in good condition?	Go to step 3.	Replace G sensor.
3	1) Disconnect ABS hydraulic unit/control module assembly connector (1) (See Fig. 1) and G sensor connector. 2) Check for proper connection to ABS control module at terminals “E116-32” and “E116-22”. 3) If OK, then turn ignition switch ON and measure voltage between “BLK/WHT” terminal of sensor connector and body ground. Is it 10 – 14 V?	Go to step 4.	“BLK/WHT” circuit open.
4	Measure voltage between “LT GRN/RED” terminal of sensor connector and body ground. Is it 0 V?	Go to step 5.	“LT GRN/RED” circuit shorted to power circuit.
5	1) Ignition switch OFF. 2) Check that “LT GRN/RED” circuit is free from open or short to ground and “LT GRN” circuit. Is it in good condition? (See Fig. 2.)	“LT GRN” circuit open. If circuit is OK, substitute a known-good ABS hydraulic unit/control module assembly.	“LT GRN/RED” circuit open or shorted to ground or “LT GRN” circuit.

Fig. 1

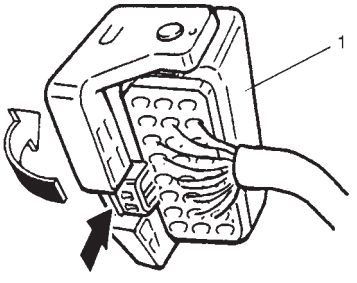
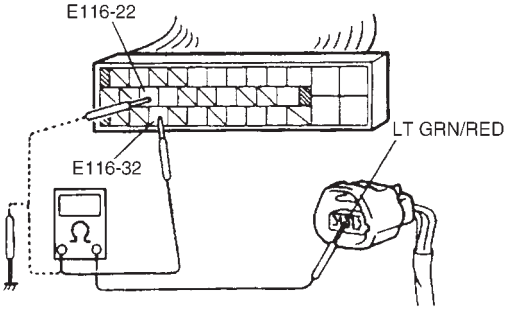
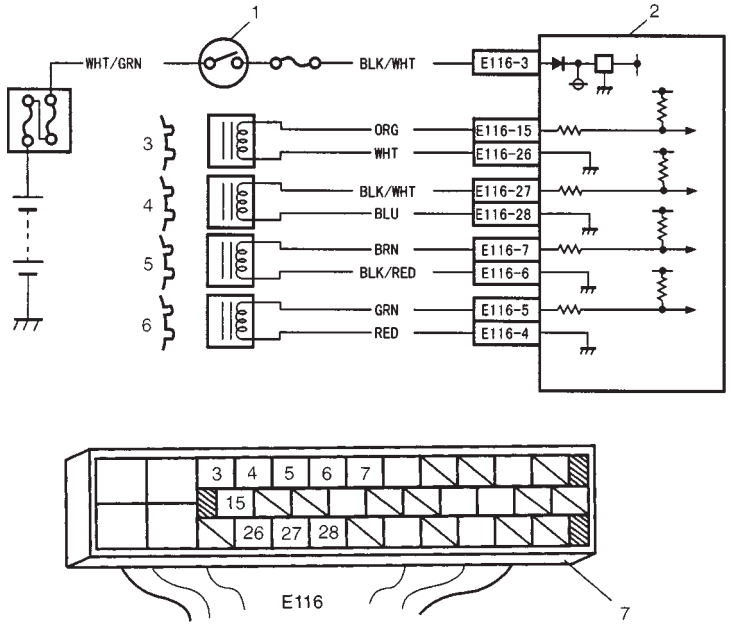


Fig. 2



DTC C1021/C1022 (DTC 21/22) – RIGHT-FRONT WHEEL SPEED SENSOR CIRCUIT
DTC C1025/C1026 (DTC 25/26) – LEFT-FRONT WHEEL SPEED SENSOR CIRCUIT
DTC C1031/C1032 (DTC 31/32) – RIGHT-REAR WHEEL SPEED SENSOR CIRCUIT
DTC C1035/C1036 (DTC 35/36) – LEFT-REAR WHEEL SPEED SENSOR CIRCUIT



1. Ignition switch
2. ABS hydraulic unit/control module assembly
3. Left-front wheel speed sensor
4. Right-front wheel speed sensor
5. Left-rear wheel speed sensor
6. Right-rear wheel speed sensor
7. ABS hydraulic unit/control connector of harness

DESCRIPTION

The ABS control module monitors the voltage at the positive (+) terminal of each sensor while the ignition switch is ON position. When the voltage is not within the specified range, an applicable DTC will be set.
Also, when no sensor signal is inputted at starting or while running, an applicable DTC will be set.

NOTE:

When the vehicle was operated in any of the following ways, one of these DTC's may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in Step 2 of "ABS DIAGNOSIS FLOW TABLE", check whether or not any abnormality exists.

- **The vehicle was driven with parking brake pulled.**
- **The vehicle was driven with brake dragging.**
- **Wheel spin occurred while driving.**
- **Wheel(s) was turned while the vehicle was jacked up.**
- **The vehicle was stuck.**

INSPECTION

STEP	ACTION	YES	NO
1	1) Disconnect the applicable sensor connector with ignition switch OFF. 2) Measure resistance between sensor terminals. Resistance of wheel speed sensor: 1.2 – 1.6 kI (at 20°C, 68°F) 3) Measure resistance between each terminal and body ground. Insulation resistance: 1MI or higher Were measured resistance values in step 2) and 3) as specified? (See Fig. 1)	Go to step 2.	Replace sensor.
2	1) Ignition switch OFF. 2) Disconnect connector (1) from ABS hydraulic unit/control module assembly. (See Fig. 2) 3) Check for proper connection to ABS hydraulic unit/control module assembly at each sensor terminal. 4) If OK then, turn ignition switch ON and measure voltage between sensor positive terminal of module connector and body ground. Is it 0 V?	Go to step 3.	Sensor positive circuit shorted to power.
3	1) Ignition switch OFF. 2) Connect connector to sensor. 3) Measure resistance between sensor terminals at module connector. 4) Measure resistance between sensor positive terminal and negative terminal of module connector, between positive terminal and body ground. Are measured resistance values within each specified range described in above step 1?	Go to step 4.	Circuit open or shorted to ground.
4	1) Remove wheel speed sensor. 2) Check sensor for damage or foreign material being attached. Is it in good condition? (See Fig. 3)	Go to step 5.	Clean or replace sensor.
5	Check visually through wheel speed sensor installation hole for following. ○Rotor neither missing or damaged. ○No foreign material being attached. ○Rotor not being eccentric. ○Wheel bearing free from excessive play. Are they in good condition? (See Fig. 4)	Go to step 6.	Clean, repair or replace.
6	1) Install sensor to knuckle or axle housing. 2) Tighten sensor bolt to specified torque and check that there is not any clearance between sensor and knuckle or axle housing. (See Fig. 5) Replace sensor if any. Referring to item OUTPUT VOLTAGE INSPECTION of FRONT WHEEL SPEED SENSOR, check output voltage or waveform of sensor. Is proper output voltage or waveform obtained?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Replace sensor and recheck.

Fig. 1

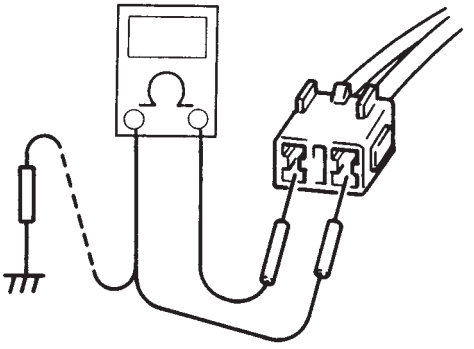


Fig. 2

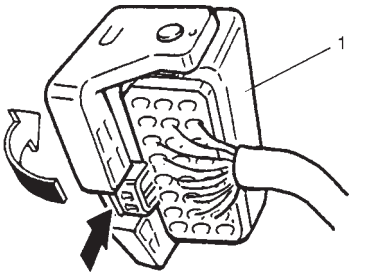


Fig. 3

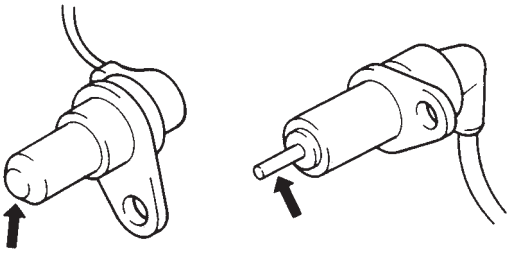


Fig. 4

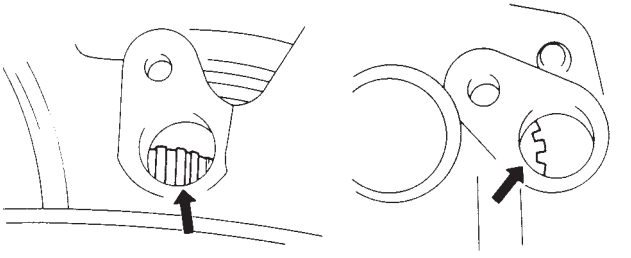
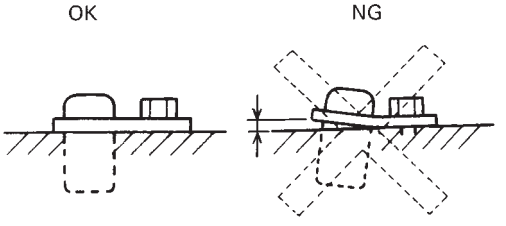
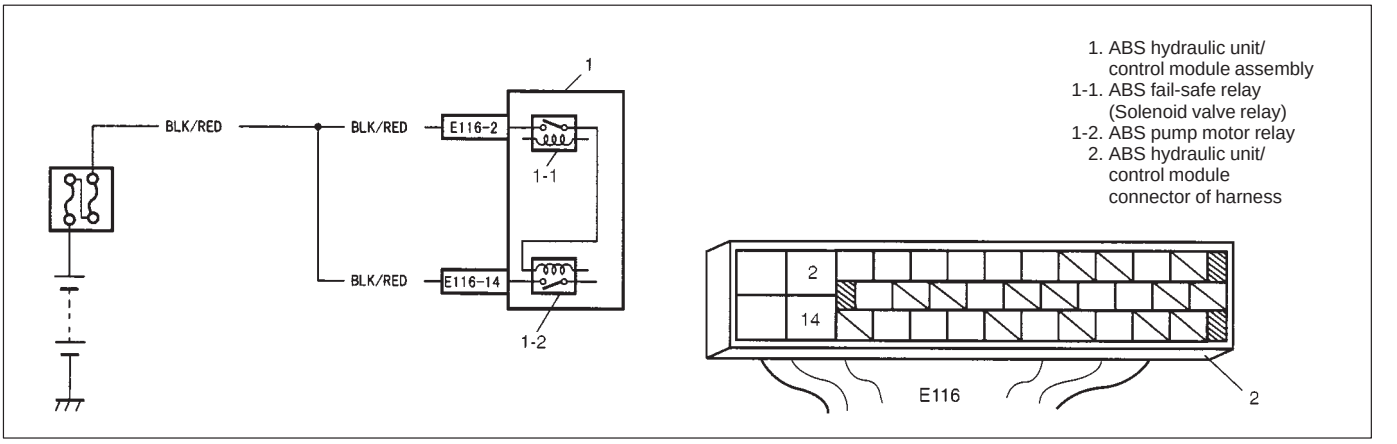


Fig. 5



DTC C1041/C1042 (DTC 41/42) – RIGHT-FRONT SOLENOID CIRCUIT
DTC C1045/C1046 (DTC 45/46) – LEFT-FRONT SOLENOID CIRCUIT
DTC C1051/C1052 (DTC 51/52) – RIGHT-REAR SOLENOID CIRCUIT
DTC C1055/C1056 (DTC 55/56) – LEFT-REAR SOLENOID CIRCUIT



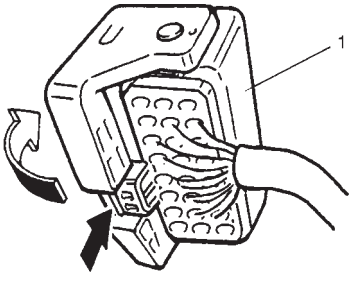
DESCRIPTION

The ABS control module monitors the voltage of the terminal of the solenoid circuit constantly with the ignition switch turned ON. It sets this DTC when the terminal voltage does not become low/high for the ON/OFF command to the solenoid or the voltage difference between solenoid circuit terminals exceeds the specified value with the solenoid turned OFF.

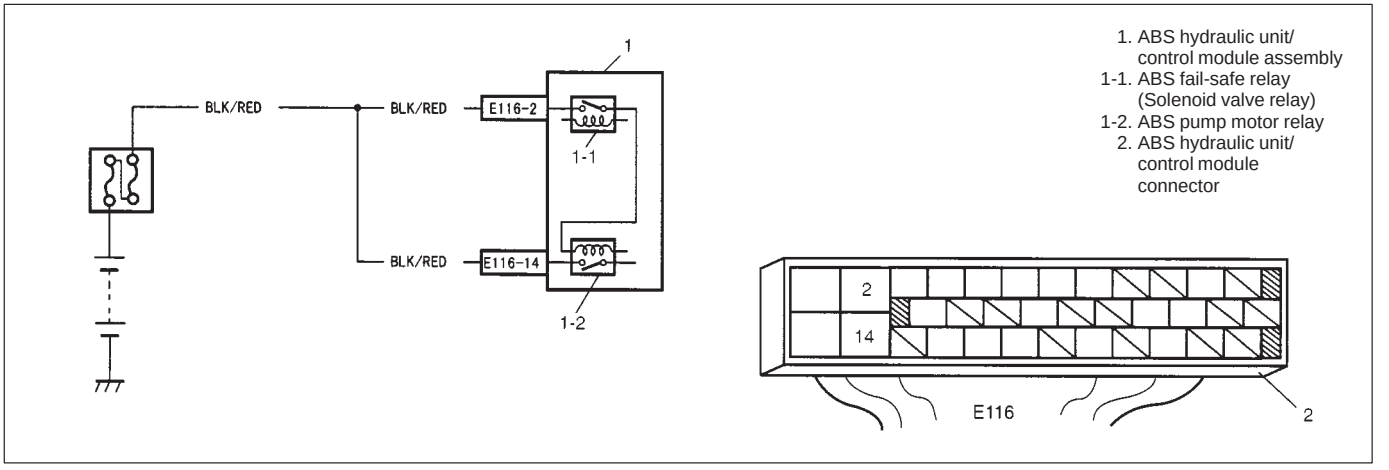
INSPECTION

STEP	ACTION	YES	NO
1	1) Check solenoid referring to item “ABS HYDRAULIC UNIT OPERATION CHECK” in this section. Is it in good condition?	Check terminals “E116-2” and “E116-14” connection. If connections OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to step 2.
2	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector (1). (See Fig. 1) 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal “E116-2”. 4) If OK, then measure voltage between terminal “E116-2” of module connector and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“BLK/RED” circuit open.

Fig. 1



DTC C1057 (DTC 57) – SOLENOID AND PUMP MOTOR POWER SOURCE CIRCUIT



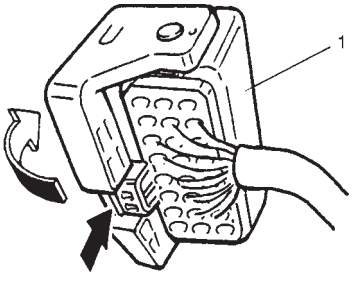
DESCRIPTION

The ABS control module monitors the voltage at terminal (“E116-2” and “E116-14”) of the fail-safe and pump motor relays circuit constantly with the ignition switch turned ON. When all solenoid circuit voltages are below the specified value or the voltage at the terminal “E116-14” became below the specified value while the pump motor is operating, this DTC will be set. As soon as the voltage rises to the specified level, the set DTC will be cleared.

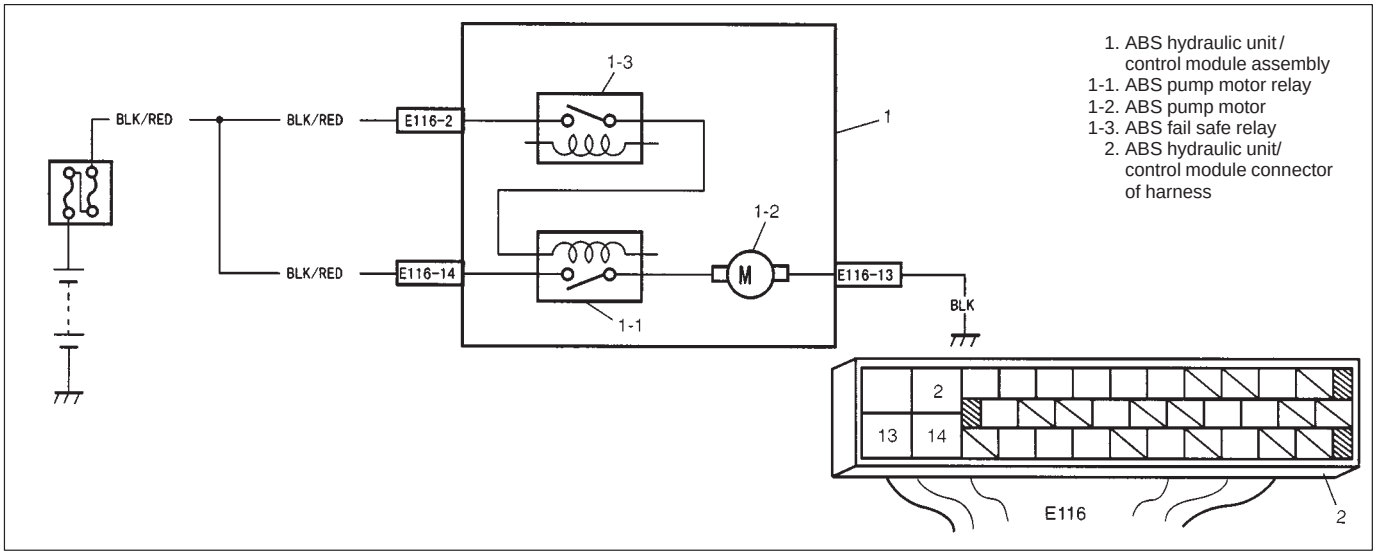
INSPECTION

STEP	ACTION	YES	NO
1	Check battery voltage. Is it about 11 V or higher?	Go to step 2.	Check charging system referring to “CHARGING SYSTEM” section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to step 3.	Repair and/or replace fuse.
3	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector (1). (See Fig. 1) 3) Check proper connection to ABS hydraulic unit/control module connector at terminals “E116-2” and “E116-14”. 4) If OK, then measure voltage between connector terminal “E116-14” and body ground, and connector terminal “E116-2” and body ground. Are they 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“BLK/RED” circuit open.

Fig. 1



DTC C1061 (DTC 61) – ABS PUMP MOTOR CIRCUIT



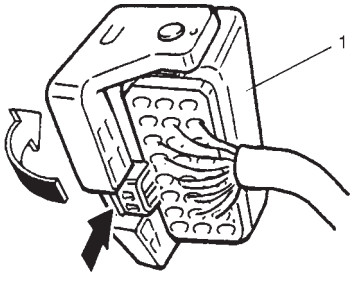
DESCRIPTION

The ABS control module monitors the voltage at the monitor terminal of the pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high/low according to ON/OFF commands to the motor relay of the module (does not follow these commands).

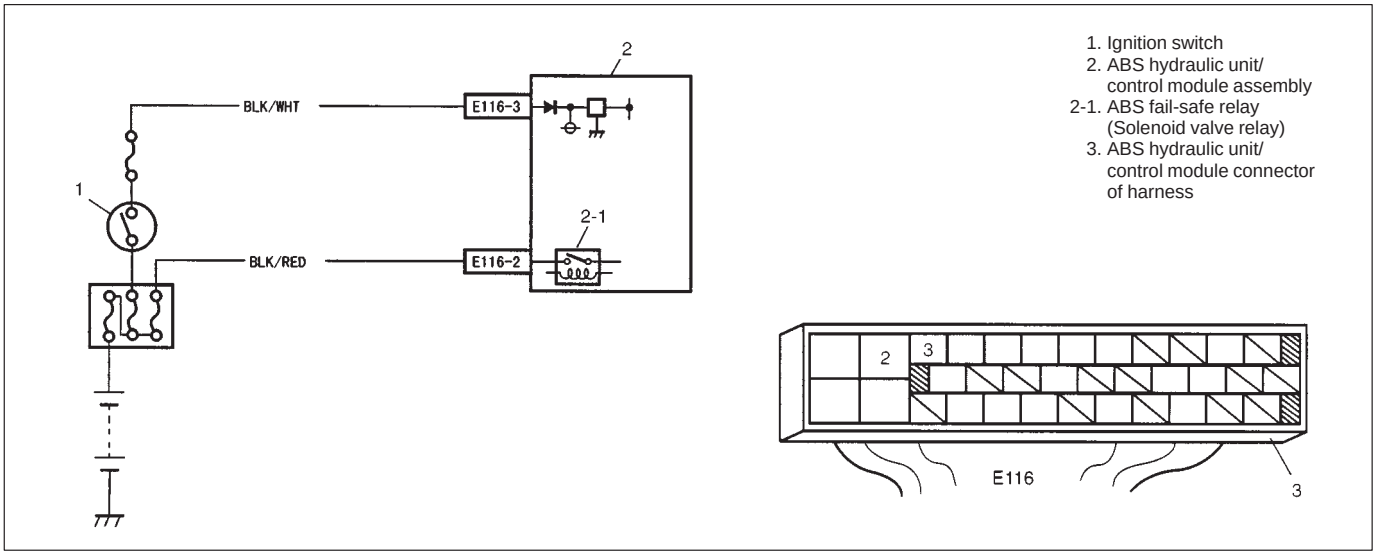
INSPECTION

STEP	ACTION	YES	NO
1	1) Check pump motor referring to item “ABS HYDRAULIC UNIT OPERATION CHECK” in this section. Is it in good condition?	Check terminals “E116-2” and “E116-14” connection. If connections OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to step 2.
2	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector (1). (See Fig. 1) 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal “E116-14”. 4) If OK, then measure voltage between terminal “E116-14” of module connector and body ground. Is it 10 – 14 V?	Go to step 3.	“BLK/RED” circuit open.
3	Measure resistance between connector terminal “E116-13” of ABS hydraulic unit/control module assembly and body ground. Is it infinite (∞)?	“BLK” circuit open.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

Fig. 1



DTC C1063 (DTC 63) – ABS FAIL-SAFE RELAY CIRCUIT



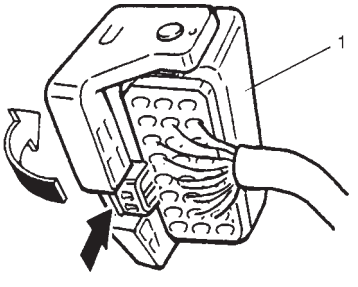
DESCRIPTION

The ABS control module monitors the voltage at the terminal of the solenoid circuit constantly with the ignition switch turned ON. Also, immediately after the ignition switch is turned ON, perform an initial check as follows. Switch the fail-safe relay in the order of ON × OFF × ON and check if the voltage at 6 solenoid circuit terminals changes to High × Low × High. If anything faulty is found in the initial check and when the voltage at all solenoid circuit terminals is low with the ignition switch turned ON and ABS not operated, this DTC will be set.

INSPECTION

STEP	ACTION	YES	NO
1	Check battery voltage. Is it about 11 V or higher?	Go to step 2.	Check charging system referring to “CHARGING SYSTEM” section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to step 3.	Repair and/or replace fuse.
3	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector (1). (See Fig. 1) 3) Check proper connection to ABS hydraulic unit/control module at terminal “E116-2”. 4) If OK, then measure voltage between connector terminal “E116-2” and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“BLK/RED” circuit open or short to ground.

Fig. 1



DTC C1071 (DTC 71) – ABS CONTROL MODULE

DESCRIPTION

This DTC will be set when an internal fault is detected in the ABS control module.

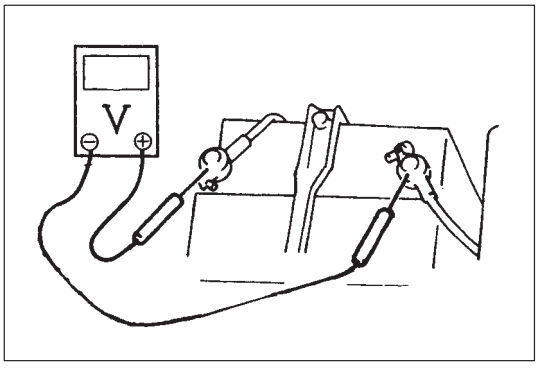
INSPECTION

STEP	ACTION	YES	NO
1	1) Ignition switch OFF. 2) Disconnect connectors from ABS control module. 3) Check for proper connection to ABS control module at all terminals. Are they in good condition?	Substitute a known-good ABS control module and recheck.	Repair or replace.

ON-VEHICLE SERVICE

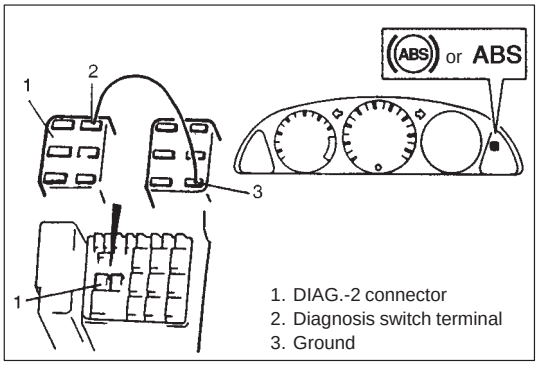
PRECAUTION

When connectors are connected to ABS hydraulic unit/control module assembly, do not disconnect connectors of sensors etc. and turn ignition switch is ON position. Then DTC will be set in ABS control module.

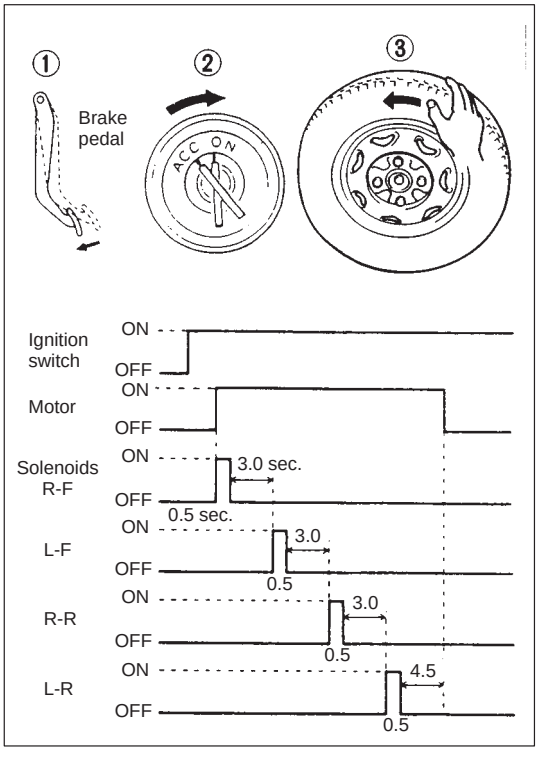


ABS HYDRAULIC UNIT OPERATION CHECK

1) Check that basic brake system other than ABS is in good condition.
2) Check that battery voltage is 11 V or higher.
3) With ABS warning lamp, check that no abnormality is detected in ABS. Refer to ABS WARNING LAMP CHECK in this section.
4) Lift up vehicle.
5) Set transmission to neutral and release parking brake.
6) Turn each wheel gradually by hand to check if brake dragging occurs. If it does, correct.

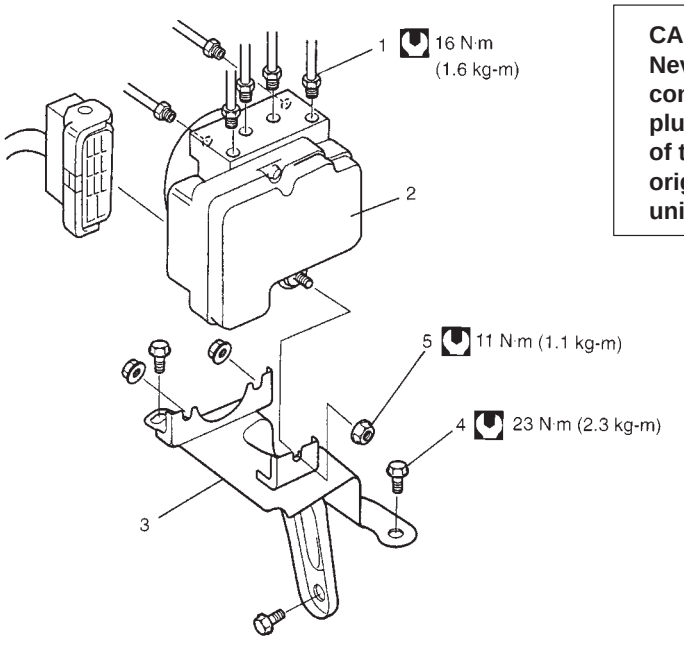


7) With diag. switch terminal of DIAG.-2 connector connected to ground by using service wire, turn ignition switch to ON and check if ABS warning lamp indicates DTC 12.
8) Turn ignition switch OFF.



9) Perform following checks with help of another person. Brake pedal should be depressed and then ignition switch turned to ON position by one person and wheel should be turned by another person's hand. At this time, check that:
   ○ Operation sound of solenoid is heard and wheel turns only about 0.5 sec. (Brake force is depressurized.)
   ○ Operation sound of pump motor is heard and pulsation is felt at brake pedal.
10) If all 4 wheels cannot be checked during one ignition cycle (OFF × ON), repeat Step 8) and 9) till all 4 wheels are checked.
    If a faulty condition is found in Steps 9) and 10), replace hydraulic unit.
11) Turn ignition switch to OFF position and remove service wire from DIAG.-2 connector.

ABS HYDRAULIC UNIT/CONTROL MODULE ASSEMBLY

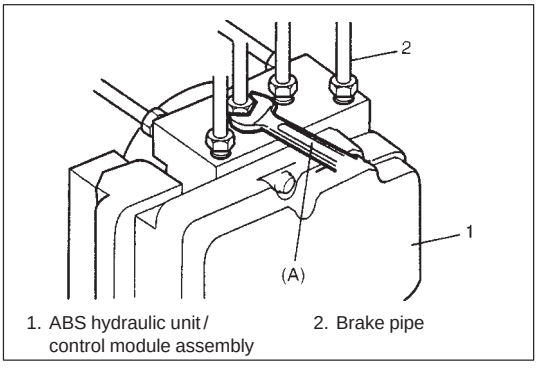


CAUTION:
Never disassemble ABS hydraulic unit/ control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS hydraulic unit/control module assembly.

1. Brake pipe
2. ABS hydraulic unit / control module assembly
3. Bracket
4. Bracket bolt
5. Nut

HYDRAULIC UNIT INSPECTION

○ Check hydraulic unit for fluid leakage.
If any, repair or replace.



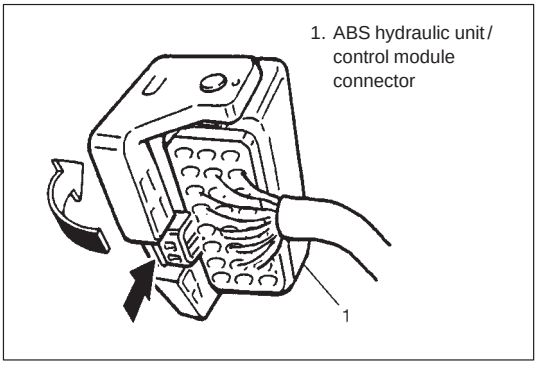
1. ABS hydraulic unit / control module assembly
2. Brake pipe

REMOVAL

1) Disconnect negative cable at battery.
2) Using special tool, disconnect brake pipes from ABS hydraulic unit/control module assembly.

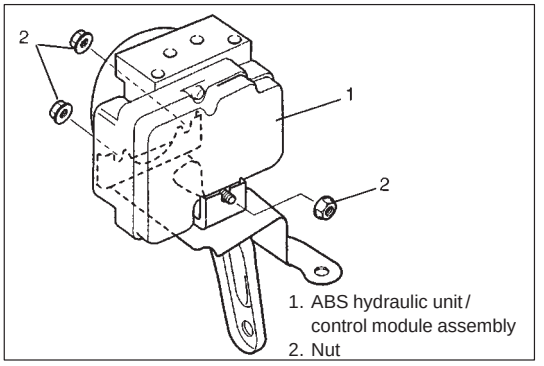
Special Tool
(A): 09950-78220

NOTE:
Put bleeder plug cap onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.



1. ABS hydraulic unit / control module connector

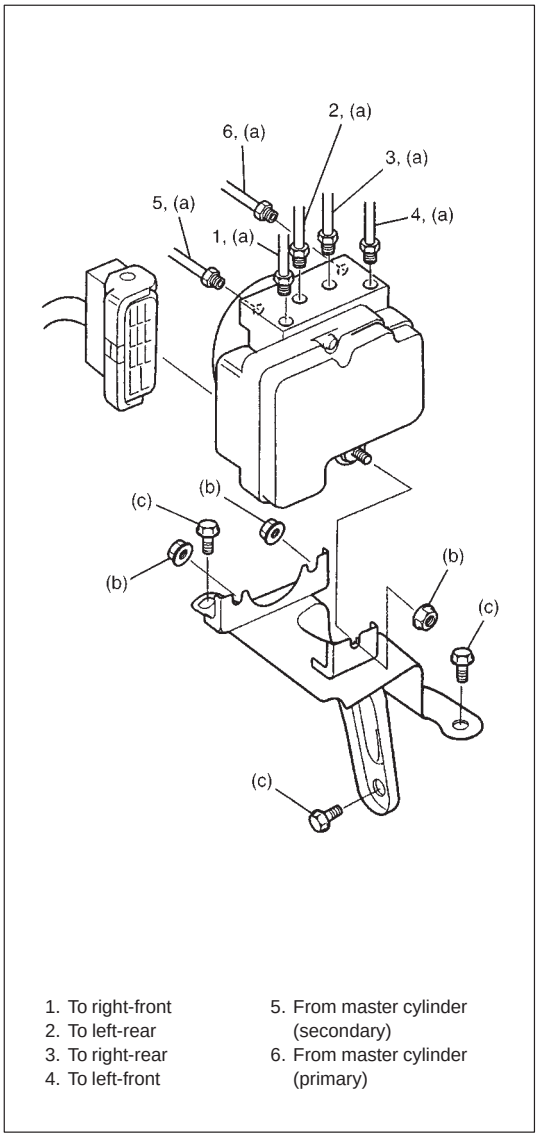
3) Disconnect ABS hydraulic unit/control module assembly connector.



1. ABS hydraulic unit / control module assembly
2. Nut

4) Remove three nuts and take out ABS hydraulic unit/control module assembly from bracket.

CAUTION:
- **Do not give an impact to hydraulic unit.**
- **Use care not to allow dust to enter hydraulic unit.**
- **Do not place hydraulic unit on its side or upside down. Handling it in inappropriate way will affect its original performance.**



1. To right-front
2. To left-rear
3. To right-rear
4. To left-front
5. From master cylinder (secondary)
6. From master cylinder (primary)

INSTALLATION

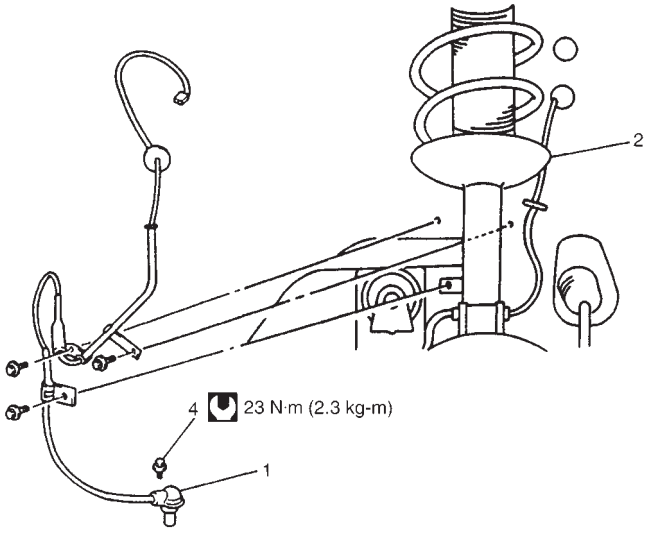
1) Install hydraulic unit by reversing removal procedure.

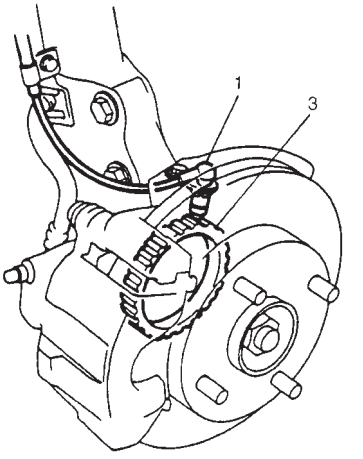
Tightening Torque
(a): 16 N·m (1.6 kg-m, 12.0 lb-ft)
(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

2) Bleed air from brake system referring to Section 5.
3) Check each installed part for fluid leakage and perform hydraulic unit operation check.

NOTE:
For new ABS hydraulic unit/control module assembly, it "ABS HYDRAULIC UNIT OPERATION CHECK" procedure has not been performed, "ABS" warning lamp may flash when ignition switch is turned ON position.
Accordingly preform "ABS HYDRAULIC UNIT OPERATION CHECK" to stop flashing of ABS warning lamp.

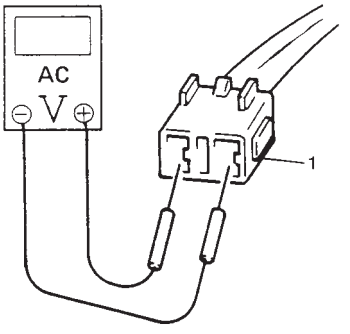
FRONT WHEEL SPEED SENSOR

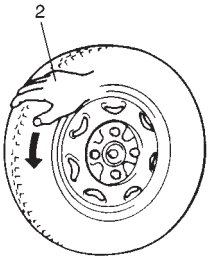




NOTE:
Never remove sensor rotor from drive shaft outside joint.
Refer to Section 4 for replacement procedure of joint with sensor.

1. Left front wheel speed sensor
2. Left front strut
3. Sensor rotor
4. Sensor bolt





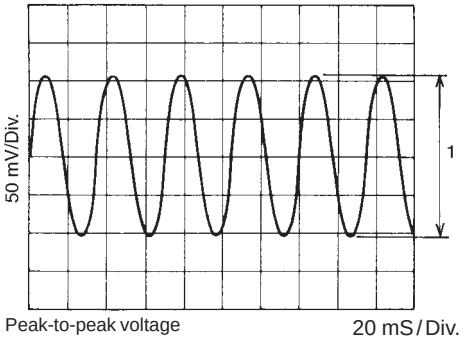
1. Wheel speed sensor connector
2. Rotate by hand

OUTPUT VOLTAGE INSPECTION

1) Turn ignition switch to OFF position.
2) Hoist vehicle a little.
3) Disconnect connector of wheel speed sensor.
4) Connect voltmeter between connector terminals.
5) While turning wheel at a speed of approximately 2/3 to 1 full rotation per second, check AC voltage of sensor.

Output AC voltage at 2/3
to one rotation per second (29 – 44 Hz): 150 mV or more

If measured voltage is not as specified, check sensor, rotor and their installation conditions.

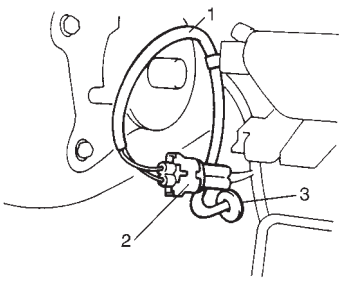


1. Peak-to-peak voltage

Reference

When using oscilloscope for this check, check if peak-to-peak voltage meets specification and waveform is complete.

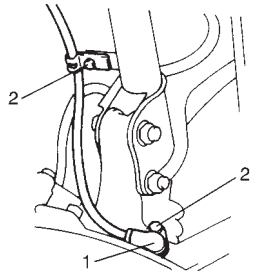
Peak-to-peak voltage
at 2/3 to one rotation per second (29 – 44 Hz): 210 mV or more



1. Front wheel speed sensor harness
2. Connector
3. Grommet

REMOVAL

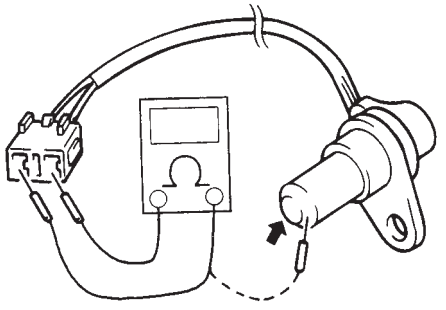
1) Disconnect negative cable at battery.
2) Hoist vehicle and remove wheel.
3) Disconnect front wheel speed sensor connector.
4) Push out grommet of harness from inner fender to outside of vehicle.



1. Front wheel speed sensor
2. Bolt

5) Remove harness clamp bolts and remove front wheel speed sensor from knuckle.

CAUTION:
- **Do not pull wire harness when removing front wheel speed sensor.**
- **Do not cause damage to surface of front wheel speed sensor and do not allow dust, etc. to enter its installation hole.**

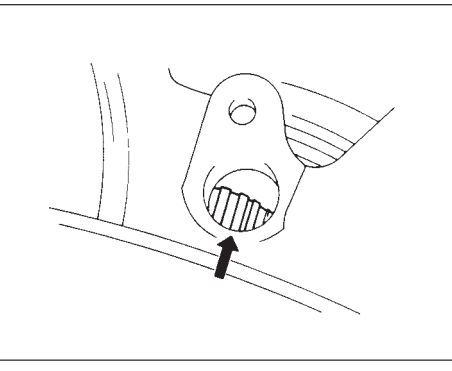


SENSOR INSPECTION

- Check sensor for damage.
- Check sensor for resistance.

Resistance between terminals: 1.2 – 1.6 kΩ at 20°C (68°F)
Resistance between terminal and sensor body: 1 MΩ or more

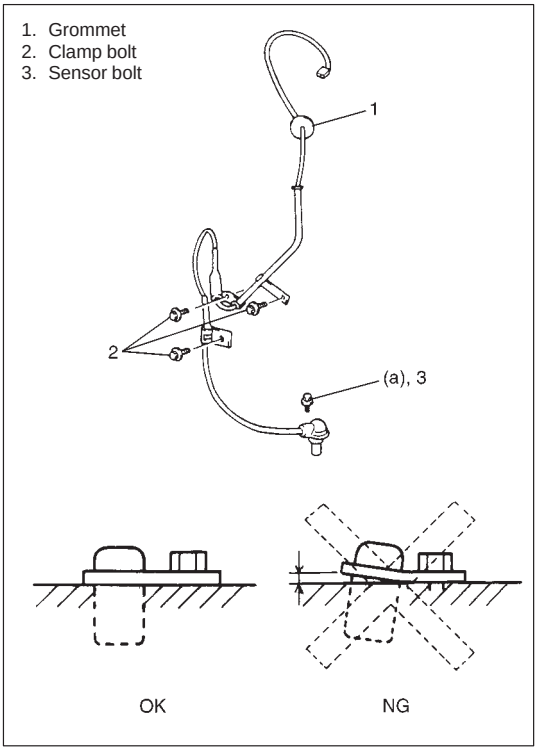
If any faulty is found, replace.



SENSOR ROTOR INSPECTION

- Check rotor serration (teeth) for being missing, damaged or deformed.
- Turn drive shaft and check if rotor rotation is free from eccentricity and looseness.
- Check that no foreign material is attached.

If any faulty is found, repair or replace.



INSTALLATION

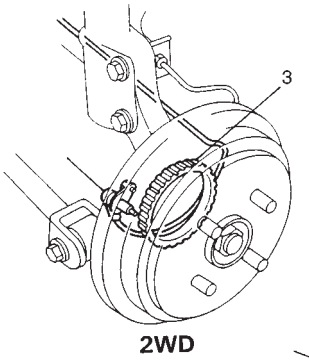
1) Check that no foreign material is attached to sensor and rotor.
2) Install it by reversing removal procedure.

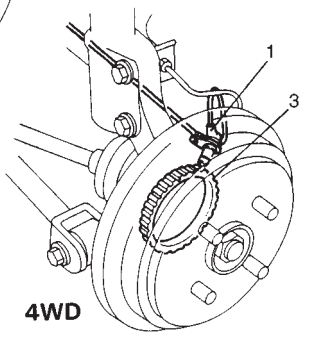
Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

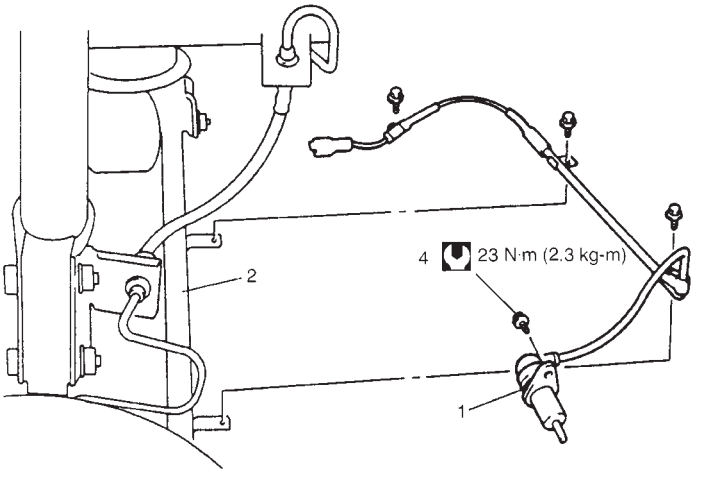
CAUTION:
- **Do not pull wire harness or twist more than necessary when installing front wheel speed sensor.**
- **Fit harness grommet to inner fender securely.**

3) Check that there is no clearance between sensor and knuckle.

REAR WHEEL SPEED SENSOR





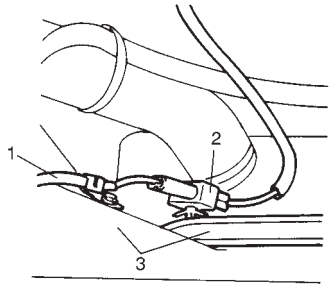


NOTE:
Never remove sensor rotor from wheel hub or drive shaft outside joint.
Refer to Section 3E for replacement procedure of wheel hub with rotor and Section 4C for replacement procedure of drive shaft outside joint with rotor.

1. Left rear wheel speed sensor
2. No.2 control rod
3. Sensor rotor
4. Sensor bolt

OUTPUT VOLTAGE INSPECTION

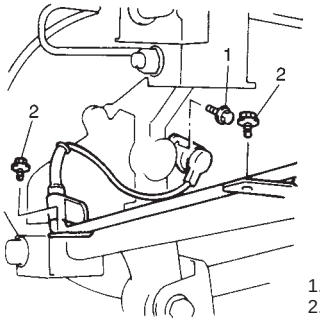
Check in the same procedure as that used of front wheel speed sensor check.



1. Rear wheel speed sensor harness
2. Connector
3. Suspension frame

REMOVAL

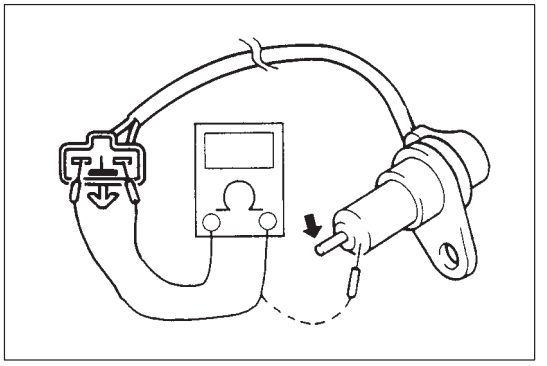
1) Disconnect negative cable at battery.
2) Hoist vehicle.
3) Disconnect rear wheel speed sensor connector and detach connector and wire harness from suspension frame.



1. Sensor bolt
2. Clamp screws

4) Remove harness clamp screws and remove rear wheel speed sensor from knuckle.

CAUTION:
- **Do not pull wire harness when removing rear wheel speed sensor.**
- **Do not cause damage to surface of rear wheel speed sensor or pole piece and do not allow dust, etc. to enter its installation hole.**



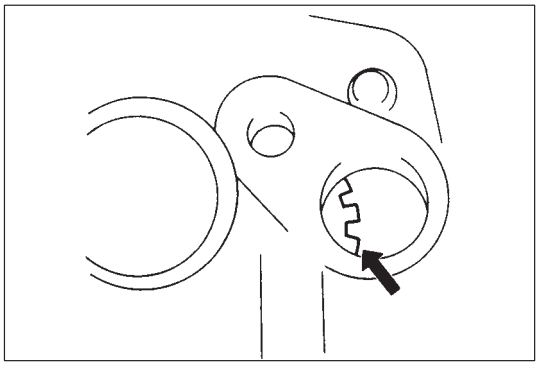
SENSOR INSPECTION

○ Check sensor (pole piece) for damage or bent.
○ Check sensor for resistance.

Resistance between terminals: 1.2 – 1.6 kΩ at 20°C (68°F)

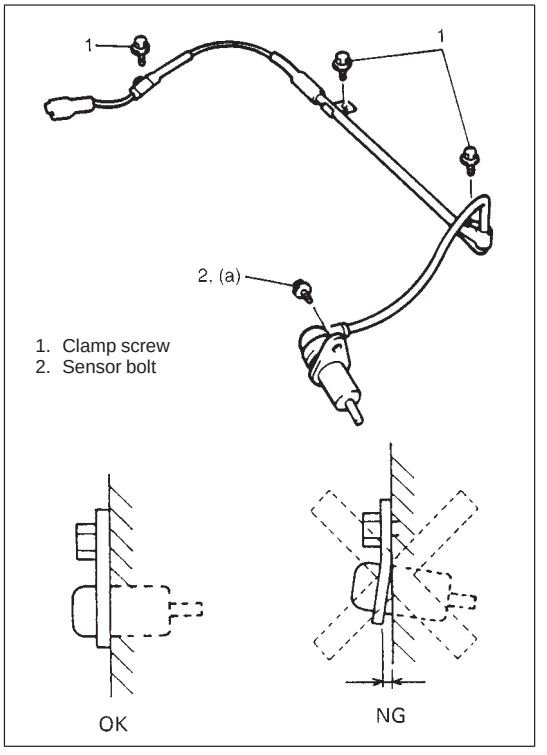
Resistance between terminal and sensor body: 1MΩ or more

If any faulty is found, replace.



SENSOR ROTOR INSPECTION

○ Check rotor serration (teeth) for being missing, damaged or deformed.
○ Turn wheel and check if rotor rotation is free from eccentricity and looseness.
○ Check that no foreign material is attached.
If any faulty is found, repair or replace.



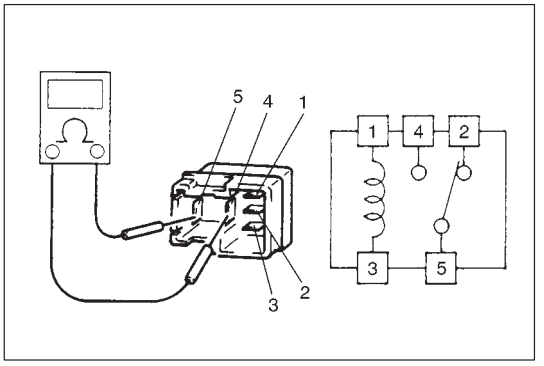
INSTALLATION

1) Check that no foreign material is attached to sensor and rotor.
2) Install it by reversing removal procedure.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

CAUTION:
Do not pull wire harness or twist more than necessary when installing rear wheel speed sensor.

3) Check that there is no clearance between sensor and knuckle.

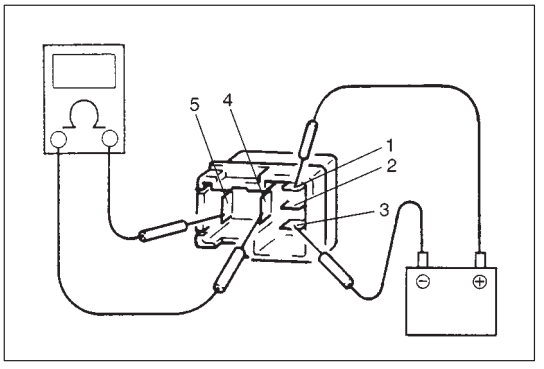


ABS WARNING LAMP RELAY

INSPECTION

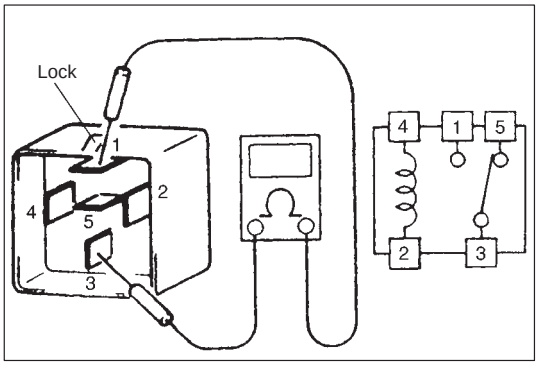
1) Disconnect negative cable at battery.
2) Remove ABS warning lamp relay from relay box.
3) Check resistance between each two terminals.

Between “1” and “3”: 78 – 96 Ω at 20°C (68°F)
Between “2” and “5”: Continuity
Between “4” and “5”: No continuity



4) Check that there is continuity between terminals “4” and “5” when battery is connected to terminals “1” and “3”.

If check result is not as specified in Step 3) and 4), replace.

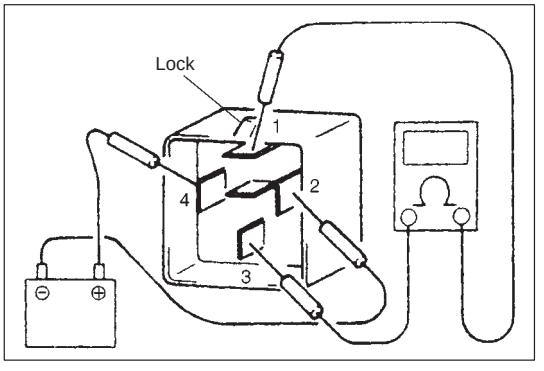


EBD WARNING LAMP RELAY

INSPECTION

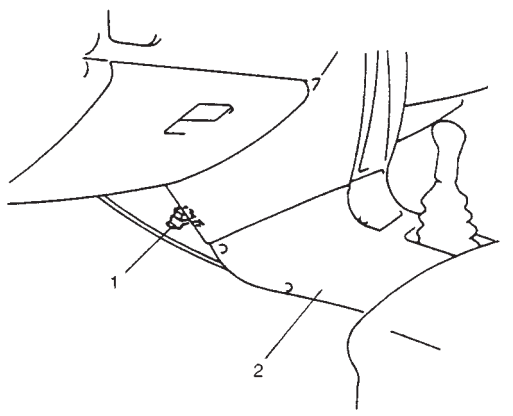
1) Disconnect negative cable at battery.
2) Remove EBD warning lamp relay from relay box.
3) Check resistance between each two terminals.

Between “2” and “4”: 70 – 90Ω at 20°C, 68°F
Between “3” and “5”: Continuity
Between “1” and “3”: No continuity



4) Check that there is continuity between terminals “1” and “3” when battery is connected to terminals “2” and “4”.

If check result is not as specified in Step 3) and 4), replace.



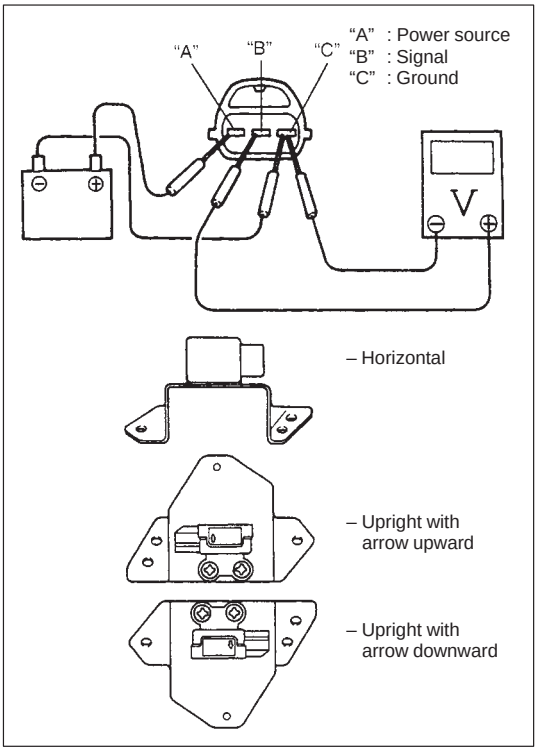
1. Console box
2. G sensor

G SENSOR (IF EQUIPPED)

REMOVAL

1) Turn ignition switch to OFF position.
2) Remove console box extension (right and left).
3) Disconnect connector from sensor.
4) Remove sensor with bracket from floor.

CAUTION:
- **Do not separate sensor and bracket. It will lead to erroneous assembly.**
- **Sensor must not be dropped or shocked. It will affect its original performance.**

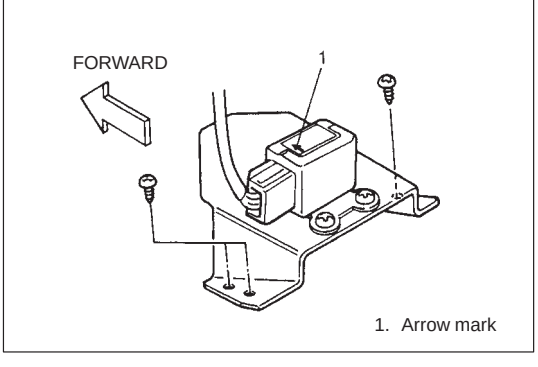


INSPECTION

1) Check sensor bracket for bend.
2) Connect positive cable of 12 volt battery to "A" terminal of sensor and ground cable to "C" terminal. Then using voltmeter, check voltage between "B" terminal and "C" terminal.

   When placed horizontally: 2 – 3 V
   When placed upright with arrow upward: 3 – 4 V
   When placed upright with arrow downward: 1 – 2 V

   If measured voltage is not as specified, replace sensor with bracket.



1. Arrow mark

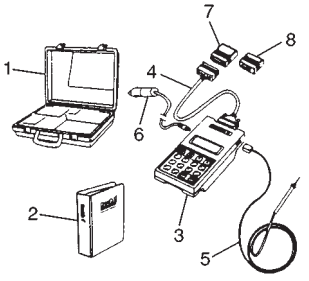
INSTALLATION

1) Using new screws, install sensor with bracket onto floor so that arrow mark directs vehicle forward.
2) Connect connector to sensor securely.
3) Install console box extensions.

SPECIAL TOOLS

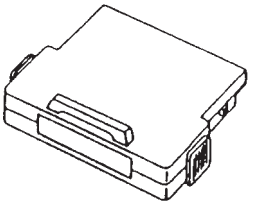


09950-78220
Flare nut wrench (10 mm)

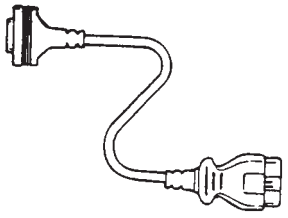


1. Storage case
2. Operator's manual
3. Tech-1A
4. DLC cable
5. Test lead / probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

09931-76011
SUZUKI scan tool (Tech-1A) kit



Mass storage cartridge



09931-76030
16 / 14 pin DLC cable

SECTION 7A

MANUAL TRANSMISSION
(G13 AND G16 ENGINE MODELS)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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GENERAL DESCRIPTION

CONSTRUCTION AND SERVICING

The transmission provides five forward speeds and one reverse speed by means of three synchronizers and three shafts: input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

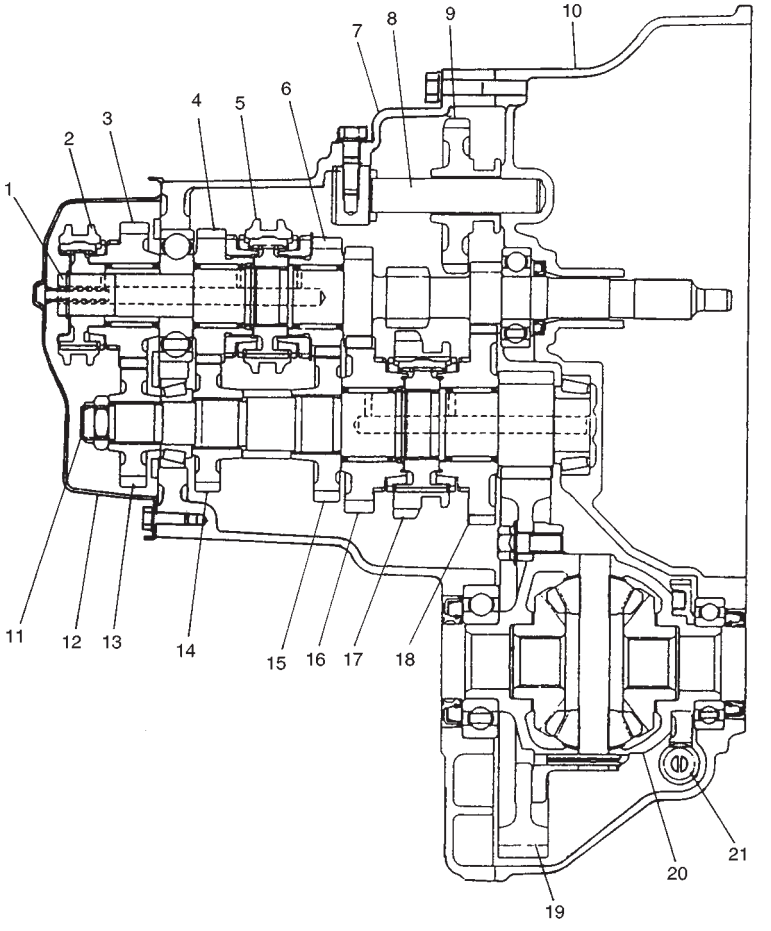
The low speed synchronizer is mounted on countershaft and engaged with countershaft first gear or second gear, while the high speed synchronizer is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

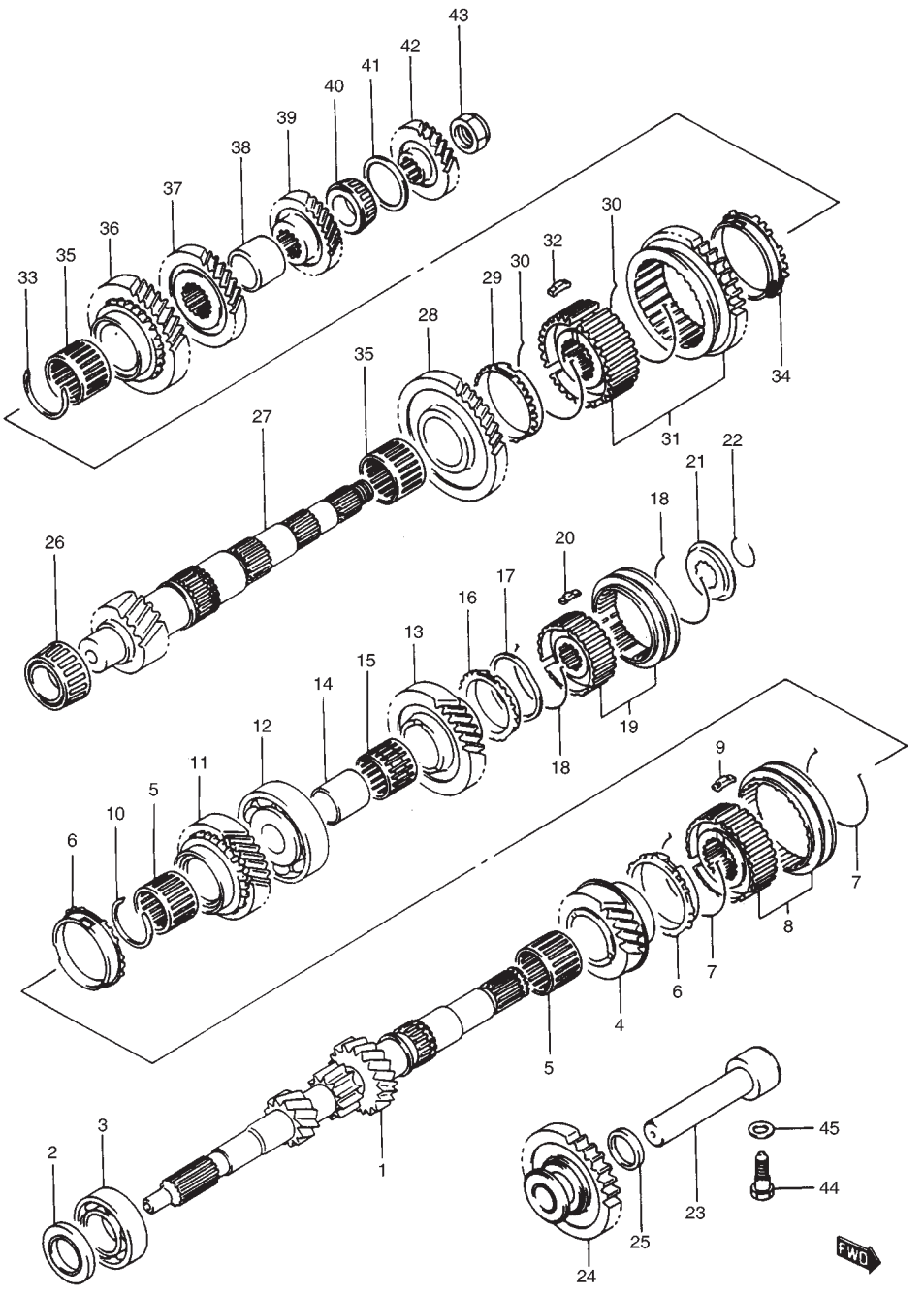
The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transmission case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of countershaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.



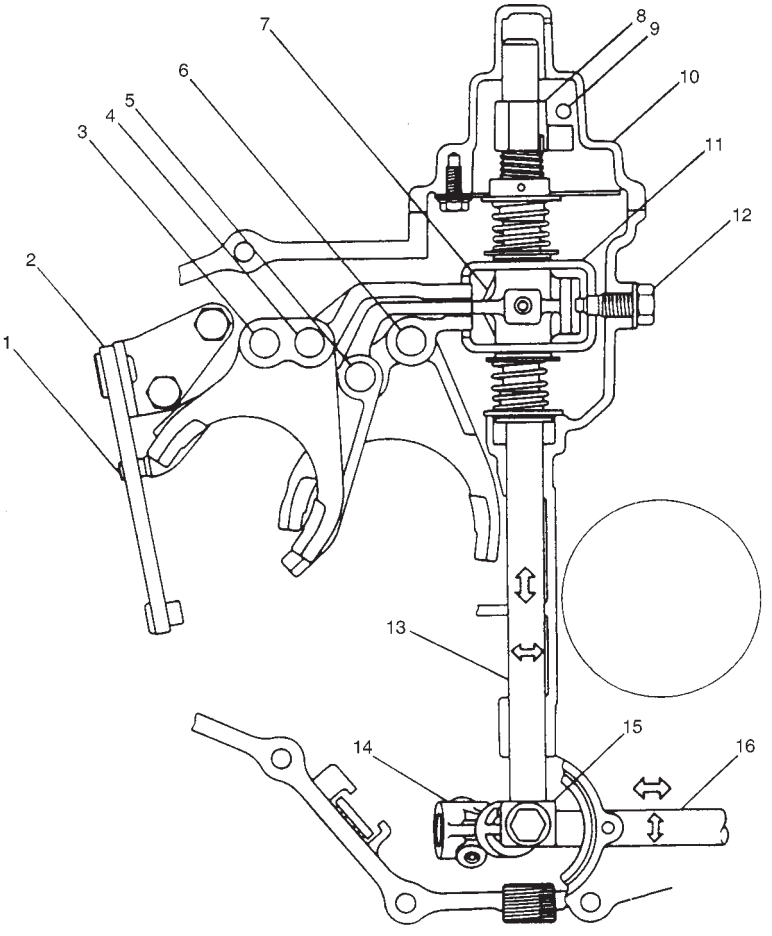
1. Input shaft
2. 5th speed sleeve & hub
3. Input shaft 5th gear
4. Input shaft 4th gear
5. High speed sleeve & hub
6. Input shaft 3rd gear
7. Left case
8. Reverse gear shaft
9. Reverse idler gear
10. Right case
11. Countershaft
12. Left cover
13. Countershaft 5th gear
14. Countershaft 4th gear
15. Countershaft 3rd gear
16. Countershaft 2nd gear
17. Low speed sleeve & hub
18. Countershaft 1st gear
19. Final gear
20. Differential case
21. Speedometer driven gear



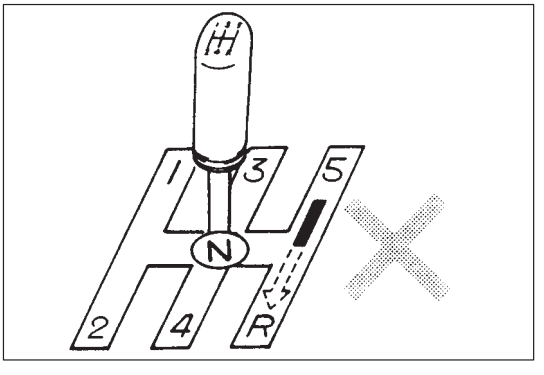
1. Input shaft
2. Oil seal
3. Input shaft R bearing
4. Input shaft 3rd gear
5. 3rd & 4th gear bearing
6. High speed synchronizer ring
7. High speed synchronizer spring
8. High speed sleeve & hub
9. High speed synchronizer key
10. Circlip
11. Input shaft 4th gear
12. Input shaft L bearing
13. Input shaft 5th gear
14. 5th gear spacer
15. 5th gear bearing
16. 5th speed synchronizer ring
17. Synchronizer ring spring
18. 5th synchronizer spring
19. 5th speed sleeve & hub
20. 5th synchronizer key
21. 5th synchronizer hub plate
22. Circlip
23. Reverse gear shaft
24. Reverse idler gear
25. Reverse shaft washer
26. Countershaft R bearing
27. Countershaft
28. Countershaft 1st gear
29. 1st gear synchronizer ring
30. Low speed synchronizer spring
31. Low speed sleeve & hub
32. Low speed synchronizer key
33. Circlip
34. 2nd gear synchronizer ring
35. 1st & 2nd gear bearing
36. Countershaft 2nd gear
37. Countershaft 3rd gear
38. 3rd & 4th gear spacer
39. Countershaft 4th gear
40. Countershaft L bearing
41. Bearing set shim
42. Countershaft 5th gear
43. Countershaft nut
44. Reverse shaft bolt
45. Washer

GEAR SHIFT MECHANISM

Movement of gear shift control lever is transmitted to gear shift shaft through gear shift control shaft, and gear shift & select shaft through gear shift arm and gear shift yoke, and then gear shift & select lever to each gear shift yoke, shaft and fork or arm. Gear shift interlock plate is provided to prevent the gear from engaging double.

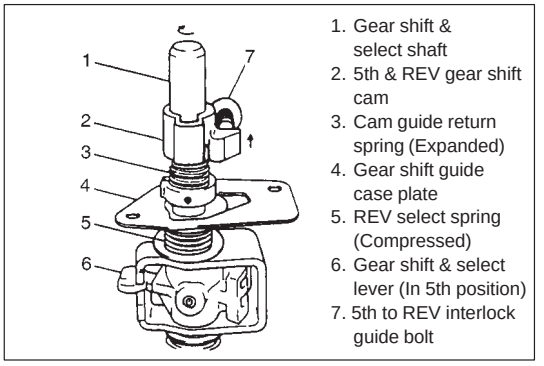


1. Reverse gear shift arm
2. Reverse gear shift lever
3. 5th & REV gear shift guide shaft
4. 5th & REV gear shift shaft
5. High speed gear shift shaft
6. Low speed gear shift shaft
7. Gear shift & select lever
8. 5th & REV gear shift cam
9. 5th to REV interlock guide bolt
10. Gear shift guide case
11. Gear shift interlock plate
12. Gear shift interlock bolt
13. Gear shift & select shaft
14. Gear shift arm
15. Gear shift yoke
16. Gear shift shaft



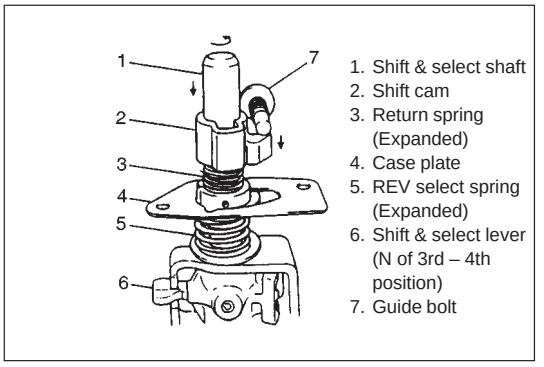
5TH & REVERSE GEAR SHIFT CAM

5th & reverse gear shift cam, cam guide return spring and 5th to reverse interlock guide bolt are provided to prevent the gear from being directly shifted from 5th to reverse.



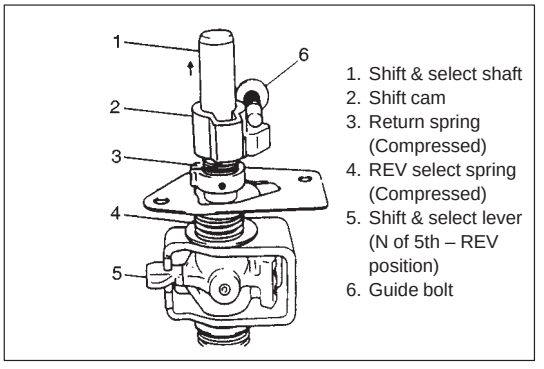
1. Gear shift & select shaft
2. 5th & REV gear shift cam
3. Cam guide return spring (Expanded)
4. Gear shift guide case plate
5. REV select spring (Compressed)
6. Gear shift & select lever (In 5th position)
7. 5th to REV interlock guide bolt

1) When gear is shifted to 5th speed, 5th & reverse gear shift cam turns clockwise with gear shift & select shaft and it is pushed up by cam guide return spring to the position where interlock guide bolt prevents the cam from being shifted to reverse straight.



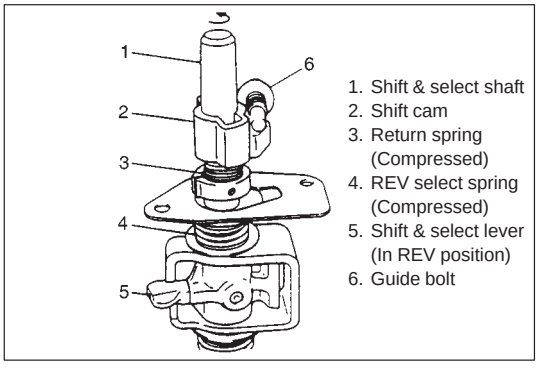
1. Shift & select shaft
2. Shift cam
3. Return spring (Expanded)
4. Case plate
5. REV select spring (Expanded)
6. Shift & select lever (N of 3rd – 4th position)
7. Guide bolt

2) Shifting from 5th to neutral is available and further shift to reverse is interrupted.
However, when shift & select shaft is moved to neutral of 3rd – 4th position, shift limit cam mechanism is canceled as shown in figure.



1. Shift & select shaft
2. Shift cam
3. Return spring (Compressed)
4. REV select spring (Compressed)
5. Shift & select lever (N of 5th – REV position)
6. Guide bolt

3) Selected position in neutral of 5th – REV is shown in figure. While shift & select shaft moves up to allow shift & select lever to shift in 5th or reverse position, shift cam stays because of interference of guide bolt.

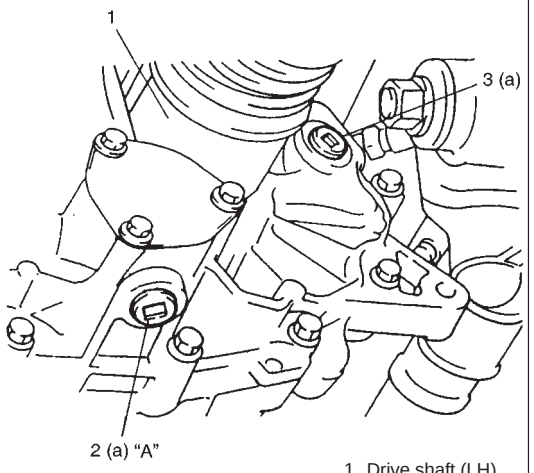


1. Shift & select shaft
2. Shift cam
3. Return spring (Compressed)
4. REV select spring (Compressed)
5. Shift & select lever (In REV position)
6. Guide bolt

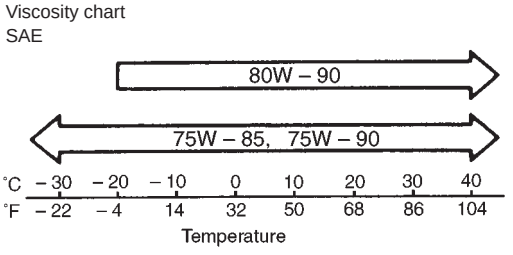
4) Now the mechanism is ready to be shifted to reverse without interference of shift cam.

DIAGNOSIS

Condition	Possible Cause	Correction
Gears slipping out of mesh	○ Worn shift fork shaft	Replace.
	○ Worn shift fork or synchronizer sleeve	Replace.
	○ Weak or damaged locating springs	Replace.
	○ Worn bearings on input shaft or countershaft	Replace.
	○ Worn chamfered tooth on sleeve and gear	Replace sleeve and gear.
Hard shifting	○ Inadequate lubricant	Replenish.
	○ Improper clutch pedal free travel	Adjust.
	○ Distorted or broken clutch disc	Replace.
	○ Damaged clutch pressure plate	Replace clutch cover.
	○ Worn synchronizer ring	Replace.
	○ Worn chamfered tooth on sleeve or gear	Replace sleeve or gear.
	○ Worn gear shift control shaft joint bush	Replace.
	○ Distorted shift shaft	Replace.
Noise	○ Inadequate or insufficient lubricant	Replenish.
	○ Damaged or worn bearing(s)	Replace.
	○ Damaged or worn gear(s)	Replace.
	○ Damaged or worn synchronizer parts	Replace.



1. Drive shaft (LH)
2. Oil drain plug
3. Oil level/filler plug



ON-VEHICLE SERVICE

OIL CHANGE

1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
2) With vehicle lifted up, check oil level and leakage.
   If leakage exists, correct it.
3) Drain old oil and fill new specified oil by specified amount (up to level hole).
4) Torque drain and level/filler plugs as specified below. Apply sealant to thread of drain plug before installation.

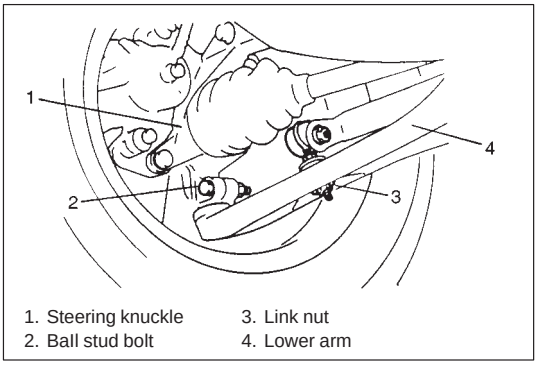
"A": Sealant 99000-31110

Tightening Torque
(a): 21 N·m (2.1 kg-m, 15.5 lb-ft)

NOTE:
- **It is recommended to use API GL-4 75W-90 gear oil.**
- **Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.**

Oil specification: API GL-4
For SAE classification, refer to viscosity chart at the left.

Oil capacity: 2.4 liters (5.1/4.2 US/Imp. pt)

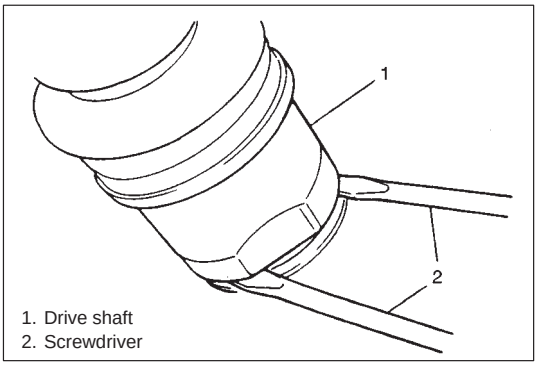


1. Steering knuckle
2. Ball stud bolt
3. Link nut
4. Lower arm

DIFFERENTIAL SIDE OIL SEAL

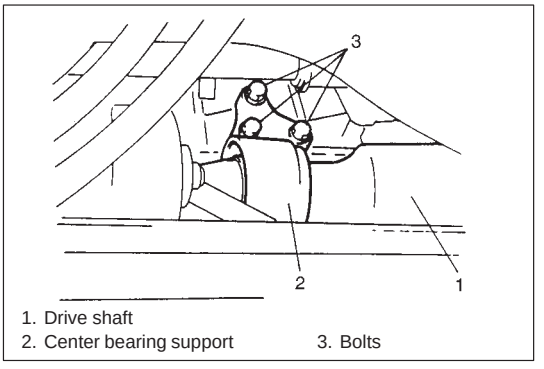
REPLACEMENT

1) Lift up vehicle and drain transmission oil.
2) Remove ball stud bolt and link nut, and then separate suspension arm from knuckle.



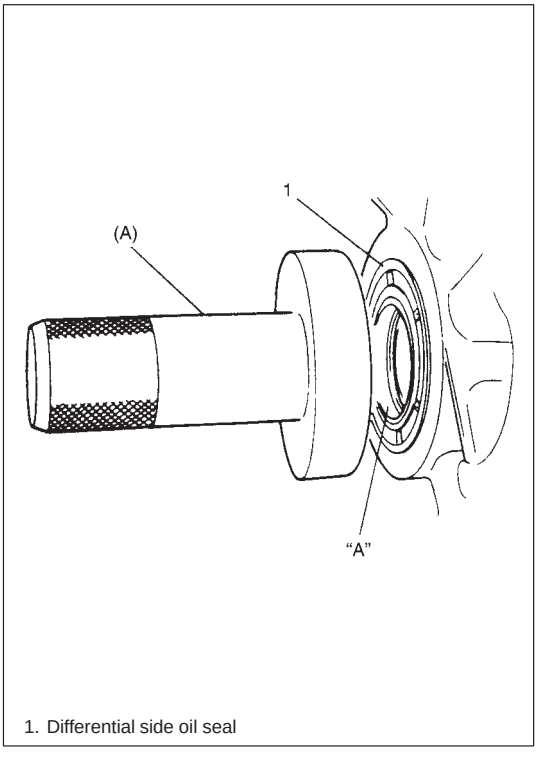
1. Drive shaft
2. Screwdriver

3) ○ In case of left side oil seal:
   By using large size screwdrivers, pull out drive shaft joint so as to release snap ring fitting of joint spline at differential side.
   Pushing knuckle portion outward, detach drive shaft at differential side.



1. Drive shaft
2. Center bearing support
3. Bolts

○ In case of right side oil seal:
By using plastic hammer, drive out drive shaft joint so as to release snap ring fitting of joint spline at center shaft.
After removing center bearing support bolts, pull out center drive shaft from differential gear.



1. Differential side oil seal

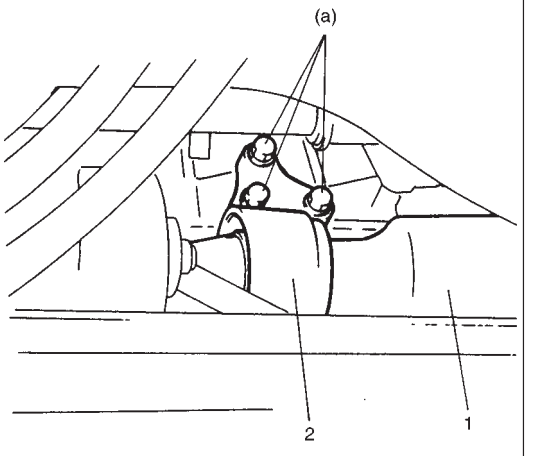
4) Remove oil seal and install a new one until it becomes flush with case surface by using special tool and hammer.

NOTE:
When installing oil seal, face its spring side inward.

Special Tool
(A): 09913-75810 (for RH)
09913-75520 (for LH)

5) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

"A": Grease 99000-25010

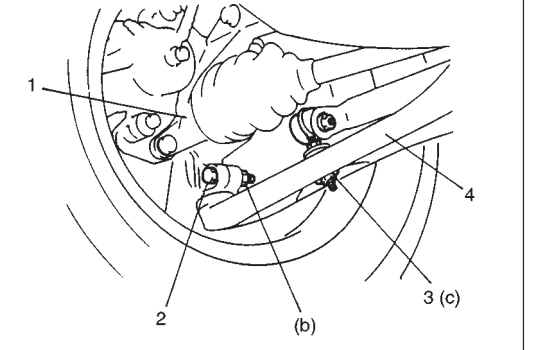


1. Drive shaft
2. Center bearing support

6) Insert drive shaft joint or center drive shaft to differential gear. With right side drive shaft, install center bearing support.

CAUTION:
- **Be careful not to scratch oil seal lip with drive shaft joint while inserting.**
- **Make sure to insert drive shaft joint fully and seat its snap ring as it was.**
- **Do not hit joint boot with hammer or the like. Nothing but hands is allowed to use when inserting joint.**

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



1. Steering knuckle
2. Ball stud bolt
3. Link nut
4. Lower arm

7) Connect ball stud with knuckle and fasten with bolt to specification.

Tightening Torque
(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)

8) Install stabilizer bar to suspension arm and fasten link nut to specification.

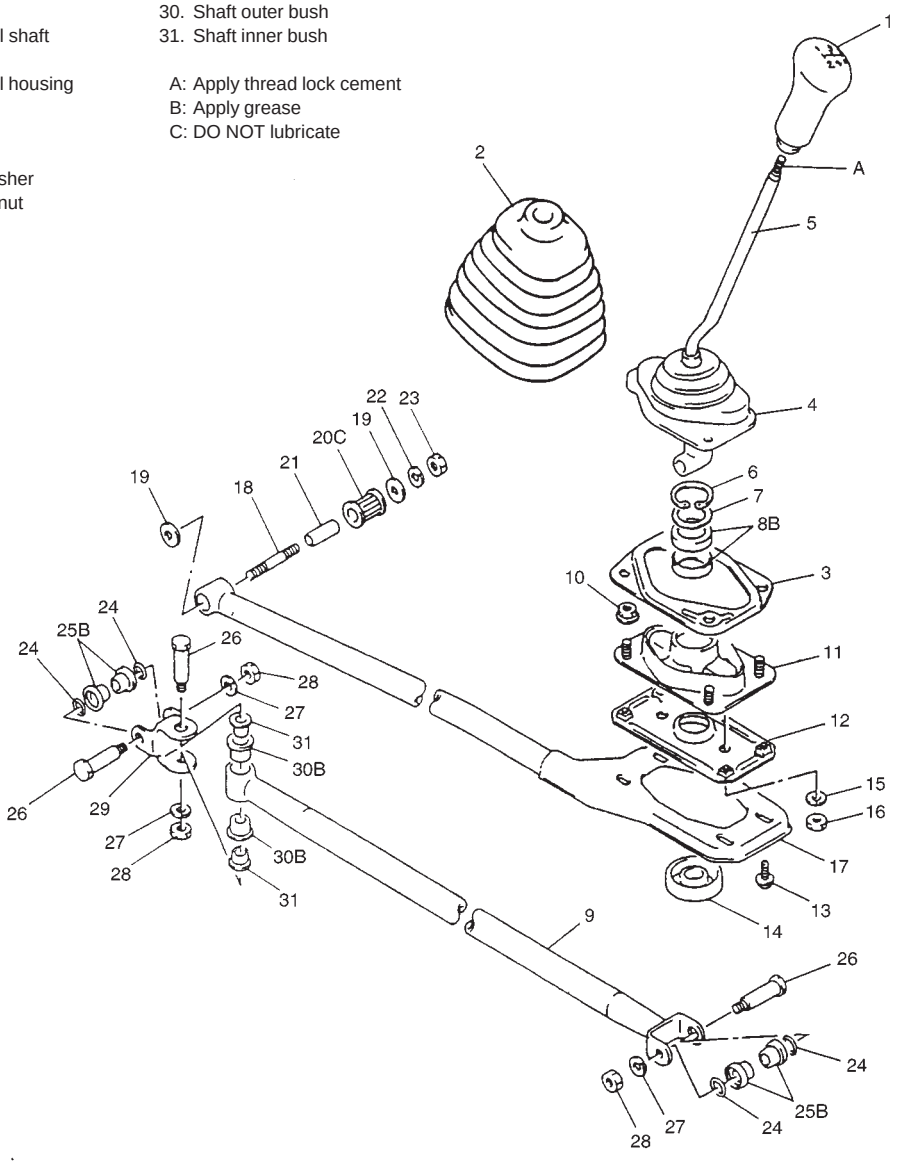
Tightening Torque
(c): 28 N·m (2.8 kg-m, 20.5 lb-ft)

9) Fill transmission oil as specified and make sure that oil has been sealed with oil seal.

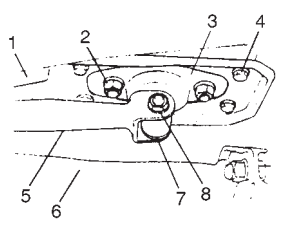
GEAR SHIFT CONTROL

1. Control lever knob
2. Boot No.2
3. Boot cover
4. Boot
5. Gear shift control lever
6. Circlip
7. Adjust shim
8. Seat
9. Gear shift control shaft
10. Housing nut
11. Gear shift control housing
12. Guide plate
13. Bolt
14. Rear boot
15. Housing lock washer
16. Control housing nut
17. Extension rod
18. Rod stud bolt
19. Rod washer
20. Rod bush
21. Spacer
22. Rod lock washer
23. Rod nut
24. O-ring
25. Control shaft bush
26. Control shaft bolt
27. Shaft lock washer
28. Shaft nut
29. Gear shift control joint
30. Shaft outer bush
31. Shaft inner bush

A: Apply thread lock cement
B: Apply grease
C: DO NOT lubricate



Tightening torque	N·m	kg-m	lb-ft
10. Housing nuts for boot cover	4.5	0.45	3.5
10. Housing nuts for control housing	18	1.8	13.0
13. Guide plate bolts	9	0.9	6.5
16. Control housing nuts	33	3.3	24.0
18. Extension rod stud bolt	18	1.8	13.0
23. Extension rod nut	33	3.3	24.0
26, Control shaft bolts and 28. nuts	18	1.8	13.0



1. Extension rod
2. Housing nut
3. Control lever guide plate
4. Guide plate bolt
5. Gear shift control shaft
6. Exhaust No.1 pipe
7. Gear shift control lever
8. Control shaft bolt & nut

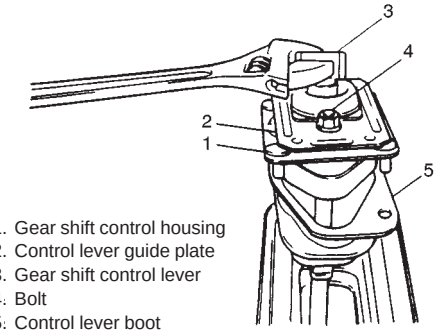
REMOVAL

On Lift

1) Disconnect gear shift control shaft from gear shift control lever by removing control shaft bolt and nut.
2) Remove 4 guide plate bolts and loosen extension rod nut at transmission end and then move extension rod aside.

In Cabin

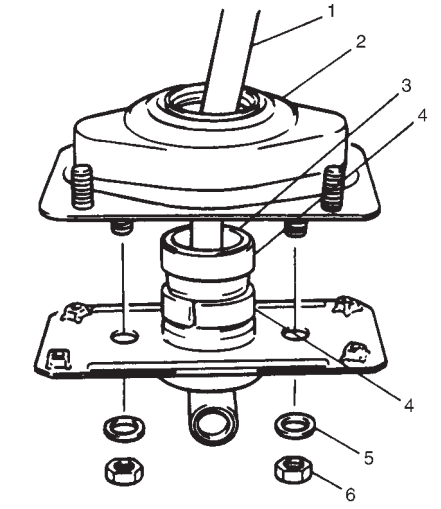
1) Remove shift control lever cover by removing 4 screws.
2) Remove 4 control lever housing nuts and then push shift control lever boot(s) into floor hole to take out shift control lever assembly from under the floor.



1. Gear shift control housing
2. Control lever guide plate
3. Gear shift control lever
4. Bolt
5. Control lever boot

On Bench

1) Holding control lever knob with soft jawed vise, loosen its screw and remove control lever.
2) Remove 2 housing nuts, and then disassemble control lever.



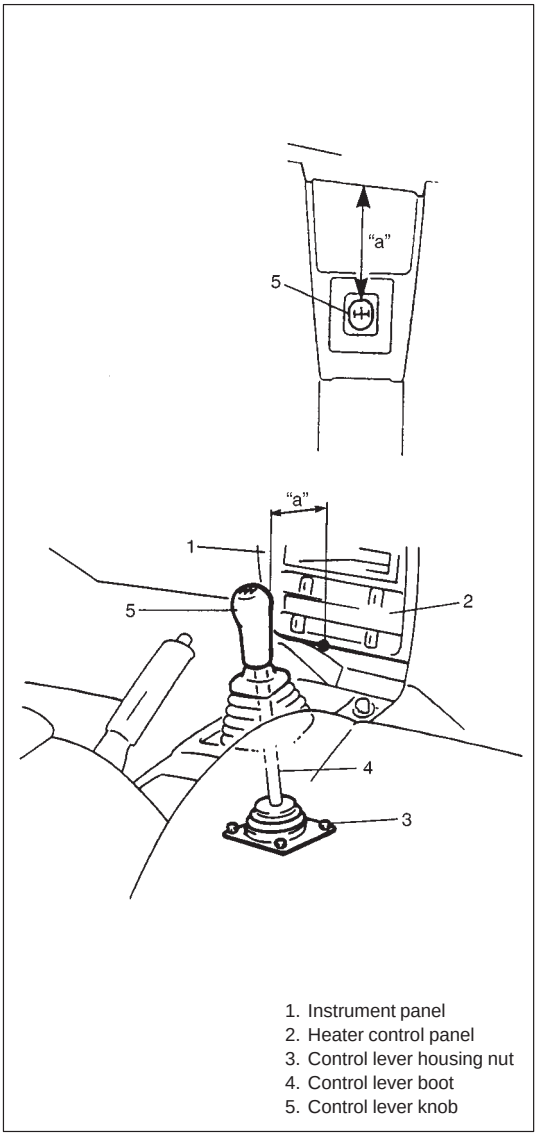
1. Shift control lever
2. Control housing
3. Shim
4. Control lever seat
5. Lock washer
6. Housing nut

INSTALLATION

1) Assemble control lever by reversing removal procedure, replacing parts with new ones as required. Select shim for adjusting vertical play of control lever, if necessary.
   Apply grease to turning or sliding portions.

NOTE:
Check control lever for smooth movement after assembly.

Control lever vertical play	0 – 0.2 mm (0 – 0.007 in)
Available shim size (thickness)	0.8, 1.0, 1.2 and 1.4 mm (0.03, 0.04, 0.05 and 0.06 in)

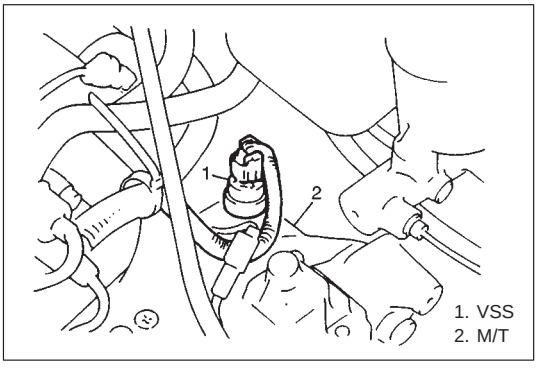


1. Instrument panel
2. Heater control panel
3. Control lever housing nut
4. Control lever boot
5. Control lever knob

2) Apply thread lock cement and then install knob to control lever. Make sure that knob is aligned with lever.
3) Install control lever assembly and related parts as they were. For positioning control lever, loosely install 4 guide plate bolts and 4 control lever housing nuts first, adjust position and then tighten those nuts and bolts.

NOTE:
- **Do not apply grease to extension rod bush of transmission end.**
- **Apply grease to gear shift control shaft bushes.**
- **Make sure that boots are installed correctly.**

Distance "a": 137 mm (5.4 in.)

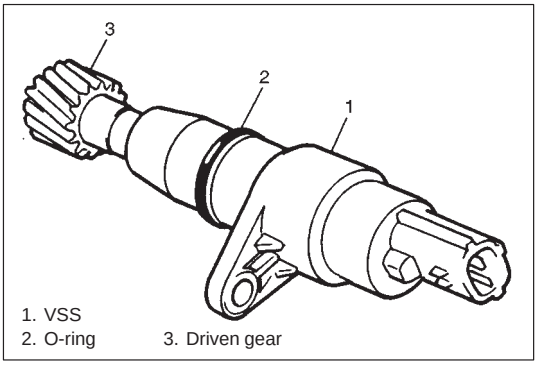


1. VSS
2. M/T

VEHICLE SPEED SENSOR (VSS, SPEEDOMETER DRIVEN GEAR)

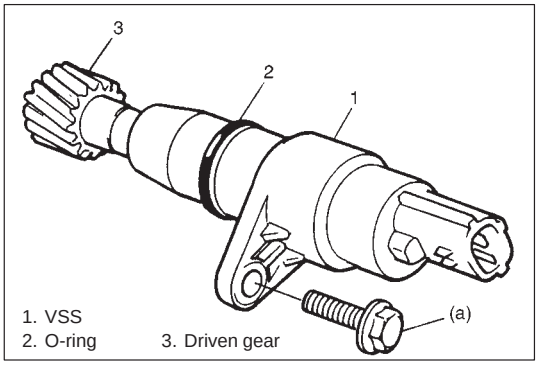
REMOVAL

1) Disconnect negative cable at battery.
2) Disconnect VSS coupler.



1. VSS
2. O-ring
3. Driven gear

3) Remove VSS.

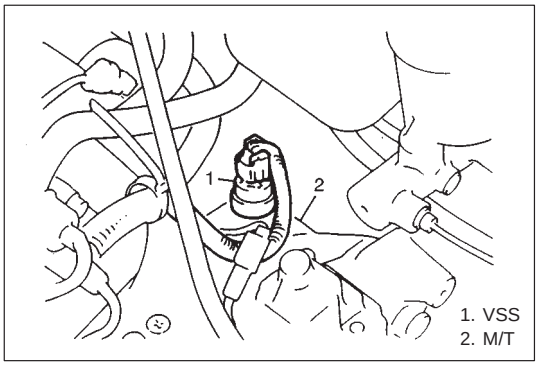


1. VSS
2. O-ring
3. Driven gear

INSTALLATION

1) Check O-ring and VSS surface for their flawlessness, apply oil to O-ring and driven gear and then install VSS to transmission.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. VSS
2. M/T

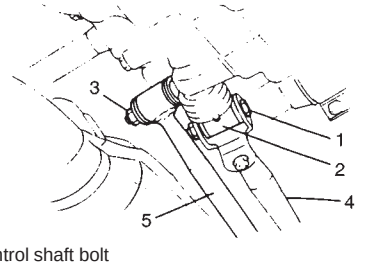
2) Connect VSS coupler.
3) Connect negative cable at battery.

UNIT REPAIR OVERHAUL

DISMOUNTING OF TRANSMISSION

UNDER HOOD

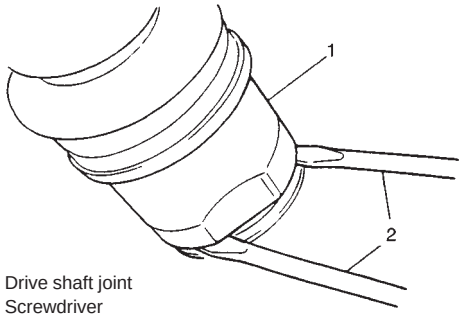
1) Disconnect battery ground cable.
2) Remove clutch cable joint nut, joint pin from cable and then cable itself from bracket.
3) Undo wiring harness clamps and couplers.
4) Remove transmission fastening bolts.
5) Remove starter taking out its 2 bolts. Starting motor plate should also come down.
6) Remove exhaust manifold cover.
7) Remove exhaust No.1 pipe nuts.



1. Control shaft bolt
2. Gear shift shaft
3. Extension rod nut
4. Gear shift control shaft
5. Extension rod

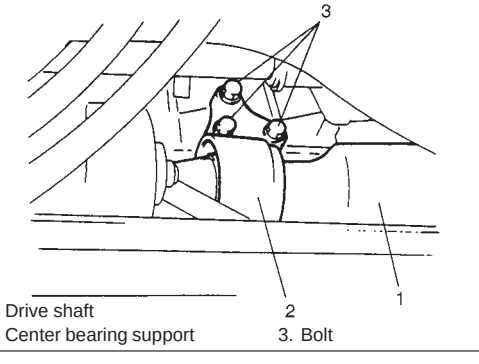
ON LIFT

1) Drain transmission oil.
2) Remove engine under cover of left side.
3) Remove exhaust No.1 pipe.
4) Remove gear shift control shaft bolt and nut, then detach control shaft from gear shift shaft.
5) Remove extension rod nut and then pull out rod with washers.



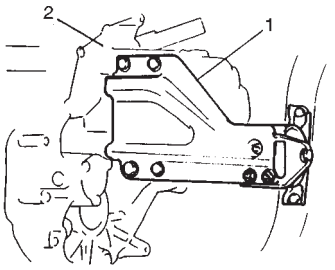
1. Drive shaft joint
2. Screwdriver

6) Remove clutch housing lower plate.
   Disconnect stabilizer joint from suspension arm.
7) Remove ball stud bolt from right and left knuckles, then disconnect each suspension arm.
8) By using large size screwdrivers, pull out drive shaft joints at differential side so as to release snap ring fitting of joint. (for LH drive shaft).



1. Drive shaft
2. Center bearing support
3. Bolt

9) Remove center bearing support bolts and pull out center drive shaft from differential gear. (for RH drive shaft).
10) Remove transmission stiffener.
11) Remove transmission to engine bolt and nut.
12) Remove engine rear mounting bracket bolts.
13) Lower vehicle and support transmission with transmission jack.



1. Engine mounting LH No.1 bracket
2. Transmission

15) Remove engine mounting LH No.1 bracket.
16) Remove other attached parts from transmission, if any.
17) Pull transmission out so as to disconnect input shaft from clutch disc and then lower it.

REMOUNTING

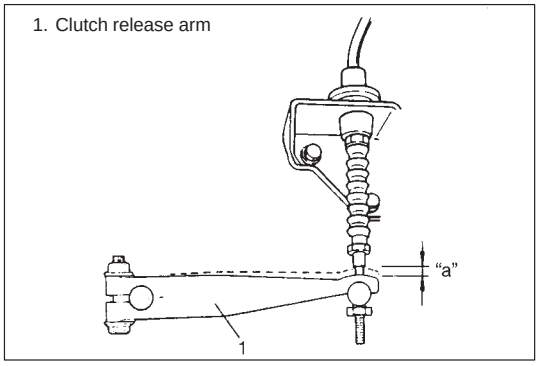
For remounting, reverse dismounting procedure.
Use specified torque as given below.

Tightening torque		N·m	kg-m	lb-ft
Transmission to engine bolts and nuts	G13 engine	61	6.1	44.0
	G16 engine	90	9.0	65.0
○ Engine rear mounting bracket bolts ○ Exhaust No.2 pipe to No.1 pipe bolts ○ Center bearing support bolts ○ Transmission case lower stiffener bolt		50	5.0	36.5
Exhaust No.1 pipe to manifold nuts		23	2.3	17.0
Ball stud bolt and nut		60	6.0	43.5
Extension rod nut		33	3.3	24.0
Gear shift control shaft bolt and nut		18	1.8	13.0
Stabilizer bar link nut		28	2.8	20.5

NOTE:
Apply grease to gear shift control shaft bushes, however, DO NOT lubricate extension rod bush.

CAUTION:
○ Care should be taken not to scratch oil seal lip with drive shaft while raising transmission.
○ Do not hit drive shaft joint with hammer when installing it into differential gear.

○ Push in left side drive shaft joint fully so as to snap ring of shaft engages with differential gear.

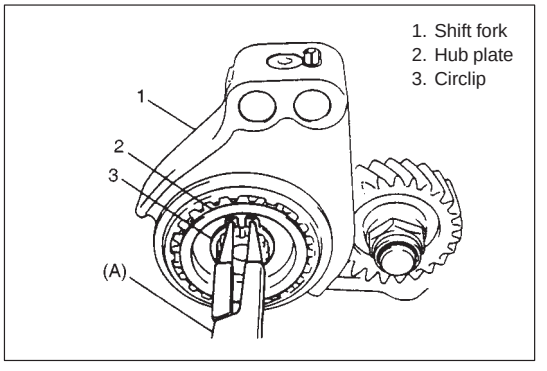


○ Set each clamp for wiring securely.
○ After connecting clutch cable, be sure to adjust its play properly (Refer to p. 7C-4 for free travel of clutch pedal).

Pedal play "a": 15 – 20 mm (0.6 – 0.8 in.)

Arm play "a" (Reference): 0 – 2 mm (0 – 0.08 in.)

○ Fill transmission with oil as specified.
○ Connect battery and check function of engine, clutch and transmission.



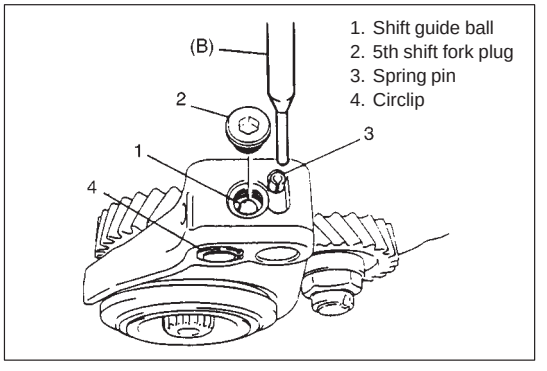
DISASSEMBLING UNIT

FIFTH GEARS

1) Remove 8 bolts and take off transmission side cover.
2) Using special tool, remove circlip and then hub plate.

CAUTION:
Care should be taken not to distort side cover when it is removed from left case.

Special Tool
(A): 09900-06107

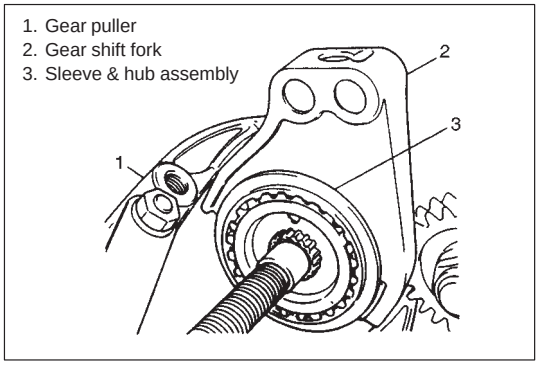


3) Remove shift fork plug and guide ball.

NOTE:
Use of magnet would facilitate removal of guide ball.

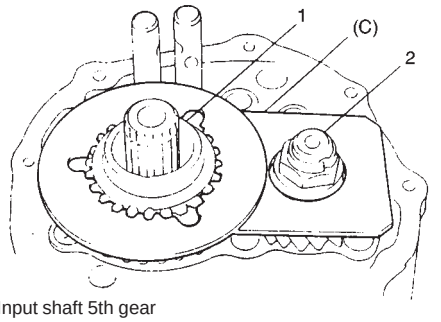
4) Drive out spring pin by using special tool and hammer.

Special Tool
(B): 09922-85811



5) Remove gear shift fork, sleeve & hub assembly, synchronizer ring spring, synchronizer ring and 5th gear all together. Gear puller is required for this work.

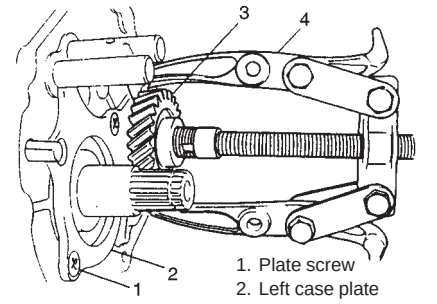
CAUTION:
Be careful not to pinch synchronizer ring spring when removing.



1. Input shaft 5th gear
2. Counter shaft nut

6) Unfasten caulking of countershaft nut, install main shaft 5th gear and special tool to stop rotation of shafts, and then remove countershaft nut.

Special Tool
(C): 09927-76010

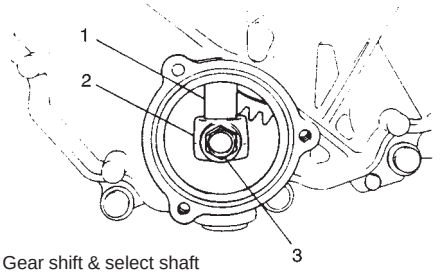


1. Plate screw
2. Left case plate
3. Countershaft 5th gear
4. Gear puller

7) Remove special tool, main shaft 5th gear, needle bearing and then counter shaft 5th gear. Gear puller would be necessary if spline fitting of counter shaft 5th gear is tight.
8) Remove 6 screws and take off left case plate, and then bearing set shim.

GEAR SHIFTER, MAIN SHAFT AND COUNTERSHAFT

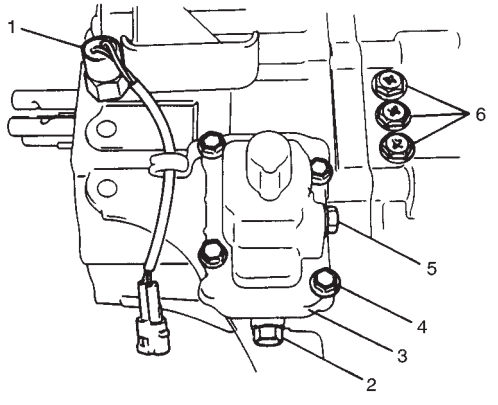
1) Remove 3 bolts from left case cap and then take off cap.
2) Remove gear shift yoke bolt.



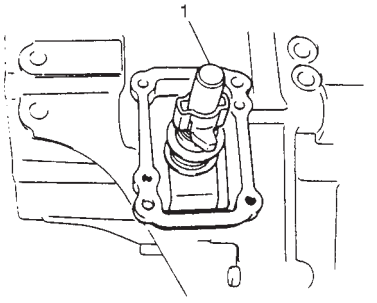
1. Gear shift & select shaft
2. Gear shift yoke
3. Yoke bolt

3) Remove 3 gear shift fork shaft bolts with washers, then take out locating springs and steel balls.
4) Remove 4 bolts from gear shift guide case, and then remove wiring harness clamp bracket and guide case.
5) Remove gear shift interlock bolt with washer.
6) Remove backup lamp switch.

NOTE:
Removal of 5th to REV interlock bolt is not necessary for removing gear shift & select shaft assembly.

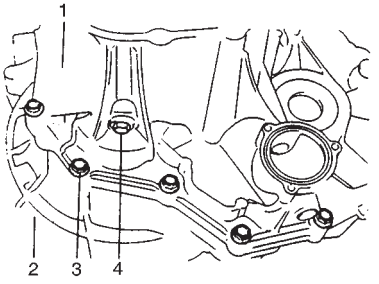


1. Backup lamp switch
2. Gear shift interlock bolt
3. Gear shift guide case
4. Guide case bolt
5. 5th to REV interlock guide bolt
6. Gear shift fork shaft bolt



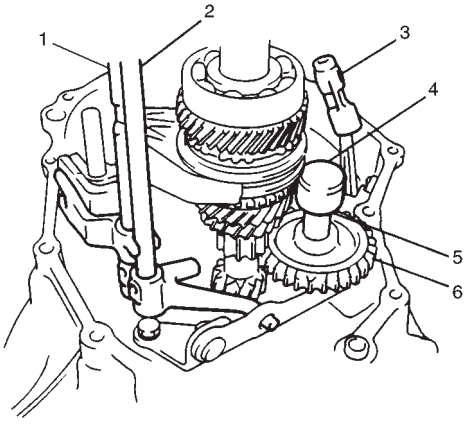
1. Gear shift & select shaft

7) Pull out gear shift & select shaft assembly.



1. Left case
2. Right case
3. Transmission case bolt
4. Reverse shaft bolt

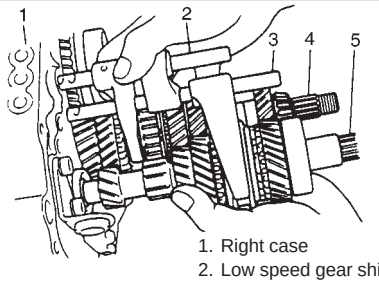
8) Remove reverse shaft bolt with washer.
9) Remove 11 case bolts from outside and another 2 from clutch housing side.
10) Tapping left case flanges with plastic hammer, remove left case.



1. 5th & REV gear shift shaft
2. 5th & REV gear shift guide shaft
3. Gear shift yoke
4. Reverse gear shaft
5. Washer
6. Reverse idler gear

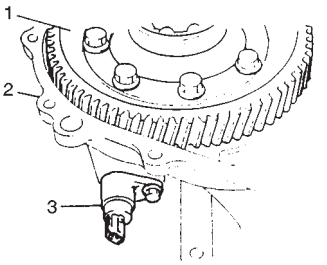
11) Remove gear shift yoke.
12) Pull out reverse gear shaft with washer, then take off reverse idler gear.
13) Pull out 5th & REV gear shift guide shaft together with 5th & REV gear shift shaft.

NOTE:
When removing 5th & REV gear shift shaft and guide shaft, push up high speed gear shift shaft and shift it to 4th to facilitate removal of 5th & REV shifter.



1. Right case
2. Low speed gear shift shaft
3. High speed gear shift shaft
4. Countershaft assembly
5. Input shaft assembly

14) Tapping input shaft end with plastic hammer, push it out as assembly from case a little, then take out input shaft assembly, counter shaft assembly, high speed gear shift shaft and low speed gear shift shaft all at once.
15) Remove countershaft L bearing cup from left case.
16) Remove differential side L oil seal also from left case.

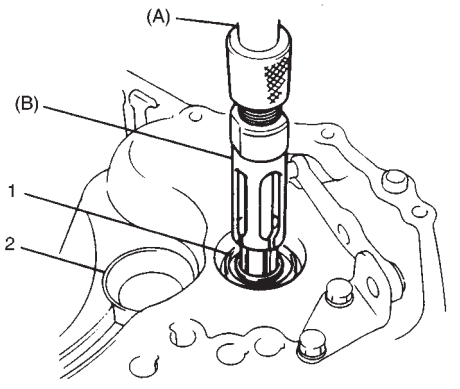


1. Differential assembly
2. Transmission right case
3. Speedometer driven gear assembly

RIGHT CASE

1) Remove differential gear assembly from right case.
2) Remove bolt and then pull out speedometer driven gear.

CAUTION:
Be careful not to damage speedometer driven gear case when removing it.



1. Input shaft oil seal
2. Countershaft R bearing cup

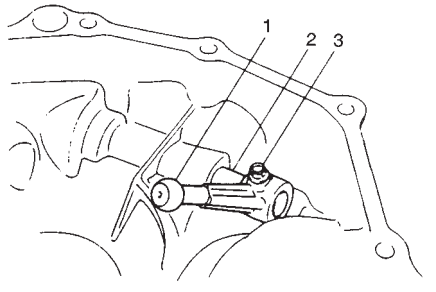
3) Remove input shaft oil seal by using special tools (combination of bearing remover and sliding shaft).

Special Tool
(A): 09930-30104
(B): 09923-74510

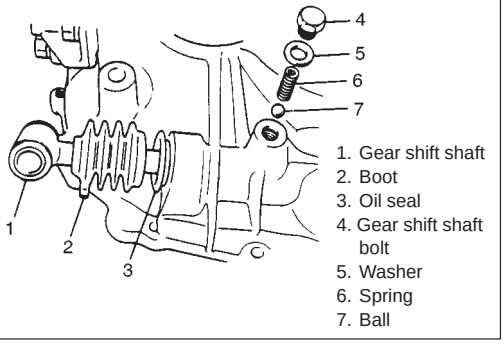
4) Also pull out countershaft R bearing cup by using bearing remover 09941-64511 with sliding shaft 09930-30104.

NOTE:
If input shaft R bearing has been left in right case, pull it out by using bearing remover 09923-73210 with sliding shaft 09930-30104.

1. Gear shift arm
2. Gear shift shaft
3. Bolt

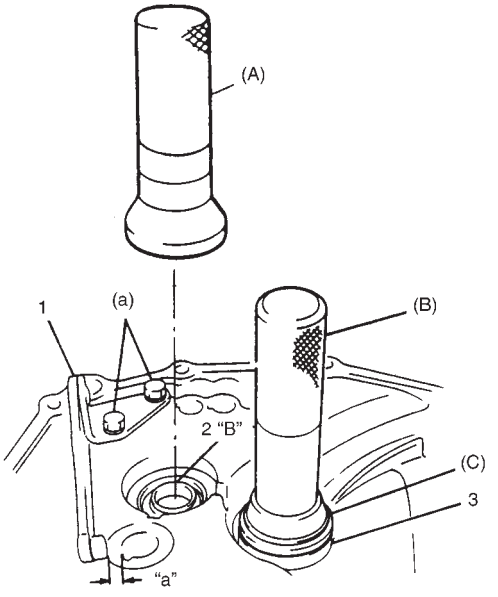


5) Remove bolt and then pull out gear shift arm.



1. Gear shift shaft
2. Boot
3. Oil seal
4. Gear shift shaft bolt
5. Washer
6. Spring
7. Ball

6) Remove gear shift shaft bolt with washer, then take out spring and steel ball.
7) Remove gear shift shaft, boot and oil seal.
8) Remove differential side R oil seal from right case.



1. Reverse gear shift lever
2. Input shaft oil seal
3. Countershaft R bearing cup

SUB ASSEMBLY SERVICE

RIGHT CASE

1) If reverse gear shift lever has been removed, fasten it with 2 bolts after applying thread lock cement.

   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

   NOTE:
   ○ **When installing reverse gear shift lever, set distance "a" between lever end and shaft bore to be 5 mm (0.2 in.).**

   Distance "a": 5 mm (0.2 in.)

   ○ **Distance "a" can be measured by installing reverse gear shaft provisionally.**
   ○ **When "a" is 5 mm (0.2 in.), clearance between reverse idler gear groove and shift lever end will be 1 mm (0.04 in.).**

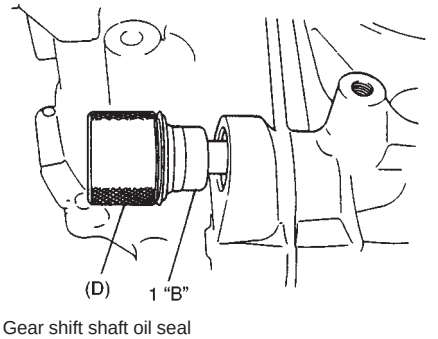
2) Install input shaft oil seal facing its spring side upward. Use special tool and hammer for installation and apply grease to oil seal lip.

   "B": SUZUKI SUPER GREASE A, 99000-25010

   Special Tool
   (A): 09951-76010

3) Install countershaft R bearing cup by using special tools and hammer.

   Special Tool
   (B): 09924-74510
   (C): 09925-68210

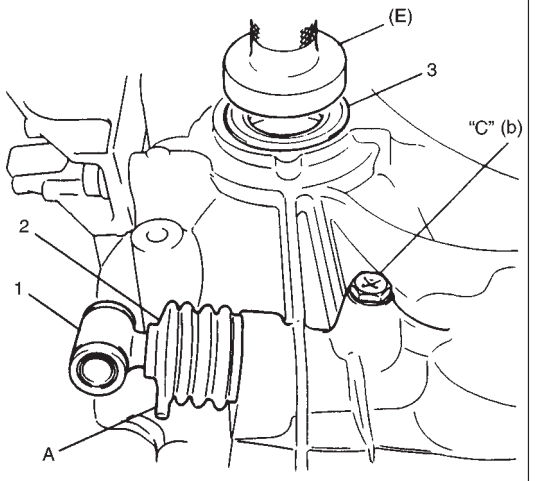


1. Gear shift shaft oil seal

4) Apply grease to gear shift shaft oil seal at its lip and install it up to bottom of the bore by using special tool and hammer.

   "B": SUZUKI SUPER GREASE A, 99000-25010

   Special Tool
   (D): 09925-58210



1. Gear shift shaft
2. Boot
3. Differential side R oil seal
A: Breather (Bring it downward)

5) Install gear shift shaft, boot, steel ball, spring and tighten bolt with washer applied with sealant.

"C": SUZUKI BOND NO.1215, 99000-31110

Tightening Torque
(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

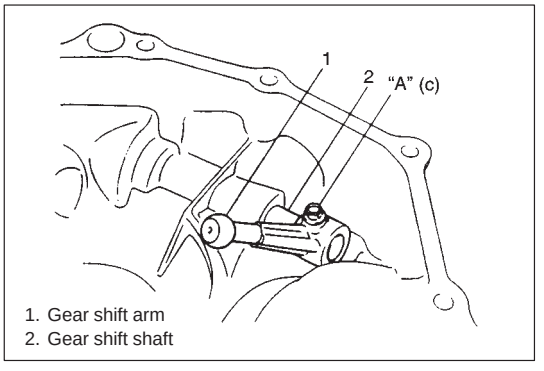
NOTE:
Bring breather of gear shift shaft boot downward.

6) Install differential side R oil seal until it becomes flush with case surface by using special tool with hammer, and then apply grease to its lip.

NOTE:
Face diff. side oil seal spring side inward.

"B": SUZUKI SUPER GREASE A, 99000-25010

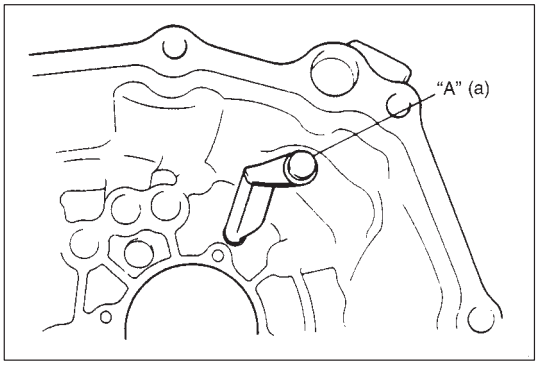
Special Tool
(E): 09913-75810



1. Gear shift arm
2. Gear shift shaft

7) Insert gear shift arm in gear shift shaft, then fasten them with bolt applied with thread lock cement.

Tightening Torque
(c): 34 N·m (3.4 kg-m, 24.5 lb-ft)

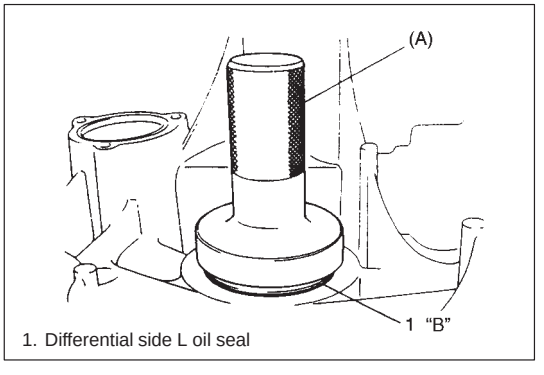


LEFT CASE

1) If input oil gutter has been removed, install it with bolt applied with thread lock cement

"A": Thread lock 1322, 99000-32110

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Differential side L oil seal

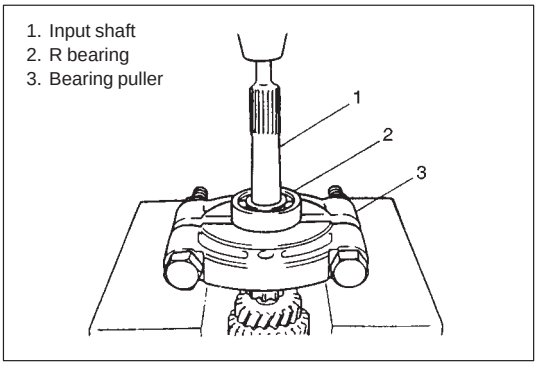
2) Install differential side L oil seal until it becomes flush with case surface by using special tool with hammer, and then apply grease to its lip.

NOTE:
Face oil seal spring side inward.

"B": SUZUKI SUPER GREASE A, 99000-25010

Special Tool
(A): 09913-75520

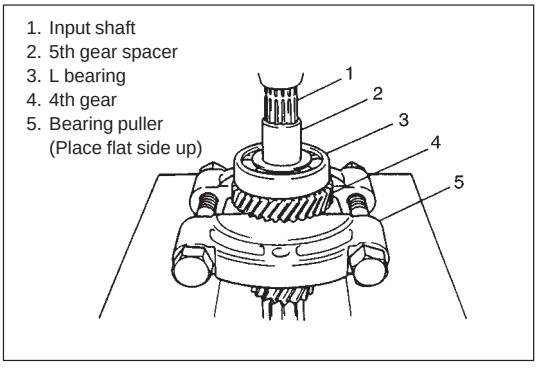
3) Install countershaft L bearing cup into case bore by tapping it with plastic hammer lightly.



INPUT SHAFT ASSEMBLY

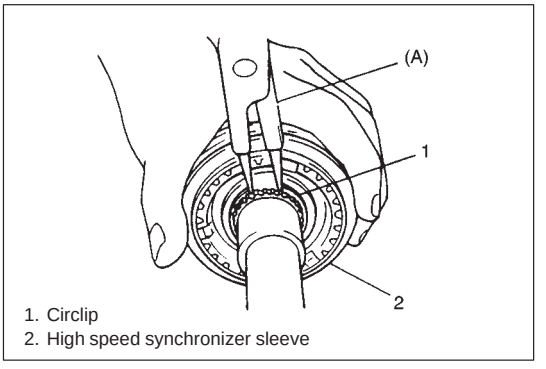
Disassembly

1) Remove input shaft R bearing by using bearing puller and press.



2) Drive out 5th gear spacer, L bearing and 4th gear all at once by using puller and press.

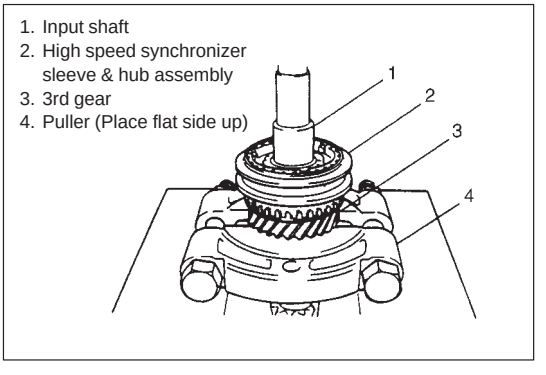
CAUTION:
- **To avoid gear tooth from being damaged, support it at flat side of bearing puller.**
- **Stop press work in the middle way and take out 5th gear bush to prevent it from being compressed and then continue to remove bearing with gear.**



3) Take out 4th gear needle bearing and high speed synchronizer ring.
4) Using special tool, remove circlip.

NOTE:
For smooth removal of circlip, it is recommended to correct tool tips to be flat.

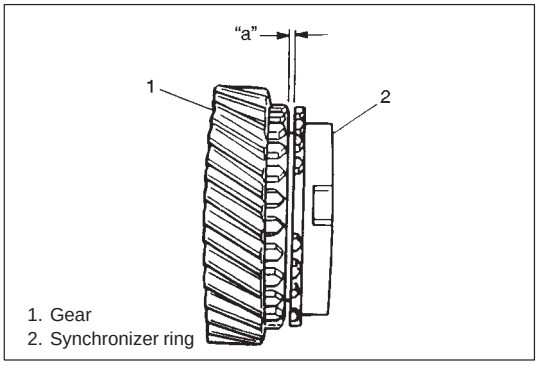
Special Tool
(A): 09900-06107



5) Drive out high speed synchronizer sleeve & hub assembly together with 3rd gear by using puller and press.

CAUTION:
Make sure to use flat side of puller to avoid causing damage to 3rd gear tooth.

6) Take out 3rd gear needle bearing from shaft.
7) Disassemble synchronizer sleeve & hub assembly.

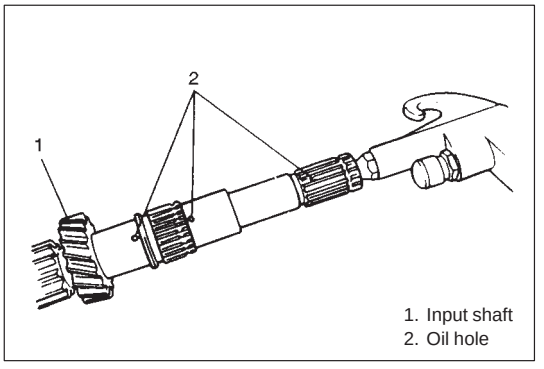


1. Gear
2. Synchronizer ring

Inspection and Reassembly

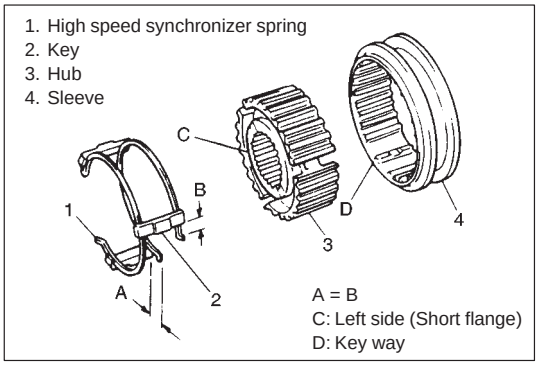
1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) If synchronizer parts need to be repaired, check clearance "a" between ring and gear, each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance "a": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)



1. Input shaft
2. Oil hole

3) To ensure lubrication, air blow oil holes and make sure that they are free from any obstruction.

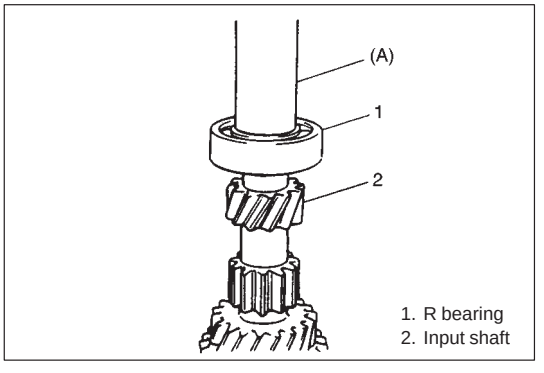


1. High speed synchronizer spring
2. Key
3. Hub
4. Sleeve

A = B
C: Left side (Short flange)
D: Key way

4) Fit high speed synchronizer sleeve to hub, insert 3 keys in it and then set springs as illustrated left.

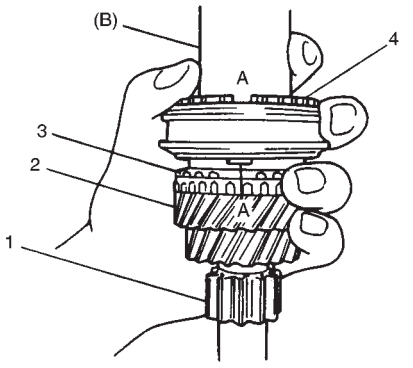
NOTE:
- **No specific direction is assigned to high speed synchronizer sleeve or each key but it is assigned as assembly.**
- **Size of high speed synchronizer sleeve, hub, keys and springs is between those of low speed and 5th speed ones.**



1. R bearing
2. Input shaft

5) Drive in R bearing by using special tool and hammer.

Special Tool
(A): 09925-98221



1. Input shaft
2. 3rd gear
3. Synchronizer ring
4. Sleeve & hub assembly

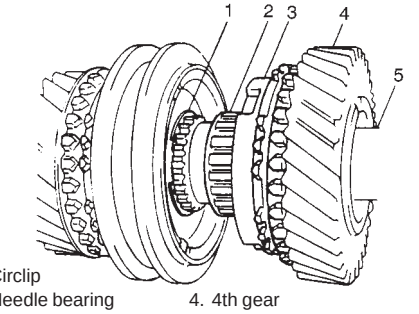
A: Key way

6) Install 3rd gear needle bearing, apply oil to it, then install 3rd gear and synchronizer ring.
7) Drive in high speed sleeve & hub assembly by using special tool and hammer.

NOTE:

- **While press-fitting sleeve & hub, make sure that synchronizer ring key slots are aligned with keys in sleeve & hub assembly.**
- **Check free rotation of 3rd gear after press-fitting sleeve & hub assembly.**
- **Needle bearings and synchronizer rings for 3rd and 4th are identical respectively.**

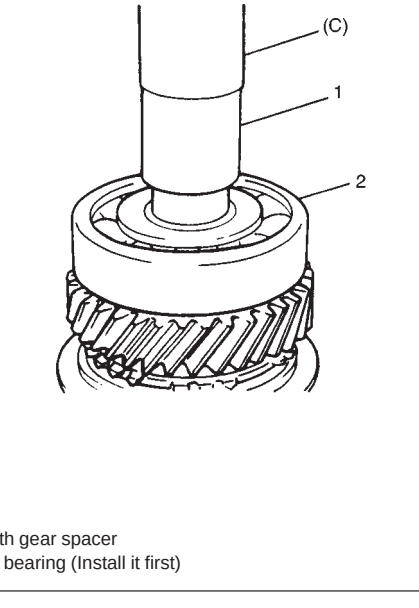
Special Tool
(B): 09913-84510



1. Circlip
2. Needle bearing
3. Synchronizer ring
4. 4th gear
5. Input shaft

8) Install circlip, needle bearing, apply oil to bearing, then install synchronizer ring and 4th gear.

CAUTION:
Confirm that circlip is installed in groove securely.



1. 5th gear spacer
2. L bearing (Install it first)

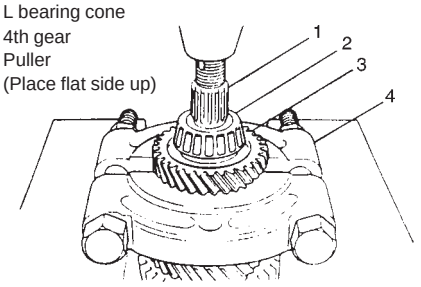
9) Press-fit L bearing by using special tool and hammer.

Special Tool
(C): 09925-98221

10) Using the same special tool, drive in 5th gear spacer.

CAUTION:
To prevent 5th gear spacer from being distorted because of excessive compression, do not press-fit it with L bearing at once.

1. Countershaft
2. L bearing cone
3. 4th gear
4. Puller
   (Place flat side up)



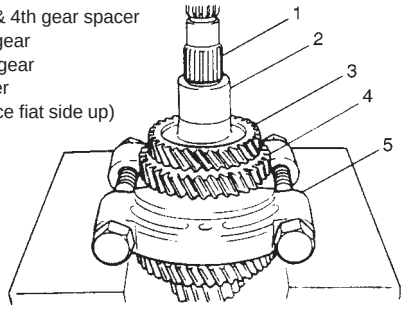
COUNTERSHAFT ASSEMBLY

Disassembly

1) Drive out L bearing cone with 4th gear by using puller and press.

CAUTION:
- **Use puller and press that will bear at least 5 ton (11,000 lb) safely.**
- **To avoid tooth damage, support 4th gear at flat side of puller.**

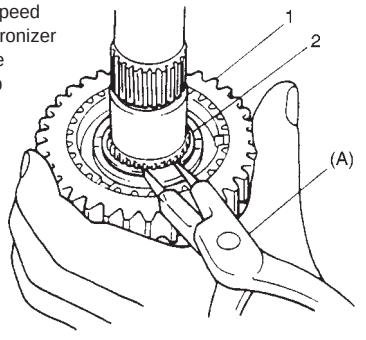
1. Countershaft
2. 3rd & 4th gear spacer
3. 3rd gear
4. 2nd gear
5. Puller
   (Place fiat side up)



2) Apply puller to 2nd gear and drive out 3rd & 4th gear spacer together with 2nd gear by using press. Needle bearing would come out with 2nd gear.

CAUTION:
If compression exceeds 5 ton (11,000 lb), release compression once, reset puller support and then continue press work again.

1. Low speed synchronizer sleeve
2. Circlip

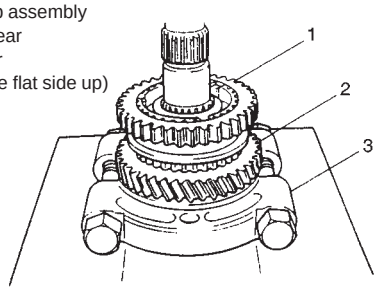


3) Take out 2nd synchronizer ring.
4) Using special tool, remove circlip.

NOTE:
Correct tool tips to be flat to facilitate removal of circlip.

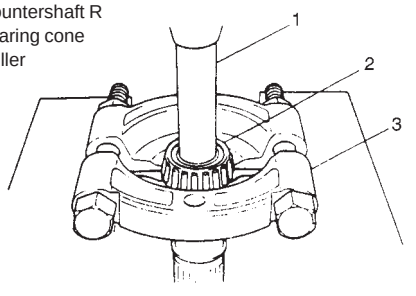
Special Tool
(A): 09900-06107

1. Low speed synchronizer sleeve & hub assembly
2. 1st gear
3. Puller
   (Place flat side up)

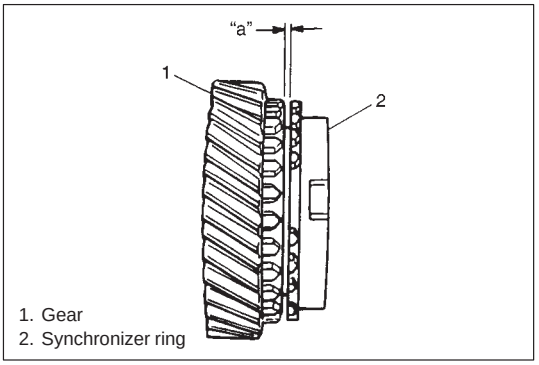


5) Apply puller to 1st gear and drive out low speed synchronizer sleeve & hub assembly with gear by using press.
6) Disassemble synchronizer sleeve & hub assembly.
7) Take out needle bearing from shaft.

1. Metal stick
2. Countershaft R bearing cone
3. Puller



8) Remove R bearing cone by using puller, metal stick and press.

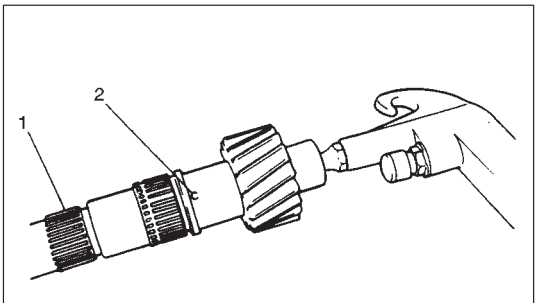


1. Gear
2. Synchronizer ring

Inspection and Reassembly

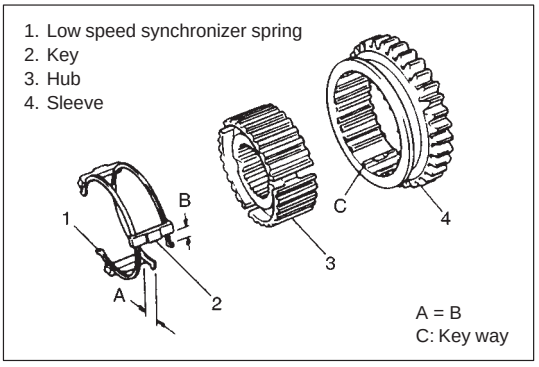
1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) If synchronizer parts need to be repaired, check clearance "a" between ring and gear, each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance "a": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)



1. Countershaft
2. Oil hole

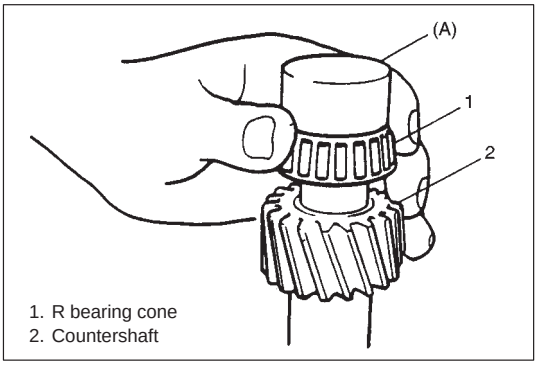
3) To ensure lubrication, air blow oil holes and make sure that they are free from any obstruction.



4) Fit high speed synchronizer sleeve to hub, insert 3 keys in it and then set springs as illustrated left.

NOTE:

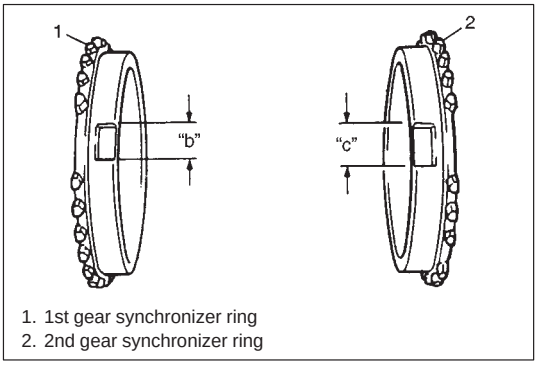
- **No specific direction is assigned to low speed synchronizer hub or each key but it is assigned as assembly.**
- **Size of low speed synchronizer keys and springs are the largest compared with those of high speed and 5th speed ones.**



1. R bearing cone
2. Countershaft

5) Install R bearing cone by using special tool and hammer.

Special Tool
(A): 09923-78210



1. 1st gear synchronizer ring
2. 2nd gear synchronizer ring

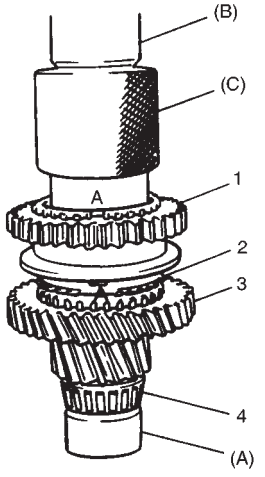
6) Install needle bearing, apply oil to it, then install 1st gear and 1st gear synchronizer ring.

NOTE:

- **Key slot width of 1st synchronizer ring is smaller than that of 2nd synchronizer ring.**
  Distinguish the difference properly.

Width "b": 8.2 mm (0.32 in.)
"c": 9.6 mm (0.38 in.)

- **Needle bearings for 1st and 2nd gear are identical.**



1. Low speed sleeve & hub assembly
2. 1st gear synchronizer ring
3. Countershaft 1st gear
4. R bearing cone

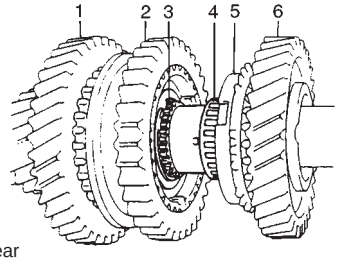
A: Align key slots with keys

7) Drive in low speed sleeve & hub assembly by using special tool and hammer.

NOTE:

- **Support shaft with special tool as illustrated left so that retainer of bearing cone will be free from compression.**
- **Make sure that synchronizer ring key slots are aligned with keys while press-fitting sleeve & hub assembly.**
- **Check free rotation of 1st gear after press-fitting sleeve & hub assembly.**

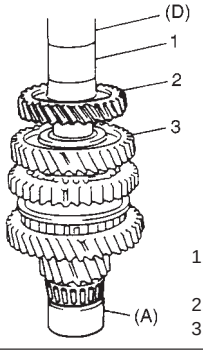
Special Tool
(A): 09923-78210
(B): 09925-18011
(C): 09940-53111



1. 1st gear
2. Low speed sleeve & hub assembly
3. Circlip
4. Needle bearing
5. 2nd gear synchronizer ring
6. 2nd gear

8) Install circlip, needle bearing, apply oil to bearing, then install 2nd gear synchronizer ring and 2nd gear.

CAUTION:
Confirm that circlip is installed in groove securely.

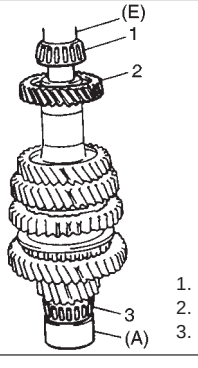


1. 3rd & 4th gear spacer
2. 3rd gear
3. 2nd gear

9) Press-fit 3rd gear and spacer by using special tool and press.

NOTE:
It is recommended to press-fit spacer and 3rd gear first, and then 4th gear later separately so that countershaft will not be compressed excessively.

Special Tool
(A): 09923-78210
(D): 09913-80112

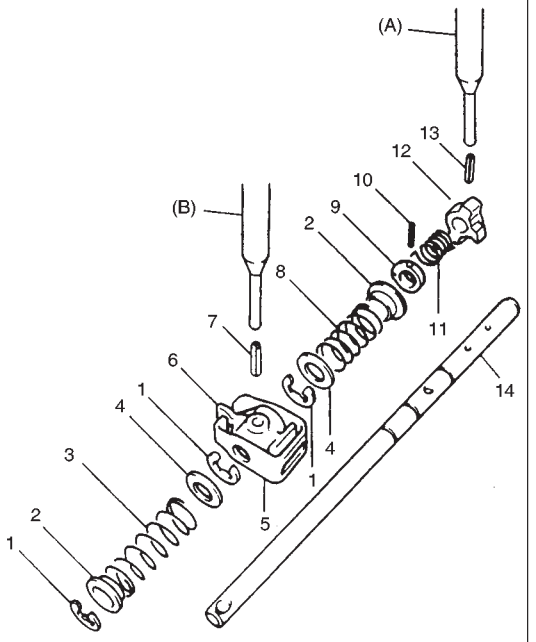


1. L bearing cone
2. 4th gear
3. R bearing cone

10) Press-fit 4th gear by using the same procedure as the above.
11) Install L bearing cone by using special tool and hammer.

NOTE:
For protection of bearing cone, always support shaft with special tool as illustrated.

Special Tool
(A): 09923-78210
(E): 09925-98221



1. E-ring
2. Select spring guide
3. Low speed select spring (Blue)
4. Washer
5. Gear shift interlock plate
6. Gear shift & select lever
7. Spring pin (Double)
8. Reverse select spring (Red)
9. 5th & REV gear shift cam guide
10. Spring pin
    (Apply spring pin remover of
    2.8 – 3.0 mm/0.11 in. diameter)
11. Cam guide return spring
12. 5th & REV gear shift cam
13. Spring pin
14. Gear shift & select shaft

GEAR SHIFTER

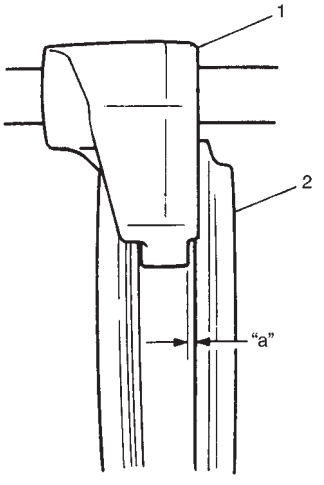
Gear Shift & Select Shaft Assembly

1) To disassemble component parts, use special tools and 2.8 – 3.0 mm (0.11 in.) pin remover in addition.

   Special Tool
   (A): 09922-85811(4.5 mm)
   (B): 09925-78210 (6.0 mm)

2) Clean all parts thoroughly, inspect them and replace with new ones as required.
3) Assemble component parts by reversing removal procedure.

   NOTE:
   - **When driving in spring pins, prevent shaft from being bent by supporting it with wood block.**
   - **Assemble 5th & REV gear shift cam by winding cam guide return spring, and then drive in spring pin.**
   - **Locate low speed select spring (Blue – Lower position) and reverse select spring (Red – Upper position) correctly.**



1. Gear shift fork
2. Synchronizer sleeve

High Speed and Low Speed Gear Shift Shafts

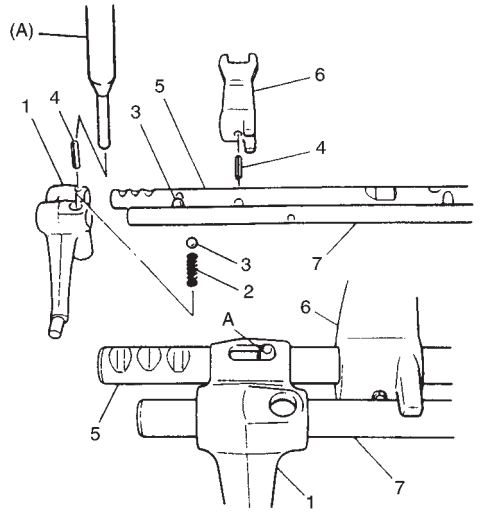
Inspection

1) Using feeler gauge, check clearance between fork and sleeve and replace those parts if it exceeds limit of 1.0 mm (0.039 in.).

   NOTE:
   For correct judgement of parts replacement, carefully inspect contact portion of fork and sleeve.

   Clearance "a": Service limit 1.0 mm (0.039 in.)

2) Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.



1. Reverse gear shift arm
2. Reverse gear shift arm spring (Blue)
3. Steel ball
4. Spring pin
5. 5th & REV gear shift shaft
6. 5th & REV gear shift yoke
7. 5th & REV gear shift guide shaft

A: Face pin slit toward front

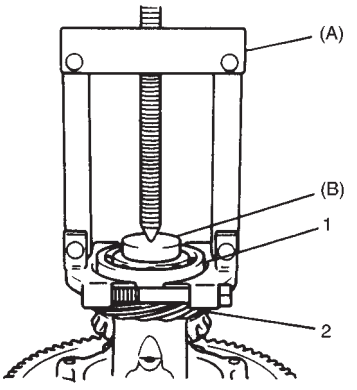
5th & REV Gear Shifter

1) Disassemble component parts by using special tool and hammer.

   Special Tool
   (A): 09922-85811 (4.5 mm)

2) Replace or correct parts as required and assemble shafts making sure that component parts are in proper order as shown left.

   NOTE:
   - **Distinguish reverse gear shift arm spring (Blue) from low speed locating spring (Purple).**
   - **Install 2 steel balls in reverse gear shift arm without fail.**
   - **Drive in spring pin for reverse shift arm facing slit A toward front.**



1. R bearing
2. Speedometer drive gear

DIFFERENTIAL ASSEMBLY

Disassembly

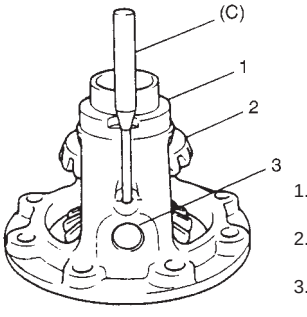
1) Using special tool, remove R bearing.

   Special Tool
   (A): 09913-65810
   (B): 09925-88210

2) Take out speedometer drive gear.

   NOTE:
   In case that half-moon type puller is used with press for bearing removal, remove final gear in advance.

3) Remove L bearing by using puller while supporting its center shaft as described above.
4) Support differential case with soft jawed vise and remove 8 final gear bolts then take out final gear.



1. Differential case
2. Differential gear
3. Differential pinion shaft

5) Using special tool and hammer, drive out differential side pinion shaft pin and then disassemble component parts.

   Special Tool
   (C): 09922-85811 (4.5 mm)

Adjustment and Reassembly

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

1) Assemble differential gear and measure thrust play of differential gear as follows.

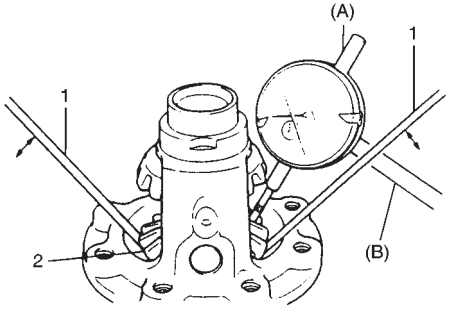
   Special Tool
   (A): 09900-20606
   (B): 09900-20701

   Diff. gear thrust play: 0.05 – 0.33 mm (0.002 – 0.013 in.)

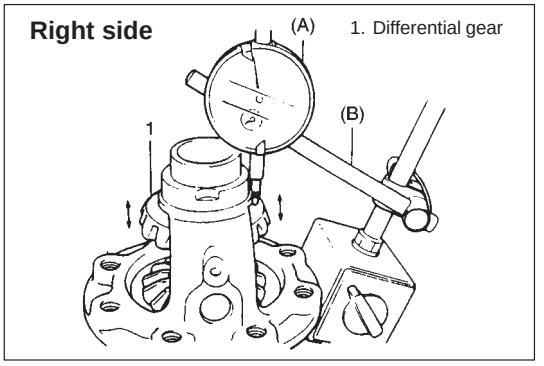
   Left side

   ○ Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear.
   ○ Using 2 screwdrivers, move gear up and down and read movement of dial gauge pointer.

Left side



1. Screwdriver
2. Differential gear



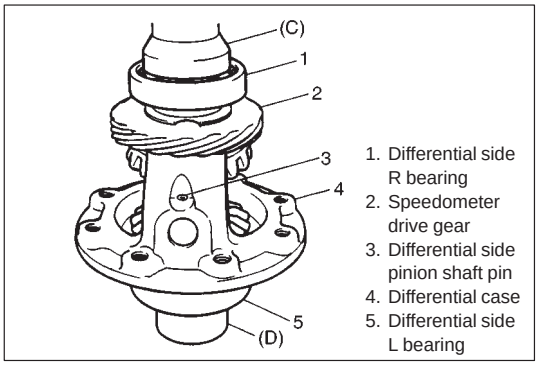
Right side

○ Using similar procedure to the above, set dial gauge tip to gear shoulder.

○ Move gear up and down by hand and read dial gauge.

2) If thrust play is out of specification, select suitable thrust washer from among following available size, install it and check again that specified gear play is obtained.

Available thrust washer thickness	0.9, 0.95, 1.0, 1.05, 1.1, 1.15 and 1.2 mm (0.035, 0.037, 0.039, 0.041, 0.043, 0.045 and 0.047 in.)



3) Drive in spring pin from right side till it is flush with differential case surface.

4) Press-fit L bearing by using special tool and copper hammer.

Special Tool
(C): 09951-76010
(D): 09951-16060

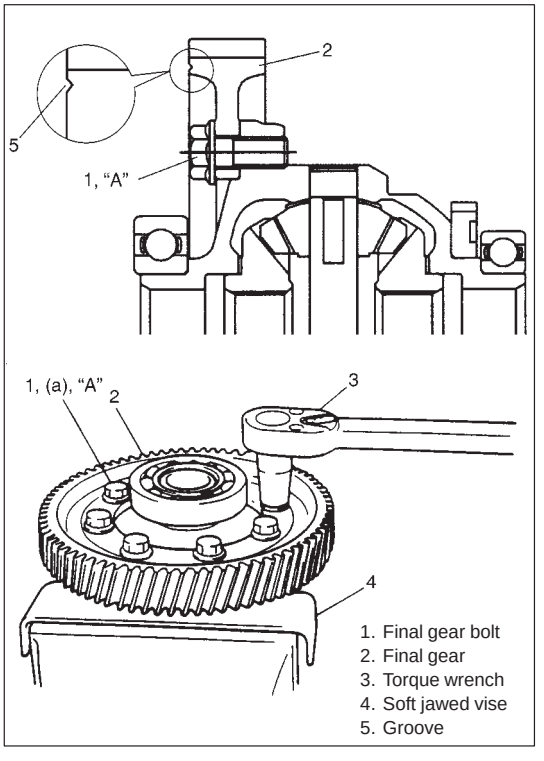
5) Install speedometer drive gear, support differential assembly as illustrated so as to L bearing is floating, and then press-fit R bearing like L bearing in Step 4).

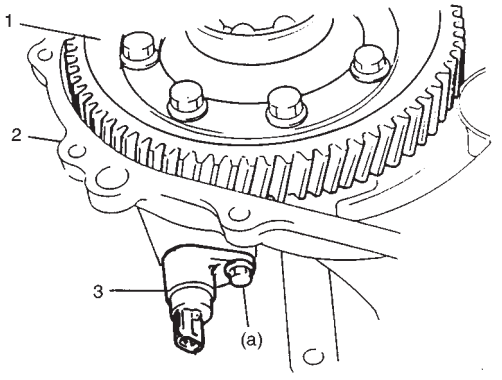
6) Hold differential assembly with soft jawed vise, install final gear as shown in figure and then tighten it with 8 bolts with thread lock cement applied to specified torque.

CAUTION:
Use of any other bolts than specified ones is prohibited.

"A": Thread lock 1322, 99000-32110

Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)





1. Differential assembly
2. Transmission right case
3. Speedometer driven gear

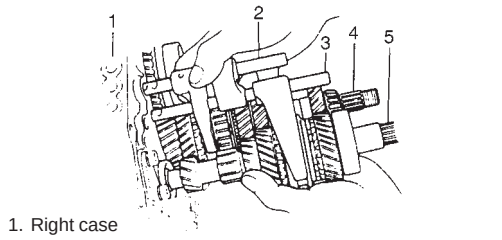
ASSEMBLING UNIT

DIFFERENTIAL TO LEFT CASE

1) Install differential assembly into right case.
2) Insert speedometer driven gear case assembly applied with oil to its O ring and gear, then tighten it with bolt.

CAUTION:
- **While inserting case assembly into transmission, turn final gear by hand slightly so that gear can mesh easily.**
- **Never push or hit slit portion of case when inserting it. Such attempt may cause case to break.**

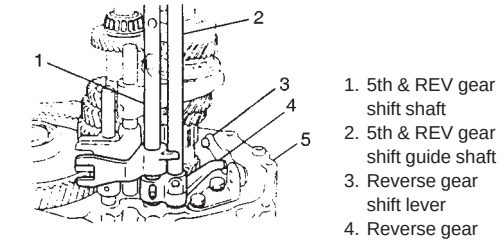
Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Right case
2. Low speed gear shift shaft
3. High speed gear shift shaft
4. Countershaft assembly
5. Input shaft assembly

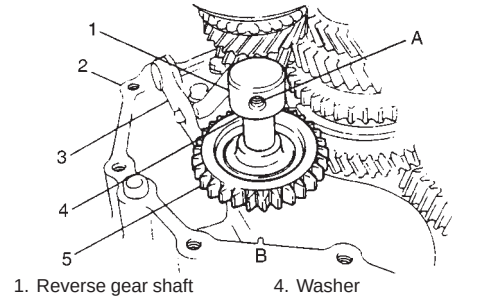
3) Join input shaft, countershaft, low speed gear shift shaft and high speed gear shift shaft assemblies all together, then install them into right case.

NOTE:
- **Input shaft R bearing on shaft can be installed into right case by tapping shaft with plastic hammer.**
- **Check to make sure that counter shaft is engaged with final gear while installing.**



1. 5th & REV gear shift shaft
2. 5th & REV gear shift guide shaft
3. Reverse gear shift lever
4. Reverse gear shift arm
5. Right case

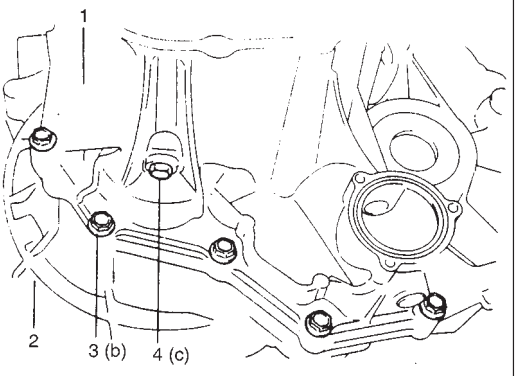
4) Install 5th & REV gear shift shaft with 5th & REV gear shift guide shaft into right case. Reverse gear shift arm has to be joined with reverse gear shift lever at the same time.



1. Reverse gear shaft
2. Right case
3. Reverse gear shift lever
4. Washer
5. Reverse idler gear
A: Thread hole

5) Make reverse idler gear with reverse gear shift lever, insert reverse gear shaft into case through idler gear and then align A in shaft with B in case.

NOTE:
- **Make sure that washer has been installed in shaft at above the gear.**
- **Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.**



1. Left case
2. Right case
3. Case bolt
4. Reverse shaft bolt

6) Clean mating surfaces of both right and left cases, coat mating surface of left case with sealant evenly then mate it with right case.

Sealant: SUZUKI BOND No.1215, 99000-31110

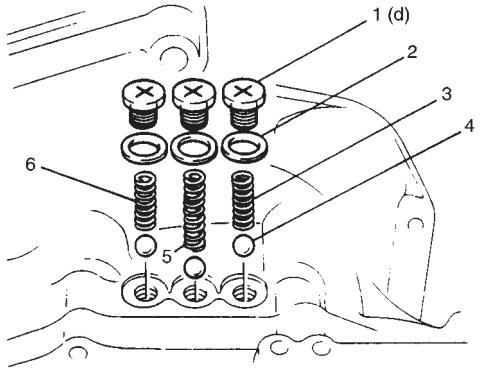
7) Tighten case bolts from outside to specified torque.

Tightening Torque
(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)

8) Install reverse shaft bolt with aluminum washer and tighten it.

Tightening Torque
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

9) Install another 2 case bolts from clutch housing side and tighten them to specification.



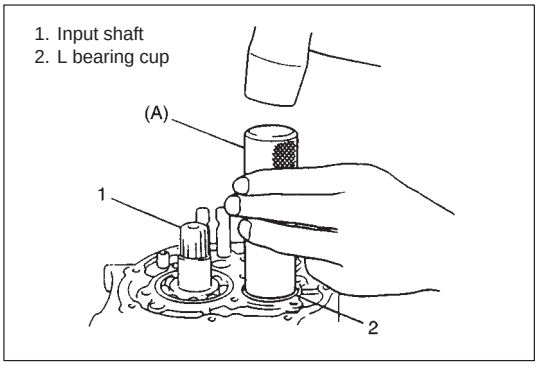
1. Gear shift fork shaft bolt
2. Washer
3. Low speed locating spring (Purple)
4. Steel ball
5. High speed locating spring (Purple)
6. 5th & REV locating spring (Purple)

10) Check locating spring for deterioration and replace with new one as necessary.

Locating spring free length	Standard	Service Limit
Low speed and 5th & REV	26.1 mm (1.028 in)	25.0 mm (0.984 in)
High speed	40.1 mm (1.579 in)	39.0 mm (1.535 in)

11) Install steel ball and locating spring for respective gear shift shaft and tighten with bolt.

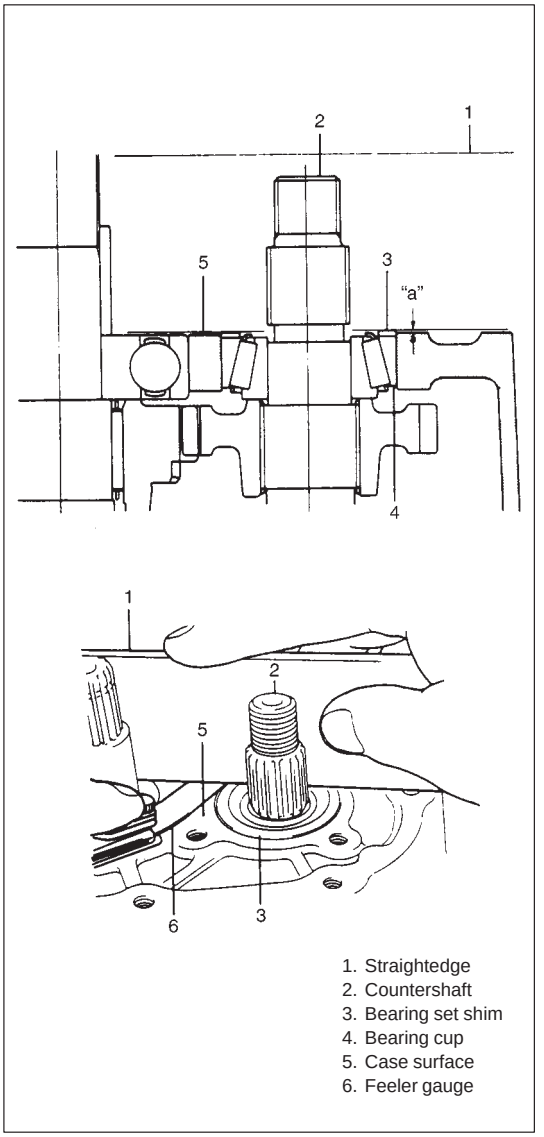
Tightening Torque
(d): 13 N·m (1.3 kg-m, 9.5 lb-ft)



FIFTH GEARS

1) To seat countershaft L bearing cup to bearing cone, tap cup by using special tool and plastic hammer.

Special Tool
(A): 09913-84510



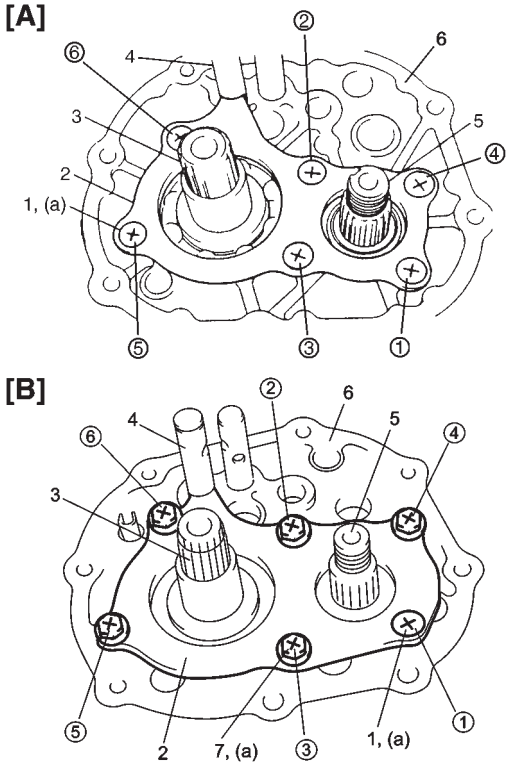
2) Put a shim on bearing cup provisionally, place straight edge over it and compress it by hand through straight edge, and then measure "a" (Clearance between case surface and straight edge) by using feeler gauge.

Clearance "a": 0.13 – 0.17 mm (0.0051 – 0.0067 in.)
(Shim protrusion)

3) By repeating above step, select a suitable shim which adjusts clearance "a" to specification and put it on bearing cup.

NOTE:
Insert 0.15 mm (0.0059 in) feeler to know whether or not a shim fulfills specification quickly.

Available shim thickness	0.40, 0.45, 0.50, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0, 1.05, 1.1 and 1.15 mm (0.015, 0.017, 0.019, 0.021, 0.023, 0.025, 0.027, 0.029, 0.031, 0.033, 0.035, 0.037, 0.039, 0.041, 0.043 and 0.045 in)



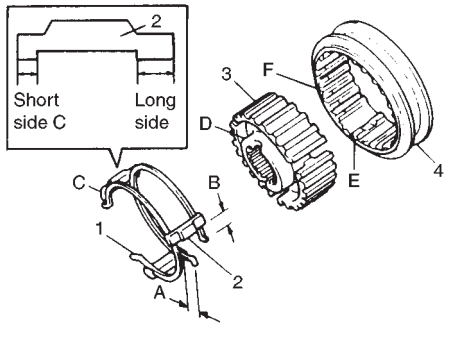
[A]: In case 6 screws are used
[B]: In case 1 screw and 5 bolts are used
1. Screw
2. Left case plate
3. Input shaft
4. 5th & REV gear shift guide shaft
5. Countershaft
6. Transaxle left case
7. Bolt

CAUTION:
Do not reuse left case plate screws and bolts. Be sure to use new adhesive pre-coated screws and new adhesive pre-coated bolts. Otherwise, screws and/or bolts may loosen.

4) Place left case plate inserting its end in groove of shift guide shaft and tighten new adhesive pre-coated screws and new adhesive pre-coated bolts temporarily with less than specified torque.
5) Tighten new screws and new bolts to specified torque finally in the order of circled numbers (➡ → ③) shown in figure.

NOTE:
After tightening screws and bolts, make sure that counter-shaft can be rotated by hand feeling certain load.

Tightening Torque
Left case plate screws and bolts
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

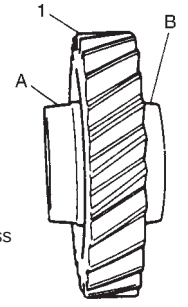


1. 5th speed synchronizer spring
2. Key
3. Hub
4. Sleeve

A = B
C: Short side (Inward)
D: Long boss (Inward)
E: Key way
F: Chamfered spline (Inward)

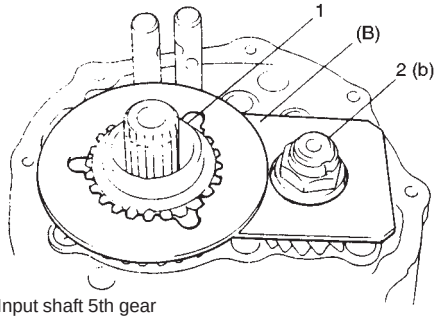
6) Assemble 5th speed synchronizer sleeve and hub with keys and springs.

NOTE:
Short side C in keys, long boss D in hub and chamfered spline F in sleeve should face inward (5th gear side).



1. Countershaft 5th gear
A: Machined boss (Inside)
B: No machining (Outside)

7) Install 5th gear to counter shaft facing machined boss A inward.



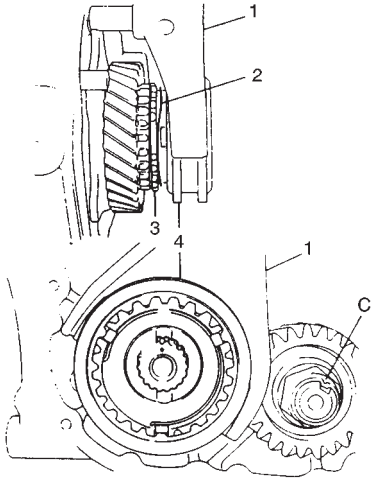
1. Input shaft 5th gear
2. Countershaft nut

8) Install needle bearing to input shaft, apply oil then install 5th gear and special tool to stop shaft rotation.

Special Tool
(B): 09927-76010

9) Install countershaft nut and tighten it to specification.

Tightening Torque
(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)

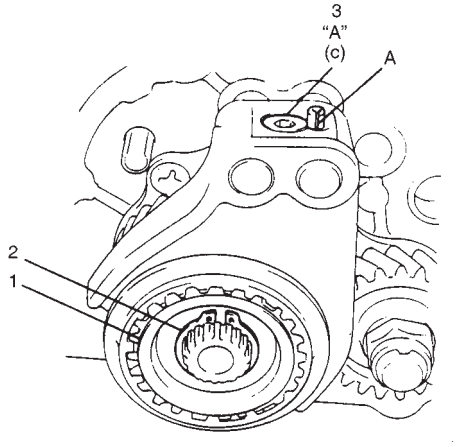


1. 5th gear shift fork
2. Synchronizer ring spring
3. 5th speed synchronizer ring
4. Sleeve & hub assembly
A: Oil groove (Align with B)
B: Punch mark (Shows oil hole)
C: Caulking

10) Remove special tool, then caulk nut at C with caulking tool and hammer.
11) Install synchronizer ring then ring spring.
12) Fit 5th gear shift fork to sleeve & hub assembly and install them into input shaft, shift shaft and shift guide shaft at once aligning hub oil groove A with shaft mark B.

NOTE:
Long boss of hub faces inward (gear side).

CAUTION:
Be careful not to pinch synchronizer ring spring by hub.



1. Hub plate
2. Circlip
3. Shift fork plug

A: Pin slit (Face outward)

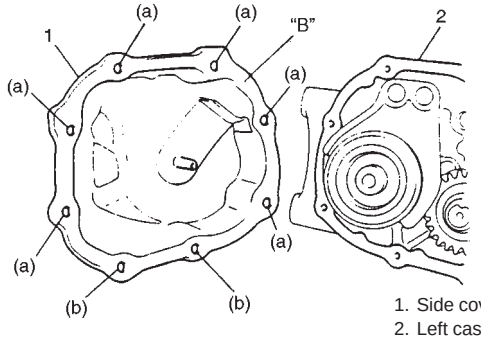
13) Drive in spring pin facing its slit A outward.
14) Install steel ball, tighten shift fork plug applied with thread lock cement.

"A": Thread lock 1322, 99000-32110

Tightening Torque
(c): 9 N·m (0.9 kg-m, 6.5 lb-ft)

15) Fit hub plate and fix it with circlip.

CAUTION:
- **Coat shift fork plug with thread lock cement reasonably. If it is done to much, excess may interfere in ball movement and cause hard shift to 5th speed.**
- **Make sure circlip is installed in shaft groove securely.**

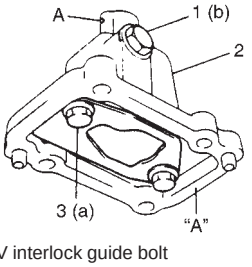


1. Side cover
2. Left case

16) Clean mating surface of both left case and side cover, coat mating surface with sealant evenly, mate it with left case and then tighten with 8 bolts.

"B": Sealant 99000-31110

Tightening Torque for left cover bolts:
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. 5th to REV interlock guide bolt
2. Gear shift guide case
3. Gear shift case plate bolt

A: Breather (Air blow)

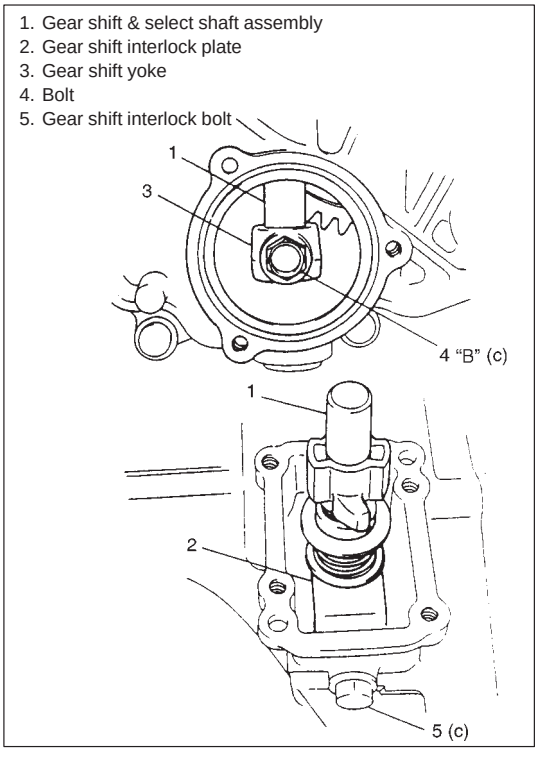
GEAR SHIFT & SELECT SHAFT ASSEMBLY

1) If gear shift guide case has been disassembled or replaced, tighten bolts as specified below. Also check breather hole for clog.

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

2) Clean mating surface of guide case and coat it with sealant evenly.

"A": Sealant 99000-31110



1. Gear shift & select shaft assembly
2. Gear shift interlock plate
3. Gear shift yoke
4. Bolt
5. Gear shift interlock bolt

3) Install gear shift yoke and joint it with gear shift arm.
4) Install gear shift & select shaft assembly into transmission and joint its bottom end with gear shift yoke.

NOTE:
When installing gear shift & select shaft assembly, position gear in neutral so that gear shift interlock plate will go in smoothly.

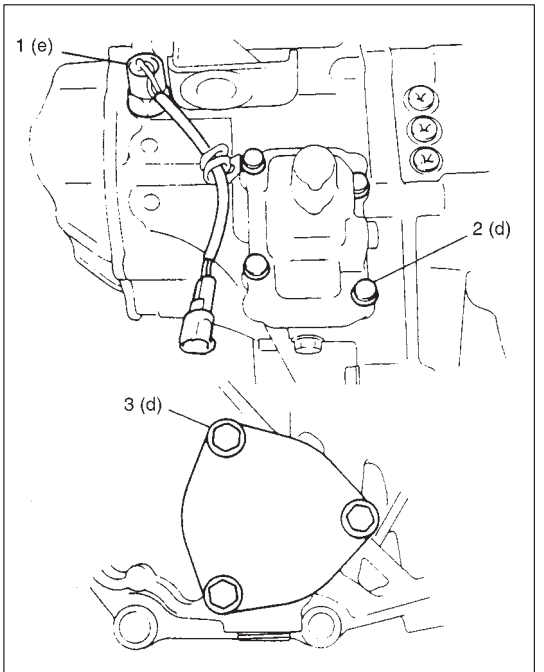
5) Tighten yoke and shaft with bolt applied with thread lock cement.

"B": Thread lock 1322, 99000-32110

Tightening Torque
(c): 34 N·m (3.4 kg-m, 24.5 lb-ft)

6) Install gear shift interlock bolt with washer and tighten it to specification.

Tightening Torque
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Backup lamp switch
2. Gear shift guide case bolt
3. Left case cap bolt

7) Clean mating surface of left case and put gear shift guide case applied with sealant on it.

Sealant: SUZUKI BOND No.1215, 99000-31110

8) Place wiring harness clamp bracket and fasten it together with gear shift guide case.

Tightening Torque
(d): 10 N·m (1.0 kg-m, 7.5 lb-ft)

9) Install backup lamp switch and clamp its lead.

Tightening Torque
(e): 20 N·m (2.0 kg-m, 14.5 lb-ft)

10) Clean left case cap and mating surface of left case, check condition of O-ring and then fasten cap with 3 bolts.

Tightening Torque
(d): 10 N·m (1.0 kg-m, 7.5 lb-ft)

11) Check input shaft for rotation in each gear position.
12) Also confirm function of backup lamp switch in reverse position by using ohmmeter.

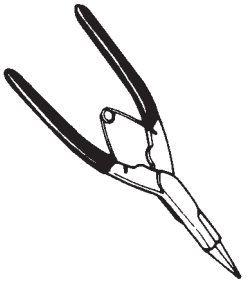
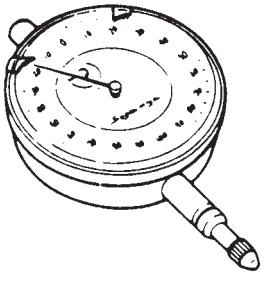
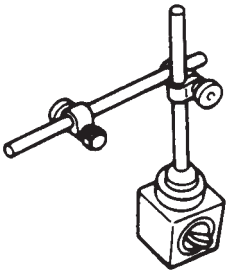
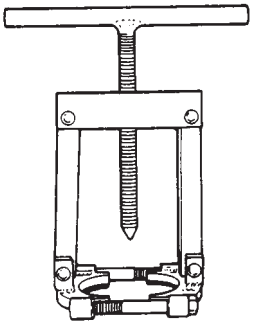
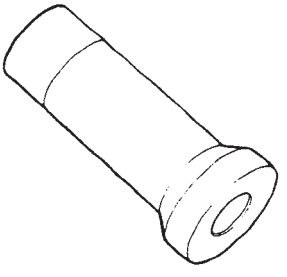
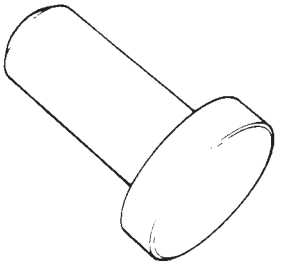
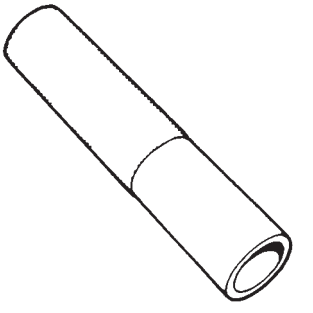
TIGHTENING TORQUE SPECIFICATIONS

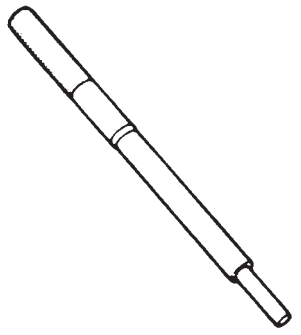
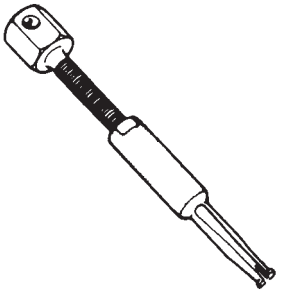
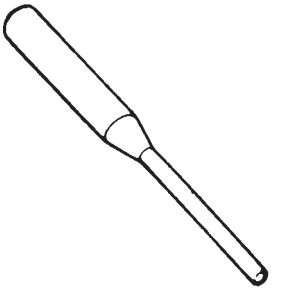
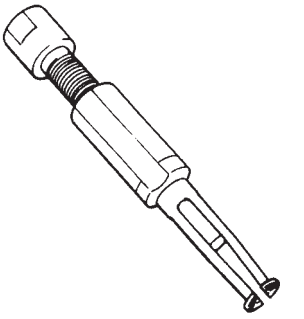
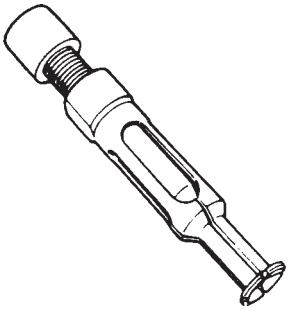
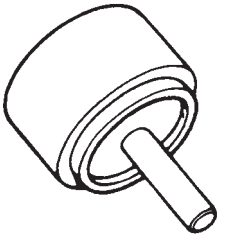
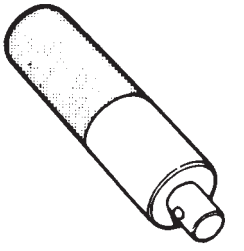
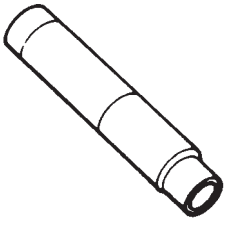
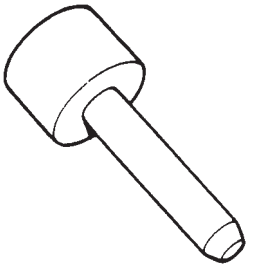
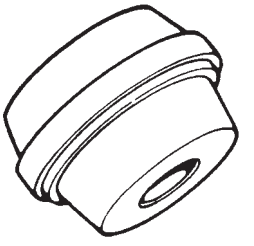
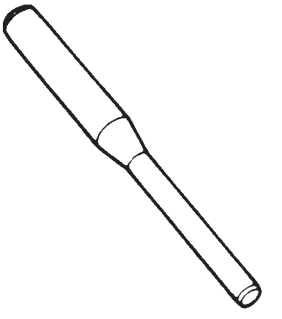
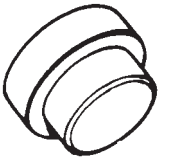
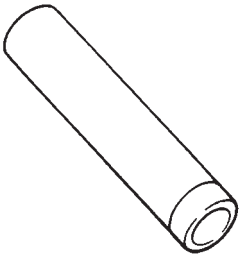
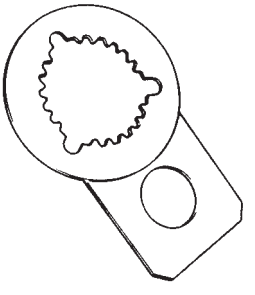
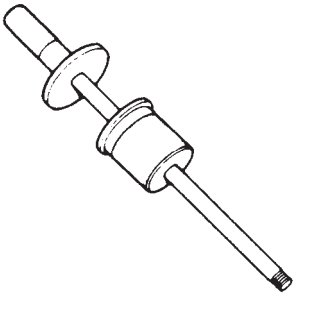
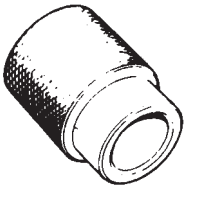
Fastening portion		Tightening Torque		
		N·m	kg-m	lb-ft
1. Oil filler/level plug		21	2.1	15.5
2. Oil drain plug				
3. Ball stud bolt and nut		60	6.0	43.5
4. Gear shift control housing nuts for boot cover		4.5	0.45	3.5
5. Housing nuts for control housing		18	1.8	13.0
6. Guide plate bolts		9	0.9	6.5
7. Control housing nuts		33	3.3	24.0
8. Extension rod stud bolt		18	1.8	13.0
9. Extension rod nut		33	3.3	24.0
10. Gear shift control shaft bolts and nuts		18	1.8	13.0
11. Speedometer driven gear case bolt		5.5	0.55	4.0
12. Transmission to engine bolts and nuts	G13 engine	61	6.1	44.0
	G16 engine	90	9.0	65.0
13. Engine rear mounting bracket bolts		50	5.0	36.5
14. Exhaust No.1 pipe to manifold nuts		23	2.3	17.0
15. Center bearing support bolts		50	5.0	36.5
16. Exhaust No.2 pipe to No.1 pipe bolts				
17. Reverse gear shift lever bolts		23	2.3	17.0
18. Gear shift arm bolt		34	3.4	24.5
19. Oil gutter bolt		10	1.0	7.5
20. Final gear bolts		90	9.0	65.0
21. Transmission case bolts		19	1.9	14.0
22. Reverse shaft bolt		23	2.3	17.0
23. Gear shift fork shaft bolts		13	1.3	9.5
24. Left case plate screws		9	0.9	6.5
25. Counter shaft nut		70	7.0	51.0
26. 5th shift fork plug		9	0.9	6.5
27. Left cover bolts	6 mm thread diameter (6 pcs.)	10	1.0	7.5
	8 mm thread diameter (2 pcs.)	23	2.3	17.0
28. Gear shift case plate bolt		10	1.0	7.5
29. 5th to REV interlock guide bolt		23	2.3	17.0
30. Gear shift yoke bolt		34	3.4	24.5
31. Gear shift interlock bolt		23	2.3	17.0
32. Gear shift guide case bolts		10	1.0	7.5
33. Left case cap bolts				
34. Backup lamp switch		20	2.0	14.5

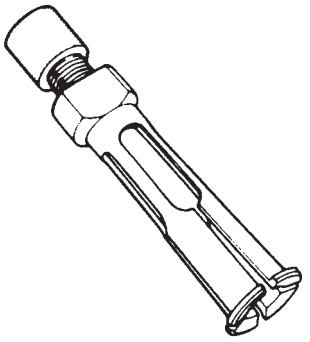
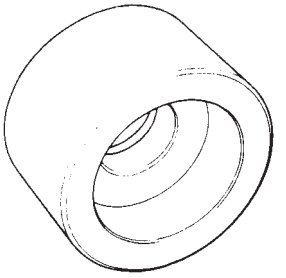
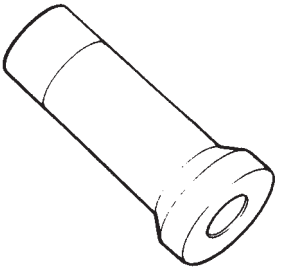
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	○ Oil seal lips ○ Gear shift control lever ○ Gear shift control shaft bushes
Sealant	SUZUKI BOND NO.1215 (99000-31110)	○ Oil drain plug ○ Gear shift shaft bolt ○ Mating surface of transmission case ○ Mating surface of side cover ○ Mating surface of gear shift guide case
Thread lock cement	THREAD LOCK 1322 (99000-32110)	○ Control lever knob ○ Reverse gear shift lever bolts ○ Oil gutter bolt ○ Left case plate screws ○ Gear shift yoke bolt ○ Shift fork plug ○ Final gear bolts

SPECIAL TOOLS

 09900-06107 Snap ring pliers (Opening type)	 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09913-65810 Bearing puller
 09913-75810 Bearing installer	 09913-75520 Bearing installer	 09913-80112 Bearing installer	 09913-84510 Bearing installer

 09916-46010 Valve guide remover	 09917-58010 Bearing remover	 09922-85811 Spring pin remover 4.5 mm	 09923-73210 Bearing remover
 09923-74510 Bearing remover	 09923-78210 Bearing installer	 09924-74510 Installer attachment	 09925-18011 Bearing installer
 09925-58210 Oil seal installer	 09925-68210 Bearing outer race installer	 09925-78210 Spring pin remover 6 mm	 09925-88210 Bearing puller attachment
 09925-98221 Bearing installer	 09927-76010 Gear holder	 09930-30104 Sliding shaft	 09940-53111 Bearing installer

		
09941-64511 Bearing remover	09951-16060 Bush remover	09951-76010 Bearing installer

SECTION 7A1

MANUAL TRANSMISSION
(J18 ENGINE MODEL)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
For the descriptions (items) not found in this section, refer to SECTION 7A (G13 and G16 Engine Models).

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GENERAL DESCRIPTION

CONSTRUCTION AND SERVICING

The transmission provides five forward speeds and one reverse speed by means of three synchronizers and three shafts: input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

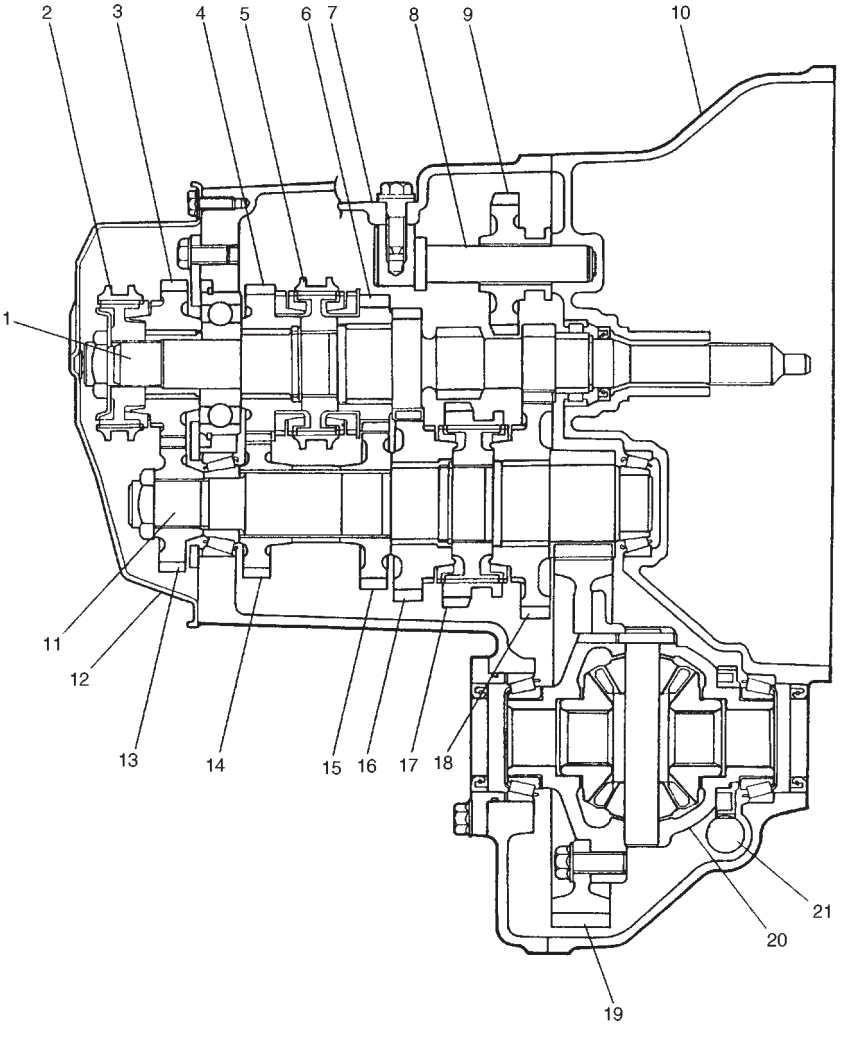
The low speed synchronizer is mounted on countershaft and engaged with countershaft first gear or second gear, while the high speed synchronizer is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

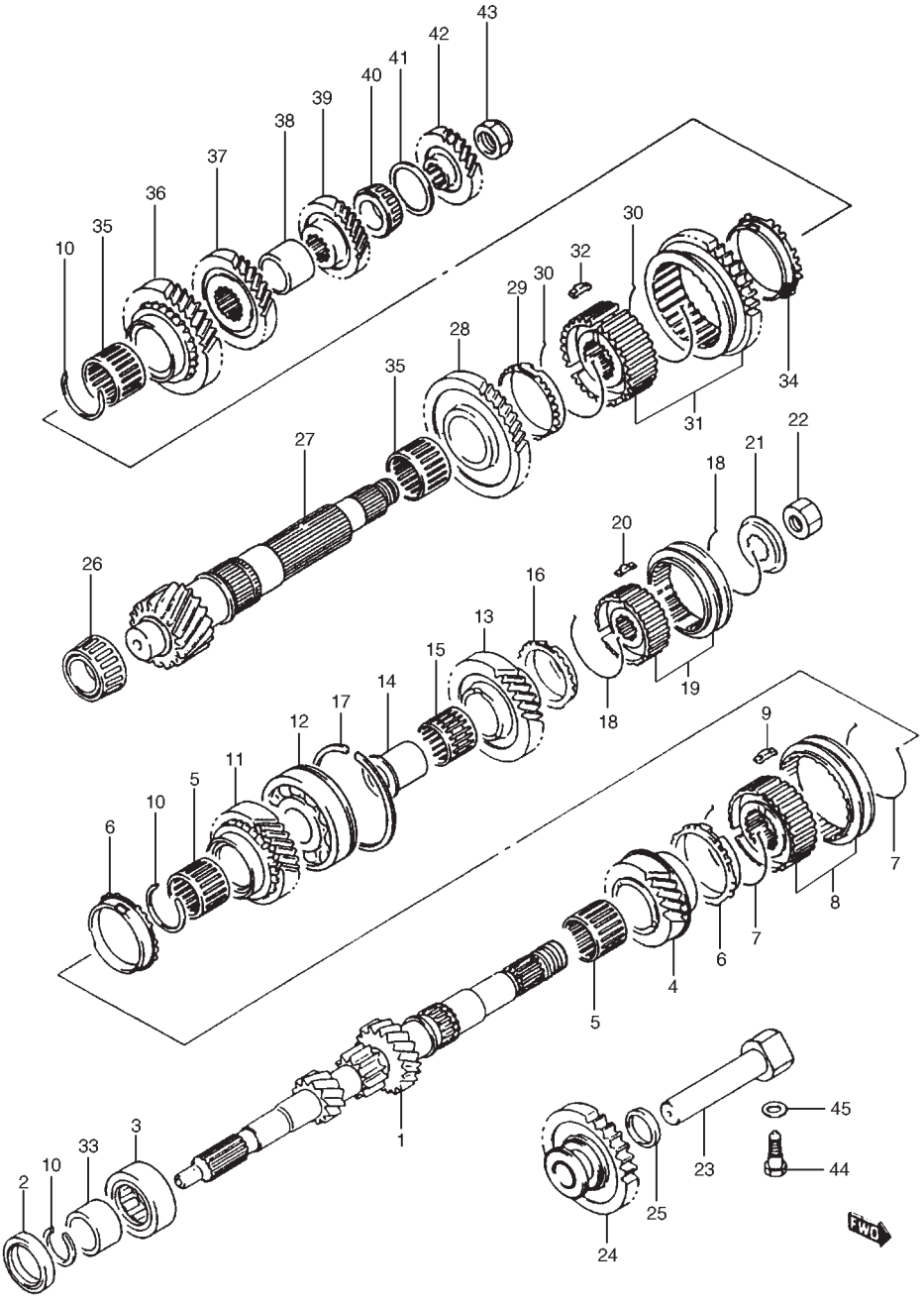
The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transmission case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of countershaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.



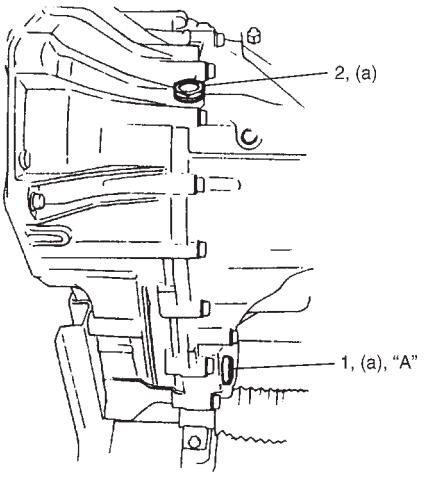
1. Input shaft
2. 5th speed sleeve & hub
3. Input shaft 5th gear
4. Input shaft 4th gear
5. High speed sleeve & hub
6. Input shaft 3rd gear
7. Left case
8. Reverse gear shaft
9. Reverse idler gear
10. Right case
11. Countershaft
12. Left cover
13. Countershaft 5th gear
14. Countershaft 4th gear
15. Countershaft 3rd gear
16. Countershaft 2nd gear
17. Low speed sleeve & hub
18. Countershaft 1st gear
19. Final gear
20. Differential case
21. Speedometer driven gear



1. Input shaft
2. Oil seal
3. Input shaft R bearing
4. Input shaft 3rd gear
5. 3rd & 4th gear bearing
6. High speed synchronizer ring
7. High speed synchronizer spring
8. High speed sleeve & hub
9. High speed synchronizer key
10. Circlip
11. Input shaft 4th gear
12. Input shaft L bearing
13. Input shaft 5th gear
14. 5th gear spacer
15. 5th gear bearing
16. 5th speed synchronizer ring
17. Snap ring
18. 5th synchronizer spring
19. 5th speed sleeve & hub
20. 5th synchronizer key
21. 5th synchronizer hub plate
22. Nut
23. Reverse gear shaft
24. Reverse idle gear
25. Reverse shaft washer
26. Countershaft R bearing
27. Countershaft
28. Countershaft 1st gear
29. 1st gear synchronizer ring
30. Low speed synchronizer spring
31. Low speed sleeve & hub
32. Low speed synchronizer key
33. Spacer
34. 2nd gear synchronizer ring
35. 1st & 2nd gear bearing
36. Countershaft 2nd gear
37. Countershaft 3rd gear
38. 3rd & 4th gear spacer
39. Countershaft 4th gear
40. Countershaft L bearing
41. Bearing set shim
42. Countershaft 5th gear
43. Countershaft nut
44. Reverse shaft bolt
45. Washer

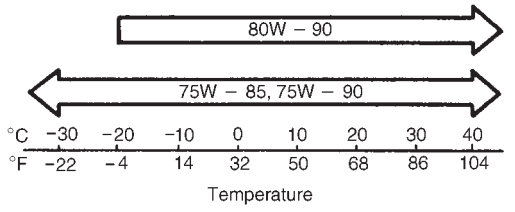
GEAR SHIFT MECHANISM

For this item, refer to same item in SECTION 7A2.



1. Oil drain plug
2. Oil level/filler plug

Viscosity chart
SAE



ON-VEHICLE SERVICE

OIL CHANGE

1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
2) With vehicle lifted up, check oil level and leakage.
   If leakage exists, correct it.
3) Drain old oil and fill new specified oil by specified amount (up to level hole).
4) Torque drain and level/filler plugs as specified below. Apply sealant to thread of drain plug before installation.

"A": Sealant 99000-31110

Tightening Torque
(a): 21 N·m (2.1 kg-m, 15.5 lb-ft)

NOTE:
- **It is recommended to use API GL-4 75W-90 gear oil.**
- **Whenever vehicle is hoisted for any service work other than oil change, be sure to check for oil leakage.**

Oil specification: API GL-4
For SAE classification, refer to viscosity chart at the left.

Oil capacity: 2.2 liters (4.6/3.9 US/Imp. pt)

GEAR SHIFT CONTROL

For this item (removal, installation and adjustment), refer to same item in SECTION 7A2.

UNIT REPAIR OVERHAUL

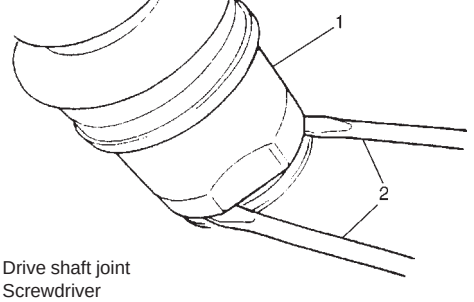
DISMOUNTING OF TRANSMISSION

UNDER HOOD

1) Disconnect battery ground cable.
2) Remove clutch operating cylinder from T/M with hose still attached.
3) Remove gear control cables.
4) Remove select cable lever with bracket.
5) Undo wiring harness clamps and couplers.
6) Remove ground cable from T/M.
7) Remove starting motor taking out its 2 bolts. Starting motor plate should also come down.
8) Remove exhaust manifold cover.
9) Remove transmission fastening bolt and nut.
10) Detach P/S oil tank from bracket.
11) Remove air cleaner.
12) Detach engine RH mounting from body.

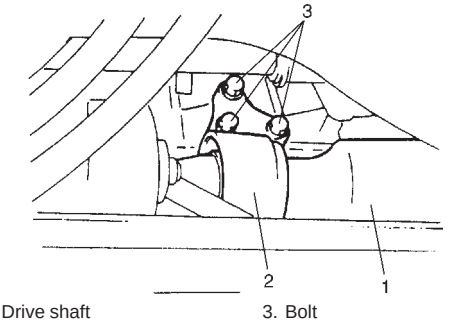
ON LIFT

1) Drain transmission oil.
2) Remove engine under covers.
3) Remove exhaust No.1 pipe.



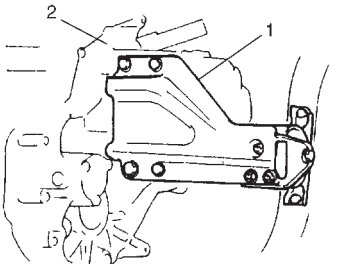
1. Drive shaft joint
2. Screwdriver

4) Remove clutch housing lower plate.
   Disconnect stabilizer joint from suspension arm.
5) Remove ball stud bolt from right and left knuckles, then disconnect each suspension arm.
6) By using large size screwdrivers, pull out drive shaft joints at differential side so as to release snap ring fitting of joint (for LH drive shaft).



1. Drive shaft
2. Center bearing support
3. Bolt

7) Remove center bearing support bolts and pull out center drive shaft from differential gear (for RH drive shaft).
8) Remove engine rear mounting stiffener.
9) Remove transmission to engine bolt and nut.
10) Remove engine rear mounting bracket bolts.
11) Lower vehicle and support transmission with transmission jack.



1. Engine mounting LH No.1 bracket
2. Transmission

12) Remove engine LH mounting with bracket.
13) Remove other attached parts from transmission, if any.
14) Pull transmission out so as to disconnect input shaft from clutch disc and then lower it.

REMOUNTING

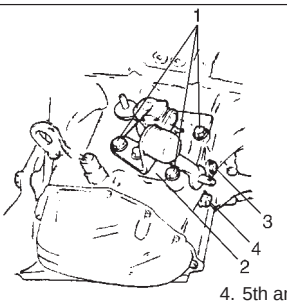
For remounting, reverse dismounting procedure.
Use specified torque as given below.

Tightening Torque	N·m	kg-m	lb-ft
Transmission to engine bolts and nuts	90	9.0	65.0
○ Engine RH mounting bolt ○ Engine LH mounting bolt	55	5.5	40.0
○ Engine rear mounting bracket bolts ○ Exhaust No.2 pipe to No.1 pipe bolts ○ Center bearing support bolts	50	5.0	36.5
Ball stud bolt and nut	60	6.0	43.5
Stabilizer bar link nut	28	2.8	20.5
○ Exhaust No.1 pipe to manifold nuts ○ Clutch operating cylinder bolts ○ Engine mounting LH No.1 bracket No.1 bolt and nut	23	2.3	17.0
Gear shift guide case bolt	19	1.9	14.0

CAUTION:
○ Care should be taken not to scratch oil seal lip with drive shaft while raising transmission.
○ Do not hit drive shaft joint with hammer when installing it into differential gear.

○ Push in left side drive shaft joint fully so as to engage snap ring of shaft with differential gear.

○ Set each clamp for wiring securely.
○ Fill transmission with oil as specified.
○ Connect battery and check function of engine, clutch and transmission.



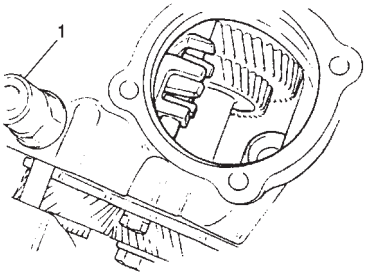
1. Bolt
2. Gear shift guide case
3. Gear shift interlock bolt
4. 5th and REV interlock guide bolt

DISASSEMBLING UNIT

GEAR SHIFT AND SELECT SHAFT ASSEMBLY AND FIFTH GEARS

1) Remove gear shift interlock bolt and 5th to REV interlock guide bolt from transmission case.
2) Remove gear shift & select shaft assembly.
3) Remove 9 bolts and take off transmission side cover.

CAUTION:
Care should be taken not to distort side cover when it is removed from left case.

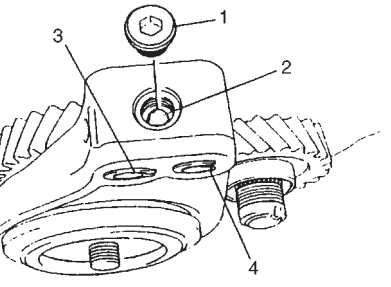


1. Backup lamp switch

4) Engage gear double meshing to loosen countershaft and input shaft nuts.
5) Remove shaft nuts and then hub plate.

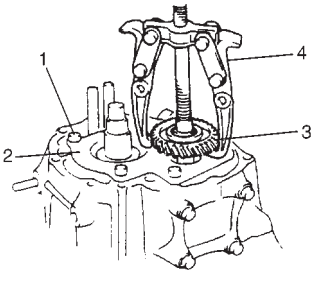
NOTE:
Do not hammer when loosening nuts.

6) Remove backup lamp switch.



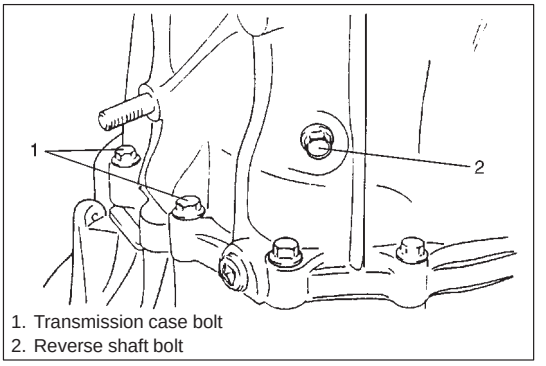
1. 5th shift fork plug
2. Shift guide ball
3. Circlip
4. C-ring

7) Remove 5th shift fork plug and guide ball.
8) Remove circlip and C-ring.
9) For removal procedure, refer to Step 5) of Fifth Gears of Disassembling Unit in SECTION 7A.



1. Plate bolt
2. Left case plate
3. Countershaft 5th gear
4. Gear puller

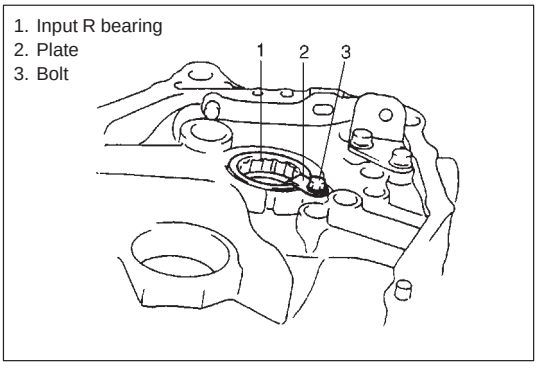
10) Remove input shaft 5th gear, needle bearing and then counter shaft 5th gear. Gear puller would be necessary if spline fitting of countershaft 5th gear is tight.
11) Remove bolts and take off left case plate, and then bearing set shim.
12) Remove C-ring of input shaft L bearing.



1. Transmission case bolt
2. Reverse shaft bolt

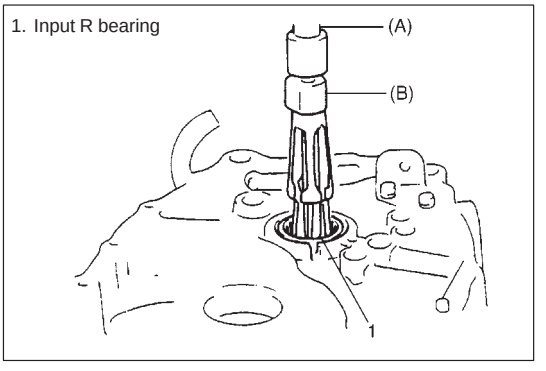
MAIN SHAFT AND COUNTERSHAFT

1) For removal procedure, refer to Steps 3), 6) and 8) of Gear Shifter, Main Shaft and Countershaft of Disassembling Unit in SECTION 7A.
2) Remove transmission case outside bolts and clutch housing bolts.
3) For removal procedure, refer to Steps 10) and 12) to 16) of Gear Shifter, Main Shaft and Countershaft of Disassembling Unit in SECTION 7A.



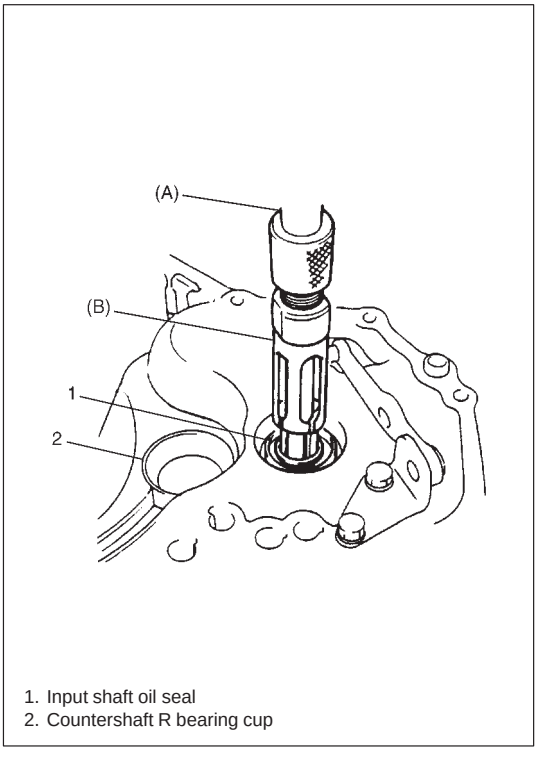
RIGHT CASE

1) Remove input R bearing stopper bolt and plate.



2) Remove input R bearing by using special tools.

Special Tool
(A): 09930-30104
(B): 09923-74510

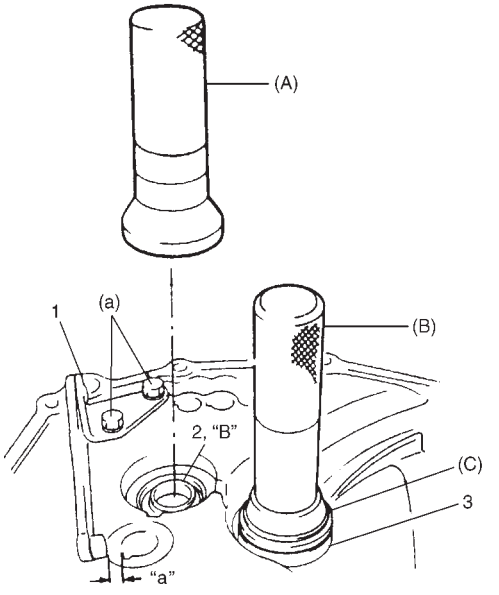


1. Input shaft oil seal
2. Countershaft R bearing cup

3) Remove input shaft oil seal by using special tools (combination of bearing remover and sliding shaft).

Special Tool
(A): 09930-30104
(B): 09923-74510

4) Also pull out countershaft R bearing cup by using bearing remover 09941-64511 with sliding shaft 09930-30104.



1. Reverse gear shift lever
2. Input shaft oil seal
3. Countershaft R bearing cup

SUB ASSEMBLY SERVICE

RIGHT CASE

1) For installation procedure, refer to Step 1) of same item of Sub Assembly Service in SECTION 7A.
2) Install input shaft oil seal facing its spring side upward.
   Use special tool and hammer for installation and apply grease to oil seal lip.

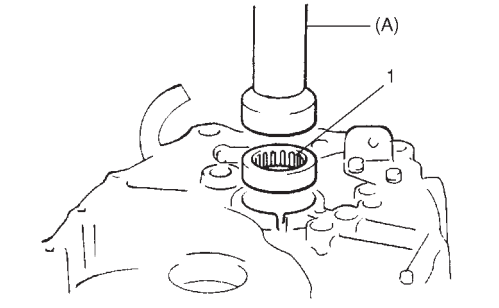
   "B": SUZUKI SUPER GREASE A, 99000-25010

   Special Tool
   (A): 09913-84510

3) Install countershaft R bearing cup by using special tools and hammer.

   Special Tool
   (B): 09913-75821
   (C): 09924-84510-004

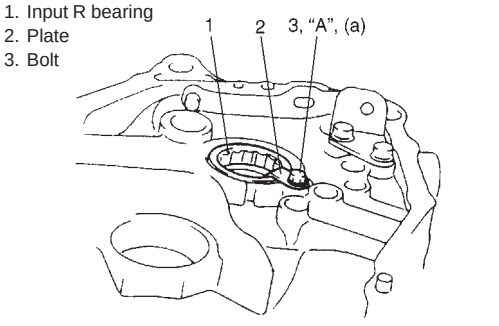
1. Input R bearing



4) Install input R bearing by using special tool and hammer.

   Special Tool
   (A): 09913-76010

1. Input R bearing
2. Plate
3. Bolt



5) Install input R bearing stopper plate and bolt applied with thread lock cement.

   "A": Thread lock 1322, 99000-32110
   Tightening Torque
   (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

LEFT CASE

1) For installation procedure, refer to Steps 1) and 3) of same item of Sub Assembly Service in SECTION 7A.

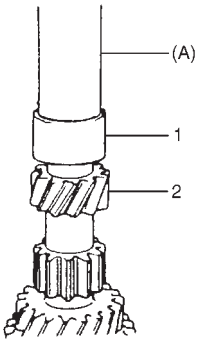
INPUT SHAFT ASSEMBLY

Disassembly

1) Remove input shaft R bearing spacer and circlip.
2) For disassembly procedure, refer to Steps 2) to 7) of same item of Sub Assembly Service in SECTION 7A.

Inspection and Reassembly

1) For inspection and reassembly procedure, refer to Steps 1) to 4) of same item of Sub Assembly Service in SECTION 7A.

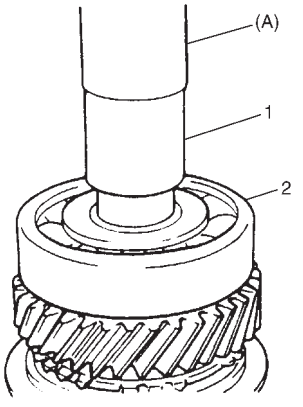


1. R bearing spacer
2. Input shaft

2) Drive in R bearing spacer by using special tool and hammer.

Special Tool
(A): 09913-80112

3) Install circlip to input shaft.
4) For inspection and reassembly procedure, refer to Steps 6) to 8) of same item of Sub Assembly Service in SECTION 7A.



1. 5th gear spacer
2. L bearing (Install it first)

5) Press-fit L bearing by using special tool and hammer.

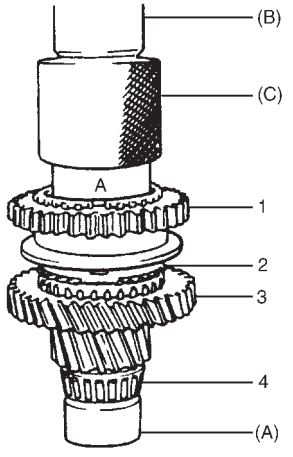
Special Tool
(A): 09913-80112

6) Using the same special tool, drive in 5th gear spacer.

CAUTION:
To prevent 5th gear spacer from being distorted because of excessive compression, do not press-fit it with L bearing at once.

COUNTERSHAFT ASSEMBLY

1) For disassembly procedure, refer to Steps 1) to 8) of same item of Sub Assembly Service in SECTION 7A.



1. Low speed sleeve & hub assembly
2. 1st gear synchronizer ring
3. Countershaft 1st gear
4. R bearing cone

A: Align key slots with keys

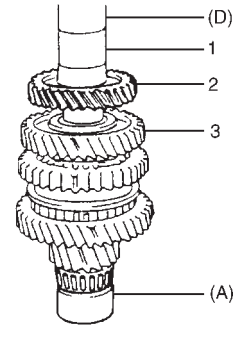
Inspection and Reassembly

1) For inspection and reassembly procedure, refer to Steps 1) to 6) of same item of Sub Assembly Service in SECTION 7A.
2) Drive in low speed sleeve & hub assembly by using special tool and hammer.

NOTE:
- **Support shaft with special tool as illustrated left so that retainer of bearing cone will be free from compression.**
- **Make sure that synchronizer ring key slots are aligned with keys while press-fitting sleeve & hub assembly.**
- **Check free rotation of 1st gear after press-fitting sleeve & hub assembly.**

Special Tool
(A): 09923-78210
(B): 09913-85210
(C): 09940-54910

3) For inspection and reassembly procedure, refer to Step 8) of same item of Sub Assembly Service in SECTION 7A.

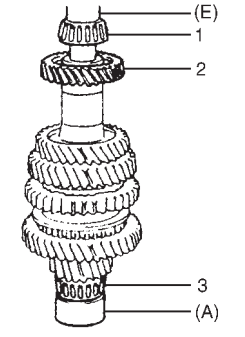


1. 3rd & 4th gear spacer
2. 3rd gear
3. 2nd gear

4) Press-fit 3rd gear and spacer by using special tool and press.

NOTE:
It is recommended to press-fit spacer and 3rd gear first, and then 4th gear later separately so that countershaft will not be compressed excessively.

Special Tool
(A): 09923-78210
(D): 09913-85210

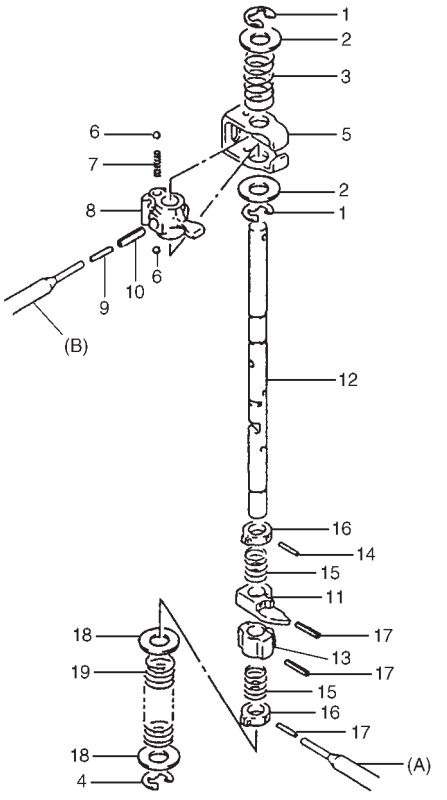


1. L bearing cone
2. 4th gear
3. R bearing cone

5) Press-fit 4th gear by using the same procedure as the above.
6) Install L bearing cone by using special tool and hammer.

NOTE:
For protection of bearing cone, always support shaft with special tool as illustrated.

Special Tool
(A): 09923-78210
(E): 09913-80112



1. E-ring
2. Thrust washer
3. Reverse select spring
4. E-ring
5. Gear shift interlock plate
6. Ball
7. Gear shift interlock spring
8. Gear shift select lever
9. Spring pin
10. Spring pin
11. Gear shift No.1 cam
12. Gear shift select shaft
13. Fifth/reverse gear shift cam
14. Spring pin
15. Cam guide return spring
16. Fifth/reverse gear shift cam guide
17. Spring pin
18. Thrust washer
19. Low select spring

GEAR SHIFTER

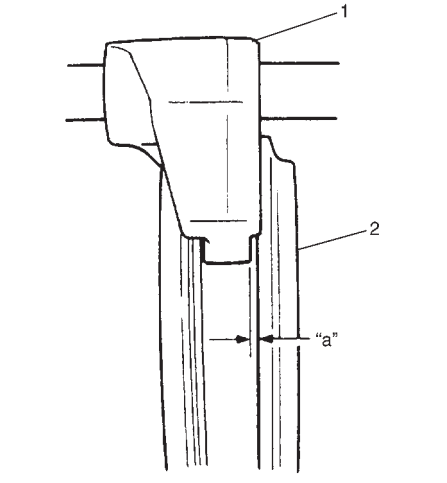
Gear Shift & Select Shaft Assembly

1) To disassemble component parts, use special tools and 2.8 – 3.0 mm (0.11 in.) pin remover in addition.

Special Tool
(A): 09922-85811 (4.5 mm)
(B): 09925-78210 (6.0 mm)

2) Clean all parts thoroughly, inspect them and replace with new ones as required.
3) Assemble component parts by reversing removal procedure.

NOTE:
- **When driving in spring pins, prevent shaft from being bent by supporting it with wood block.**
- **Assemble 5th & REV gear shift cam by winding cam guide return spring, and then drive in spring pin.**
- **Locate low speed select spring (Lower position) and reverse select spring (Yellow-Upper position) correctly.**



1. Gear shift fork
2. Synchronizer sleeve

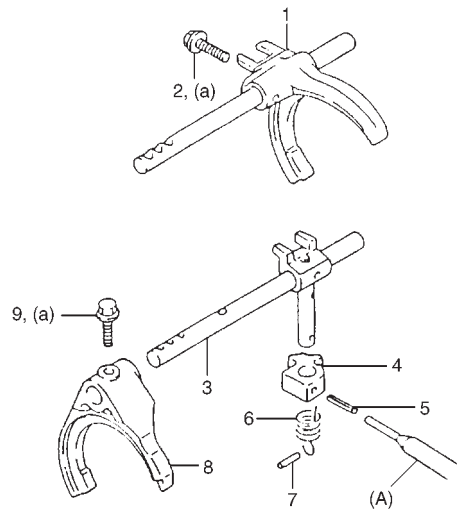
High Speed and Low Speed Gear Shift Shafts Inspection

1) Using feeler gauge, check clearance between fork and sleeve and replace those parts if it exceeds limit of 1.0 mm (0.039 in.)

NOTE:
For correct judgement of parts replacement, carefully inspect contact portion of fork and sleeve.

Clearance "a": Service limit 1.0 mm (0.039 in.)

2) Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.



1. High speed gear shift yoke ass'y
2. Low/high speed fork bolt
3. Low speed gear shift yoke ass'y
4. Gear shift No.2 cam
5. Pin
6. No.2 cam return spring
7. Pin
8. Low speed gear shift fork
9. Low/high speed fork bolt

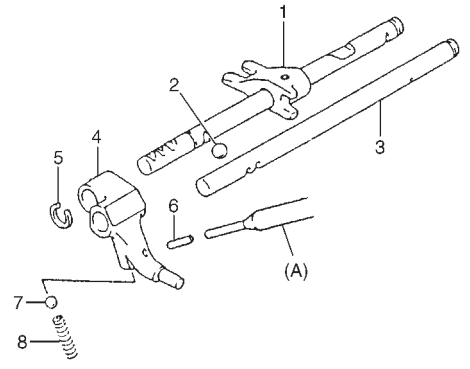
3) Disassemble component parts by using spring pin remover and hammer.

Special Tool
(A): 09922-85811 (4.5 mm)

4) Assemble shift shafts as shown while making sure that component parts are in proper order.

NOTE:
- **Correct shaft surface by using oilstone, if any scratch or dent is found.**
- **Support shaft with wood blocks when driving in spring pins.**

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Fifth/reverse gear shift yoke
2. Ball
3. Fifth/reverse gear shift guide shaft
4. Reverse gear shift arm
5. Snap ring
6. Pin
7. Ball
8. Reverse gear shift arm spring

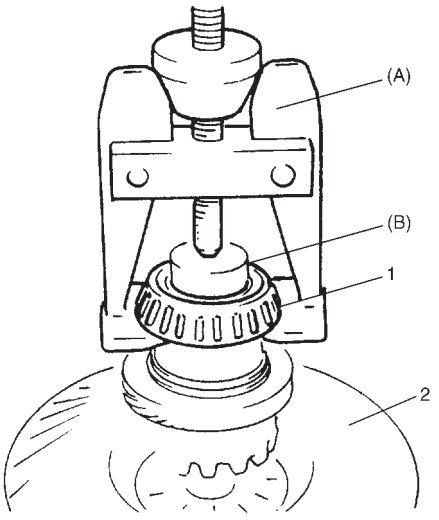
5th & REV Gear Shifter

1) Disassemble component parts by using spring pin remover and hammer.

Special Tool
(A): 09922-85811 (4.5 mm)

2) Replace or correct parts as required and assemble shafts making sure that component parts are in proper order as shown.

NOTE:
Install 2 steel balls in reverse gear shift arm without fail.



1. Differential side R bearing
2. Differential case

DIFFERENTIAL ASSEMBLY

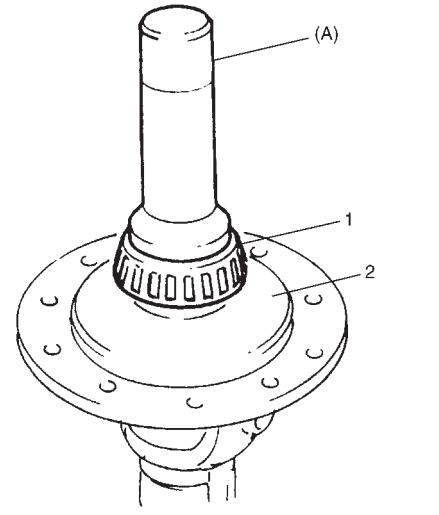
Disassembly

1) Using special tool, remove R bearing.

Special Tool
(A): 09913-61510
(B): 09925-88210

NOTE:
Change removed bearing to new one.

2) Take out speedometer drive gear.
3) Remove L bearing by using puller while supporting its center shaft as described above.
4) Support differential case with soft jawed vise and remove final gear bolts then take out final gear.
5) For disassembly procedure, refer to Step 5) of same item of Sub Assembly Service in SECTION 7A.



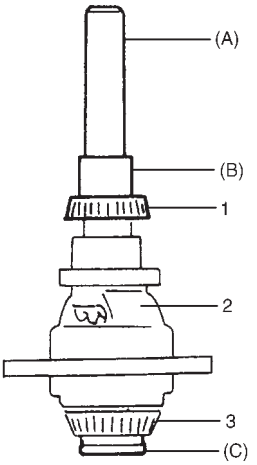
1. Differential side L bearing
2. Differential case

Adjustment and Reassembly

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

1) For adjustment and reassembly procedure, refer to Steps 1) and 2) of same item of Sub Assembly Service in SECTION 7A.
2) Drive in spring pin from right side till it is flush with differential case surface.
3) Press-fit L bearing by using special tool and copper hammer.

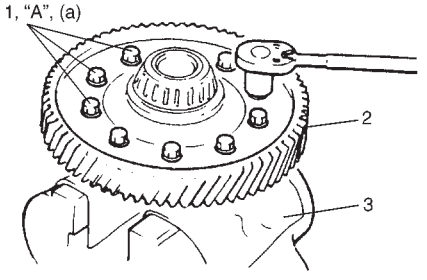
Special Tool
(A): 09951-76010



1. Differential side R bearing
2. Differential case
3. Differential side L bearing

4) Install speedometer drive gear.
5) Press-fit R bearing by using special tools and copper hammer.

Special Tool
(A): 09924-74510
(B): 09951-16060
(C): 09913-85230

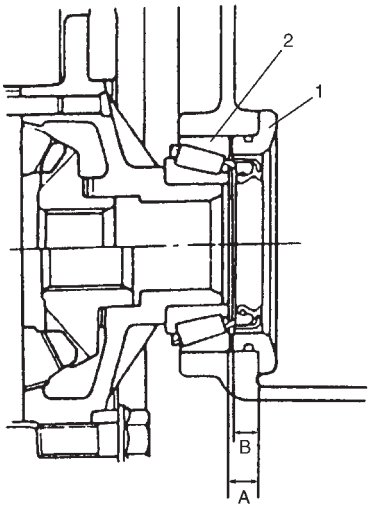


1. Final gear bolt
2. Final gear
3. Soft jawed vise

6) Hold differential assembly with soft jawed vise, install final gear and bevel gear and then tighten them with 10 bolts to specified torque.

CAUTION:
Use of any other bolts than specified ones is prohibited.

Thread lock cement
"A": 99000-32030 (SUZUKI BOND 1303B)
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



1. Side bearing retainer
2. Bearing outer race

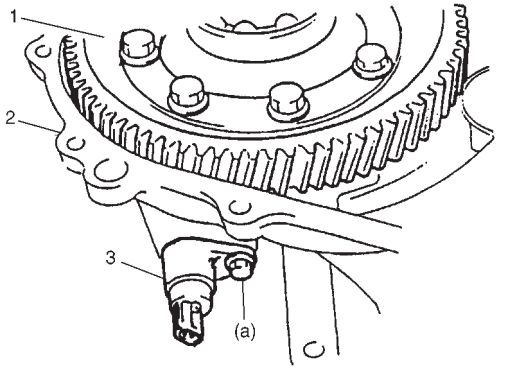
ASSEMBLING UNIT

DIFFERENTIAL TO LEFT CASE

1) Install differential assembly into right case.
2) Measure clearance “A” (between differential side face and side bearing outer race) and “B” (bearing retainer).
3) Select the shim referring to the following table.

Clearance A – B (mm)	Thickness of bearing shim to be installed (mm)
0.496 – 0.515	0.60
0.516 – 0.545	0.63
0.546 – 0.575	0.66
0.576 – 0.605	0.69
0.606 – 0.635	0.72
0.636 – 0.665	0.75
0.666 – 0.695	0.78
0.696 – 0.725	0.81
0.726 – 0.755	0.84
0.756 – 0.785	0.87
0.786 – 0.815	0.90
0.816 – 0.845	0.93
0.846 – 0.875	0.96
0.876 – 0.905	0.99
0.906 – 0.935	1.02
0.936 – 0.965	1.05
0.966 – 0.995	1.08
0.996 – 1.025	1.11
1.026 – 1.055	1.14
1.056 – 1.085	1.17
1.086 – 1.115	1.20
1.116 – 1.145	1.23
1.146 – 1.175	1.26
1.176 – 1.205	1.29
1.206 – 1.236	1.32

Available shim thickness	0.3, 0.6, 0.63, 0.66, 0.69, 0.72, 0.75, 0.78, 0.81, 0.84, and 0.87 mm 0.011, 0.023, 0.024, 0.025, 0.027, 0.028, 0.029, 0.030, 0.031, 0.033 and 0.034 in

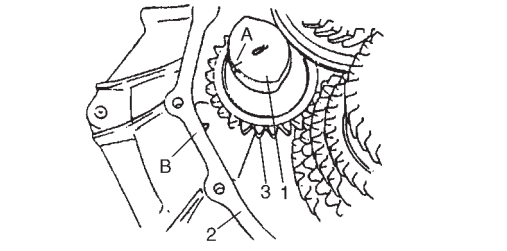


1. Differential assembly
2. Transmission right case
3. Speedometer driven gear

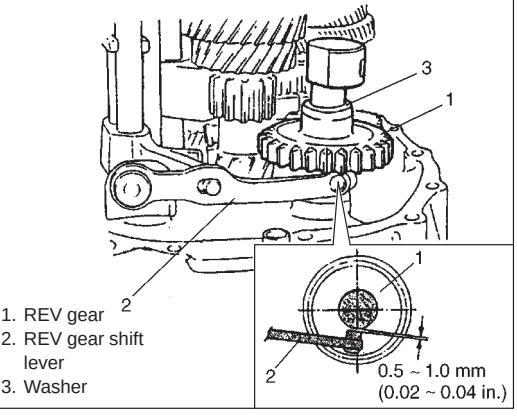
4) Insert speedometer driven gear case assembly applied with oil to its O-ring and gear, then tighten it with bolt.

CAUTION:
- **While inserting case assembly into transmission, turn final gear by hand slightly so that gear can mesh easily.**
- **Never push or hit slit portion of case when inserting it. Such attempt may cause case to break.**

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Reverse gear shaft
2. Right case
3. Reverse idle gear
A: Align with B



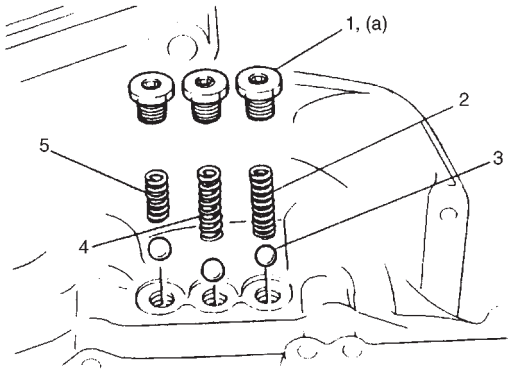
1. REV gear
2. REV gear shift lever
3. Washer

LEFT CASE

1) For installation procedure, refer to Steps 3) and 4) of Differential to Left Case of Assembly Unit in SECTION 7A.
2) Make reverse idler gear with reverse gear shift lever, insert reverse gear shaft into case through idler gear and then align A in shaft with B in case.

NOTE:
- **Make sure that washer has been installed in shaft at above the gear.**
- **Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.**

3) For installation procedure, refer to Steps 6) to 8) of Differential to Left Case of Assembly Unit in SECTION 7A.
4) Install another case bolts from clutch housing side and tighten them to specification.



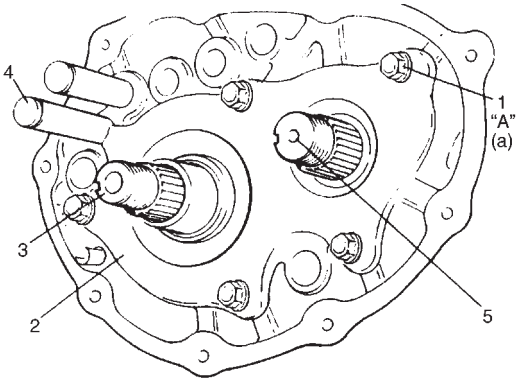
1. Gear shift locating bolt
2. Low speed locating spring
3. Steel ball
4. High speed locating spring
5. 5th & reverse locating spring

5) Check locating springs for deterioration and replace with new ones as necessary.

REF No. (Left figure)	Locating spring free length	Standard	Service limit
2	Low speed	53.1 mm (2.091 in.)	50.5 mm (1.988 in.)
4	High speed	46.1 mm (1.815 in.)	44.0 mm (1.732 in.)
5	5th & reverse	29.8 mm (1.173 in.)	28.5 mm (1.122 in.)

6) Install steel ball and locating spring for respective gear shift shaft and tighten with bolt.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Bolt
2. Left case plate
3. Input shaft
4. 5th & REV gear shift guide shaft
5. Countershaft

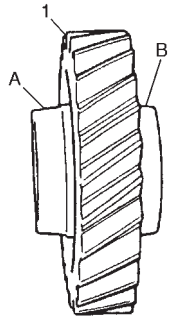
FIFTH GEARS

1) For installation procedure, refer to Steps 1) to 3) of same item of Assembly Unit in SECTION 7A.
2) Place left case plate inserting its end in groove of shift guide shaft and then tighten it with bolts applied with thread lock cement.

NOTE:
After tightening bolts, make sure that countershaft can be rotated by hand feeling some load.

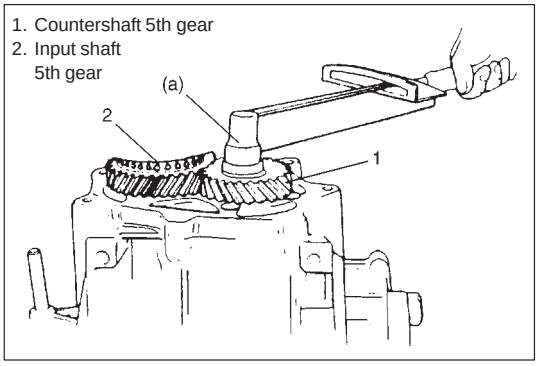
"A": Thread lock 1322, 99000-32110

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



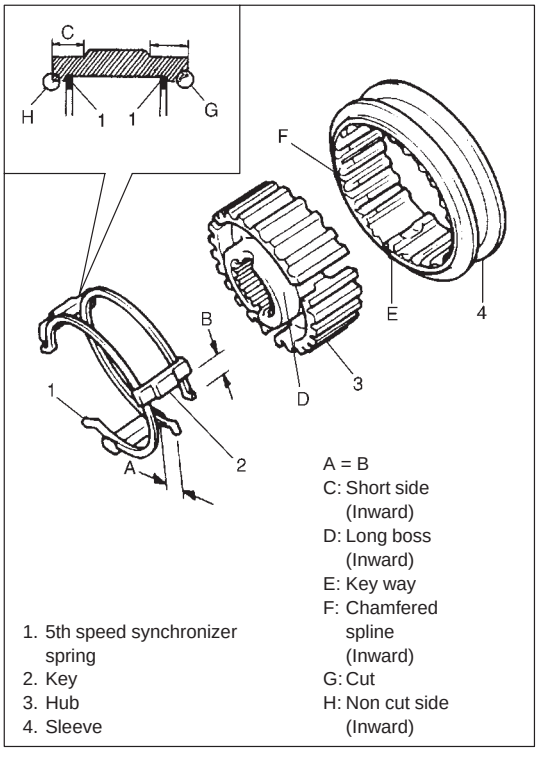
1. Countershaft 5th gear
A: Machined boss (Inside)
B: No machining (Outside)

3) Install countershaft 5th gear to countershaft facing machined boss A inward.



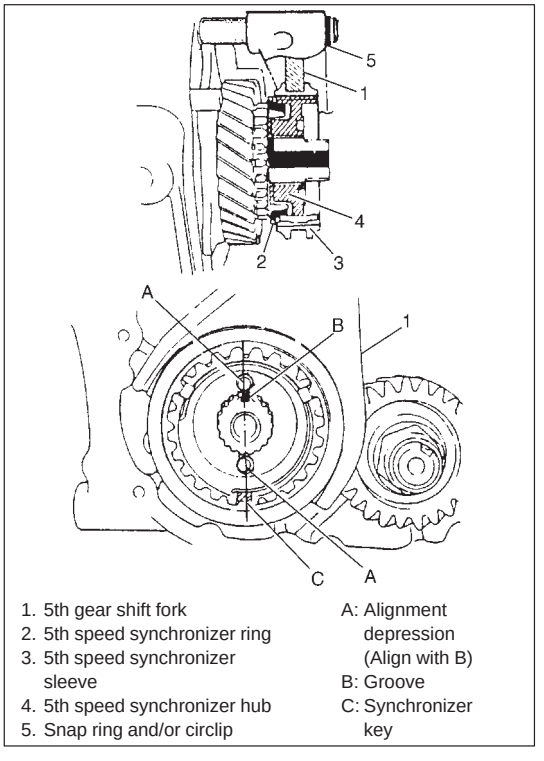
4) Install needle bearing to input shaft, apply oil then install input shaft 5th gear.
5) Engage gear double meshing to tighten countershaft nut and tighten it to specified torque.

Tightening Torque
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)



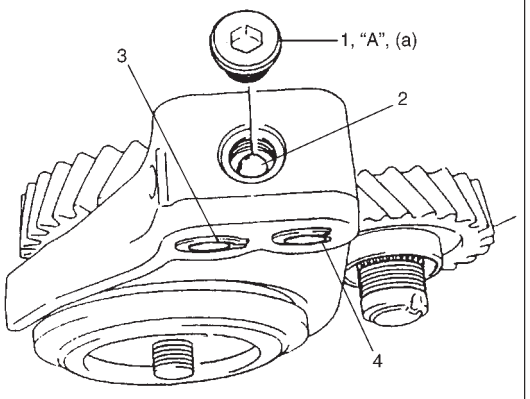
6) Assemble 5th speed synchronizer sleeve and hub with keys and springs.

NOTE:
Short side C in keys, long boss D in hub and chamfered spline F in sleeve should face inward (5th gear side).



7) Install synchronizer ring to input shaft 5th gear.
8) Fit 5th gear shift fork to sleeve & hub assembly and install them into input shaft, gear shift shaft and gear shift guide shaft at once aligning hub depression A, shaft mark B and synchronizer key C.

NOTE:
Long boss of hub faces inward (gear side).



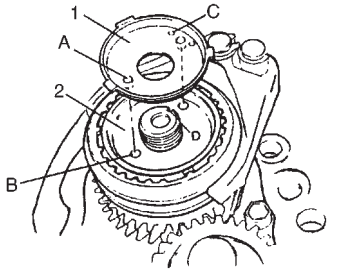
1. 5th shift fork plug
2. Shift guide ball
3. Circlip
4. C-ring

9) Install steel ball, tighten shift fork plug applied with thread lock cement.

CAUTION:
- **Coat shift fork plug with tread lock cement reasonably. If it is done too much, excess coating may interfere in ball movement and cause hard shift to 5th speed.**
- **Make sure circlip is installed in shaft groove securely.**

"A": Thread lock 1322, 99000-32110
Tightening Torque
(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

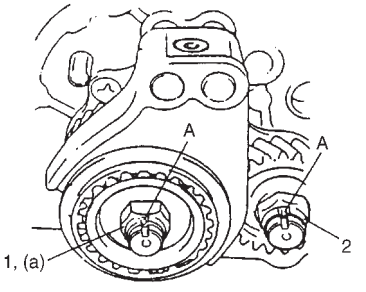
10) Install circlip and C-ring.



A: Lug
B: Alignment depression
C: Small hole
D: Cut

1. 5th synchronizer hub plate
2. Synchronizer hub

11) Install 5th synchronizer hub plate to synchronizer hub by positioning it so that its lugs A fit into their depression B in synchronizer hub and its 2 small holes C come on the same side as cut D in input shaft.



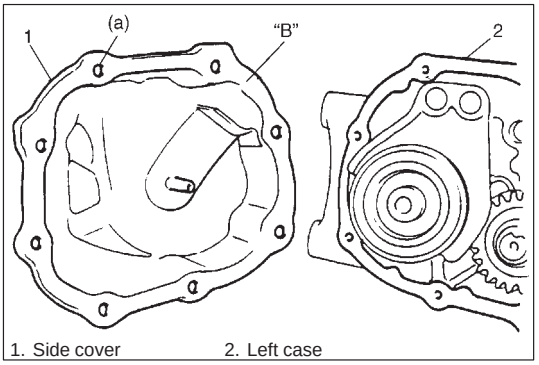
1. Input shaft nut
2. Countershaft nut

A: Caulking

12) Engage gear double meshing to tighten input shaft nut and tighten it to specified torque.

Tightening Torque
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)

13) Caulk input shaft nut and countershaft nut with caulking tool.

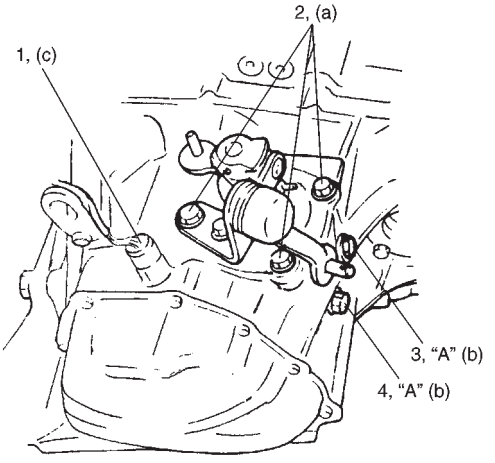


1. Side cover
2. Left case

14) Clean mating surface of both left case and side cover, coat mating surface with sealant evenly, mate it with left case and then tighten with 8 bolts.

"B": SUZUKI BOND No.1215, 99000-31110

Tightening Torque for left cover bolts
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Backup lamp switch
2. Gear shift guide case bolt
3. Gear shift interlock bolt
4. 5th to REV interlock guide bolt

GEAR SHIFT AND SELECT SHAFT ASSEMBLY

1) Clean mating surface of guide case.
2) Install gear shift and select shaft assembly with new gasket into transmission.
3) Place breather hose bracket and tighten it together with gear shift guide case bolts to specified torque.

   Tightening Torque
   (a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

4) Install washer and gear shift interlock bolt applied with thread lock cement and them tighten it to specified torque.

   Thread lock cement
   "A": 99000-32110 (SUZUKI BOND No.1322)

   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

5) Install washer and 5th to REV interlock guide bolt applied with thread lock cement and then tighten it to specified torque.

   Thread lock cement
   "A": 99000-32110 (SUZUKI BOND No.1322)
   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

6) Tighten backup lamp switch to specified torque.

   Tightening Torque
   (c): 20 N·m (2.0 kg-m, 14.5 lb-ft)

7) Check input shaft for rotation in each gear position.
8) Also confirm function of backup lamp switch in reverse position by using ohmmeter.

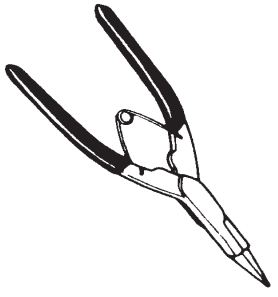
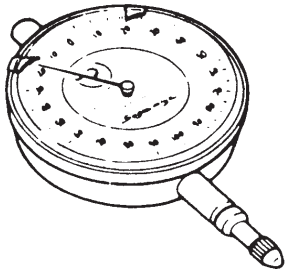
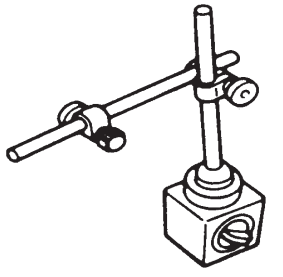
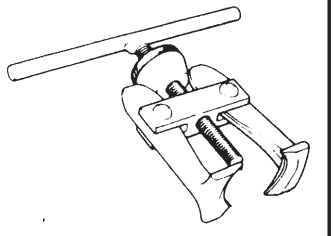
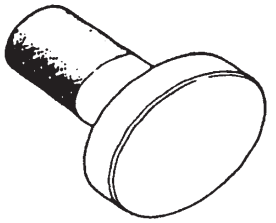
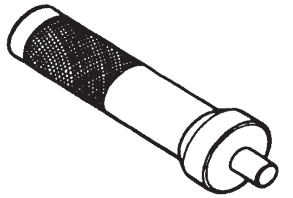
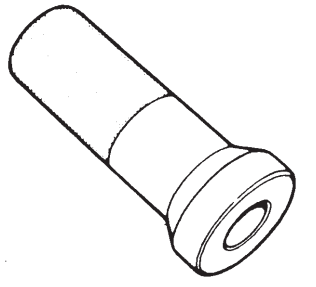
TIGHTENING TORQUE SPECIFICATIONS

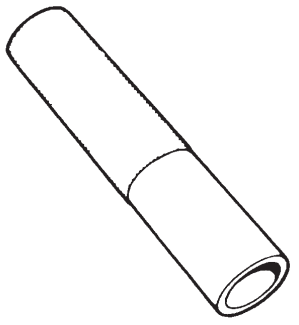
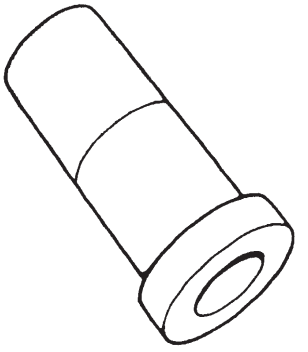
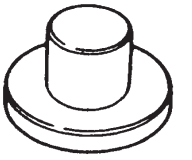
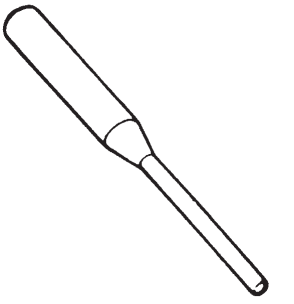
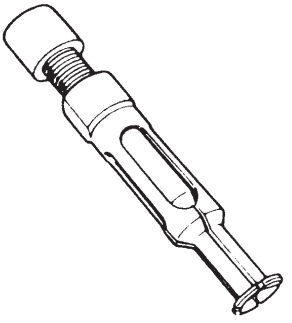
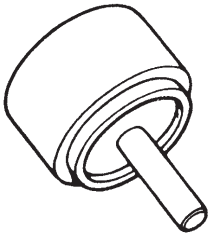
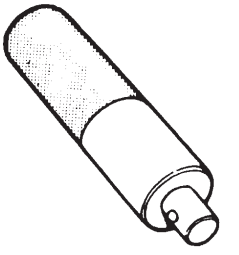
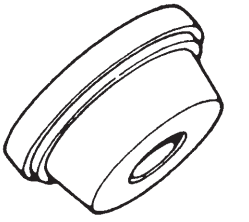
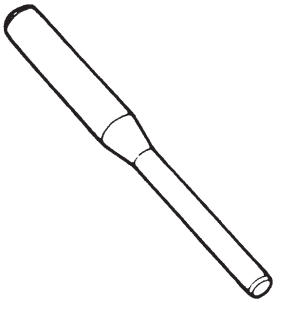
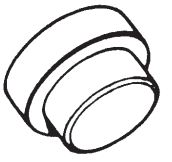
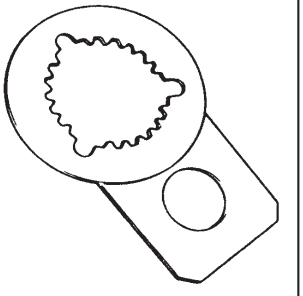
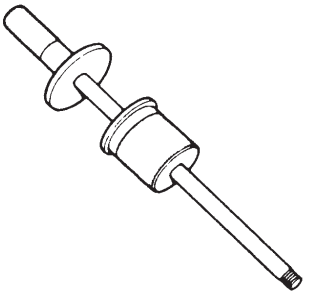
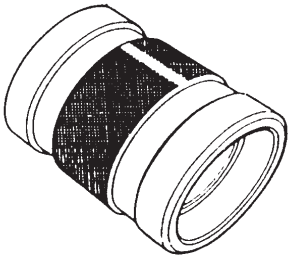
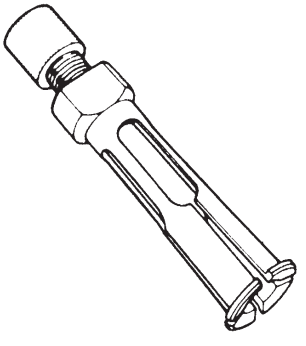
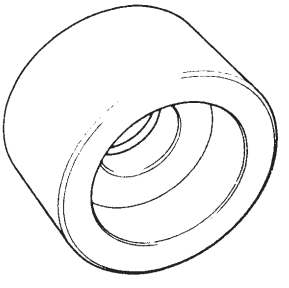
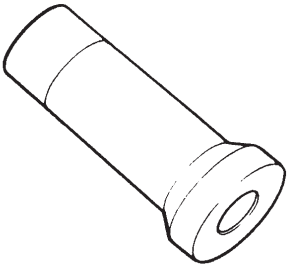
Fastening Parts	Tightening Torque		
	N·m	kg-m	lb-ft
1. Oil filler/level plug	21	2.1	15.5
2. Oil drain plug			
3. Speedometer driven gear case bolt	5.5	0.55	4.0
4. Center bearing support bolts	50	5.0	36.5
5. Ball stud bolt and nut	60	6.0	43.5
6. Stabilizer link nut	28	2.8	20.5
7. Shift and select control cable lock nut	6	0.6	4.5
8. Transmission to engine bolts and nuts	90	9.0	65.0
9. Transmission control cable bracket bolt	55	5.5	40.0
10. Transmission case bolts	19	1.9	14.0
11. Engine rear mounting bracket bolts	50	5.0	36.5
12. Input shaft R bearing plate bolt	10	1.0	7.5
13. Shift fork bolts	10	1.0	7.5
14. Oil gutter bolt	10	1.0	7.5
15. Side bearing retainer bolts	19	1.9	14.0
16. Final gear bolts	90	9.0	65.0
17. Gear shift locating bolts	13	1.3	9.5
18. Left case plate bolts	23	2.3	17.0
19. Countershaft nut	70	7.0	51.0
20. 5th shift fork plug	9	0.9	6.5
21. Input shaft nut	70	7.0	51.0
22. Side cover bolts	10	1.0	7.5
23. Gear shift guide case bolts	19	1.9	14.0
24. Gear shift interlock bolt	23	2.3	17.0
25. 5th to REV interlock guide bolt			
26. Backup lamp switch	20	2.0	14.5
27. Reverse gear shift lever bolts	23	2.3	17.0
28. Reverse shaft bolt			
29. Exhaust No.2 pipe to No.1 pipe bolts	50	5.0	36.5
30. Exhaust No.1 pipe to manifold nuts	23	2.3	17.0

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	○ Oil seal lips
Sealant	SUZUKI BOND NO.1215 (99000-31110)	○ Drain plug ○ Mating surface of transmission case ○ Mating surface of driven case ○ Mating surface of side cover
Thread lock cement	THREAD LOCK 1322 (99000-32110)	○ Input shaft R bearing plate bolt ○ Left case plate bolts ○ 5th shift fork plug ○ Gear shift interlock bolt ○ 5th to REV interlock guide bolt ○ Reverse gear shift lever bolts ○ Oil gutter bolt
	SUZUKI BOND 1303B (99000-32030)	○ Final gear bolts

SPECIAL TOOLS

 09900-06107 Snap ring pliers (Opening type)	 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09913-61510 Bearing puller
 09913-75810 Bearing installer	 09913-75821 Installer attachment	 09913-76010 Bearing installer	 09913-80112 Bearing installer

 09913-84510 Bearing installer	 09913-85210 Bearing installer	 09913-85230 Bearing removing jig	 09922-85811 Spring pin remover 4.5 mm
 09923-74510 Bearing remover	 09923-78210 Bearing installer	 09924-74510 Bearing & oil seal installer handle	 09924-84510-004 Bearing installer attachment
 09925-78210 Spring pin remover 6 mm	 09925-88210 Bearing puller attachment	 09927-76010 Gear holder	 09930-30104 Sliding shaft
 09940-54910 Bearing installer	 09941-64511 Bearing remover	 09951-16060 Bush remover	 09951-76010 Bearing installer

SECTION 7A2

MANUAL TRANSMISSION (4WD)

NOTE:
For the descriptions (items) not found in this section, refer to Section 7A1.

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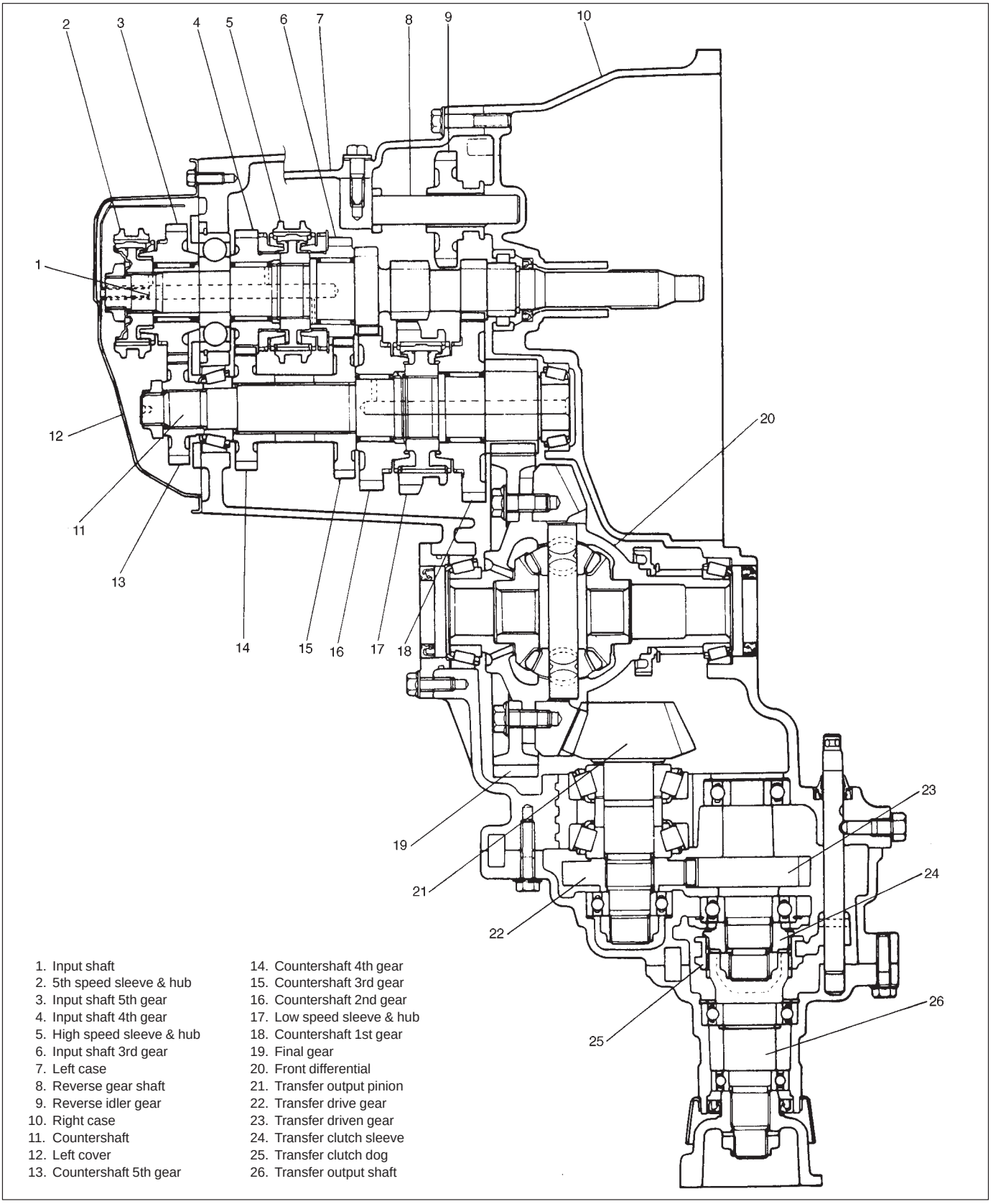
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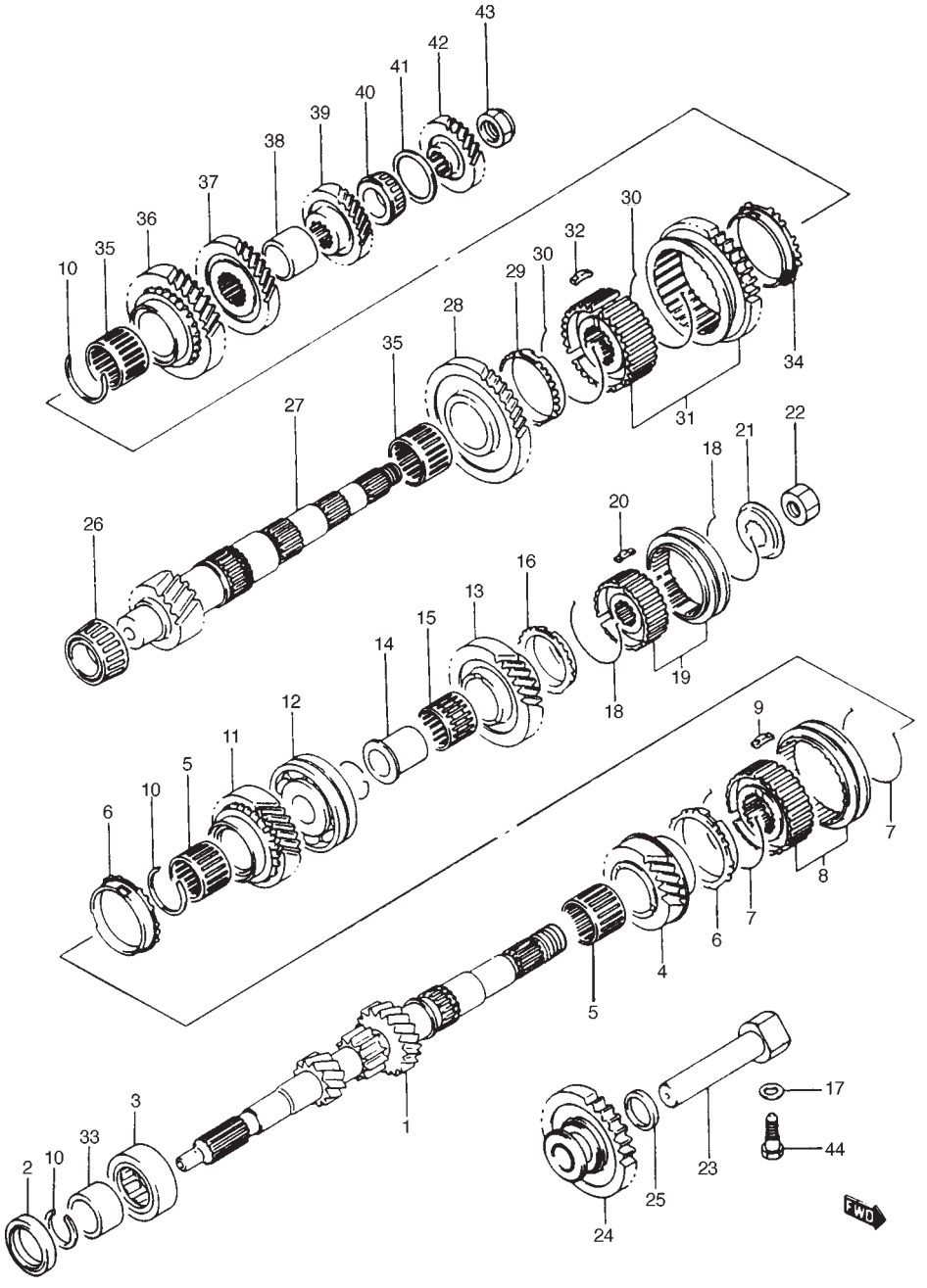
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GENERAL DESCRIPTION

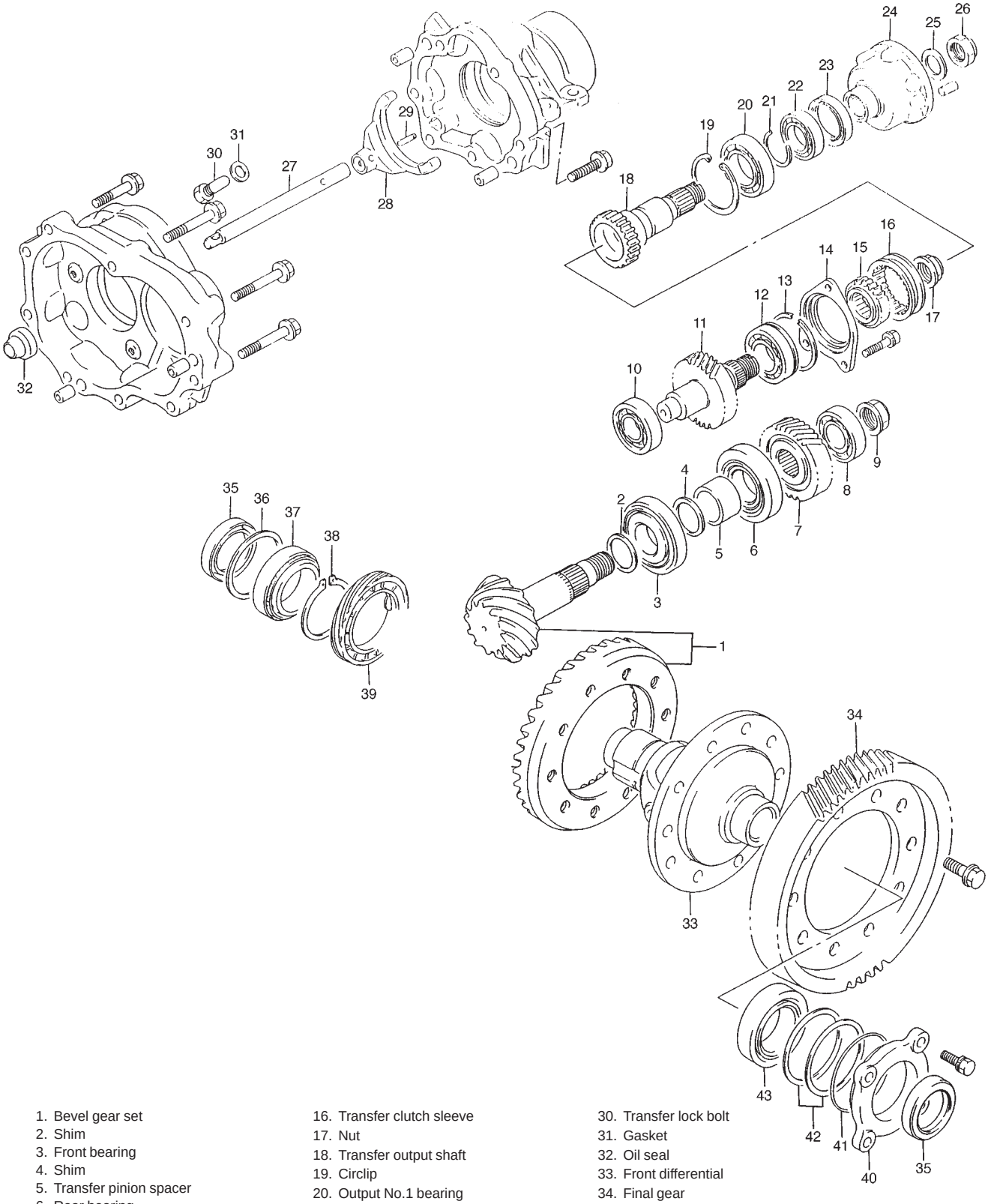
This transmission uses a full-time 4WD system in which a rotary blade coupling is installed between propeller shaft No.1 and No.2 so that optimum amount of drive force is distributed to the front and rear wheels according to the driving conditions. Also, a 2WD to 4WD selector lever is installed to the front transfer case to improve serviceability.



1. Input shaft
2. 5th speed sleeve & hub
3. Input shaft 5th gear
4. Input shaft 4th gear
5. High speed sleeve & hub
6. Input shaft 3rd gear
7. Left case
8. Reverse gear shaft
9. Reverse idler gear
10. Right case
11. Countershaft
12. Left cover
13. Countershaft 5th gear
14. Countershaft 4th gear
15. Countershaft 3rd gear
16. Countershaft 2nd gear
17. Low speed sleeve & hub
18. Countershaft 1st gear
19. Final gear
20. Front differential
21. Transfer output pinion
22. Transfer drive gear
23. Transfer driven gear
24. Transfer clutch sleeve
25. Transfer clutch dog
26. Transfer output shaft



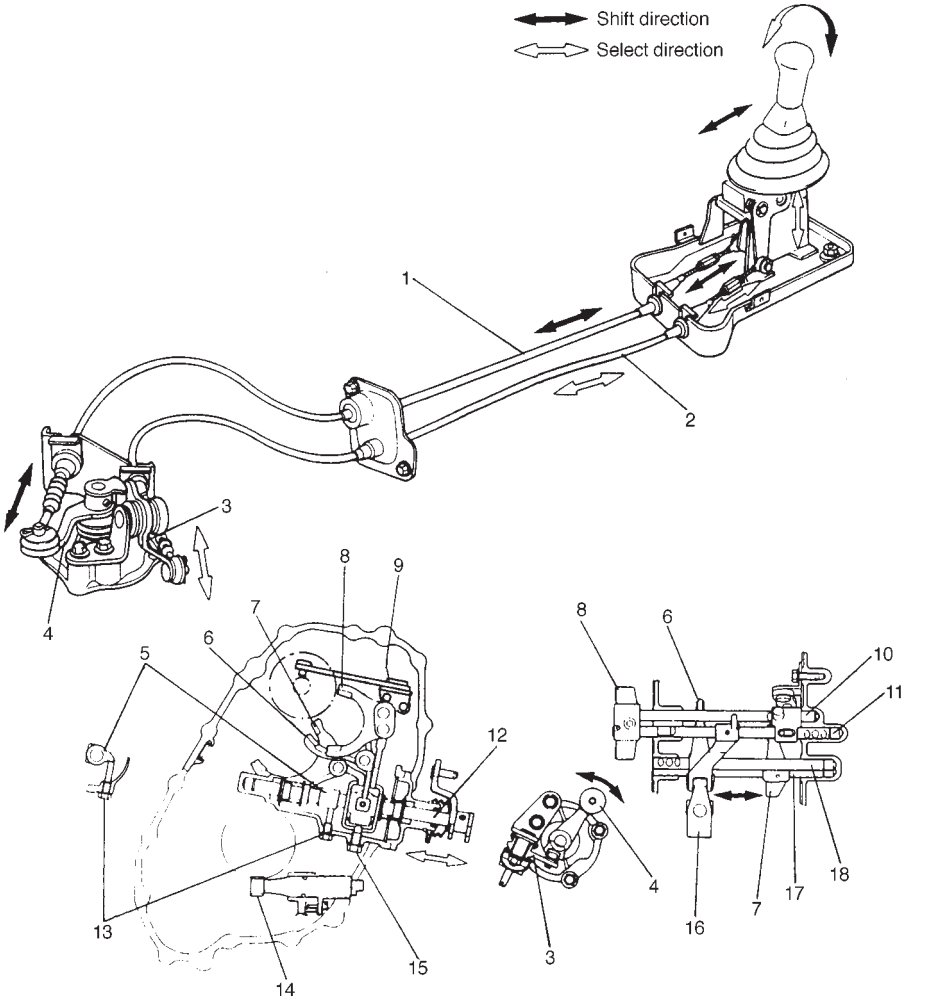
1. Input shaft
2. Oil seal
3. Input shaft R bearing
4. Input shaft 3rd gear
5. 3rd & 4th gear bearing
6. High speed synchronizer ring
7. High speed synchronizer spring
8. High speed sleeve & hub
9. High speed synchronizer key
10. Circlip
11. Input shaft 4th gear
12. Input shaft L bearing
13. Input shaft 5th gear
14. 5th gear spacer
15. 5th gear bearing
16. 5th speed synchronoizer ring
17. Washer
18. 5th synchronizer spring
19. 5th speed sleeve & hub
20. 5th synchronizer key
21. 5th synchronizer hub plate
22. Nut
23. Reverse gear shaft
24. Reverse idle gear
25. Reverse shaft washer
26. Countershaft R bearing
27. Countershaft
28. Countershaft 1st gear
29. 1st gear synchronizer ring
30. Low speed synchronizer spring
31. Low speed sleeve & hub
32. Low speed synchronizer key
33. Spacer
34. 2nd gear synchronoizer ring
35. 1st & 2nd gear bearing
36. Countershaft 2nd gear
37. Countershaft 3rd gear
38. 3rd & 4th gear spacer
39. Countershaft 4th gear
40. Counter shaft L bearing
41. Bearing set shim
42. Countershaft 5th gear
43. Countershaft nut
44. Reverse shaft bolt



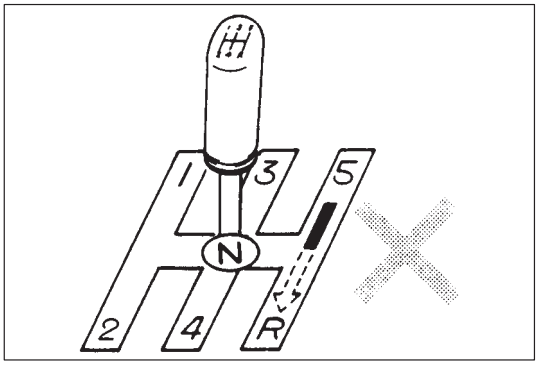
1. Bevel gear set
2. Shim
3. Front bearing
4. Shim
5. Transfer pinion spacer
6. Rear bearing
7. Transfer drive gear
8. Bearing
9. Nut
10. Driven gear No.1 bearing
11. Transfer driven gear
12. Driven gear No.2 bearing
13. Snap ring
14. Transfer driven gear bearing plate
15. Transfer clutch dog
16. Transfer clutch sleeve
17. Nut
18. Transfer output shaft
19. Circlip
20. Output No.1 bearing
21. Snap ring
22. Output No.2 bearing
23. Oil seal
24. Transfer output flange
25. Thrust washer
26. Nut
27. Transfer shift fork shaft
28. Transfer shift fork
29. Spring pin
30. Transfer lock bolt
31. Gasket
32. Oil seal
33. Front differential
34. Final gear
35. Oil seal
36. Differential side bearing RH shim
37. Differential side bearing RH
38. Circlip
39. Speedometer drive gear
40. Differential side bearing LH retainer
41. O ring
42. Differential side bearing LH shim
43. Differential side bearing LH

GEAR SHIFT MECHANISM

The gear shifting control system consists of following main parts. Movement of gear shift control lever is transmitted to gear shift & select shaft through gear shift and gear select cables.

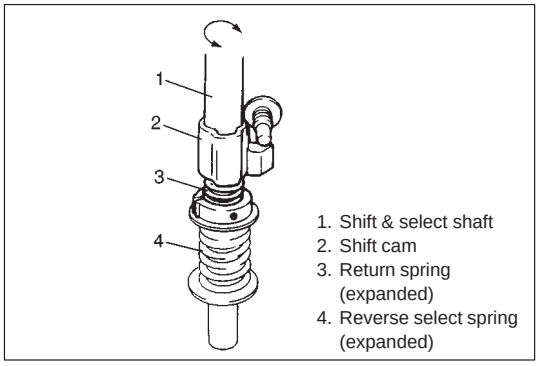


1. Gear shift control cable
2. Gear select control cable
3. Gear select lever
4. Gear shift lever
5. 5th & reverse gear shift cam
6. High speed shift fork
7. Low speed gear shift fork
8. 5th gear shift fork
9. Reverse gear shift lever
10. 5th & reverse gear shift guide shaft
11. 5th & reverse gear shift shaft
12. Gear shift & select shaft
13. 5th-reverse gear shift lock guide bolt
14. Speedometer driven gear
15. Gear shift interlock bolt
16. Gear shift & select lever
17. Low speed gear shift shaft
18. High speed gear shift shaft



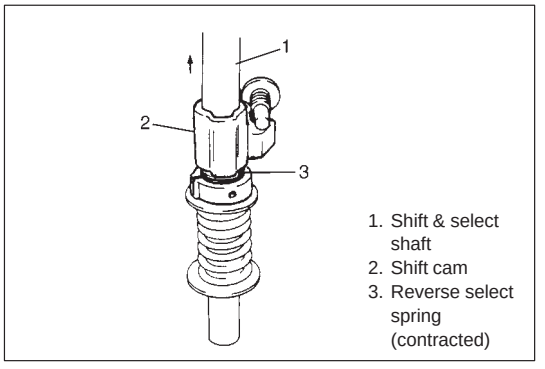
5TH & REVERSE GEAR SHIFT CAM

5th & reverse gear shift cam, cam guide return spring and 5th to reverse interlock guide bolt are provided to prevent the gear from being directly shifted from 5th to reverse.



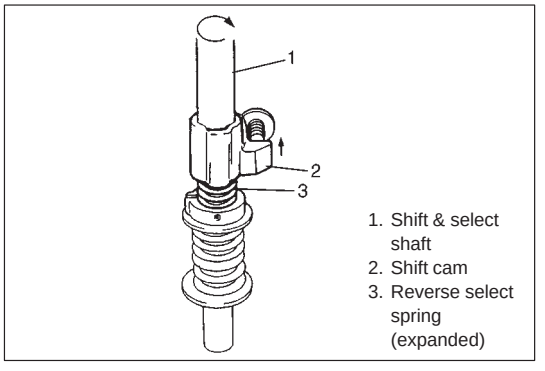
1. Shift & select shaft
2. Shift cam
3. Return spring (expanded)
4. Reverse select spring (expanded)

1) When shift lever is at neutral position between 3rd and 4th gear, shift cam is under guide bolt and can turn freely clockwise (to 3rd gear) and counterclockwise (to 4th gear).



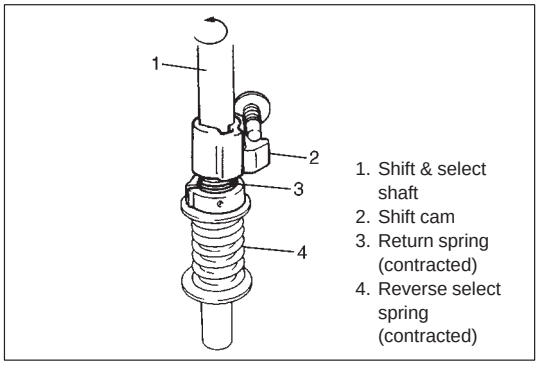
1. Shift & select shaft
2. Shift cam
3. Reverse select spring (contracted)

2) When shift lever is shifted toward the right from neutral position, shift and select shaft moves up but shift cam is restricted by guide bolt and return spring is contracted.



1. Shift & select shaft
2. Shift cam
3. Reverse select spring (expanded)

3) When shift lever is shifted to 5th gear, shift & select shaft turns clockwise letting shift cam off from guide bolt and pushed up by return spring. In this state, movement of shift cam is restricted by guide bolt and therefore, gearshift to reverse is not attainable.



1. Shift & select shaft
2. Shift cam
3. Return spring (contracted)
4. Reverse select spring (contracted)

4) When shift lever is shifted from neutral position between 5th gear and reverse gear to reverse gear, shift cam turns counterclockwise to atain reverse gear.

DIAGNOSIS

Condition	Possible Cause	Correction
Gears slipping out of mesh	○ Worn shift fork shaft ○ Worn shift fork or synchronizer sleeve ○ Weak or damaged locating springs ○ Worn bearings on input shaft or counter-shaft ○ Worn chamfered tooth on sleeve and gear	Replace Replace Replace Replace Replace sleeve and gear
Hard shifting	○ Inadequate lubricant ○ Improper clutch pedal free travel ○ Distorted or broken clutch disc ○ Damaged clutch pressure plate ○ Worn synchronizer ring ○ Worn chamfered tooth on sleeve or gear ○ Worn gear shift control shaft joint bush ○ Distorted shift shaft	Replenish Replace clutch arm or master cylinder Replace Replace clutch cover Replace Replace sleeve or gear Replace Replace
Noise	○ Inadequate or insufficient lubricant ○ Damaged or worn bearing(s) ○ Damaged or worn gear(s) ○ Damaged or worn synchronizer parts ○ Maladjusted backlash between bevel pinion and gear ○ Improper tooth contact in the mesh between bevel pinion and gear	Replenish Replace Replace Replace Adjust as prescribed Adjust or replace

ON-VEHICLE SERVICE

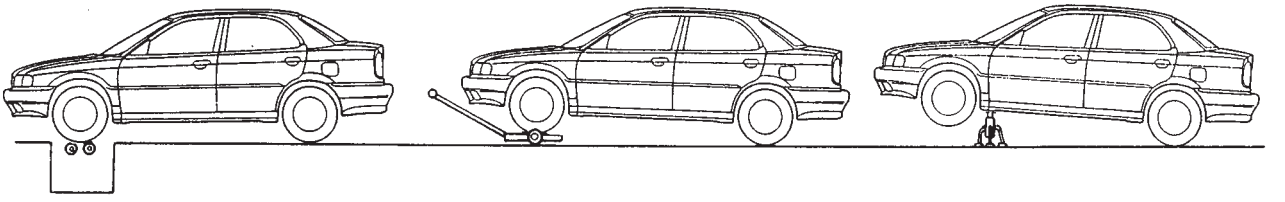
PRECAUTION IN SERVICING (FULL-TIME 4WD)

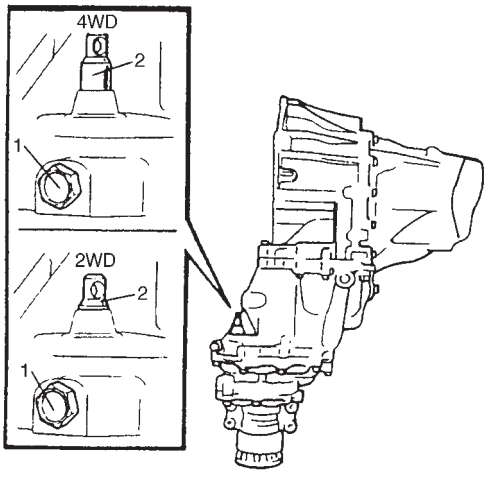
When performing any of the following types of work, it is necessary to make the vehicle as front wheel drive by cutting transmission of driving force to the rear wheels.

Testing following items
○ Speedometer
○ Chassis dynamo
○ Brake
○ Wheel balance (on-vehicle type)

Towing vehicle with front or rear wheels lifted up

Driving front wheels which are jacked up





1. Transfer lock bolt
2. Shift fork shaft

SWITCHING FROM 4WD TO 2WD

Set 4WD/2WD selector lever located at lower side of transfer driven case to 2WD.

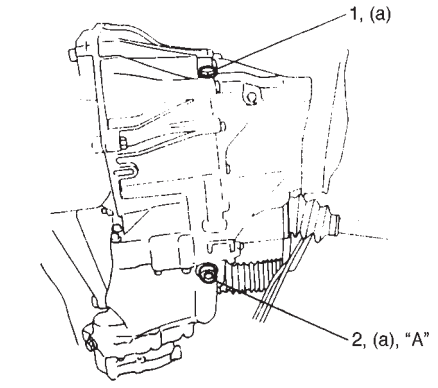
1) Loosen transfer lock bolt.
2) Push in shift fork shaft fully.
3) With shift fork shaft pushed in, tighten transfer lock bolt.

Tightening Torque
(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

NOTE:

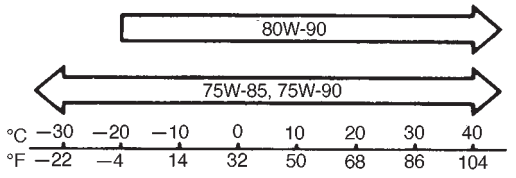
○ **If shift fork shaft is hard to move, try to move it while turning it to the right and left little by little. Do the same when setting back to 4WD after servicing vehicle.**

○ **Upon completion of servicing, always set shift fork shaft back to 4WD.**



1. Oil level/filler plug
2. Oil drain plug

Viscosity chart
SAE



OIL CHANGE

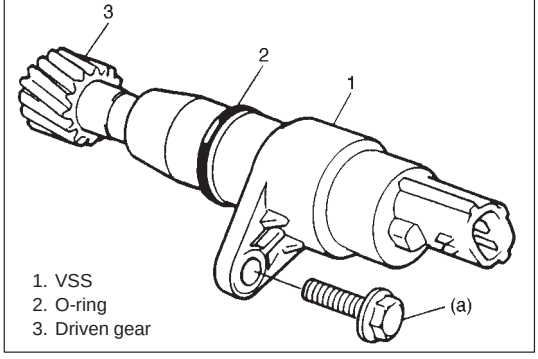
1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
2) With vehicle lifted up, check oil level and leakage. If leakage exists, correct it.
3) Drain old oil and fill new specified oil as in the following table by specified amount (up to level hole).
4) Torque drain and level/filler plugs as specified below. Apply sealant to drain plug before installation.

"A": SUZUKI BOND No.1215, 99000-31110

Tightening Torque
(a): 21 N·m (2.1 kg-m, 15.5 lb-ft)

NOTE:
- **It is recommended to use API GL-4 SAE 75W-90 gear oil.**
- **Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.**

Oil specification : API GL-4
For SAE classification, refer to viscosity chart at the left.
Oil capacity : 4.1 liters (8.7/7.2 US/Imp. pt)

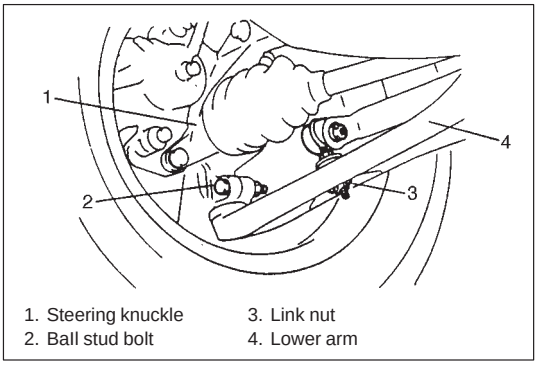


1. VSS
2. O-ring
3. Driven gear

VEHICLE SPEED SENSOR (VSS, SPEEDOMETER DRIVEN GEAR)

Refer to Section 7A for removal, installation and inspection procedure.

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

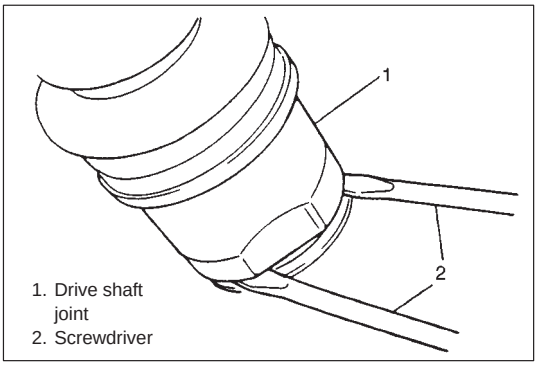


1. Steering knuckle
2. Ball stud bolt
3. Link nut
4. Lower arm

DIFFERENTIAL SIDE OIL SEAL

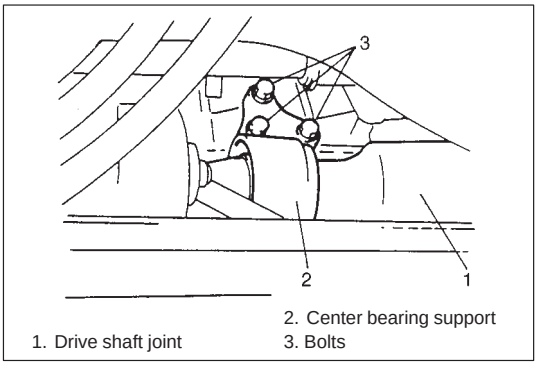
REPLACEMENT

1) Lift up vehicle and drain transmission oil.
2) Remove ball stud bolt and link nut, and then separate suspension arm from knuckle.



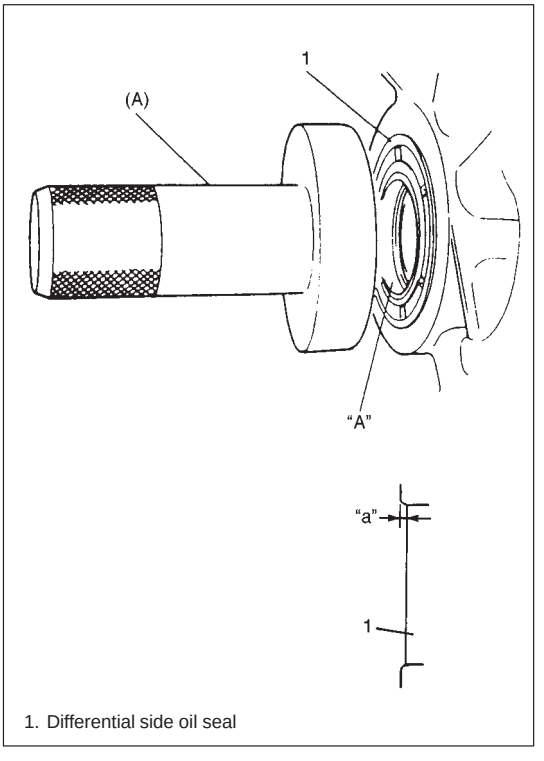
1. Drive shaft joint
2. Screwdriver

3) ○ In case of left side oil seal:
   By using large size screwdrivers, pull out drive shaft joint so as to release snap ring fitting of joint spline at differential side.
   Pushing knuckle portion outward, detach drive shaft at differential side.



1. Drive shaft joint
2. Center bearing support
3. Bolts

○ In case of right side oil seal:
Remove exhaust No.1 pipe.
By using plastic hammer, drive out drive shaft joint so as to release snap ring fitting of joint spline at center shaft.
After removing center bearing support bolts, pull out center drive shaft from differential gear.



1. Differential side oil seal

4) Remove oil seal and install a new one by using special tool and hammer.

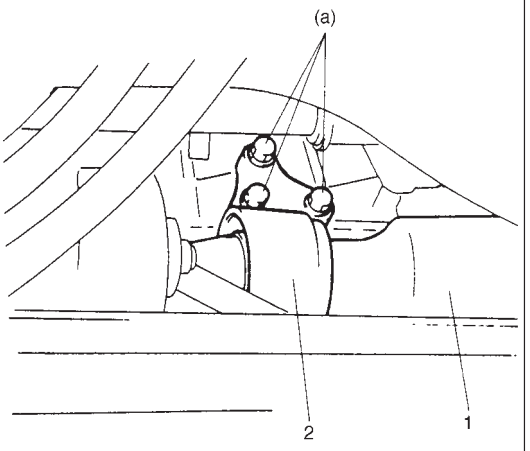
NOTE:
When installing oil seal, face its spring side inward.

Special Tool
(A): 09913-75810

Distance "a": 1.0 – 1.5 mm (0.04 – 0.06 in.)

5) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

"A": SUZUKI SUPER GREASE A, 99000-25010



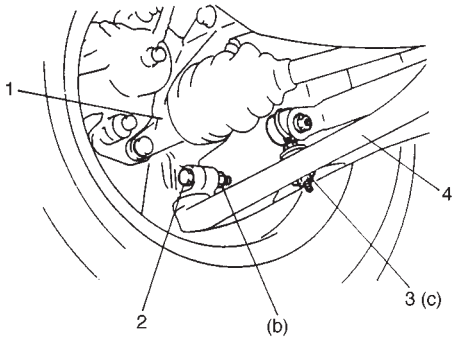
1. Drive shaft
2. Center bearing support

6) Insert drive shaft joint or center drive shaft to differential gear. With right side drive shaft, install center bearing support.

CAUTION:
- **Be careful not to scratch oil seal lip with drive shaft joint while inserting.**
- **Make sure to insert drive shaft joint fully and seat its snap ring as it was.**
- **Do not hit joint boot with hammer or the like. Nothing but hands is allowed to use when inserting joint.**

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

7) Install exhaust No.1 pipe.



1. Steering knuckle
2. Ball stud bolt
3. Link nut
4. Lower arm

8) Connect ball stud with knuckle and fasten with bolt to specification.

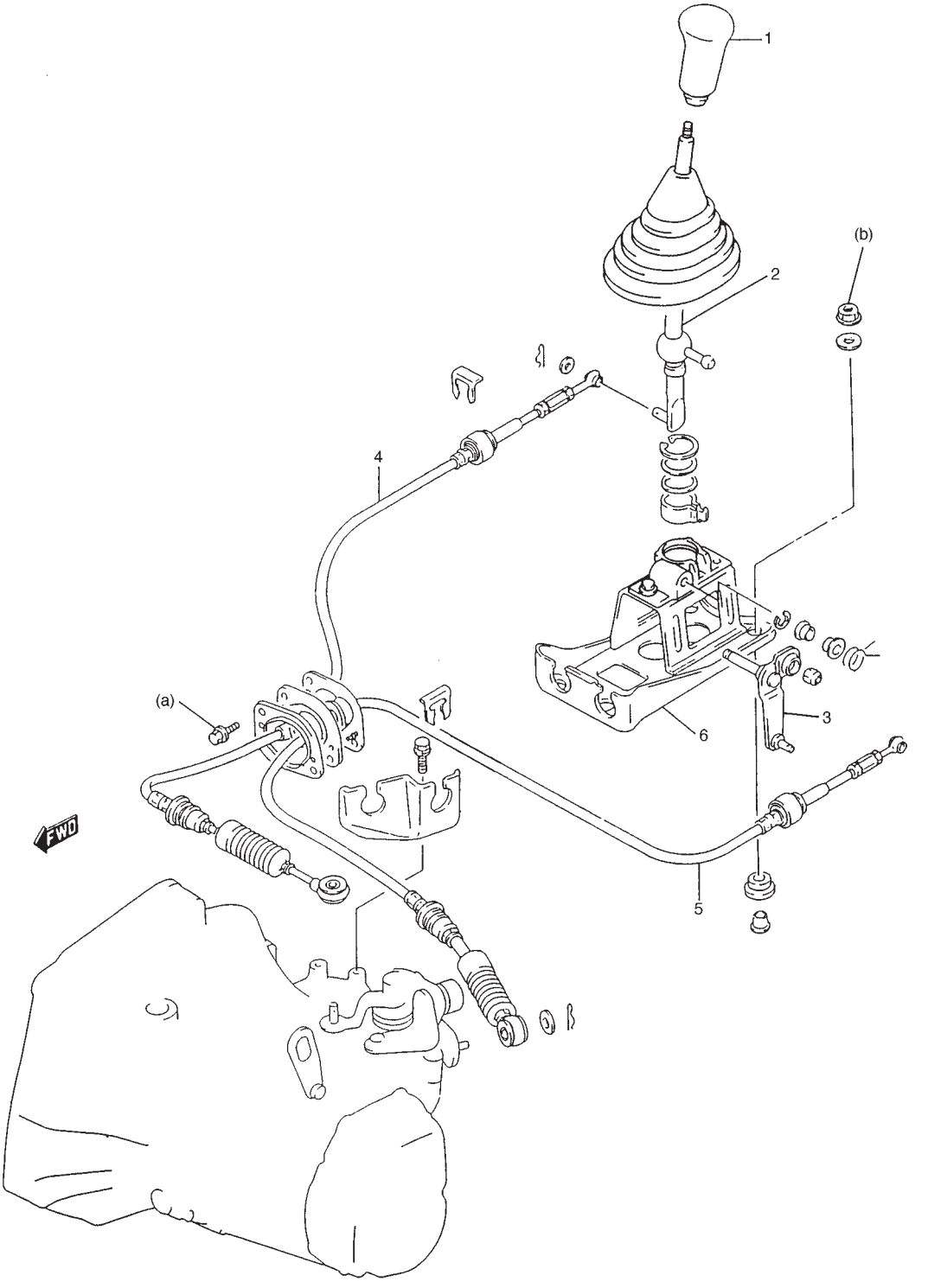
Tightening Torque
(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)

9) Install stabilizer bar to suspension arm and fasten link nut to specification.

Tightening Torque
(c): 28 N·m (2.8 kg-m, 20.5 lb-ft)

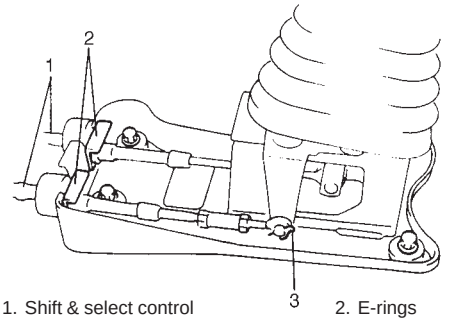
10) Fill transmission oil as specified and make sure that oil has been sealed with oil seal.

GEAR SHIFT CONTROL



1. Gear shift control lever knob
2. Gear shift control lever
3. Gear select control arm
4. Gear shift control cable
5. Gear select control cable
6. Gear shift control guide

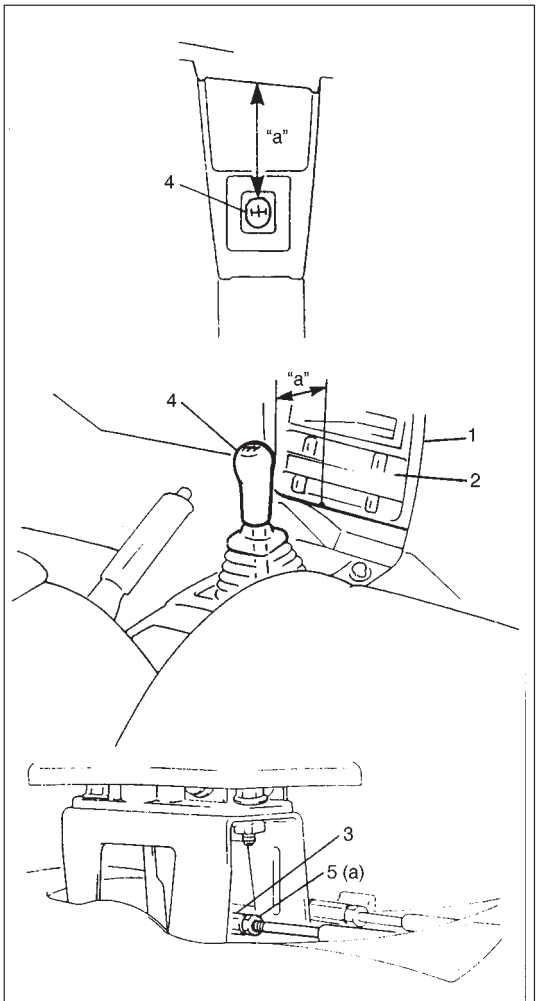
Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)
(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Shift & select control cables
2. E-rings
3. Clip

REMOVAL

1) Remove parking brake lower cover and console box.
2) Remove E-rings and clips from shift & select control cables.
3) Remove gear shift lever assembly.



1. Instrument panel
2. Heater control panel
3. Shift cable adjusting nut
4. Control lever knob
5. Lock nut

INSTALLATION

Reverse removal procedure for installation and note as follows.

○ Adjustment of shift cable.

With shift lever in NEUTRAL position, adjust shift cable adjusting nut so that distance "a" between edge of instrument panel and center of shift knob measured as shown.

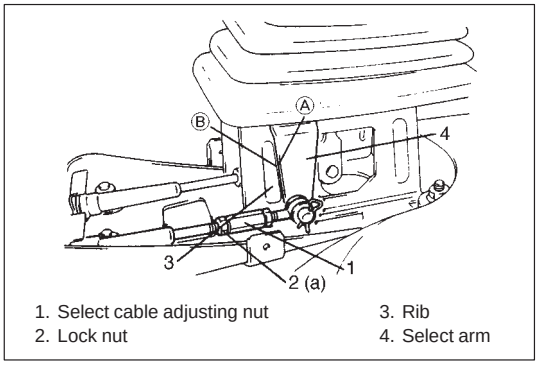
NOTE:

○ After shift cable adjustment, tighten lock nut securely.

Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)

○ Make sure that boots are installed correctly.

Distance "a": 137 mm (5.4 in.)



1. Select cable adjusting nut
2. Lock nut
3. Rib
4. Select arm

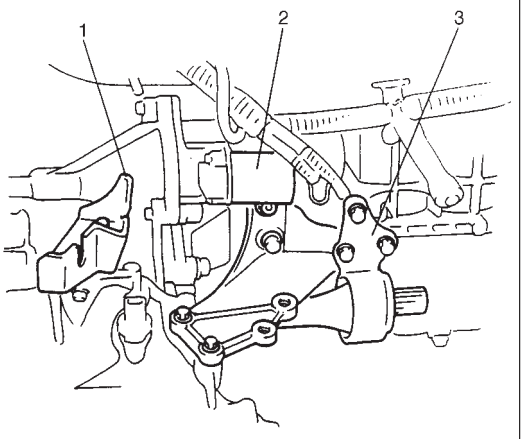
○ Adjustment of select cable.

With shift lever in NEUTRAL position, adjust select cable adjusting nut so that front side end surface Ⓐ of select arm and rear side line of rib Ⓑ are aligned.

NOTE:

After select cable adjustment, tighten lock nut securely.

Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)

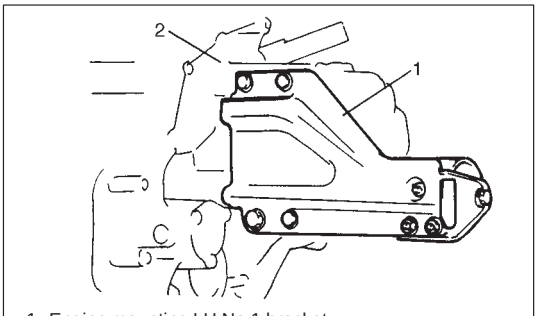


1. Transmission control cable bracket
2. Starter motor
3. Center bearing support mounting
4. Transmission case right stiffener

UNIT REPAIR OVERHAUL

DISMOUNTING OF TRANSMISSION

1) Take down engine with transmission referring to Section 6A1.
2) Remove transmission control cable bracket.
3) Remove starter motor.
4) Remove center bearing support mounting bolts and center drive shaft.
5) Remove transmission stiffener
6) Remove bolts and nuts fastening engine and transmission.
7) Remove clutch housing lower plate.



1. Engine mounting LH No.1 bracket
2. Transmission

8) Remove engine mounting LH No.1 bracket.
9) Check all around transmission for any other parts required to be removed or disconnected for removal of transmission and remove or disconnect whatever necessary.
10) Pull transmission out so as to disconnect input shaft from clutch disc.

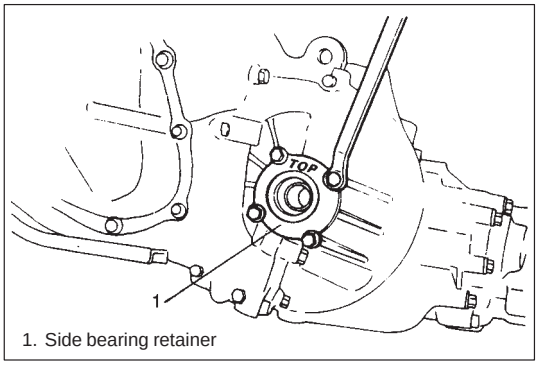
REMOUNTING

Reverse dismounting procedure. The important steps in installation are as follows.

○ Use specified torque as given blow.

Tightening Torque	N·m	kg-m	lb-ft
○ Transmission to engine bolts and nuts	90	9.0	65.0
○ Transmission control cable bracket bolts ○ Transmission case lower stiffener bolts and nut	55	5.5	40.0
○ Transmission case right stiffener bolts and nut ○ Center bearing support bolts	50	5.0	36.5

○ Remount engine with transmission according to procedure described in Section 6A1.



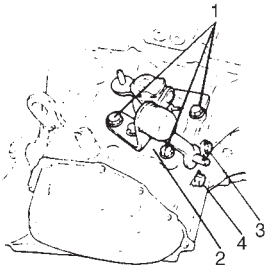
1. Side bearing retainer

DISASSEMBLING UNIT

REMOVAL OF TRANSFER AND DIFFERENTIAL

1) Remove differential side bearing retainer.
2) Remove speedometer driven gear.
3) Remove transfer assembly and differential from transmission.

CAUTION:
Be careful not to damage gear teeth surface.

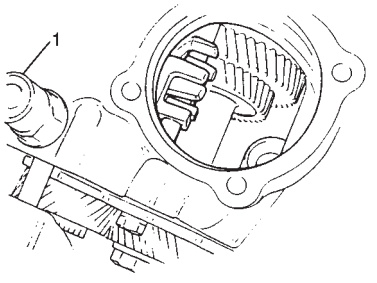


1. Bolt
2. Gear shift guide case
3. Gear shift interlock bolt
4. 5th and REV interlock guide bolt

GEAR SHIFT AND SELECT SHAFT ASSEMBLY AND FIFTH GEARS

1) Remove gear shift interlock bolt and 5th to REV interlock guide bolt from transmission case.
2) Remove gear shift & select shaft assembly.
3) Remove 9 bolts and take off transmission side cover.

CAUTION:
Care should be taken not to distort side cover when it is removed from left case.

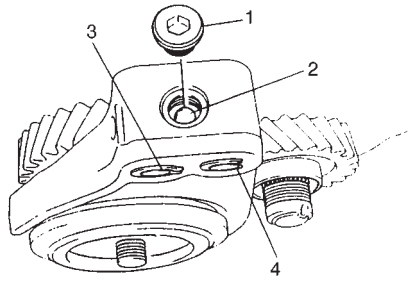


1. Backup light switch

4) Engage gear double meshing to loosen counter shaft and input shaft nuts.
5) Remove shaft nuts and then hub plate.

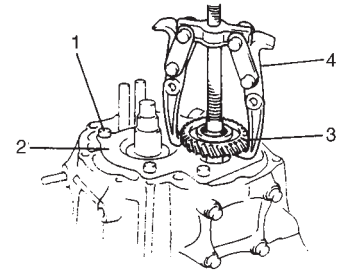
NOTE:
Do not hammer when loosening nuts.

6) Remove backup light switch.



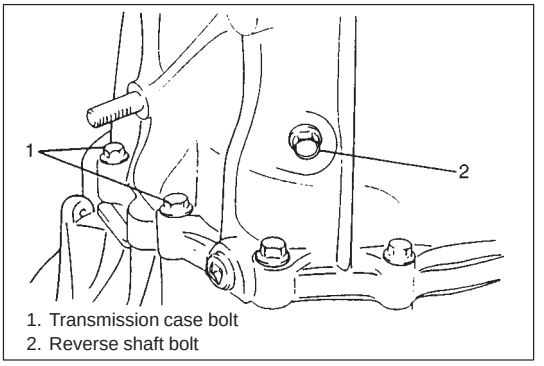
1. 5th shift fork plug
2. Shift guide ball
3. Circlip
4. C-ring

7) Remove 5th shift fork plug and guide ball.
8) Remove circlip and C-ring.
9) For removal procedure, refer to Step 5) of Fifth Gear in Section 7A (DISASSEMBLING UNIT).



1. Plate bolt
2. Left case plate
3. Countershaft 5th gear
4. Gear puller

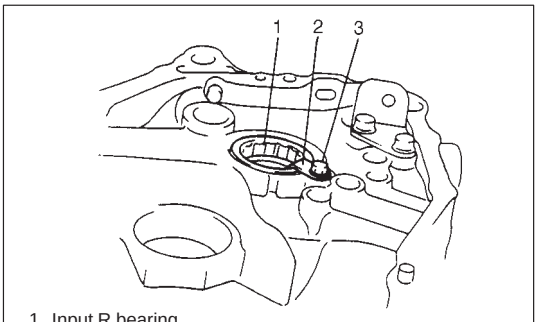
10) Remove input shaft 5th gear, needle bearing and then counter shaft 5th gear. Gear puller would be necessary if spline fitting of counter shaft 5th gear is tight.
11) Remove bolts and take off left case plate, and then bearing set shim.
12) Remove C-ring of input shaft L bearing.



1. Transmission case bolt
2. Reverse shaft bolt

MAIN SHAFT AND COUNTER SHAFT

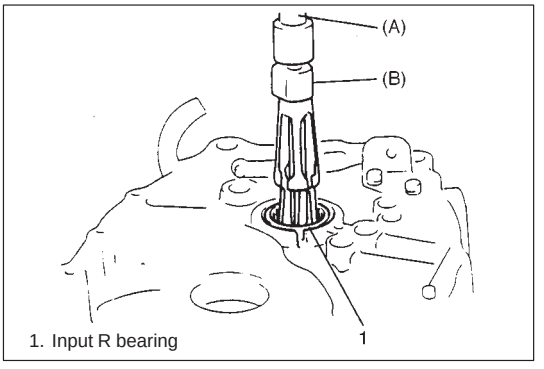
1) For removal procedure, refer to Steps 3), 6) and 8) of Gear Shifter, Main Shaft and Counter Shaft in Section 7A (DISASSEMBLING UNIT).
2) Remove transmission case outside bolts and clutch housing bolts.
3) For removal procedure, refer to Steps 10) and 12) to 16) of Gear Shifter, Main Shaft and Counter Shaft in Section 7A (DISASSEMBLING UNIT).



1. Input R bearing
2. Plate
3. Bolt

RIGHT CASE

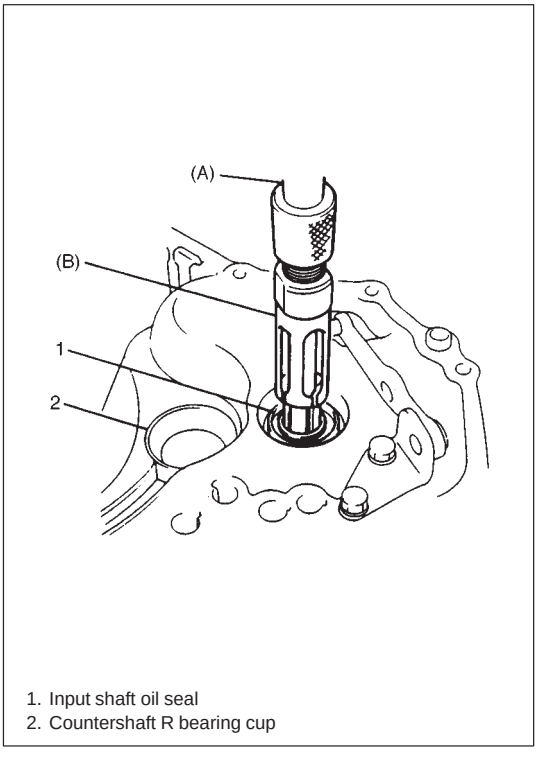
1) Remove input R bearing stopper bolt and plate.



1. Input R bearing

2) Remove input R bearing by using special tools.

Special Tool
(A): 09930-30104
(B): 09923-74510

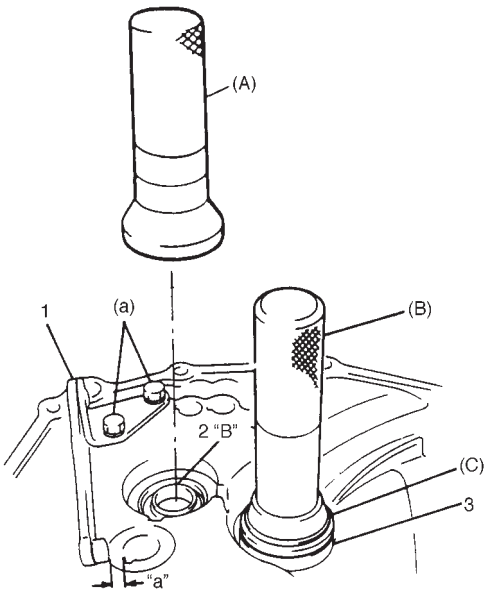


1. Input shaft oil seal
2. Countershaft R bearing cup

3) Remove input shaft oil seal by using special tools (combination of bearing remover and sliding shaft).

Special Tool
(A): 09930-30104
(B): 09923-74510

4) Also pull out countershaft R bearing cup by using bearing remover 09941-64511 with sliding shaft 09930-30104.



1. Reverse gear shift lever
2. Input shaft oil seal
3. Countershaft R bearing cup

SUB ASSEMBLY SERVICE

RIGHT CASE

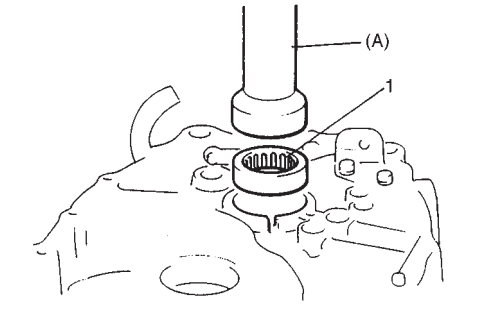
1) For installation procedure, refer to Step 1) of same item in Section 7A.
2) Install input shaft oil seal facing its spring side upward. Use special tool and hammer for installation and apply grease to oil seal lip.

   "B": SUZUKI SUPER GREASE A, 99000-25010

   Special Tool
   (A): 09913-84510

3) Install countershaft R bearing cup by using special tools and hammer.

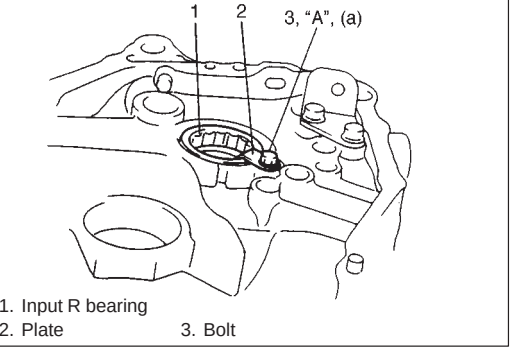
   Special Tool
   (B): 09913-75821
   (C): 09924-84510-004



1. Input R bearing

4) Install input R bearing by using special tool and hammer.

   Special Tool
   (A): 09913-76010



1. Input R bearing
2. Plate
3. Bolt

5) Install input R bearing stopper plate and bolt applied with thread lock cement.

   "A": Thread lock 1322, 99000-32110

   Tightening Torque
   (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

LEFT CASE

1) For installation procedure, refer to Steps 1) and 3) of same item in Section 7A.

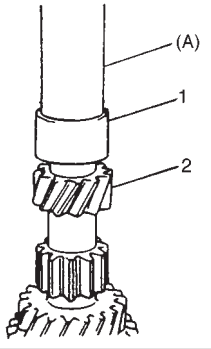
INPUT SHAFT ASSEMBLY

Disassembly

1) Remove input shaft R bearing spacer and circlip.
2) For disassembly procedure, refer to Steps 2) to 7) of same item in Section 7A.

Inspection and Reassembly

1) For inspection and reassembly procedure, refer to Steps 1) to 4) of same item in Section 7A.

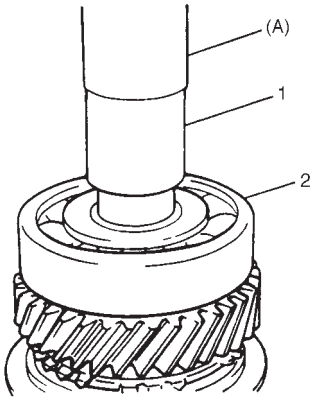


1. R bearing spacer
2. Input shaft

2) Drive in R bearing spacer by using special tool and hammer.

Special Tool
(A): 09913-80112

3) Install circlip to input shaft.
4) For inspection and reassembly procedure, refer to Steps 6) to 8) of same item in Section 7A.



1. 5th gear spacer
2. L bearing (Install it first)

5) Press-fit L bearing by using special tool and hammer.

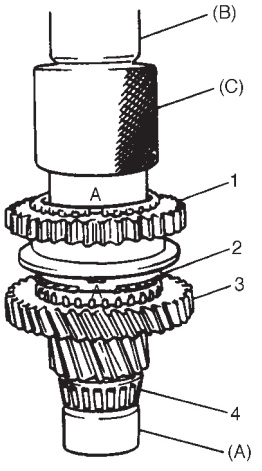
Special Tool
(A): 09913-80112

6) Using the same special tool, drive in 5th gear spacer.

CAUTION:
To prevent 5th gear spacer from being distorted because of excessive compression, do not press-fit it with L bearing at once.

COUNTERSHAFT ASSEMBLY

1) For disassembly procedure, refer to Steps 1) to 8) of same item in Section 7A.



1. Low speed sleeve & hub assembly
2. 1st gear synchronizer ring
3. Countershaft 1st gear
4. R bearing cone

A: Align key slots with keys

Inspection and Reassembly

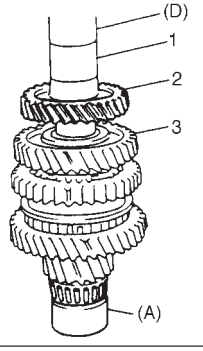
1) For inspection and reassembly procedure, refer to Steps 1) to 6) of same item in Section 7A.
2) Drive in low speed sleeve & hub assembly by using special tool and hammer.

NOTE:

- **Support shaft with special tool as illustrated left so that retainer of bearing cone will be free from compression.**
- **Make sure that synchronizer ring key slots are aligned with keys while press-fitting sleeve & hub assembly.**
- **Check free rotation of 1st gear after press-fitting sleeve & hub assembly.**

Special Tool
(A): 09923-78210
(B): 09913-85210
(C): 09940-54910

3) For inspection and reassembly procedure, refer to Step 8) of same item in Section 7A.

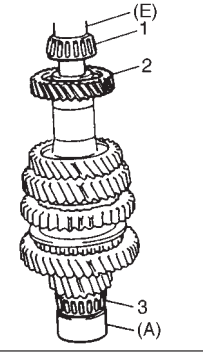


1. 3rd & 4th gear spacer
2. 3rd gear
3. 2nd gear

4) Press-fit 3rd gear and spacer by using special tool and press.

NOTE:
It is recommended to press-fit spacer and 3rd gear first, and then 4th gear later separately so that countershaft will not be compressed excessively.

Special Tool
(A): 09923-78210
(D): 09913-85210

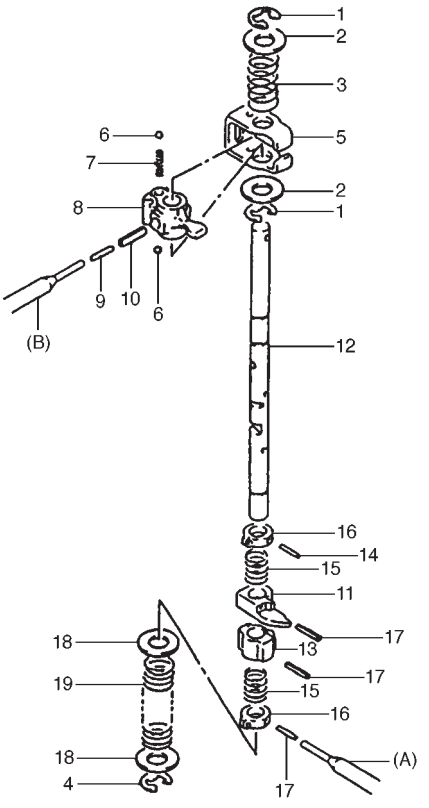


1. L bearing cone
2. 4th gear
3. R bearing cone

5) Press-fit 4th gear by using the same procedure as the above.
6) Install L bearing cone by using special tool and hammer.

NOTE:
For protection of bearing cone, always support shaft with special tool as illustrated.

Special Tool
(A): 09923-78210
(E): 09913-80112



1. E-ring
2. Thrust washer
3. Reverse select spring
4. E-ring
5. Gear shift interlock plate
6. Ball
7. Gear shift interlock spring
8. Gear shift select lever
9. Spring pin
10. Spring pin
11. Gear shift No.1 cam
12. Gear shift select shaft
13. Fifth/reverse gear shift cam
14. Spring pin
15. Cam guide return spring
16. Fifth/reverse gear shift cam guide
17. Spring pin
18. Thrust washer
19. Low select spring

GEAR SHIFTER

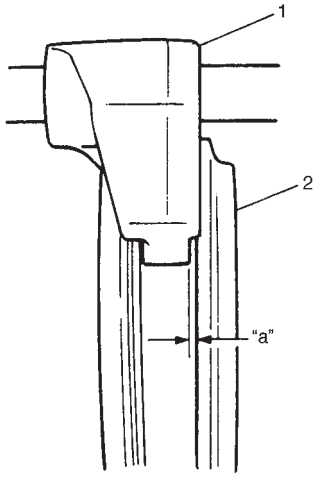
Gear Shift & Select Shaft Assembly

1) To disassemble component parts, use special tools and 2.8 – 3.0 mm (0.11 in.) pin remover in addition.

Special Tool
(A): 09922-85811 (4.5 mm)
(B): 09925-78210 (6.0 mm)

2) Clean all parts thoroughly, inspect them and replace with new ones as required.
3) Assemble component parts by reversing removal procedure.

NOTE:
- **When driving in spring pins, prevent shaft from being bent by supporting it with wood block.**
- **Assemble 5th & REV gear shift cam by winding cam guide return spring, and then drive in spring pin.**
- **Locate low speed select spring (Lower position) and reverse select spring (Yellow – Upper position) correctly.**



1. Gear shift fork
2. Synchronizer sleeve

High Speed and Low Speed Gear Shift Shafts

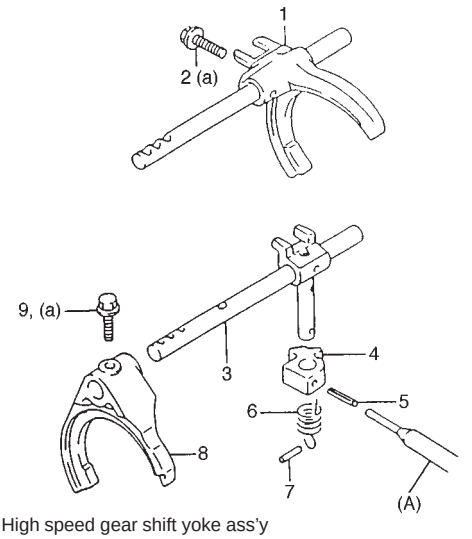
Inspection

1) Using feeler gauge, check clearance between fork and sleeve and replace those parts if it exceeds limit of 1.0 mm (0.039 in.)

NOTE:
For correct judgement of parts replacement, carefully inspect contact portion of fork and sleeve.

Clearance "a": Service limit 1.0 mm (0.039 in.)

2) Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.



1. High speed gear shift yoke ass'y
2. Low/high speed fork bolt
3. Low speed gear shift yoke ass'y
4. Gear shift No.2 cam
5. Pin
6. No.2 cam return spring
7. Pin
8. Low speed gear shift fork
9. Low/high speed fork bolt

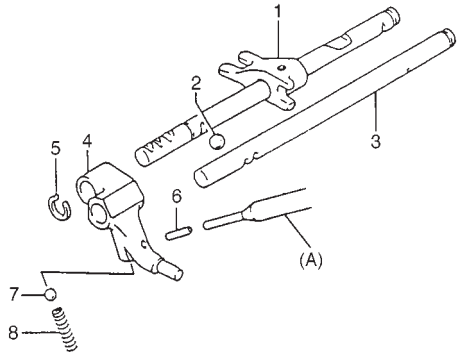
3) Disassemble component parts by using spring pin remover and hammer.

Special Tool
(A): 09922-85811 (4.5 mm)

4) Assemble shift shafts as shown while making sure that component parts are in proper order.

NOTE:
- **Correct shaft surface by using oil stone, if any scratch or dent is found.**
- **Support shaft with wood blocks when driving in spring pins.**

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Fifth/reverse gear shift yoke
2. Ball
3. Fifth/reverse gear shift guide shaft
4. Reverse gear shift arm
5. Snap ring
6. Pin
7. Ball
8. Reverse gear shift arm spring

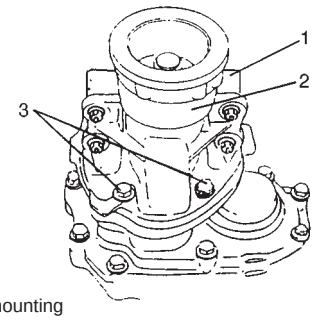
5th & REV Gear Shifter

1) Disassemble component parts by using spring pin remover and hammer.

Special Tool
(A): 09922-85811 (4.5 mm)

2) Replace or correct parts as required and assemble shafts making sure that component parts are in proper order as shown.

NOTE:
Install 2 steel balls in reverse gear shift arm without fail.

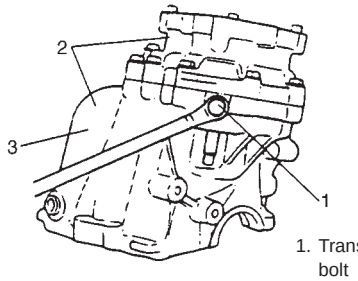


1. Rear mounting
2. Output case
3. Output case bolt

TRANSFER ASSEMBLY

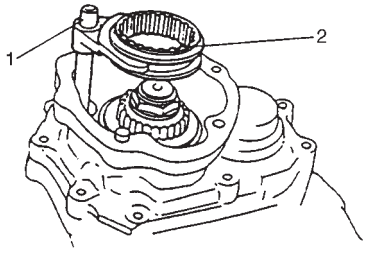
Disassembly

1) Remove rear mounting.
2) Remove output case bolts.



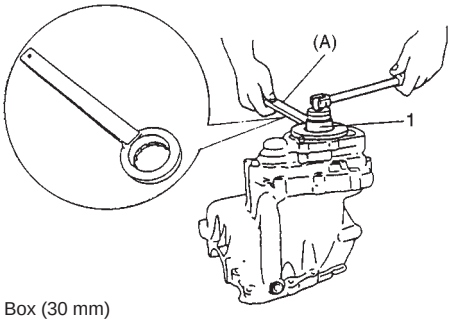
1. Transfer lock bolt
2. Driven case
3. Rear case

3) Remove transfer lock bolt from rear case.



1. Shift fork shaft
2. Sleeve

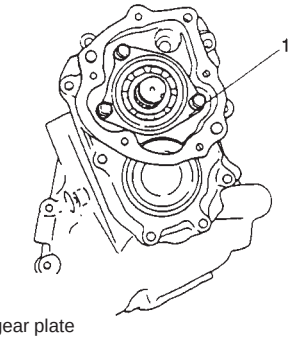
4) Remove shift fork shaft and then sleeve.



1. Box (30 mm)

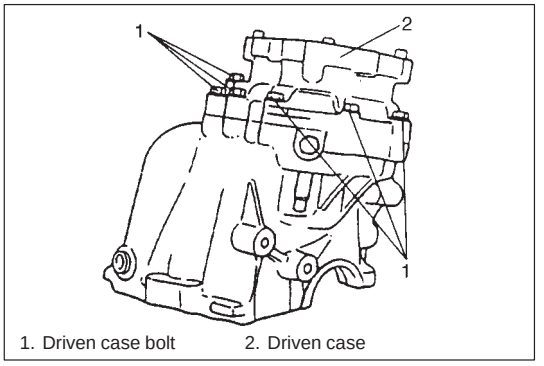
5) Remove caulking of driven gear nut, loosen nut as shown and remove clutch dog.

Special Tool
(A): 09927-25411



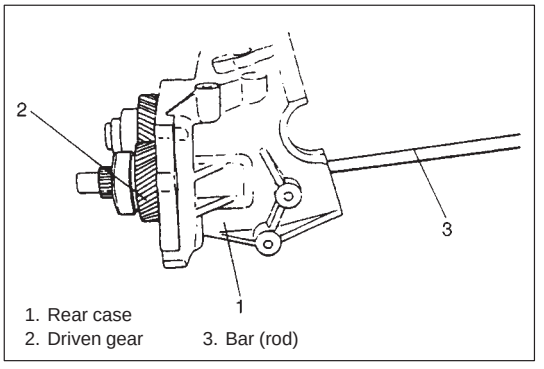
1. Driven gear plate

6) Remove driven gear plate and then circlip of ball bearing.



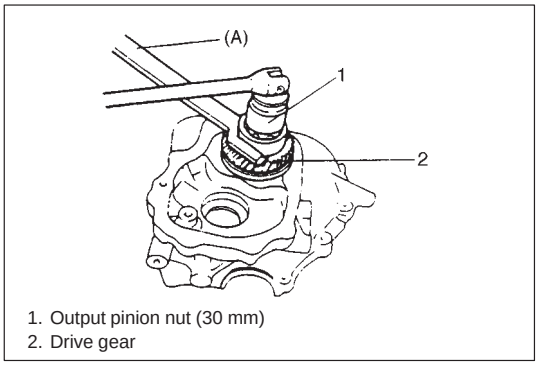
1. Driven case bolt 2. Driven case

7) Loosen driven case bolt and remove driven case.



1. Rear case
2. Driven gear 3. Bar (rod)

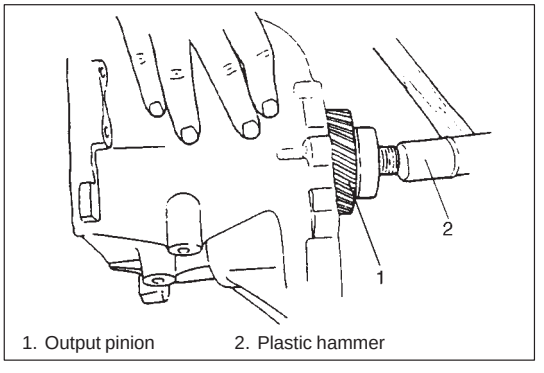
8) Drive driven gear out of rear case.



1. Output pinion nut (30 mm)
2. Drive gear

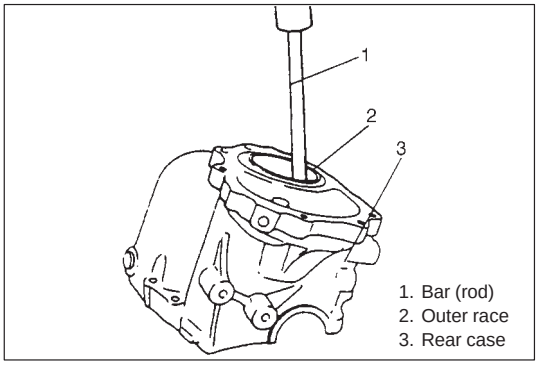
9) Using special tool, hold drive gear securely and loosen output pinion nut.

Special Tool
(A): 09927-76030



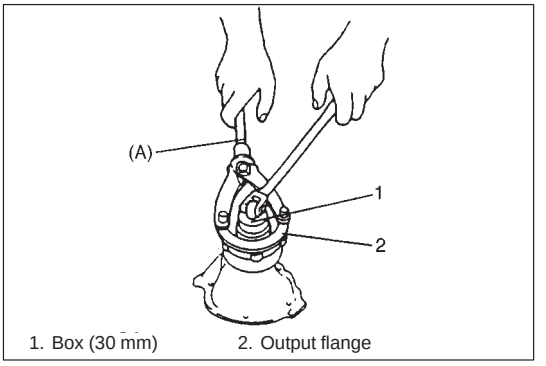
1. Output pinion 2. Plastic hammer

10) Drive out output pinion with plastic hammer.



1. Bar (rod)
2. Outer race
3. Rear case

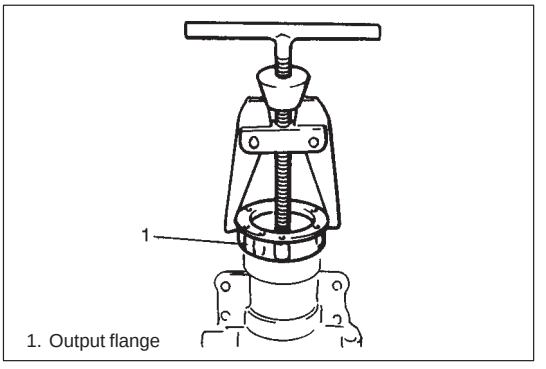
11) Drive pinion bearing outer races out of rear case.



1. Box (30 mm)
2. Output flange

12) Remove caulking of output shaft nut and loosen it with flange fixed as shown.

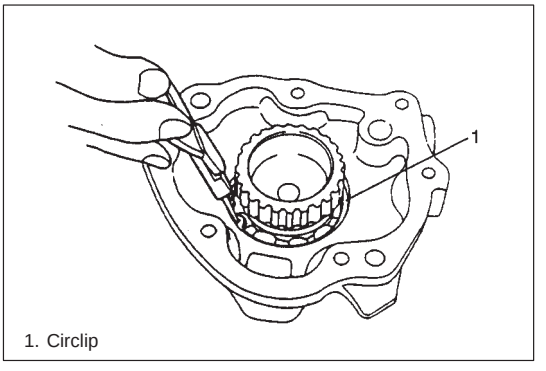
Special Tool
(A): 09930-40113



1. Output flange

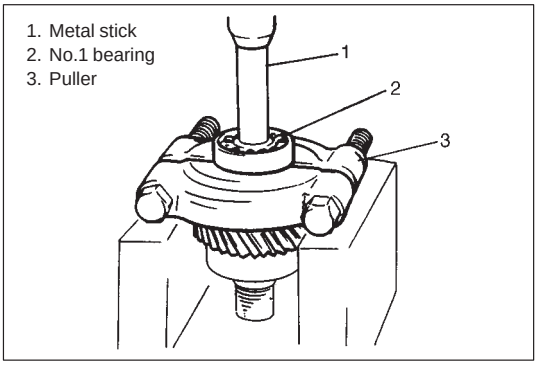
13) Using special tool, remove output flange.

Special Tool
(A): 09913-60910



1. Circlip

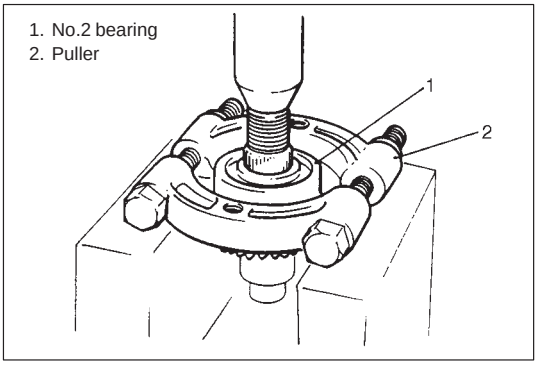
14) Remove output No.1 bearing circlip.
15) Using plastic hammer, drive out output shaft bearing.



1. Metal stick
2. No.1 bearing
3. Puller

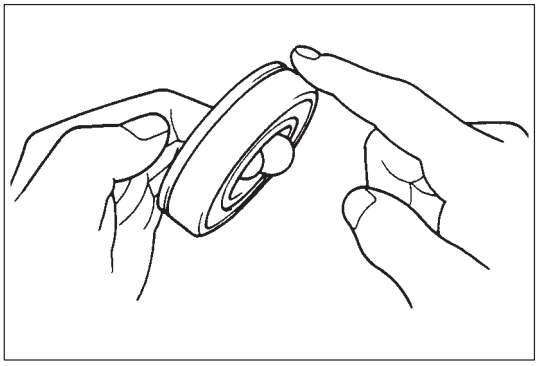
Driven Gear

1) Drive out No.1 bearing by using puller, metal stick and press.



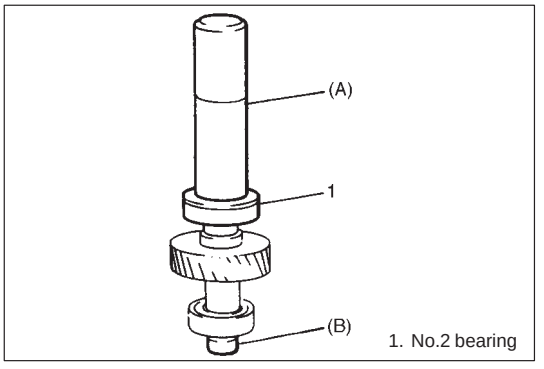
1. No.2 bearing
2. Puller

2) Drive out No.2 bearing by using puller and press.



Inspection and reassembly

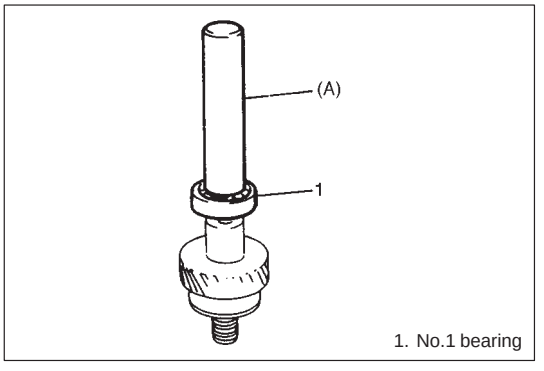
1) Check tooth surface of gear and rotation of bearing and replace with new one if necessary
   As long as no abnormal condition such as noise exists before removal, replacement is unnecessary.



1. No.2 bearing

2) Drive in No.2 bearing by using special tools and hammer.

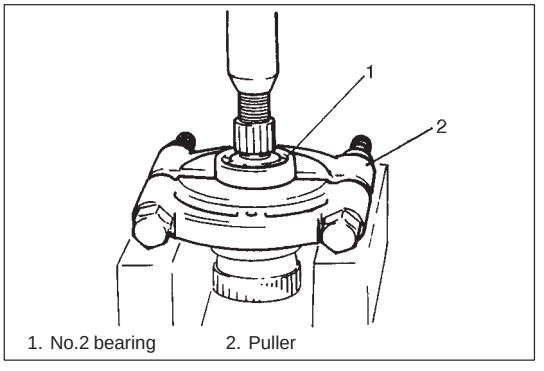
   Special Tool
   (A): 09913-84510
   (B): 09926-58010



1. No.1 bearing

3) Drive in No.1 bearing by using special tool and hammer.

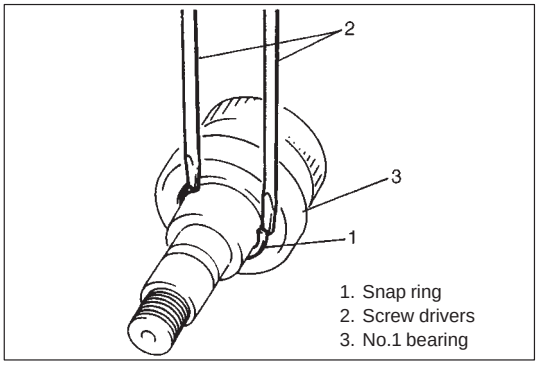
   Special Tool
   (A): 09913-80112



1. No.2 bearing 2. Puller

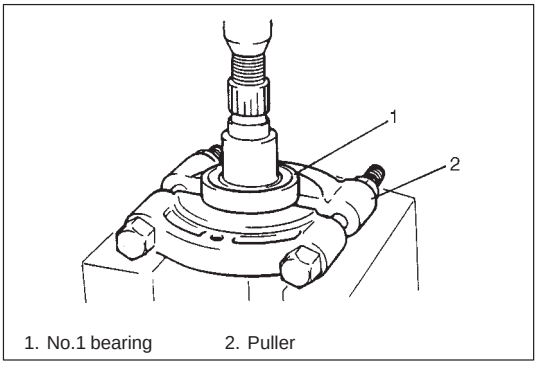
Output Shaft

1) Drive out No.2 bearing by using puller and press.



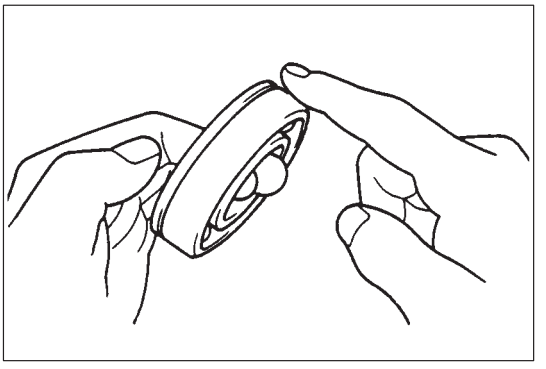
1. Snap ring
2. Screw drivers
3. No.1 bearing

2) Remove snap ring by using screw drivers.



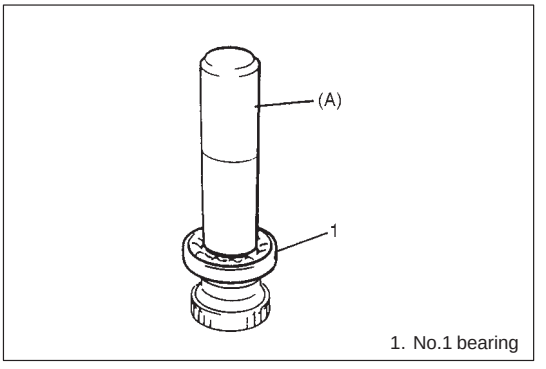
1. No.1 bearing 2. Puller

3) Drive out No.1 bearing by using puller and press.



Inspection and reassembly

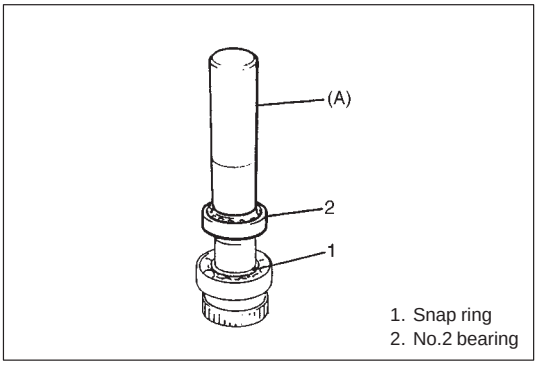
1) Check tooth surface of hub and rotation of bearing and replace with new one if necessary.
   As long as no abnormal condition such as noise exists before removal, replacement is unnecessary.



1. No.1 bearing

2) Drive in No.1 bearing by using special tool and hammer.

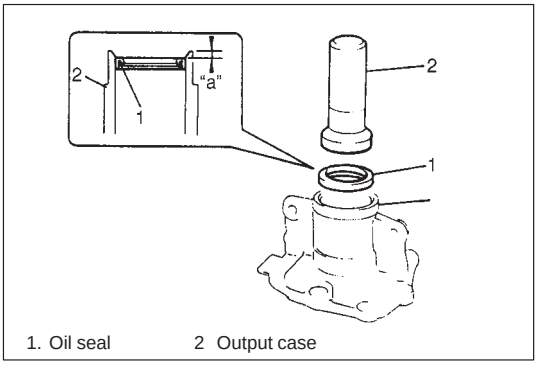
   Special Tool
   (A): 09913-84510



1. Snap ring
2. No.2 bearing

3) Install snap ring.
4) Drive in No.2 bearing by using special tool and hammer.

   Special Tool
   (A): 09913-80112



1. Oil seal 2 Output case

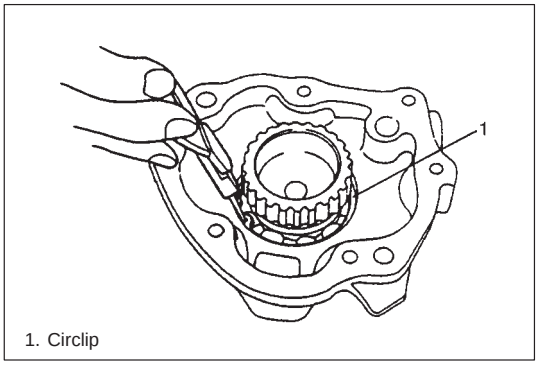
Sub Assembly Service

Output case

1) If oil seal is removed,install new oil seal with grease applied to oil seal lip by using special tool.
   "A": SUZUKI SUPER GREASE A, 99000-25010

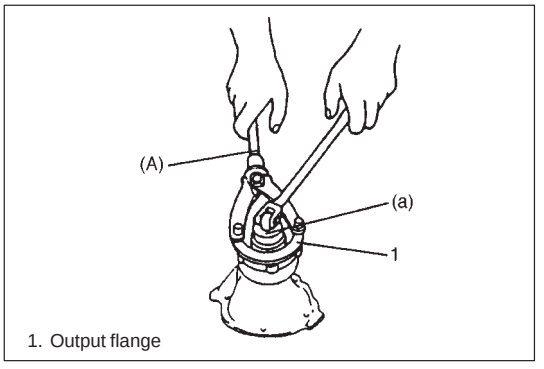
   Special Tool
   (A): 09913-75810

   Clearance
   "a": 1.0 – 1.5 mm (0.04 – 0.06 in.)



1. Circlip

2) Install output shaft to output case.
3) Install output No.1 bearing circlip

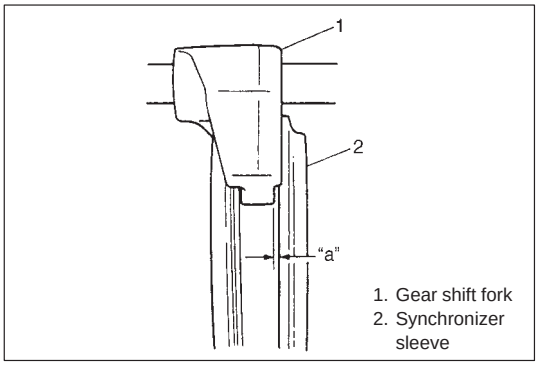


1. Output flange

4) Install output flange, washer and nut.
5) Tighten nut to specified torque by using special tool and then caulk nut.

Special Tool
(A): 09930-40113

Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



1. Gear shift fork
2. Synchronizer sleeve

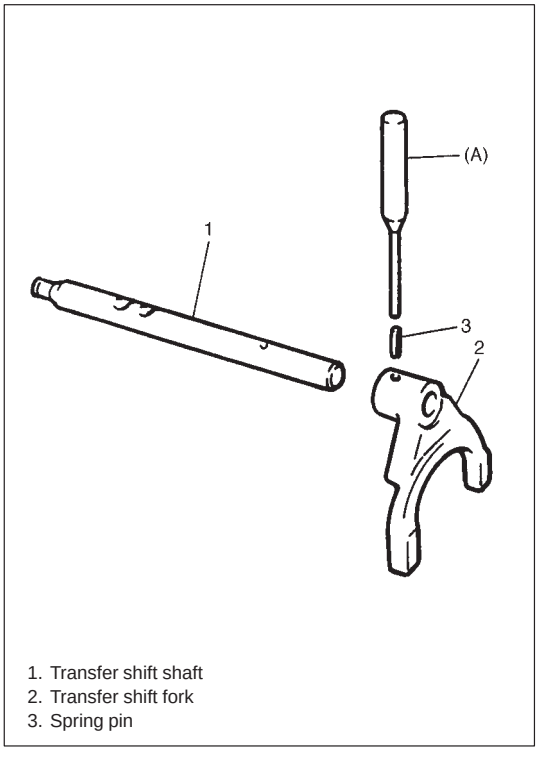
Transfer Gear Shifter

Inspection

1) Using feeler gauge, check clearance between fork and sleeve and replace those parts if it exceeds limit of 1.0 mm (0.04 in.)

NOTE:
For correct judgement of parts replacement, carefully inspect contact portion of fork and sleeve.

Clearance "a": 1.0 mm (0.039 in.)



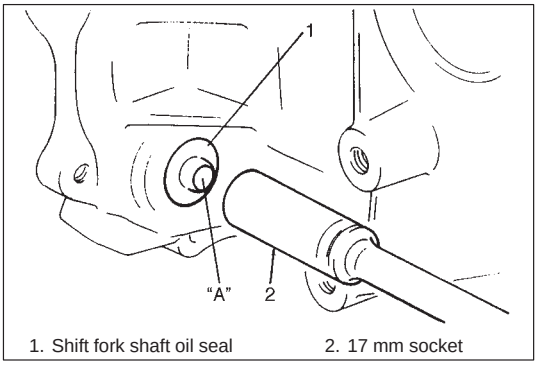
1. Transfer shift shaft
2. Transfer shift fork
3. Spring pin

2) Insert transfer shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.
3) Disassemble component parts by using spring pin remover and hammer.

Special Tool
(A): 09922-85811 (4.5 mm)

4) Assemble shift shafts as shown while making sure that component parts are in proper order.

NOTE:
- ○ **Correct shaft surface by using oil stone, if any scratch or dent is found.**
- ○ **Support shaft with wood blocks when driving in spring pins.**

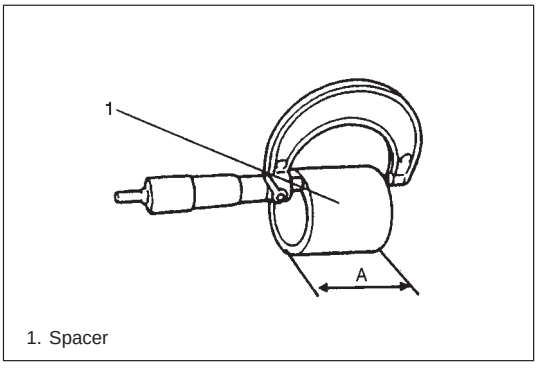


1. Shift fork shaft oil seal 2. 17 mm socket

Rear Case

1) If shift fork shaft oil seal is removed, push in new oil seal with grease applied to oil seal lip by using 1 7 mm socket.

"A": SUZUKI SUPER GREASE A, 99000-25010

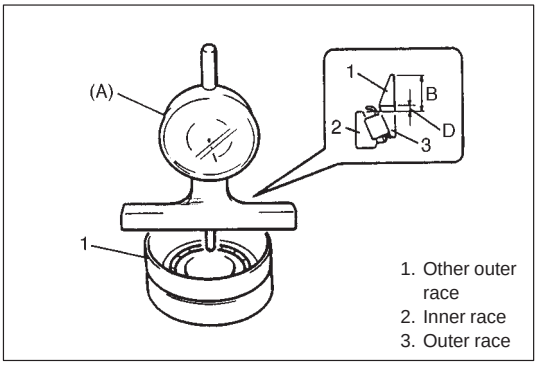


1. Spacer

Adjustment

Bevel pinion bearing shim adjustment

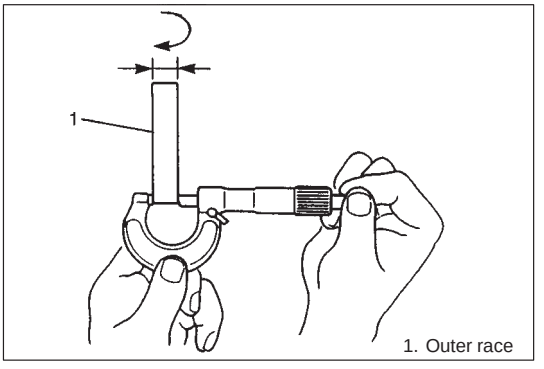
1) Measure drive pinion spacer length A.



1. Other outer race
2. Inner race
3. Outer race

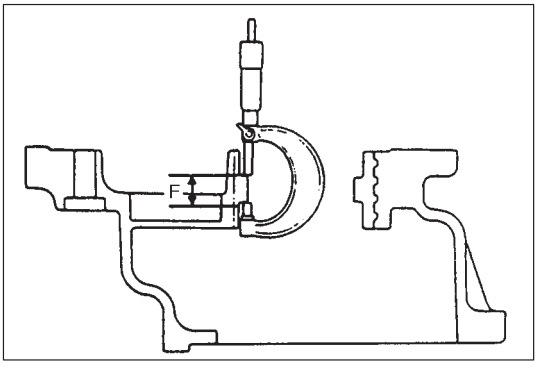
3) Measure level difference B between other outer race plus outer race and inner race of bevel pinion bearing (at both front and rear).
Level difference at front bearing plus other outer race: B
Level difference at rear bearing plus other outer race: B'

Special Tool
(A): 09922-77241



1. Outer race

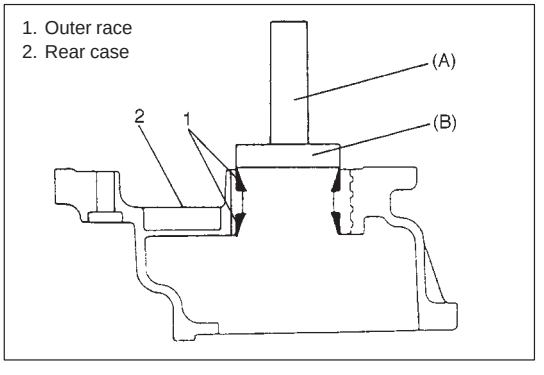
4) Measure other outer race length C.
Level difference at front bearing: B – C = D
Level difference at rear bearing : B' – C = D'
D + D' = E



5) Measure dimension F of differential carrier.
E + F = G
Measured level difference = G – A

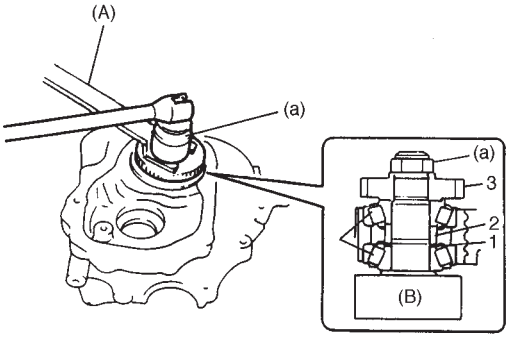
6) Using following table, select necessary shim(s). UNIT (mm)

Shim to use / Measured level difference	0.60	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.30
0.976 – 1.005	©										©
1.006 – 1.035		©									©
1.036 – 1.065			©								©
1.066 – 1.095				©							©
1.096 – 1.125					©						©
1.126 – 1.155						©					©
1.156 – 1.185							©				©
1.186 – 1.215								©			©
1.216 – 1.245									©		©
1.246 – 1.275										©	©
1.276 – 1.305	© ©										
1.306 – 1.335	©	©									
1.336 – 1.365	©		©								
1.366 – 1.395	©			©							
1.396 – 1.425	©				©						
1.426 – 1.455	©					©					
1.456 – 1.485	©						©				
1.486 – 1.515	©							©			
1.516 – 1.545	©								©		
1.546 – 1.575	©									©	
1.576 – 1.605		©								©	
1.606 – 1.635			©							©	
1.636 – 1.665				©						©	



7) Press-fit bevel pinion bearing and outer race into rear case.

Special Tool
(A): 09924-74510
(B): 09951-16090



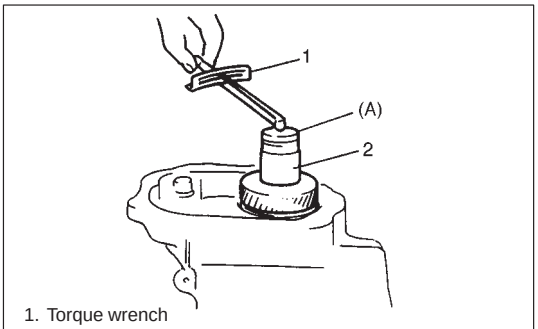
1. Shim
2. Spacer
3. Drive gear

Bevel pinion shim adjustment
(Mounting distance adjustment)

1) Place bearings, spacer, shim(s) and drive gear on bevel pinion dummy of special tool (Bevel pinion dummy set) and tighten bevel pinion nut to specified torque.
Use new nut.

Tightening Torque
(a): 120 N·m (12.0 kg-m, 87.0 lb-ft)

Special Tool
(A): 09927-76030
(B): 09922-77270



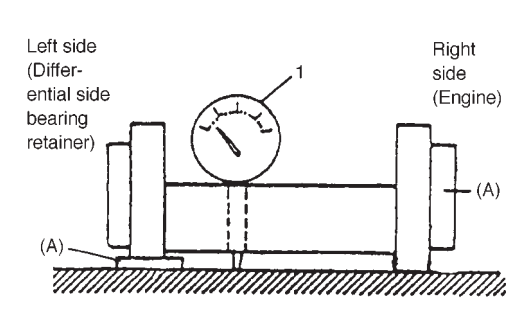
1. Torque wrench
2. Box (30 mm)

2) Using torque wrench, measure preload.

Standard value of preload: 5 – 13 kg-cm (0.37 – 1.08 lb-ft)

Special Tool
(a): 09915-24550

NOTE:
- **Apply thin coat of gear oil to bearing before measurement.**
- **Also before measuring preload, turn taper bearing a few times to ensure its good fitting.**

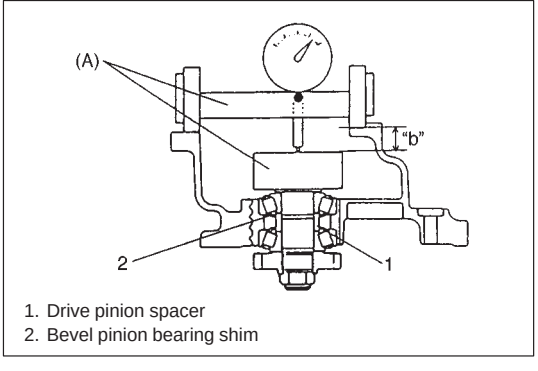


1. Dial gauge

3) Place bevel pinion adjuster on surface plate as shown and set dial gauge to “0”.

Special Tool
(A): 09922-77270

NOTE:
As bearing size is different between right and left, use shim supplied in bevel pinion dummy set under smaller size bearing as shown.



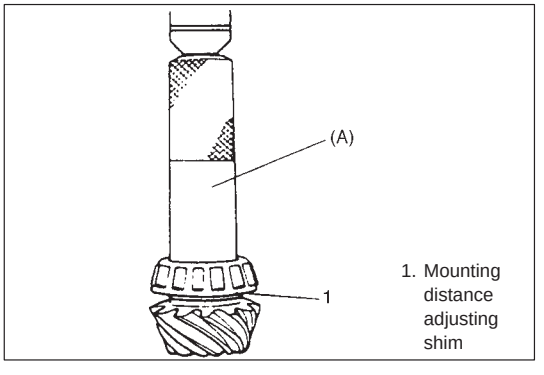
1. Drive pinion spacer
2. Bevel pinion bearing shim

4) Measure dimension “b” in figure by reading dial gauge.

SPECIAL Tool
(A): 09922-77270

5) Using the following table, select necessary shim (s). UNIT (mm)

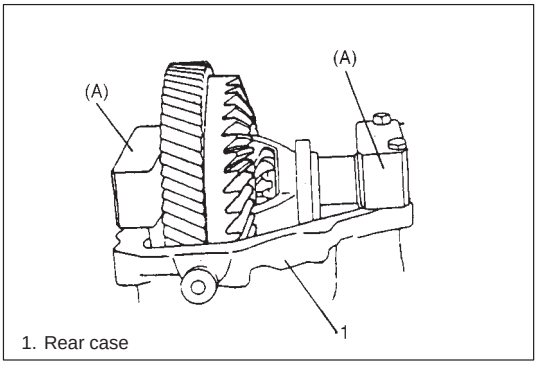
Shim to use / Measured level difference Dimension "b"	0.60	0.63	0.66	0.69	0.72	0.75	0.78	0.81	0.84	0.87	0.30
0.586 – 0.615	©										
0.616 – 0.645		©									
0.646 – 0.675			©								
0.676 – 0.705				©							
0.706 – 0.735					©						
0.736 – 0.765						©					
0.766 – 0.795							©				
0.796 – 0.825								©			
0.826 – 0.855									©		
0.856 – 0.885										©	
0.886 – 0.915	©										©
0.916 – 0.945		©									©
0.946 – 0.975			©								©
0.976 – 1.005				©							©
1.006 – 1.035					©						©
1.036 – 1.065						©					©
1.066 – 1.095							©				©
1.096 – 1.125								©			©
1.126 – 1.155									©		©
1.156 – 1.185										©	©
1.186 – 1.215	© ©										
1.216 – 1.245	©	©									



1. Mounting distance adjusting shim

6) Press-fit shim(s) and bearing into bevel pinion bearing.

Special Tool
(A): 09913-84510

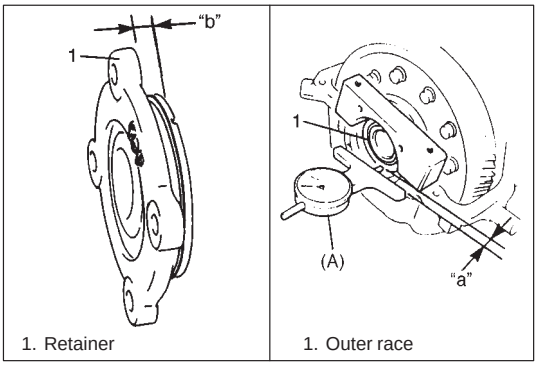


1. Rear case

Drive bevel gear backlash adjustment and side bearing preload adjustment

1) Using special tool, install differential assembly into rear case.

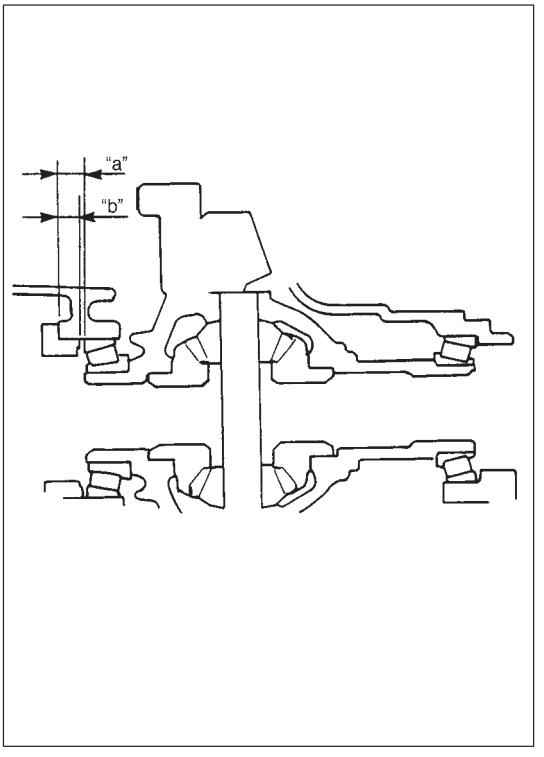
Special Tool
(A): 09927-56030



1. Retainer
1. Outer race

2) Using depth gauge, measure depth "a" down to bearing outer race and obtain difference with dimension "b" of bearing retainer; "a" – "b" = "c".

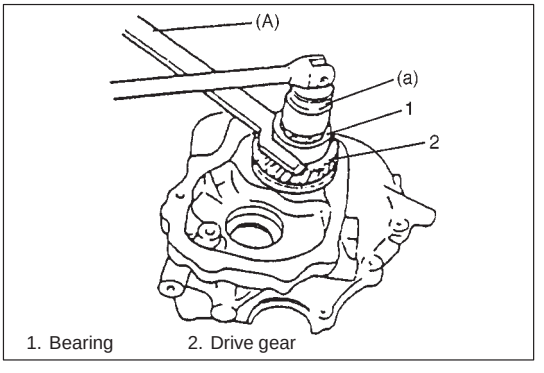
Special Tool
(A): 09922-77241



3) Calculate shim thickness to be inserted into differential side bearing.
Shim thickness = "c" + (0.085 to 0.114 mm)
(0.0033 to 0.0045 in.)

4) Select shim(s) to fit within calculated value.

Available shims	0.30, 0.87, 0.84, 0.81, 0.78, 0.75, 0.72, 0.69, 0.66, 0.63, and 0.60 mm 0.012, 0.034, 0.033, 0.032, 0.031, 0.029, 0.028, 0.027, 0.026, 0.025 and 0.024 in.

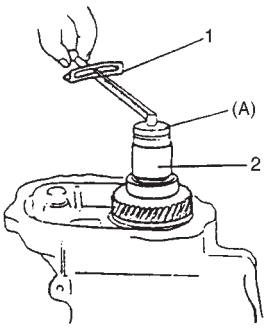


1. Bearing 2. Drive gear

5) Place bearings, spacer, shim(s) and drive gear to rear case and tighten bevel pinion nut to specified torque.

Tightening Torque
(a): 120 N·m (12.0 kg-m, 87.0 lb-ft)

Special Tool
(A): 09927-76030



1. Torque wrench
2. Box (30 mm)

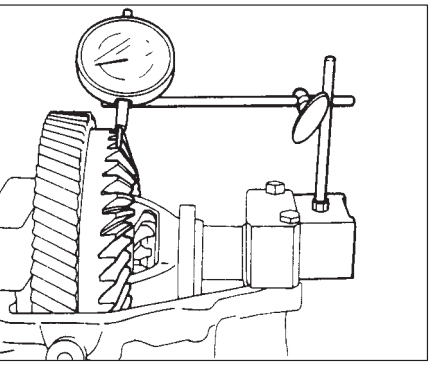
6) Using torque wrench, measure preload.

Standard value of preload: 0.5 – 1.3 N·m
(5 – 13 kg-cm, 0.37 – 0.94 lb-ft)

Special Tool
(A): 09915–24550

NOTE:
- **Apply thin coat of gear oil to bearing before measurement.**
- **Also before measuring preload, turn taper bearing a few times to ensure its good fitting.**

7) Caulk bevel pinion nut.



8) Adjust the driving bevel gear backlash by adding or taking off shims in bearing gap of the left and right cases (stopper) so as to obtain the specified value for the backlash.
9) To measure drive bevel gear backlash, set dial gauge at right angle to bevel gear tooth, fix drive bevel pinion and rear dial gauge while moving bevel gear.

Drive bevel gear backlash: 0.10 – 0.18 mm
(0.004 – 0.007 in.)

10) With bevel gear installed, measure starting torque by using differential preload adjusting tool. If bevel pinion starting torque and side bearing starting torque with bevel gear installed (bevel pinion bearing + side bearing preload) is within standard value, side bearing preload is satisfactory.

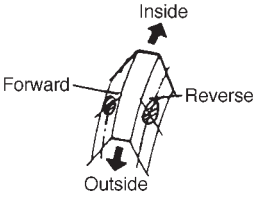
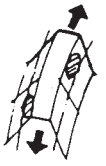
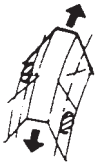
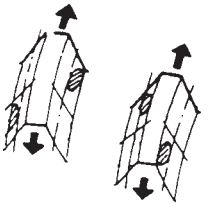
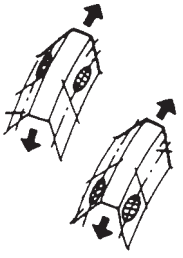
Side bearing preload: Measured bevel pinion preload + standard value 0.3 – 0.5 N·m
(3 – 5 kg-cm, 0.217 – 0.361 lb-ft)

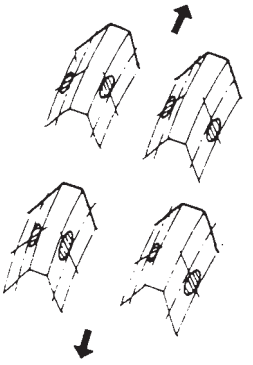
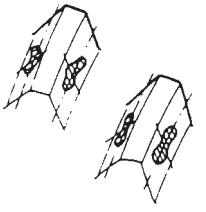
Inspection of gear tooth surface contact

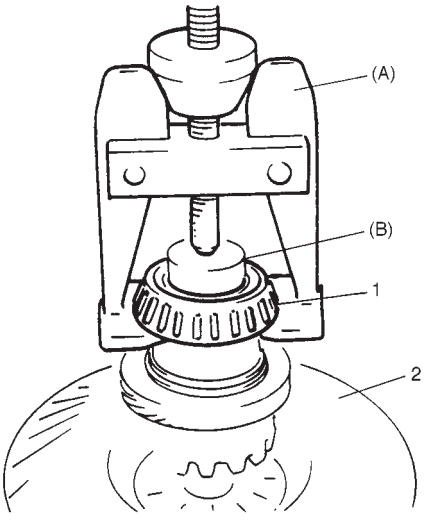
Upon completion of assembly, apply red lead paste to tooth surface of drive bevel gear and turn it by hand to check its contact with drive bevel pinion. Adjust if check result is not satisfactory.

NOTE:

Apply red lead paste all around bevel gear but not so much as to become sticky.

	Tooth surface contact	Possible cause and correction
Correct		Both forward and reverse contacts should occur a little toward inside from the center.
Poor shim adjustment		Forward contact occurs toward outside and reverse contact toward inside from the center and both at higher position. In such case, bevel pinion shim is too thin. Correction: Adjust shim thickness by increasing it.
Poor shim adjustment		Forward contact occurs toward inside and reverse contact toward outside from the center and both at lower position. In such case, bevel pinion shim is too thick. Correction: Adjust shim thickness by reducing it.
Defect in parts (s)		When tooth contacts occur as shown at the left, proper rear case offset (1 8 mm) in not obtained. Correction: Replace rear case (rear case, right case and left case assembly).
Defect in parts (s)		When tooth contacts are deviated toward inside or outside of gear, possible causes are as follows. ● Drive bevel gear or drive bevel pinion defective. ● Poor squareness of rear case. ● Rear case surface where gear is installed is defective. Correction: Replace defective part as an assembly.

	Tooth surface contact	Possible cause and correction
Defect in parts (s)		When tooth contacts occur as shown at the left, gear itself is defective. Correction: Replace drive bevel gear and drive bevel pinion as a set.
Defect in parts (s)		When contact is not oval in shape, gear itself is defective. Abnormal contact is also caused by nick in tooth surface or faulty condition of differential case at its drive bevel gear mounting part. Correction: Replace drive bevel gear and drive bevel pinion as a set and differential gear case as well, if found defective.



1. Differential side R bearing
2. Differential case

DIFFERENTIAL ASSEMBLY

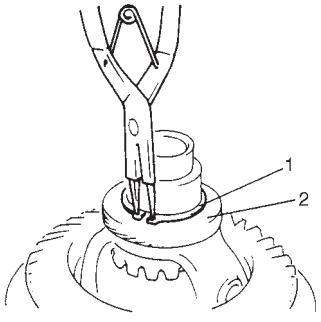
Disassembly

1) Using special tool, remove R bearing.

Special Tool
(A): 09913-61510
(B): 09925-88210

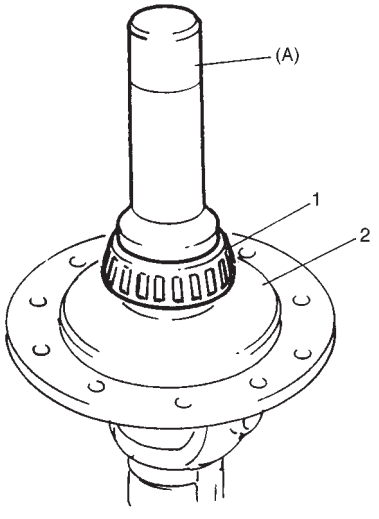
NOTE:
Change removed bearing to new one.

2) Remove L bearing by using puller while supporting its center shaft as described above.



1. Circlip 2. Speedometer drive gear

3) Remove circlip.
4) Take out speedometer drive gear.
5) Support differential case with soft jawed vise and remove final gear bolts then take out final gear and output bevel gear.
6) For disassembly procedure, refer to Step 5) of same item in Section 7A.



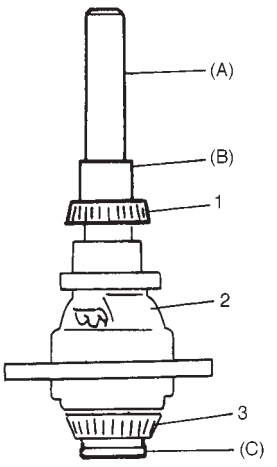
1. Differential side L bearing
2. Differential case

Adjustment and Reassembly

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

1) For adjustment and reassembly procedure, refer to Steps 1) and 2) of same item in Section 7A.
2) Drive in spring pin from right side till it is flush with differential case surface.
3) Press-fit L bearing by using special tool and copper hammer.

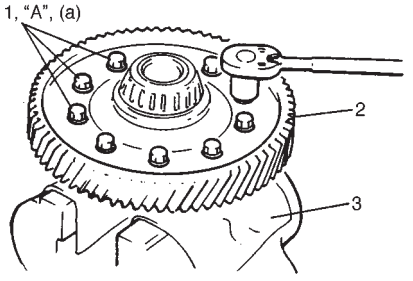
Special Tool
(A): 09951-76010



1. Differential side R bearing
2. Differential case
3. Differential side L bearing

4) Install speedometer drive gear, and then install circlip.
5) Press-fit R bearing by using special tools and copper hammer.

Special Tool
(A): 09924-74510
(B): 09951-16060
(C): 09913-85230

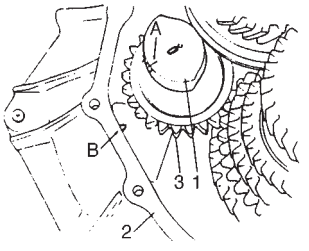


1. Final gear bolts
2. Final gear
3. Soft jawed vise

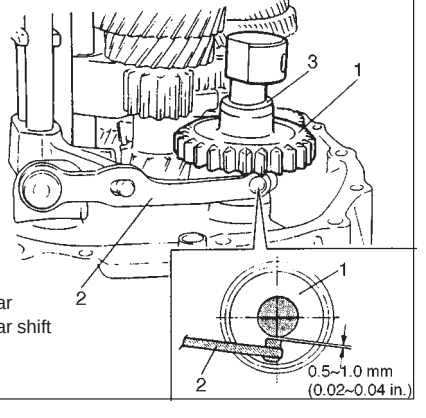
6) Hold differential assembly with soft jawed vise, install final gear and bevel gear and then tighten them with 10 bolts to specified torque.

CAUTION:
Use of any other bolts than specified ones is prohibited.

Thread lock cement
"A": 99000-32030 (SUZUKI BOND No. 1303B)
Tightening Torque
(a): 73 N·m (7.3 kg-m, 53.0 lb-ft)



1. Reverse gear shaft
2. Right case
3. Reverse idle gear
A: Align with B



1. REV gear
2. REV gear shift lever
3. Washer

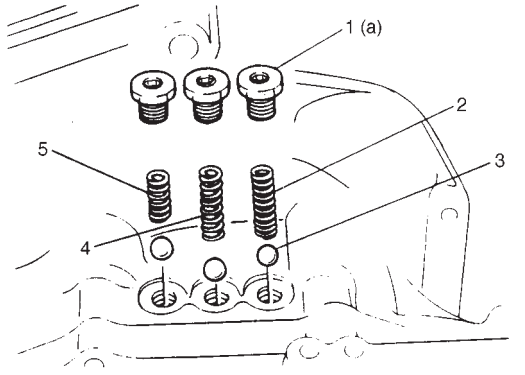
ASSEMBLING UNIT

LEFT CASE

1) For installation procedure, refer to Steps 3) and 4) of Differential to Left Case in Section 7A (ASSEMBLING UNIT).
2) Make reverse idler gear with reverse gear shift lever, insert reverse gear shaft into case through idler gear and then align A in shaft with B in case.

NOTE:
- **Make sure that washer has been installed in shaft at above the gear.**
- **Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.**

3) For installation procedure, refer to Steps 6) to 8) of Differential to Left Case in Section 7A (ASSEMBLING UNIT).
4) Install another case bolts from clutch housing side and tighten them to specification.



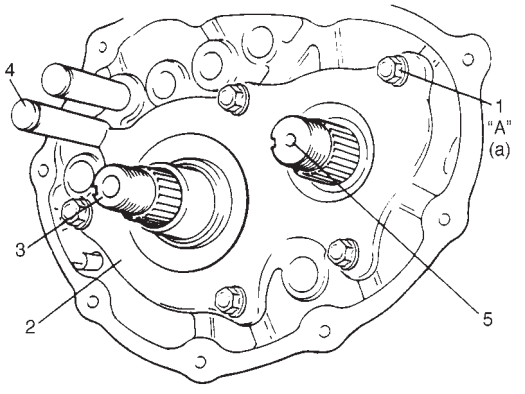
1. Gear shift locating bolt
2. Low speed locating spring
3. Steel ball
4. High speed locating spring
5. 5th & reverse locating spring

5) Check locating springs for deterioration and replace with new ones as necessary.

REF No. (Left figure)	Locating spring free length	Standard	Service limit
2	Low speed	53.1 mm (2.091 in.)	50.5 mm (1.988 in.)
4	High speed	46.1 mm (1.815 in.)	44.0 mm (1.732 in.)
5	5th & reverse	29.8 mm (1.173 in.)	28.5 mm (1.122 in.)

6) Install steel ball and locating spring for respective gear shift shaft and tighten with bolt.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Bolt
2. Left case plate
3. Input shaft
4. 5th & REV gear shift guide shaft
5. Countershaft

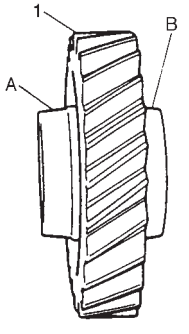
FIFTH GEARS

1) For installation procedure, refer to Steps 1) to 3) of same item in Section 7A.
2) Place left case plate inserting its end in groove of shift guide shaft and then tighten it with bolts applied with thread lock cement.

NOTE:
After tightening bolts, make sure that countershaft can be rotated by hand feeling some load.

"A": Thread lock 1322, 99000-32110

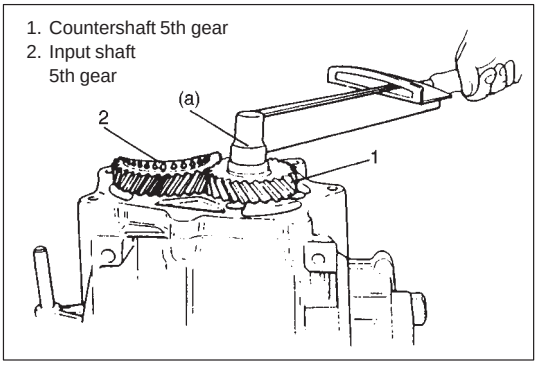
Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Countershaft 5th gear

A: Machined boss (Inside)
B: No maching (Outside)

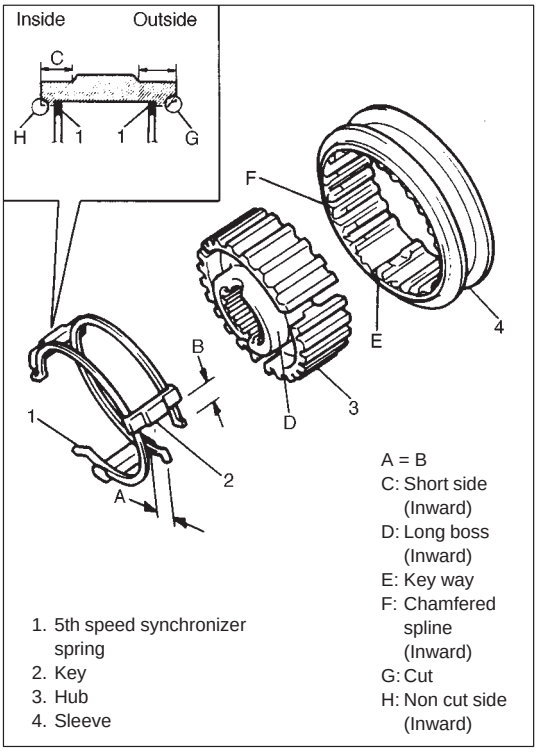
3) Install countershaft 5th gear to countershaft facing machined boss A inward.



1. Countershaft 5th gear
2. Input shaft 5th gear

4) Install needle bearing to input shaft, apply oil then install input shaft 5th gear.
5) Engage gear double meshing to tighten Countershaft nut and tighten it to specified torque.

Tightening Torque
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)

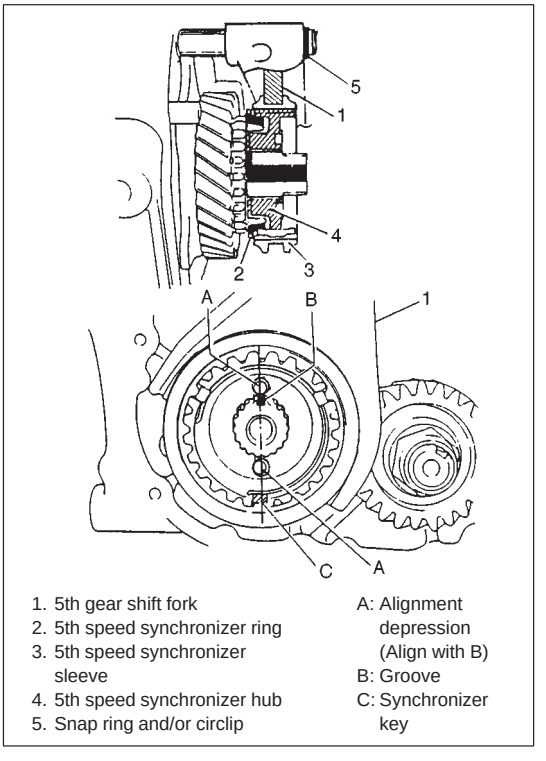


1. 5th speed synchronizer spring
2. Key
3. Hub
4. Sleeve

A = B
C: Short side (Inward)
D: Long boss (Inward)
E: Key way
F: Chamfered spline (Inward)
G: Cut
H: Non cut side (Inward)

6) Assemble 5th speed synchronizer sleeve and hub with keys and springs.

NOTE:
Short side C in keys, long boss D in hub and chamfered spline F in sleeve should face inward (5th gear side).

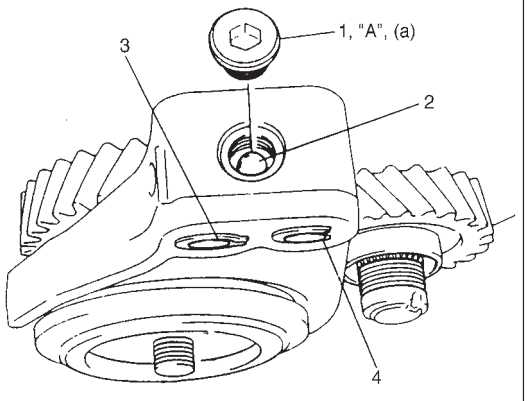


1. 5th gear shift fork
2. 5th speed synchronizer ring
3. 5th speed synchronizer sleeve
4. 5th speed synchronizer hub
5. Snap ring and/or circlip

A: Alignment depression (Align with B)
B: Groove
C: Synchronizer key

7) Install synchronizer ring to input shaft 5th gear.
8) Fit 5th gear shift fork to sleeve & hub assembly and install them into input shaft, gear shift shaft and gear shift guide shaft at once aligning hub depression A, shaft mark B and synchronizer key C.

NOTE:
Long boss of hub faces inward (gear side).



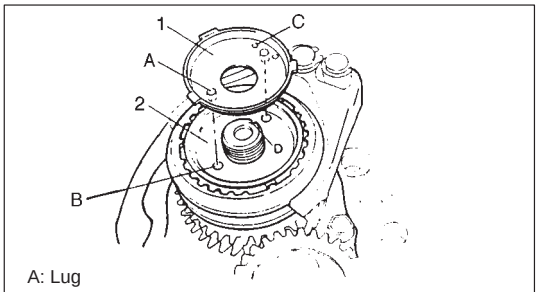
1. 5th shift fork plug
2. Shift guide ball
3. Circlip
4. C-ring

9) Install steel ball, tighten shift fork plug applied with thread lock cement.

CAUTION:
- **Coat shift fork plug with tread lock cement reasonably. If it is done to much, excess may interfere in ball movement and cause hard shift to 5th speed.**
- **Make sure circlip is installed in shaft groove securely.**

"A": Thread lock 1322, 99000-32110
Tightening Torque
(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

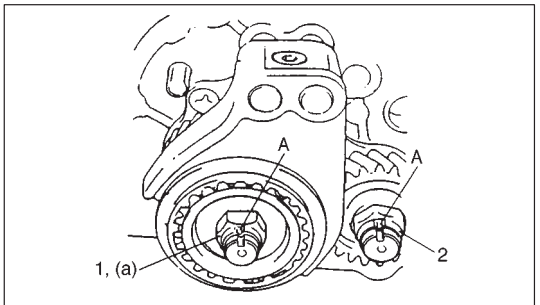
10) Install circlip and C-ring.



A: Lug
B: Alignment depression
C: Small hole
D: Cut

1. 5th synchronizer hub plate
2. Synchronizer hub

11) Install 5th synchronizer hub plate to synchronizer hub by positioning it so that its lugs A fit into their depression B in synchronizer hub and its 2 small holes C come on the same side as cut D in input shaft.



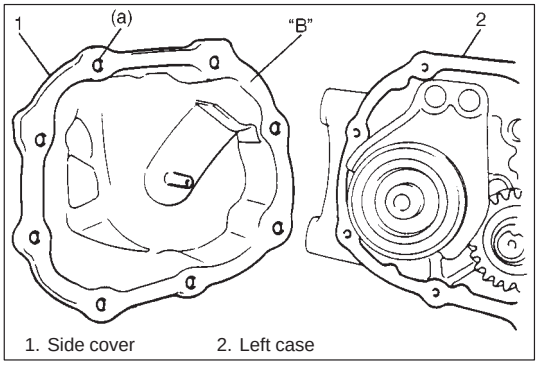
1. Input shaft nut
2. Countershaft nut

A: Caulking

12) Engage gear double meshing to tighten input shaft nut and tighten it to specified torque.

Tightening Torque
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)

13) Caulk input shaft nut and countershaft nut with caulking tool.

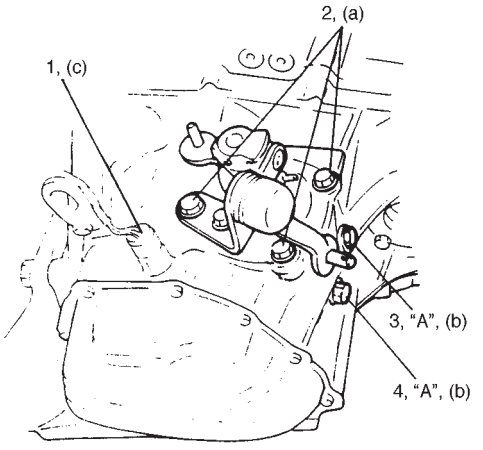


1. Side cover
2. Left case

14) Clean mating surface of both left case and side cover, coat mating surface with sealant evenly, mate it with left case and then tighten with 8 bolts.

"B": SUZUKI BOND No.1215, 99000-31110

Tightening Torque for left cover bolts
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Backup light switch
2. Gear shift guide case bolt
3. Gear shift interlock bolt
4. 5th to REV interlock guide bolt

GEAR SHIFT AND SELECT SHAFT ASSEMBLY

1) Clean mating surface of guide case.
2) Install gear shift and select shaft assembly with new gasket into transmission.
3) Place breather hose bracket and tighten it together with gear shift guide case bolts to specified torque.

   Tightening Torque
   (a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

4) Install washer and gear shift interlock bolt applied with thread lock cement and them tighten it to specified torque.

   Thread lock cement
   "A": 99000-32110 (SUZUKI BOND No.1322)

   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

5) Install washer and 5th to REV interlock guide bolt applied with thread lock cement and then tighten it to specified torque.

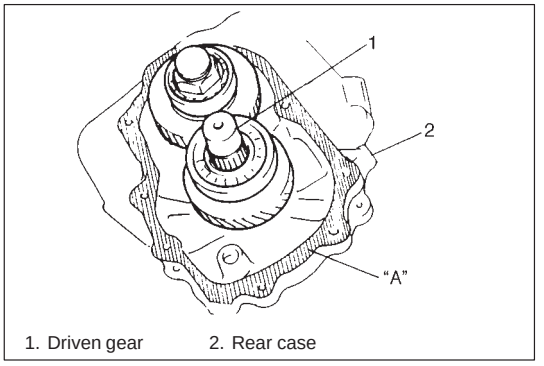
   Thread lock cement
   "A": 99000-32110 (SUZUKI BOND No.1322)

   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

6) Tighten backup light switch to specified torque.

   Tightening Torque
   (c): 20 N·m (2.0 kg-m, 14.5 lb-ft)

7) Check input shaft for rotation in each gear position.
8) Also confirm function of backup light switch in reverse position by using ohmmeter.

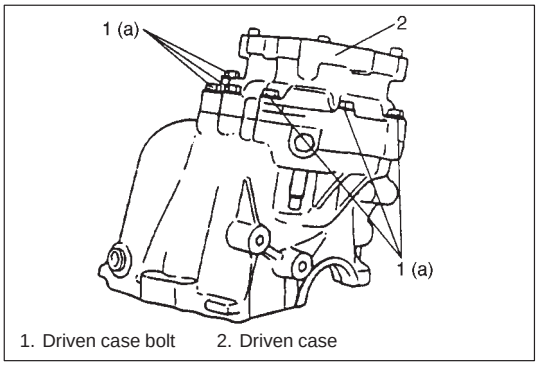


1. Driven gear 2. Rear case

TRANSFER

1) Install driven gear to rear case.
2) Clean mating surface to both rear case and driven case, coat mating surface of rear case with sealant evenly then mate it with driven case.

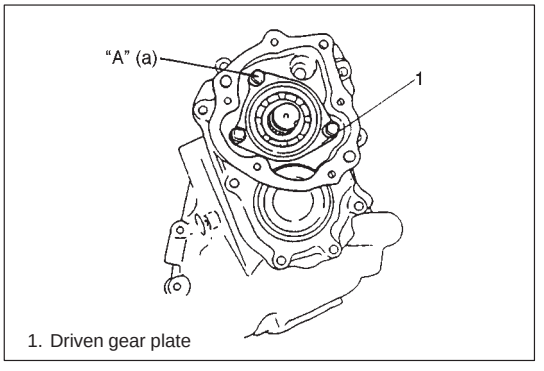
Sealant
"A": 99000-31110 (SUZUKI BOND No.1215)



1. Driven case bolt 2. Driven case

3) Tighten driven case bolts to specified torque.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

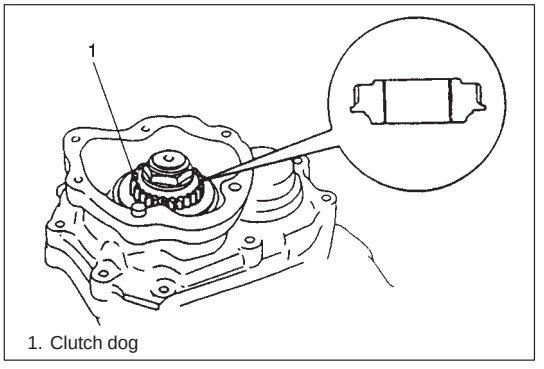


1. Driven gear plate

4) Install circlip and driven gear plate.
5) Tighten plate bolts applied with thread lock cement to specified torque.

"A": Thread lock 1322, 99000-32110

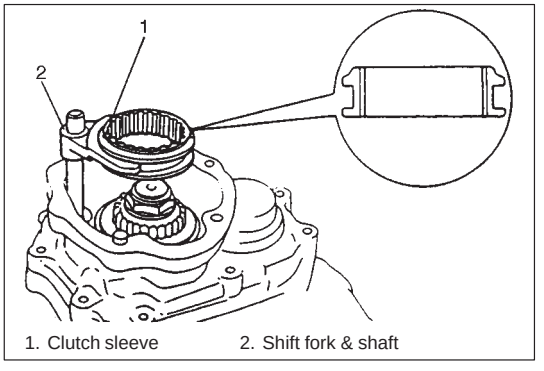
Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Clutch dog

6) Install clutch dog to driven gear.

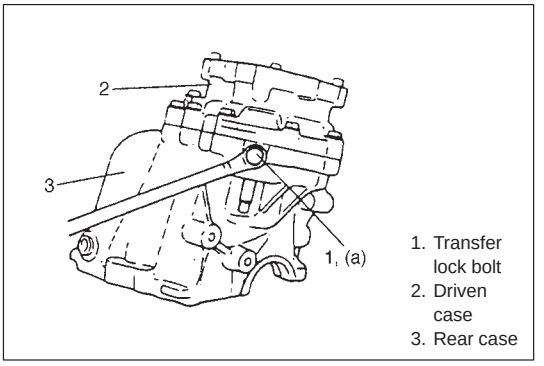
NOTE:
Make sure to put clutch dog with right side up as shown.



1. Clutch sleeve 2. Shift fork & shaft

7) Install clutch sleeve and shift fork & shaft.

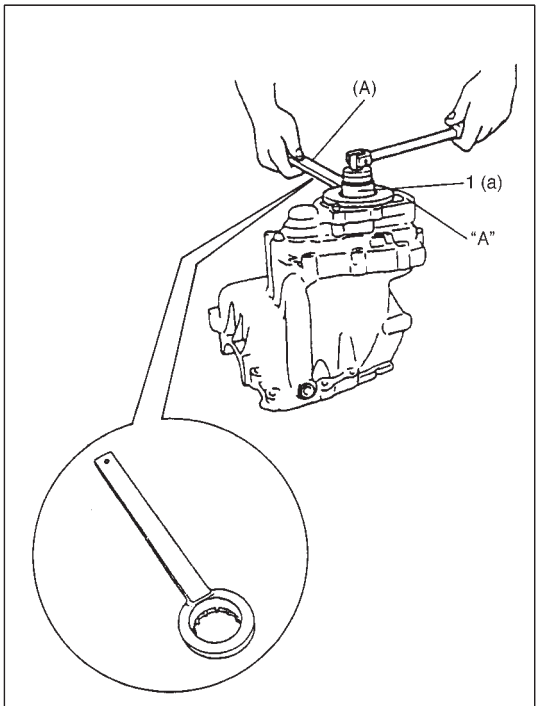
NOTE:
Make sure to put clutch sleeve with right side up as shown.



1. Transfer lock bolt
2. Driven case
3. Rear case

8) Install transfer lock bolt and washer and tighten it to specified torque.

Tightening Torque
(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)



1. Box (30 mm)

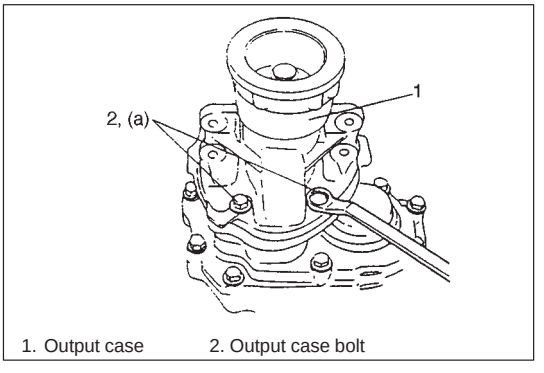
9) Tighten driven gear nut to specified torque by using special tool.

Special Tool
(A): 09927-25411

Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)

10) Caulk driven gear nut.
11) Clean mating surface to both driven case and output case, coat mating surface of driven case with sealant evenly then mate it with output case.

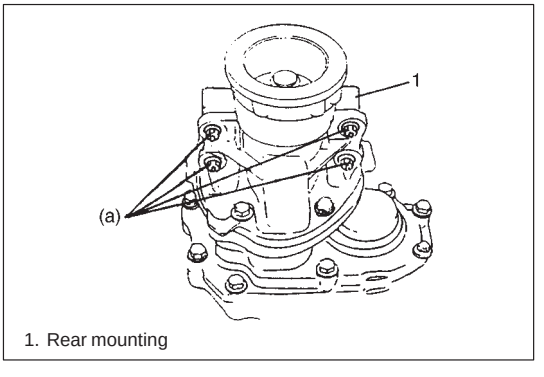
Sealant
"A": 99000-31110 (SUZUKI BOND No.1215)



1. Output case 2. Output case bolt

12) Tighten output case bolts to specified torque.

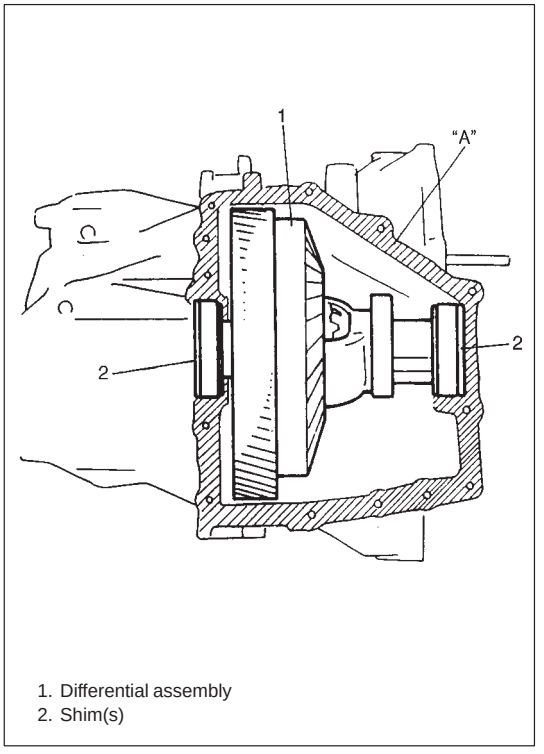
Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Rear mounting

13) Install rear mounting and tighten nuts to specified torque.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

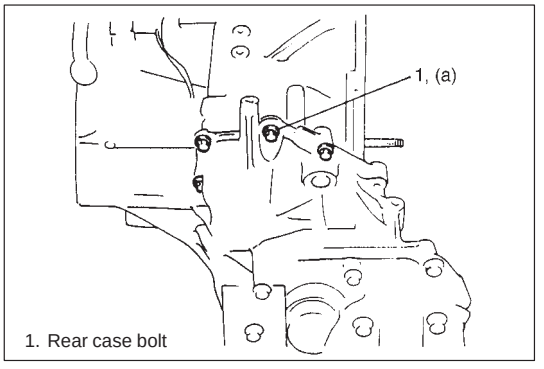


1. Differential assembly
2. Shim(s)

INSTALLATION OF TRANSFER & DIFFERENTIAL

1) Install differential assembly and shim(s) into transmission case.
2) Clean mating surfaces of both transmission case and rear case, coat mating surface of transmission case with sealant evenly then mate it with rear case.

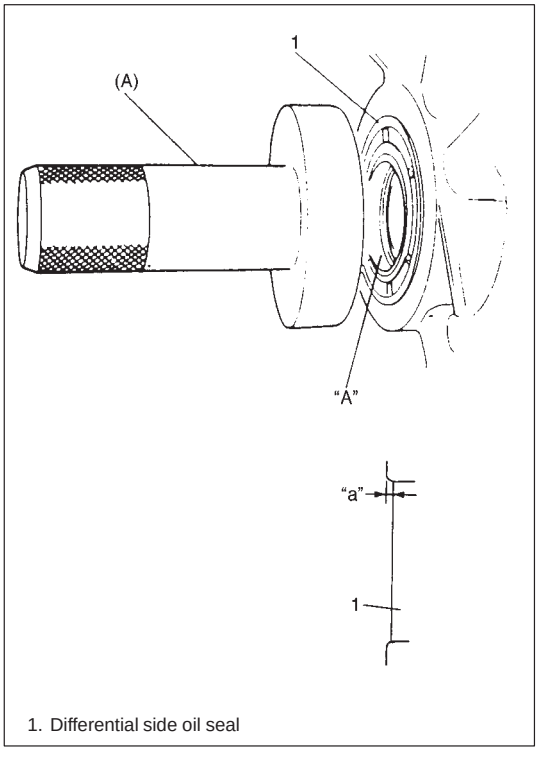
"A": SUZUKI BOND No1215, 99000-31110



1. Rear case bolt

3) Tighten rear case bolts to specified torque.

Tightening Torque
(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)



1. Differential side oil seal

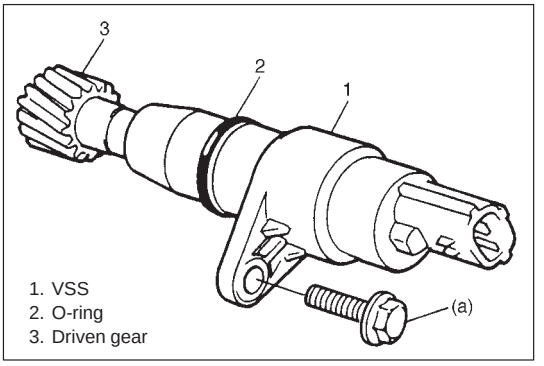
4) Install differential side oil seals by using special tool and hammer, and then apply grease to its lip.

NOTE:
Face oil seal spring side inward.

Distance "a": 1.0 – 1.5 mm (0.04 – 0.06 in.)

Special Tool
(A): 09913-75810

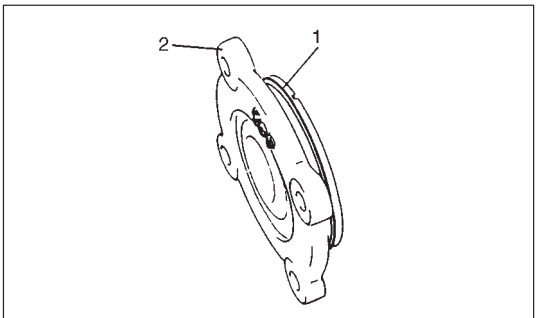
"A": SUZUKI SUPER GREASE A, 99000-25010



1. VSS
2. O-ring
3. Driven gear

5) Check O-ring and VSS surface for their flawlessness, apply oil to O-ring and driven gear and then install VSS to transmission.

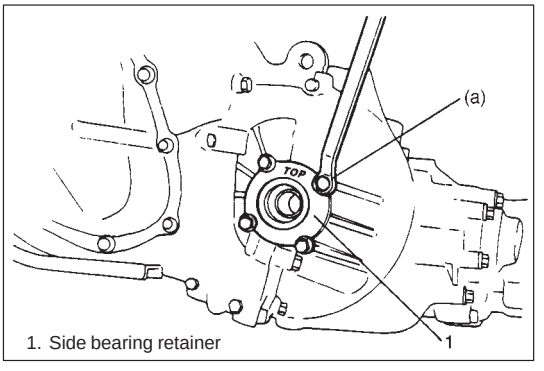
Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. O-ring
2. Side bearing retainer

6) Check side bearing retainer O-ring for flawlessness, apply oil to O-ring and then install to transmission.

NOTE:
Install side bearing retainer with its "TOP" mark facing upward.



1. Side bearing retainer

7) Tighten side bearing retainer bolts to specified torque.

Tightening Torque
(a): 19 N·m (1.9 kg-m, 14.0 lb-ft)

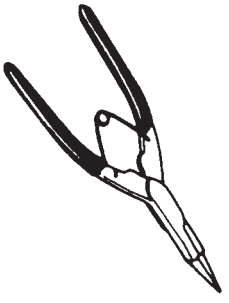
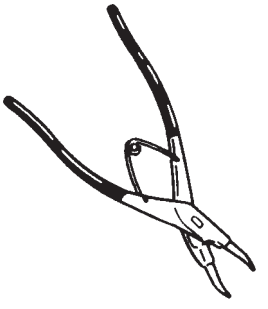
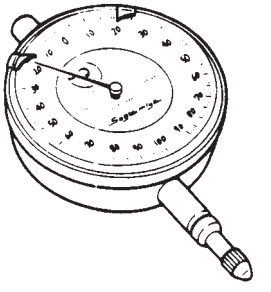
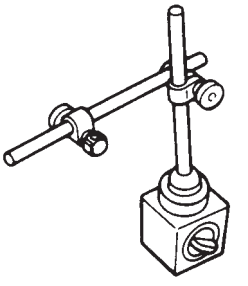
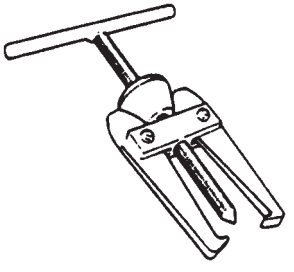
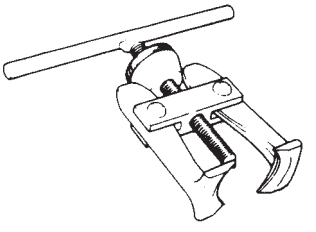
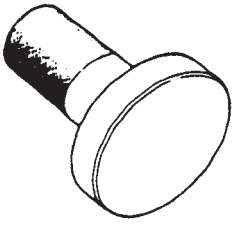
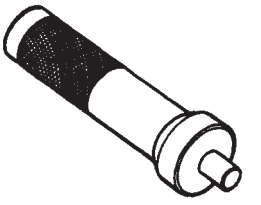
TIGHTENING TORQUE SPECIFICATIONS

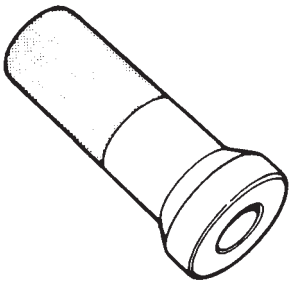
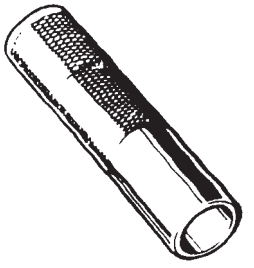
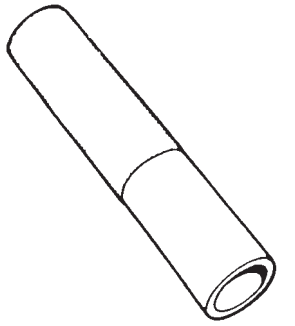
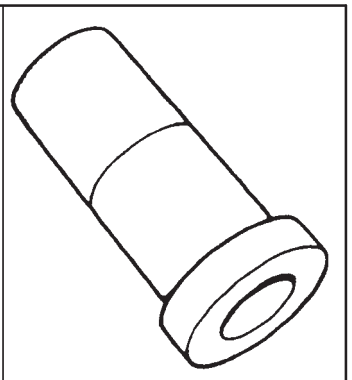
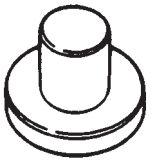
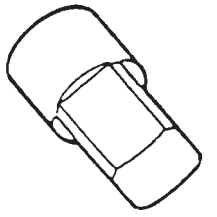
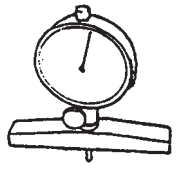
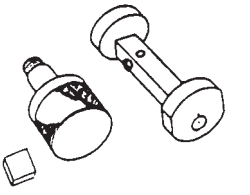
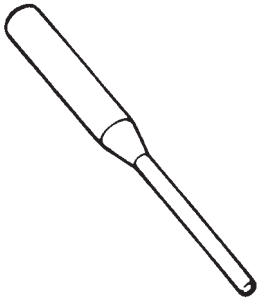
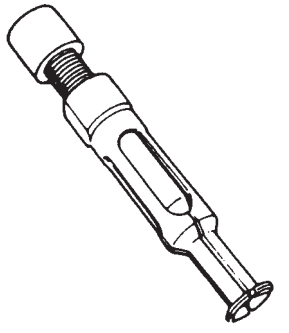
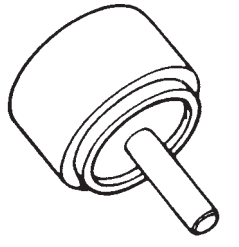
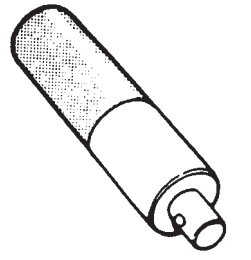
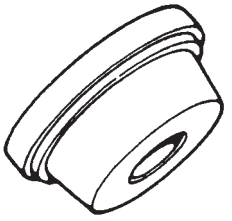
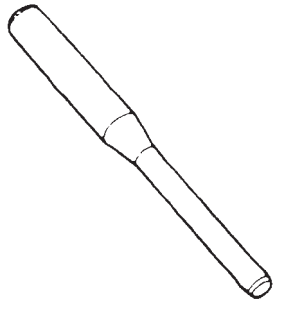
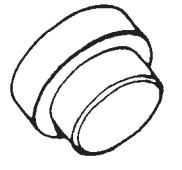
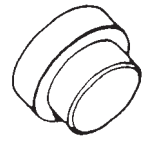
Fastening portion	Tightening Torque		
	N·m	kg-m	lb-ft
1. Transfer shift fork shaft lock bolt	19	1.9	14.0
2. Oil filler/level plug	21	2.1	15.5
3. Speedometer driven gear case bolt	5.5	0.55	4.0
4. Center bearing support bolts	50	5.0	36.5
5. Ball stud bolt and nut	60	6.0	43.5
6. Stabilizer link nut	28	2.8	20.5
7. Shift and select control cable lock nut	6	0.6	4.5
8. Transmission to engine bolts and nuts	90	9.0	65.0
9. Transmission control cable bracket bolt	55	5.5	40.0
10. Transmission case lower stiffener bolts and nut			
11. Transmission case right stiffener bolts and nut	50	5.0	36.5
12. Input shaft R bearing plate bolt	10	1.0	7.5
13. Shift fork bolts	10	1.0	7.5
14. Output shaft nut	90	9.0	65.0
15. Bevel pinion nut	120	12.0	87.0
16. Final gear bolts	73	7.3	53.0
17. Gear shift locating bolts	13	1.3	9.5
18. Left case plate bolts	23	2.3	17.0
19. Countershaft nut	70	7.0	51.0
20. 5th shift fork plug	9	0.9	6.5
21. Input shaft nut	70	7.0	51.0
22. Side cover bolts	10	1.0	7.5
23. Gear shift guide case bolts	19	1.9	14.0
24. Gear shift interlock bolt	23	2.3	17.0
25. 5th to REV interlock guide bolt			
26. Backup light switch	20	2.0	14.5
27. Driven case bolts	23	2.3	17.0
28. Driven gear plate bolts			
29. Driven gear nut	90	9.0	65.0
30. Output case bolts	23	2.3	17.0
31. Rear mounting nuts			
32. Rear case bolts	19	1.9	14.0
33. Side bearing retainer bolts			

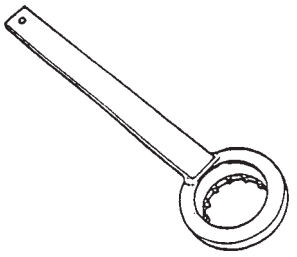
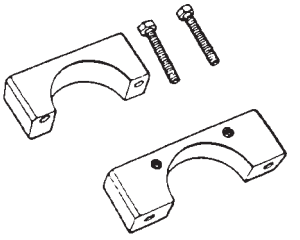
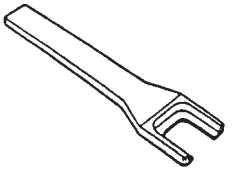
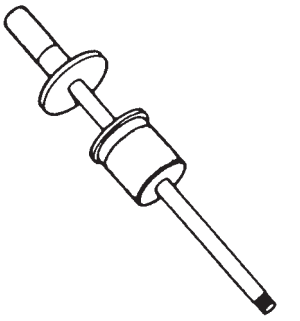
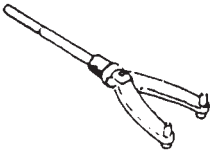
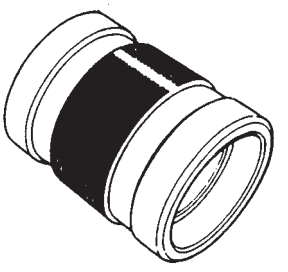
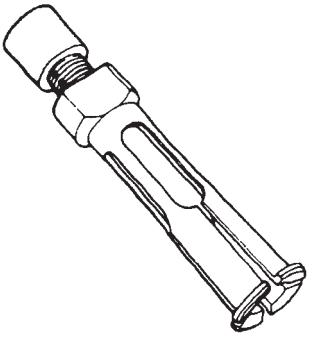
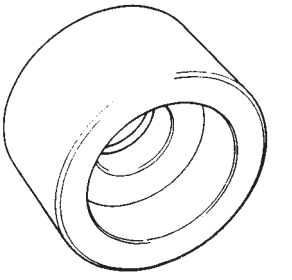
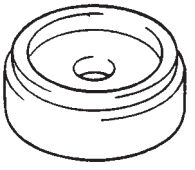
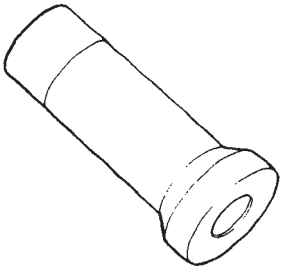
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	● Oil seal lips
Sealant	SUZUKI BOND NO.1215 (99000-31110)	● Drain plug ● Mating surface of transmission case ● Mating surface of driven case ● Mating surface of output case ● Mating surface of rear case
Thread lock cement	THREAD LOCK 1322 (99000-32110)	● Input shaft R bearing plate bolt ● Left case plate bolts ● 5th shift fork plug ● Gear shift interlock bolt ● 5th to REV interlock guide bolt ● Driven gear plate bolts
	SUZUKI BOND NO.1303B (99000-32030)	● Final gear bolts

SPECIAL TOOLS

 09900-06107 Snap ring pliers (Opening type)	 09900-06108 Snap ring pliers (Closing type)	 09900-20606 Dial gauge	 09900-20701 Magnetic stand
 09913-60910 Bearing/Gear puller	 09913-61510 Bearing puller	 09913-75810 Bearing installer	 09913-75821 Installer attachment

 09913-76010 Bearing installer	 09913-80112 Bearing installer	 09913-84510 Bearing installer	 09913-85210 Bearing installer
 09913-85230 Bearing removing jig	 09915-24550 Adapter socket	 09922-77241 Dial depth gauge	 09922-77270 Bevel pinion dummy set
 09922-85811 Spring pin remover 4.5 mm	 09923-74510 Bearing remover	 09923-78210 Bearing installer	 09924-74510 Bearing & oil seal installer handle
 09924-84510-004 Bearing installer attachment	 09925-78210 Spring pin remover 6 mm	 09925-88210 Bearing puller attachment	 09926-58010 Bearing puller attachment

 09927-25411 Bevel pinion holder	 09927-56030 Gear holder tool	 09927-76030 Bevel pinion holder	 09930-30104 Sliding shaft
 09930-40113 Rotor holder	 09940-54910 Bearing installer	 09941-64511 Bearing remover	 09951-16060 Bush remover
 09951-16090 Oil seal installer	 09951-76010 Bearing installer		

SECTION 7B

AUTOMATIC TRANSMISSION (3 A/T)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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GENERAL DESCRIPTION

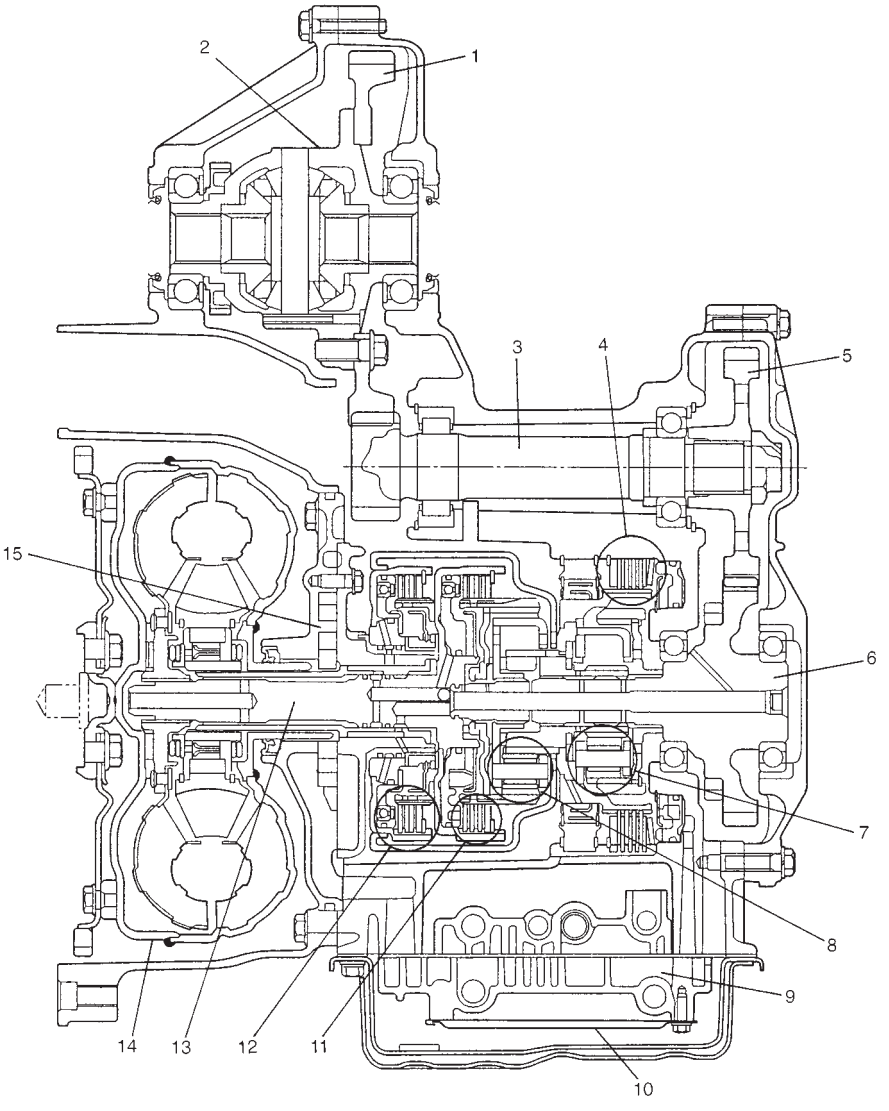
The automatic transmission consists of the hydraulic torque converter, electronically controlled 3-speed automatic transmission, countershaft and differential.

The transmission consists of 2 planetary gears, 2 disk clutches, 1 band brake, 1 disk brake and 1 one-way clutch. Its operation is controlled by selecting a position from 6 positions (P, R, N, D, 2 and L ranges) manually by means of the selector lever installed on the compartment floor.

In the D or 2 range, the gear ratio is changed for the 1st, 2nd or 3rd speed (D range only) automatically by engine control module (electronic control).

For the automatic transmission fluid, DEXRON® -IIE, DEXRON® -III or its equivalent must be used. Lubrication in the automatic transmission is provided by the oil pump which is operated by the engine revolution. Therefore, the engine should not be stopped even during coasting to obtain proper lubrication.

When it becomes necessary to be towed, front wheels must be raised so as not to roll them.



1. Final gear
2. Differential gear assembly
3. Counter shaft
4. 1st and reverse brake
5. Counter driven gear
6. Output shaft
7. Rear planetary gear
8. Front planetary gear
9. Valve body assembly
10. Oil strainer
11. Forward clutch
12. Direct clutch
13. Input shaft
14. Torque converter
15. Oil pump

COMPONENTS OPERATION CHART

Range	Gear	Forward Clutch	Direct Clutch	Second Brake	1st & Reverse Brake	One-way Clutch	Parking Lock Pawl
P	Parking	–	–	–	**○	–	○
R	Reverse	–	○	–	○	–	–
N	Neutral	–	–	–	–	–	–
D	1st		–	–	–	○	–
	2nd	○	–	○	–	–	–
	3rd	○	○	–	–	–	–
2	1st	○	–	–	–	○	–
	2nd	○	–	○	–	–	–
L	1st	○	–	–	○	○	–
	*2nd	○	–	○	–	–	–

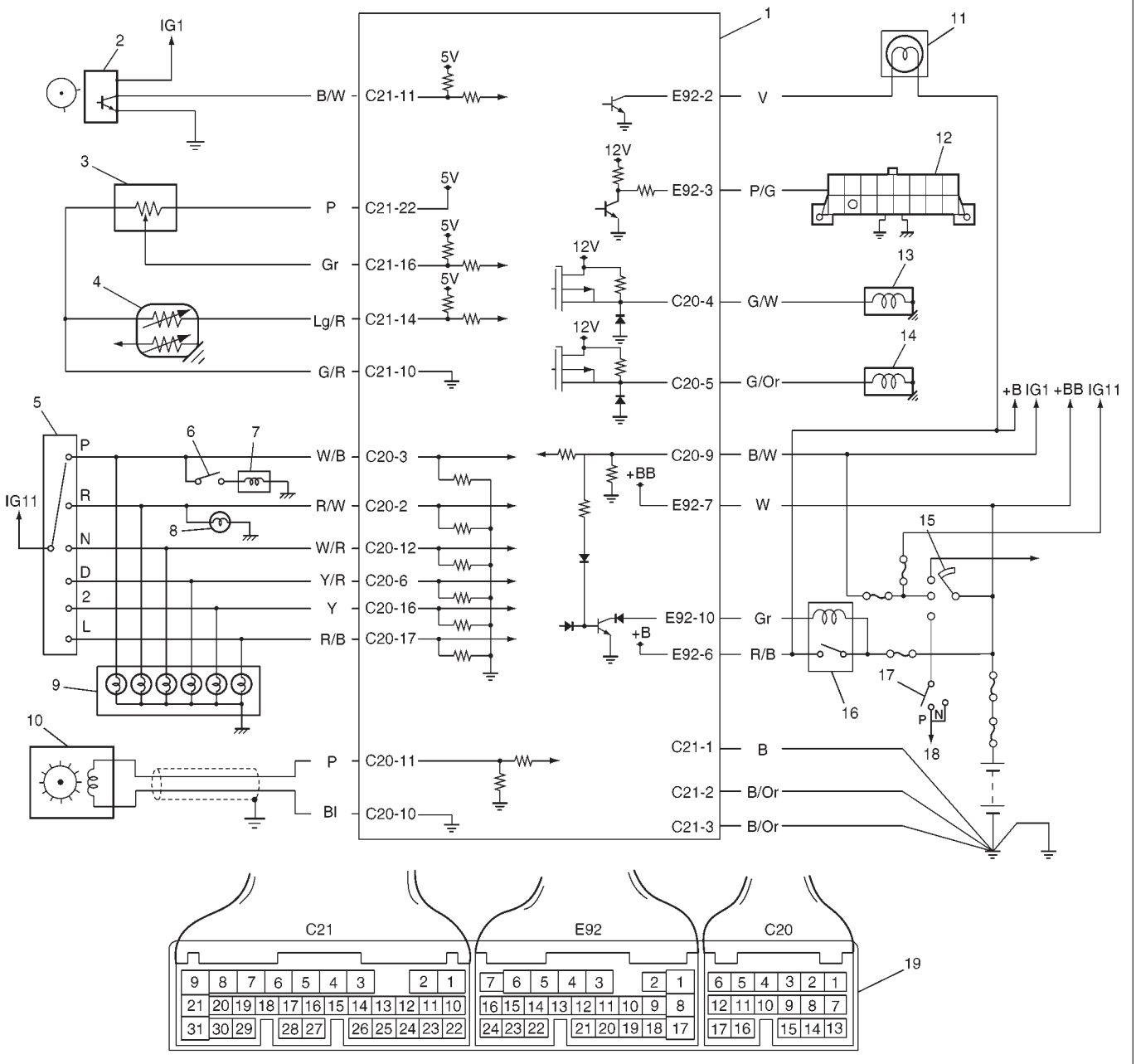
○ : Operated

* : To prevent overrevolution of engine, this 2nd gear is operated only when selector lever is shifted to L range at a higher than 40 km/h (25 mile/h) speed.

**: When engine is running.

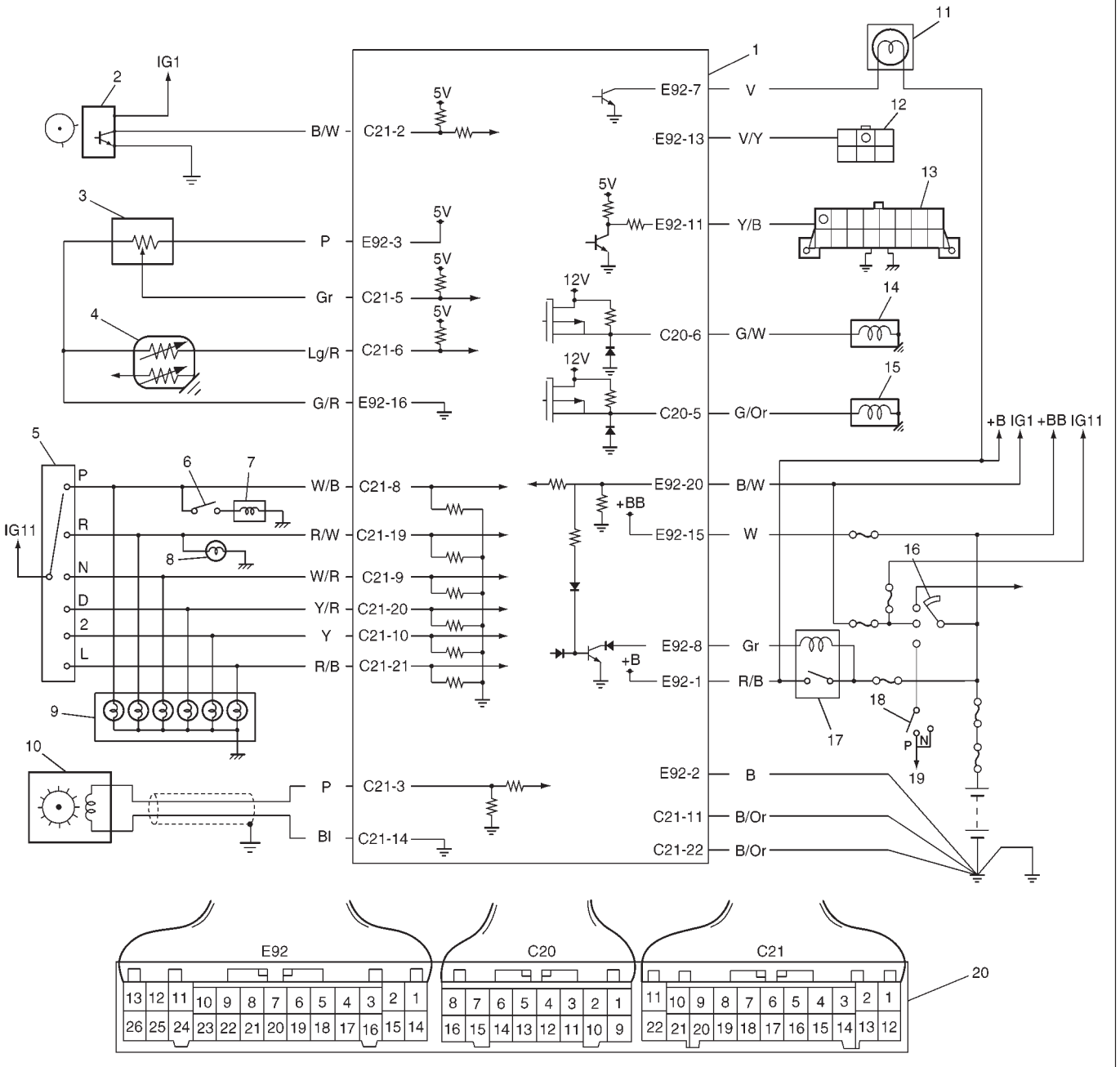
ELECTRONIC SHIFT CONTROL SYSTEM

[For vehicle with WU-TWC]

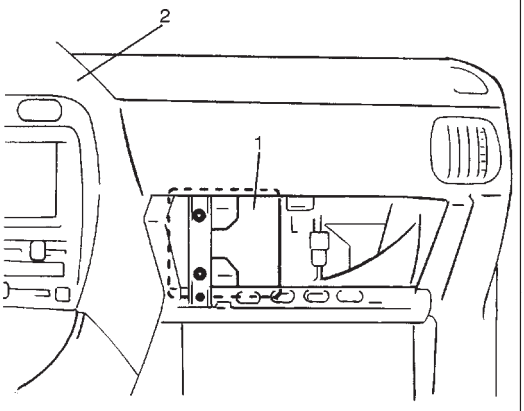


1. PCM
2. Camshaft position (CMP) sensor
3. Throttle position (TP) sensor
4. Engine coolant temperature (ECT) sensor
5. Transmission range sensor (shift switch)
6. Stop lamp switch
7. Shift lock solenoid (if equipped)
8. Backup lamp
9. Shift indicator (if equipped)
10. Output shaft speed sensor (A/T VSS)
11. Malfunction indicator lamp (MIL)
12. Data link connector (DLC)
13. Shift solenoid-A
    (No.1, Direct clutch solenoid valve)
14. Shift solenoid-B
    (No.2, 2nd brake solenoid valve)
15. Ignition switch
16. Main relay
17. Inhibitor switch
18. To starter
19. Terminal arrangement of PCM coupler
    (Viewed from harness side)

[For vehicle without WU-TWC]



1. PCM
2. Camshaft position (CMP) sensor
3. Throttle position (TP) sensor
4. Engine coolant temperature (ECT) sensor
5. Transmission range sensor (shift switch)
6. Stop lamp switch
7. Shift lock solenoid (if equipped)
8. Backup lamp
9. Shift indicator (if equipped)
10. Output shaft speed sensor (A/T VSS)
11. Malfunction indicator lamp (MIL)
12. Monitor connector No.1
13. Data link connector (DLC)
14. Shift solenoid-A
    (No.1, Direct clutch solenoid valve)
15. Shift solenoid-B
    (No.2, 2nd brake solenoid valve)
16. Ignition switch
17. Main relay
18. Inhibitor switch
19. To starter
20. Terminal arrangement of PCM coupler
    (Viewed from harness side)



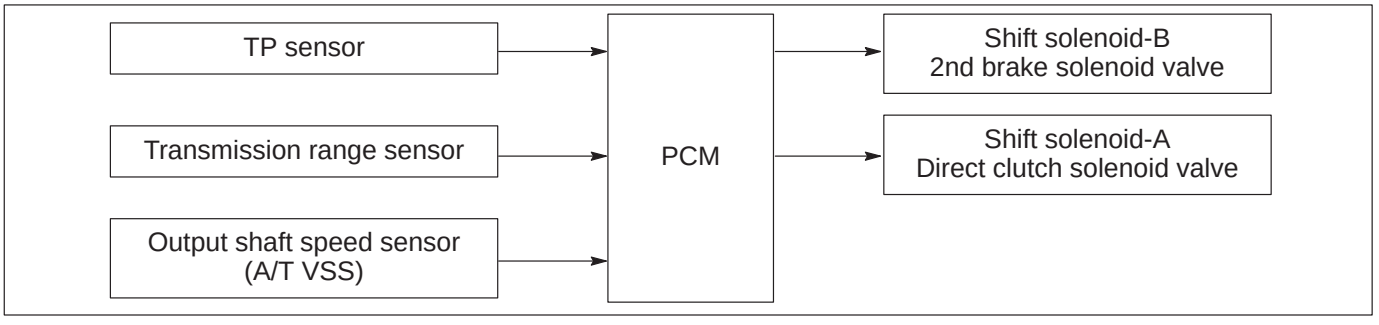
1. PCM
2. Instrument panel

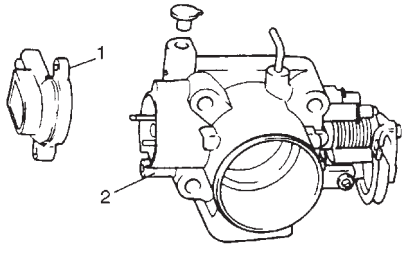
POWER TRAIN CONTROL MODULE (PCM)

The PCM controls the shift solenoid-B (No.2, 2nd brake solenoid valve) and the shift solenoid-A (No.1, direct clutch solenoid valve) by sending electric signals to them so as to attain automatic gear shift between the 1st and 2nd gears, and the 2nd and 3rd gears. Equipped as PCM sensed parameters are the TP sensor, transmission range sensor and output shaft speed sensor. Theses sensors sense the throttle valve opening, selector lever's position and vehicle speed, and send those signals to the engine control module. Then, the engine control module opens and closes valves of the above solenoids according to these signals.

The PCM is located at the underside of the instrument panel at the passenger's seat side.

GEAR SHIFT CONTROL SYSTEM



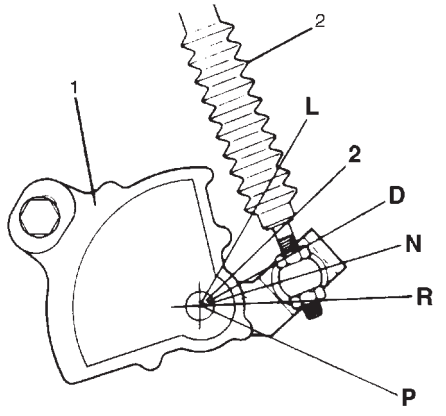


1. Throttle position (TP) sensor
2. Throttle body

THROTTLE POSITION SENSOR (TP sensor)

The throttle position sensor consisting of a potentiometer is connected to the throttle valve shaft.

Throttle valve opening signal (output voltage) is transmitted from throttle position sensor to PCM as voltage signal. PCM uses it as one of the signals to control transmission gear shift.



1. Transmission range sensor
2. Select cable

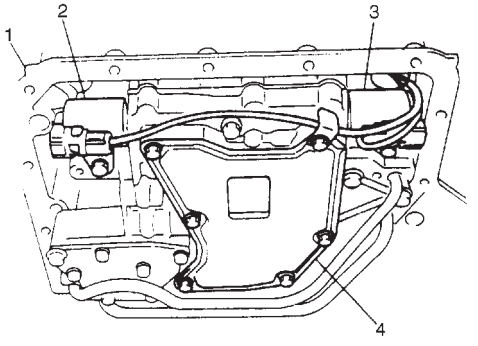
TRANSMISSION RANGE SENSOR (SHIFT SWITCH)

Being linked with the selector lever, this sensor changes selector lever positions into electric signals and send them to the engine control module. The contact points of this sensor for P and N ranges are also connected with the starting motor circuit.

So when the selector lever is shifted to the P or N range position, the contact points for P or N range are connected and cause the starting motor to operate by turning the starter switch ON.

When the selector lever is in any other position than P and N ranges, the sensor remains OFF and therefore the starting motor cannot be operated, that is, the engine cannot be started.

Also, as its contact point for R range is connected with the backup lamp circuit, only when the selector lever is shifted to R range, the contact point contacts to light the backup lamp.



1. Transmission
2. Shift solenoid-B
   (No.2, 2nd brake solenoid valve)
3. Shift solenoid-A
   (No.1, direct clutch solenoid valve)
4. Oil strainer

DIRECT CLUTCH AND 2ND BRAKE SOLENOID VALVES

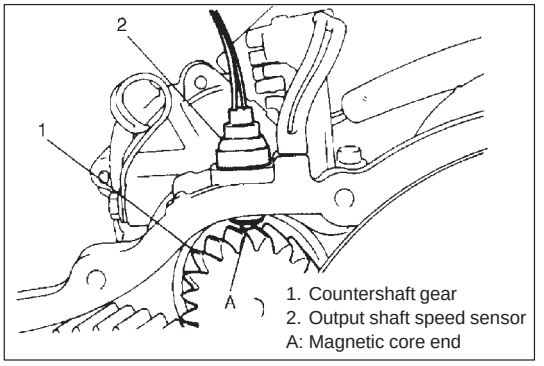
These solenoid valves are mounted on the valve body. They are turned ON and OFF by the signals from the engine control module and actuate each shift valve (1 – 2 and 2 – 3 valves) so as to control transmission gear shift.

Shift solenoid-B (2nd brake solenoid valve) operates 1 – 2 shift valve, and shift solenoid-A (direct clutch solenoid valve) does 2 – 3 shift valve.

OPERATION OF DIRECT CLUTCH AND 2ND BRAKE SOLENOIDS

Range	D			2		L		P, N & R
Gear	1st	2nd	3rd	1st	2nd	1st	(2nd)	–
Shift solenoid-A (No.1) (Direct clutch solenoid valve)	○	○	×	×	○	×	×	×
Shift solenoid-B (No.2) (2nd brake solenoid valve)	○	×	×	○	×	×	○	×

○: Operated (Solenoid Valve is Open) ×: Unoperated (Solenoid Valve is Closed)



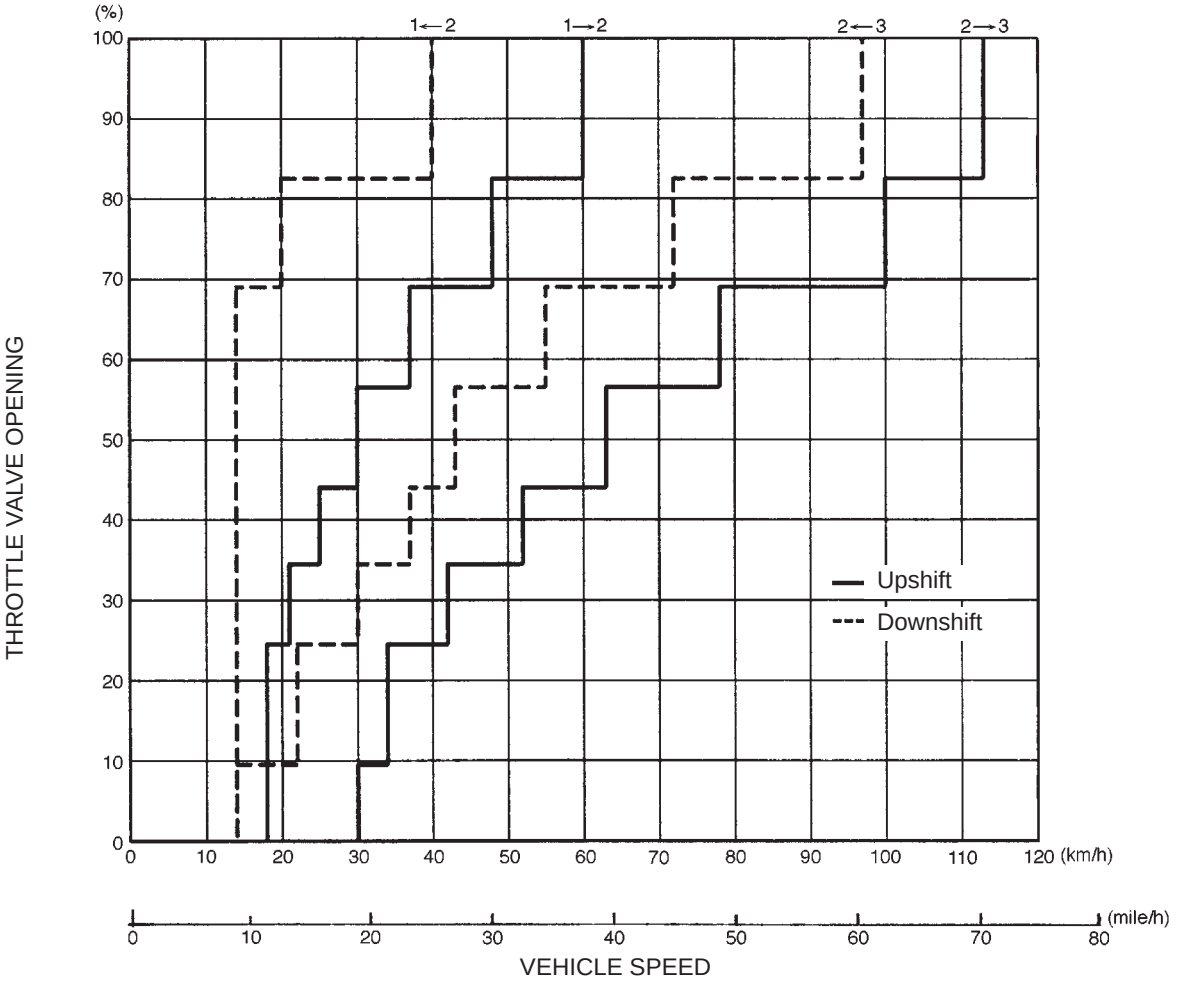
OUTPUT SHAFT SPEED SENSOR (A/T VSS)

The output shaft speed sensor consists of a magnetic core with magnet and coil. It is mounted on transmission case with 0.6 mm (0.024 in.) air gap between the core end and countershaft gear tooth.

While the countershaft rotates, magnetic flux is cut by gear tooth thus a pulse is generated in the sensor coil according to the speed. And then, the pulse is transmitted to engine control module as speed signal.

AUTOMATIC SHIFT DIAGRAM

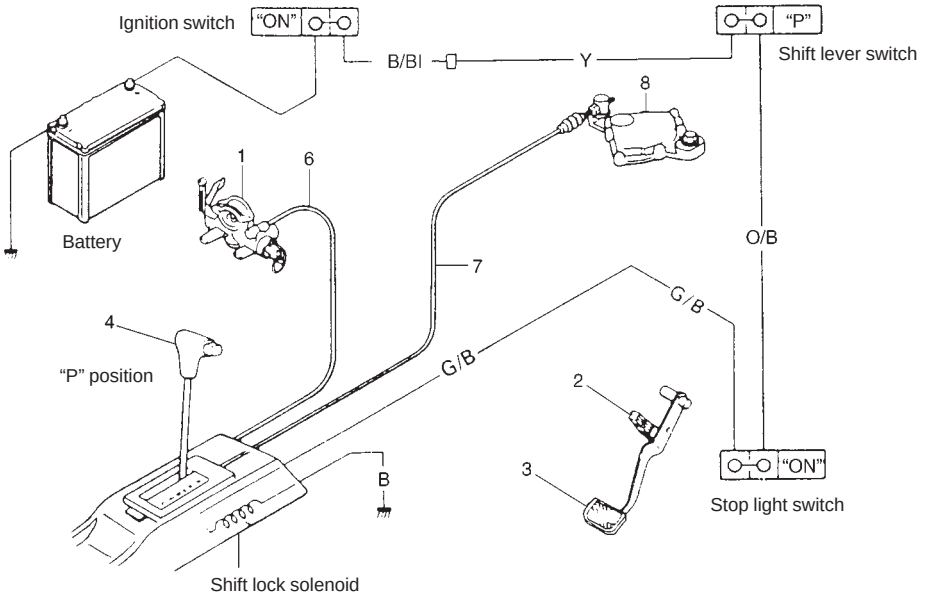
Automatic shift schedule as a result of shift control is shown below. In case that selector lever is shifted to L range at a higher than 40 km/h (25 mile/h) speed, 2nd gear is operated and then down shifts to 1st at a speed lower than that. No up shift is available in L range.



Throttle \ Selector / Gear \ Speed		D or 2	D		D or 2	L
		1→2	2→3	3→2	2→1	2→1
Full close	km/h	18	30	14	14	40
	mile/h	11	19	9	9	25
Full open	km/h	60	113	97	40	40
	mile/h	37	70	61	25	25

BRAKE INTERLOCK SYSTEM (If equipped)

This system is so designed that select lever cannot be shifted from P range position unless the ignition switch is turned to “ON” and brake pedal is depressed. Also, ignition key cannot be pulled out of key hole unless selector lever is in P range. These mechanism are as follows.

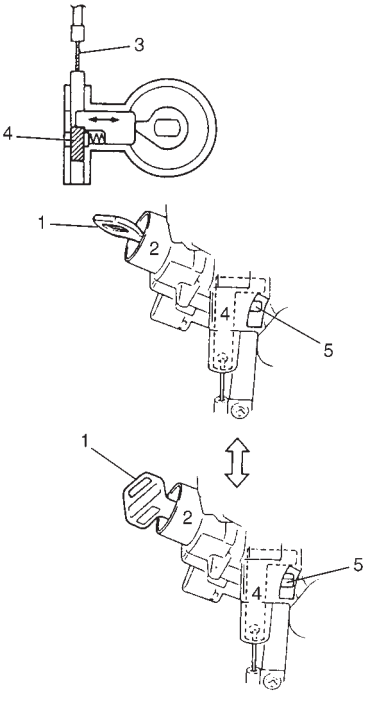


1. Ignition switch
2. Stop lamp switch
3. Brake pedal
4. Selector lever
5. Blank
6. Interlock cable
7. Select cable
8. Shift lever switch

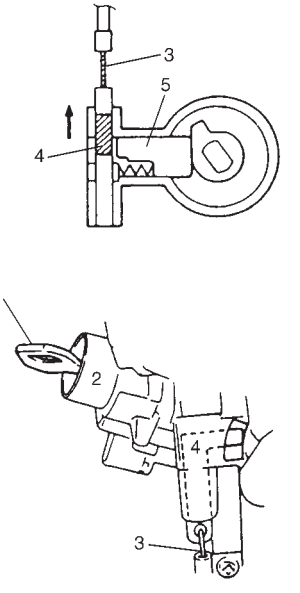
STEERING LOCK

When selector lever is in position other than P range, lock lever interrupts key cylinder to turn to “LOCK” position, thus steering is kept to be operated free. However, when selector lever is shifted in P range, lock lever is released, thus allowing ignition key to be removed and then steering is locked.

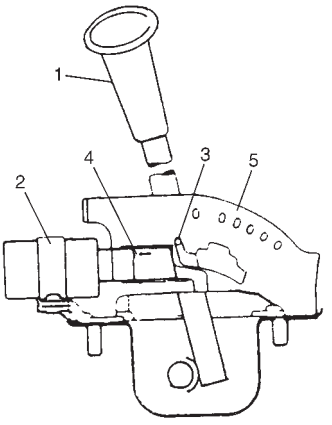
When selector lever is shifted to P range and its knob button is released.



When selector lever is shifted to any range other than P range or when selector lever knob button is pushed at P range.



1. Ignition key
2. Ignition switch
3. Interlock cable
4. Release shaft
5. Lock lever

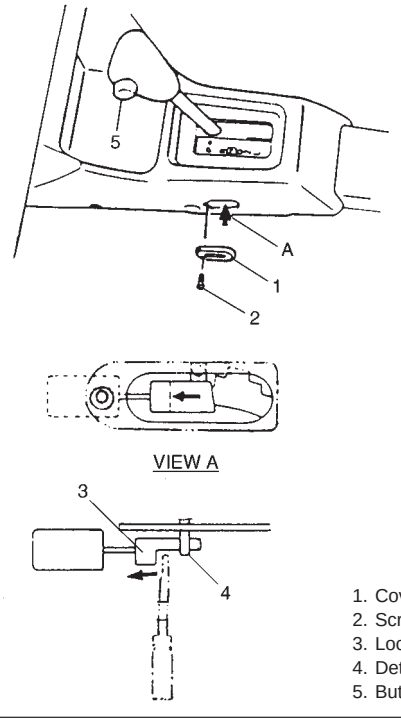


1. Selector lever (in P range)
2. Shift lock solenoid
3. Detent pin
4. Lock plate
5. Detent plate

SHIFT LOCK SOLENOID

When the select lever is in P range, the ignition key position is "ON" and depressing the brake pedal cause the electric current to flow to the solenoid. As the lock plate is drawn toward the solenoid in this state, it frees the detent pin, which then allows the select lever to be shifted from P range to any other position.

Even when the select lever is in P range, if the ignition key position is "LOCK" or "ACC" or the brake pedal is not depressed, the electric current does not flow to the solenoid. In this state, the lock plate is pushed away from the solenoid by spring force and it obstructs the detent pin movement. Thus the select lever button does not work even when pressed and the select lever shift is prevented.



1. Cover
2. Screw
3. Lock plate
4. Detent pin
5. Button

MANUAL RELEASE PROCEDURE FOR SHIFT LOCK SOLENOID

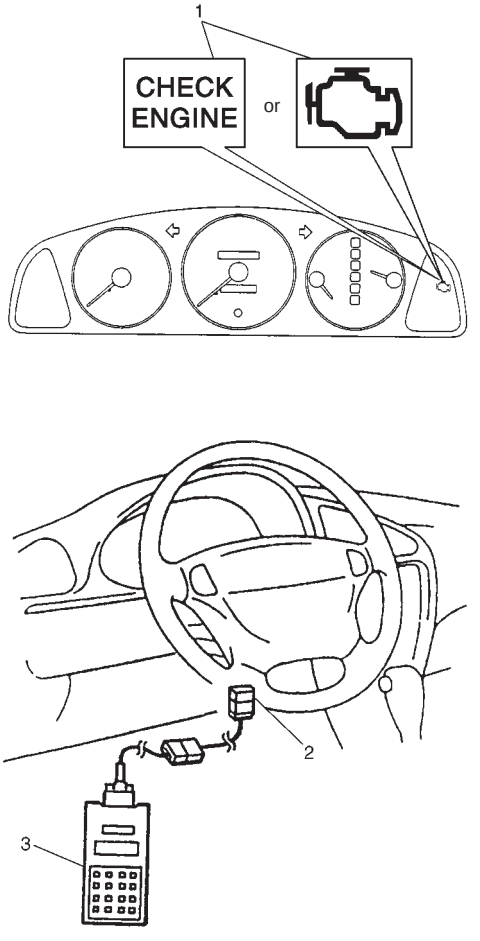
Shift lock solenoid can be manually released by following procedure.

1) Remove access hole cover by unfastening screw.
2) Turn ignition key to "ACC" position and move lock plate toward front side of vehicle by using screw driver or the like until detent pin becomes free.
3) In this state, selector lever can be moved to any range or position regardless of brake pedal operation.

DIAGNOSIS

This vehicle is equipped with an electronic transmission control system, which control the automatic shift up and shift down timing, etc. suitably to vehicle driving conditions.
PCM has an On-Board Diagnosis System which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission.
When diagnosing a trouble in transmission including this system, be sure to have full understanding of the outline of “ON-BOARD DIAGNOSTIC SYSTEM” and each item in “PRECAUTION IN DIAGNOSING TROUBLE” and execute diagnosis according to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” given below to obtain correct result smoothly.

NOTE:
There are two types of ON-BOARD DIAGNOSTIC SYSTEM depending on vehicle specifications. The type of system for vehicle being serviced can be identified by whether equipped with WU-TWC or not. Identify vehicle referring to “IDENTIFICATION WHETHER VEHICLE EQUIPPED WITH WU-TWC OR NOT” in Section 0A.



1. Malfunction indicator lamp (MIL)
2. Data link connector (DLC)
3. SUZUKI scan tool (Tech-1)

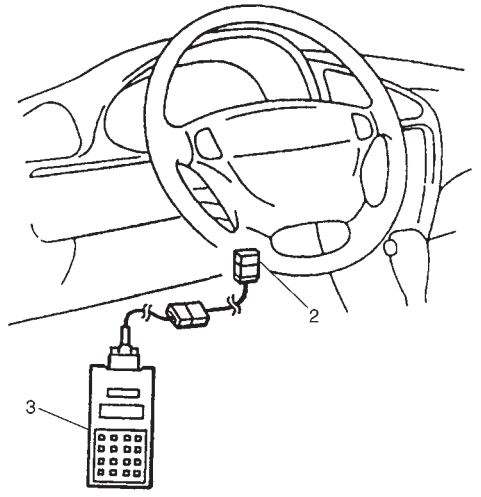
ON-BOARD DIAGNOSTIC SYSTEM

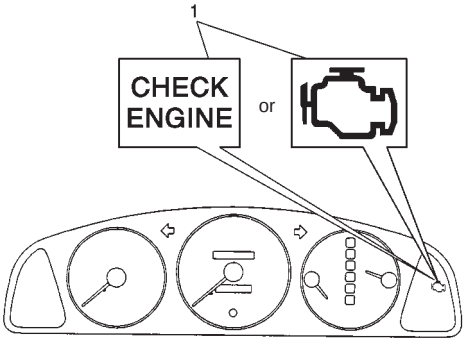
[For vehicle with WU-TWC]
For automatic transmission control system, PCM has following functions. Refer to Section 6-1 or 6-2 for details.

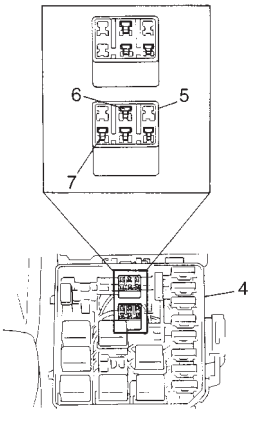
- When ignition switch is turned ON with engine at a stop malfunction indicator lamp (MIL) turns ON to check bulb of MIL.
- When PCM detects a malfunction in A/T control system (and/or a malfunction which gives an adverse effect to vehicle emission) while engine is running, it makes malfunction indicator lamp in meter cluster of instrument panel turn ON and stores malfunction area (DTC) in its memory.
  If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL turn OFF although DTC stored in its memory will remain.
- It is possible to communicate with PCM through data link connecter (DLC) by using SUZUKI scan tool (Tech-1).
  (Diagnostic information can be checked and erased by using a scan tool)

2 Driving Cycle Detection Logic
Refer to Section 6-1 or 6-2 for details.

Freeze Frame Data
Refer to Section 6-1 or 6-2 for details.







1. Malfunction indicator lamp (MIL)
2. Data link connector (DLC)
3. SUZUKI scan tool (Tech-1)
4. Relay/Fuse box
5. Monitor connector No.1
6. Diagnosis switch terminal
7. Ground terminal

[For vehicle without WU-TWC]

For automatic transmission control system, PCM has following functions.

- When PCM detects a malfunction in A/T control system while engine is running, it stores malfunction area (DTC) in its memory.
- It is possible to communicate with PCM through data link connecter (DLC) by using SUZUKI scan tool (Tech-1).
  (Diagnostic information can be checked and erased by using a scan tool)
- It is also possible to check DTC stored in PCM memory by flashing of malfunction indicator lamp (MIL) with diagnosis switch terminal of monitor connector No.1, which is located in relay/fuse box, grounded. If no malfunction DTC is stored in PCM memory, DTC No.2 is outputted repeatedly. If two or more DTCs are stored in PCM memory, they are outputted starting from smallest code number in increasing order. After all DTCs are outputted, all DTCs are outputted repeatedly.

PRECAUTION IN DIAGNOSING TROUBLE

- Don't disconnect couplers from PCM, battery cable from battery, PMC ground wire harness from engine or main fuse before checking the diagnosis information (DTC, freeze frame data, etc.) stored in PCM memory. Such disconnection will clear memorized information in PCM.
- Using SUZUKI scan tool (Tech-1) the diagnostic information stored in PCM memory can be checked and cleared as well. Before its use, be sure to read Operator's (instruction) Manual supplied with it carefully to have good understanding of its functions and usage.
- Priorities for diagnosing troubles
  If two or more diagnostic trouble codes (DTCs) are stored, proceed to flow table (chart) of DTC which was detected earliest in order and follow instruction in that table (chart).
  If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.
  1. Diagnostic trouble codes (DTCs) other than DTC P0171/P0172 (Fuel system too lean/too rich), DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected) and DTC P0400 (EGR flow malfunction)
  2. DTC P0171/P0172 (Fuel system too lean/too rich) and DTC P0400 (EGR flow malfunction)
  3. DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected)
- Be sure to read "PRECAUTION FOR ELECTRICAL CIRCUIT SERVICE" in Section 0A before inspection and observe what is written there.
- PCM replacement
  When substituting a known-good PCM, check for following conditions.
  Neglecting this check may result in damage to good PCM.
  – All relays and actuators have resistance of specified value.
  – MAF sensor, TP sensor and fuel tank pressure sensor (if equipped) are in good condition. Also, the power circuit of these sensors is not shorted to the ground.

AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed according to instruction on the next page?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC (including pending DTC) referring to the next page. Is there any DTC(s)?	1) Print DTC and freeze frame data or write them down and clear them by referring to "DTC CLEARANCE" in this section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the next page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC CHECK" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC CHECK" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 10.
8	Automatic Transmission Basic Inspection and Symptoms-to-Inspection Table 1) Check and repair according to "A/T BASIC CHECK" and "SYMPTOM-TO-INSPECTION TABLE" in this section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Trouble shooting for DTC 1) Check and repair according to applicable DTC flow Table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer.
For this purpose, use of such an inspection form (shown in next page) will facilitate collecting information to the point required for proper analysis and diagnosis.

2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK, RECORD AND CLEARANCE

First, referring to "DTC CHECK" in this section, check DTC (including pending DTC). If DTC exists, print or write down DTC and freeze frame data and then clear them by referring to "DTC CLEARANCE" in this section.
DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.
Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in an faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

3. and 4. VISUAL INSPECTION

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine and automatic transmission referring to "VISUAL INSPECTION" in this section.

5. TROUBLE SYMPTOM CONFIRMATION

Check trouble symptoms based on information obtained in Step 1 "Customer complaint analysis" and Step 2 "DTC/freeze frame data check".
Also, reconfirm DTC according to "DTC CONFIRMATION PROCEDURE" described in each "DTC Flow Table" in this section.

6. and 7. RECHECKING AND RECORD OF DTC/FREEZE FRAME DATA

Refer to "DTC CHECK" in this section for checking procedure.

8. AUTOMATIC TRANSMISSION BASIC CHECK AND SYMPTOM-TO-INSPECTION TABLE

Perform basic check of A/T according to "AUTOMATIC TRANSMISSION BASIC CHECK FLOW TABLE" first.
When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to "SYMPTOM -TO- INSPECTION TABLE" and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or A/T basic check) and repair or replace faulty parts, if any.

9. DIAGNOSTIC TROUBLE CODE FLOW TABLE

Based on the DTC indicated in Step 6 and 7, and referring to "DTC Flow Table" in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, PCM or other part and repair or replace faulty parts.

10. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.) referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A and related circuit of DTC recorded in step 2.

11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the vehicle is free from any abnormal conditions.
If what has been repaired is related to the DTC, clear the DTC once, perform DTC confirmation procedure and check to ensure that no DTC is indicated.

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

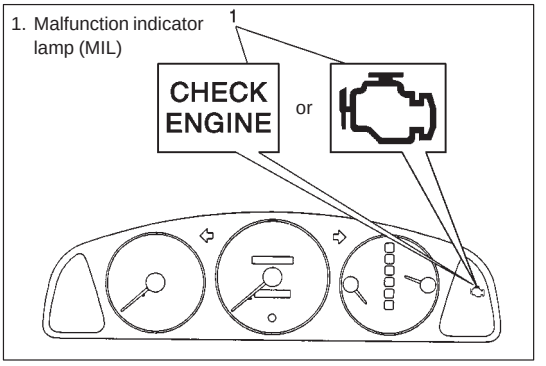
User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

PROBLEM SYMPTOMS
☐ Vehicle does not move (R, D, 2, L range)
☐ No upshift automatically (☐ 1st to 2nd ☐ 2nd to 3rd ☐ 2 range ☐ D range)
☐ No downshift automatically (☐ 3rd to 2nd ☐ 2nd to 1st ☐ 2 range ☐ D range)
☐ No gear change manually (☐ 1st ↔ 2nd ☐ 2nd ↔ 3rd)
☐ Automatic shift point too high or too low
☐ Excessive gear change shock (1st/2nd/3rd/Reverse)
☐ No kickdown
☐ Transmission slipping in (1st/2nd/3rd/Reverse)
☐ Others

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather	☐ Fair ☐ Cloudy ☐ Rain ☐ Snow ☐ Always ☐ Other _____
Temperature	(°F/ °C) ☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ always
Frequency	☐ Always ☐ Sometimes (times/ day, month) ☐ Only once ☐ Under certain condition
Road	☐ Urban ☐ Suburb ☐ Highway ☐ Mountainous ☐ Uphill ☐ Downhill ☐ Tarmacadam ☐ Grave ☐ Other _____
Vehicle Condition	
Engine & transmission condition	☐ Cold/☐ Warming up phase/ ☐ Warmed up Engine speed (r/min) Throttle opening (☐ Idle/☐ About %/☐ full)
Vehicle condition	☐ At stop/ ☐ During driving (☐ Constant speed ☐ Accelerating ☐ Decelerating) ☐ Right hand corner ☐ Left hand corner ☐ Vehicle speed (km/h Mile/h) ☐ Other _____

Malfunction indicator lamp	☐ Blink ☐ Always ON ☐ Sometimes ON ☐ Always OFF ☐ Good condition
Diagnostic trouble code	First check: ☐ No code ☐ Malfunction code ( )
	Second check: ☐ No code ☐ Malfunction code ( )

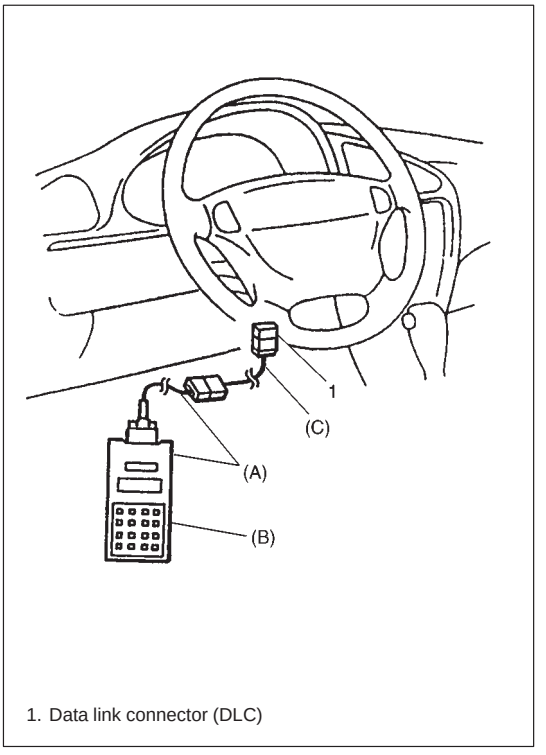
NOTE:
The above form is a standard sample. It should be modified according to conditions characteristic of each market.



1. Malfunction indicator lamp (MIL)

MALFUNCTION INDICATOR LAMP (MIL) CHECK

Refer to the same item in Section 6E1, 6E3, 6-1 or 6-2 for checking procedure.



1. Data link connector (DLC)

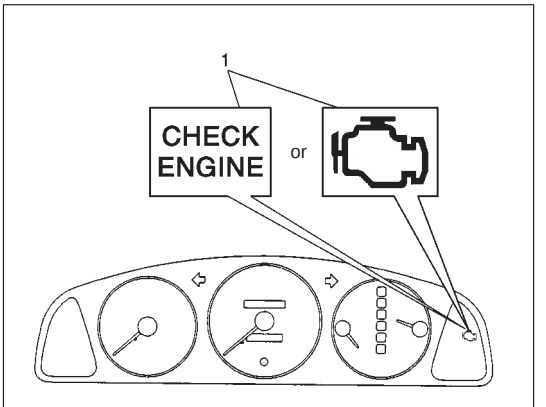
DIAGNOSTIC TROUBLE CODE(S) CHECK

[Using SUZUKI scan tool]

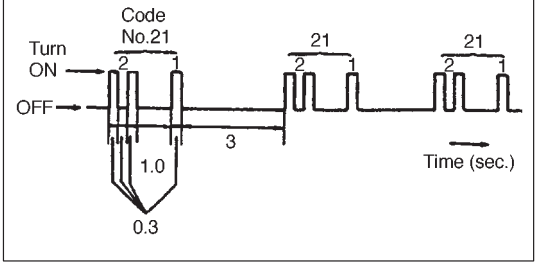
1) Turn ignition switch OFF.
2) After setting cartridge to SUZUKI scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

   Special Tool
   (A): 09931-76011 (SUZUKI scan tool)
   (B): Mass storage cartridge
   (C): 09931-76030 (16/14 pin DLC cable)

3) Turn ignition switch ON.
4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).

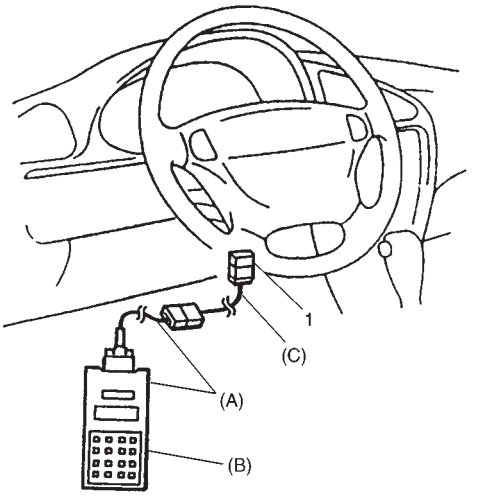


1. Malfunction indicator lamp (MIL)



[Not using SUZUKI scan tool]

1) Check malfunction indicator lamp, referring to "MALFUNCTION INDICATOR LAMP CHECK" in this section.
2) Using service wire, ground diagnosis switch terminal in monitor connector No.1.
3) Read DTC from flashing pattern of malfunction indicator lamp. (Refer to "DIAGNOSTIC TROUBLE CODE TABLE" in this section.)
4) After completing the check, turn ignition switch OFF and disconnect service wire from monitor coupler.



1. Data link connector (DLC)

DIAGNOSTIC TROUBLE CODE(S) CLEARANCE

[Using SUZUKI scan tool]

1) Turn ignition switch OFF.
2) After setting cartridge to SUZUKI scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

   Special Tool
   (A): 09931-76011 (SUZUKI scan tool)
   (B): Mass storage cartridge
   (C): 09931-76030 (16/14 pin DLC cable)

3) Turn ignition switch ON.
4) Erase DTC according to instructions displayed on SUZUKI scan tool. Refer to SUZUKI scan tool operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).

[Not using SUZUKI scan tool]

1) Turn ignition switch OFF.
2) Disconnect battery negative cable for specified time below to erase diagnostic trouble code stored in PCM memory and reconnect it.
   TIME REQUIRED TO ERASE DTC

AMBIENT TEMPERATURE	TIME TO CUT POWER TO PCM
Over 0°C (32°F)	60 sec. or longer
Under 0°C (32°F)	Not specifiable. Select a place with higher than 0°C (32°F) temperature.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

A: Using scan tool for vehicle with WU-TWC
B: Using scan tool and not using scan tool for vehicle without WU-TWC
C: Driving cycles when MIL lighting for vehicle with WU-TWC
D: Driving cycles when PCM stores DTC in its memory for vehicle without WU-TWC

DTC NO.		DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	C	D
A	B				
–	12	Normal	–	–	–
P0705	72	Transmission range sensor circuit malfunction	No signal or multiple signals inputted with shifted in “D” range.	1 driving cycle	1 driving cycle
P0720	24	Output speed sensor circuit malfunction	No signal inputted while running vehicle with “D” or “2” range.	1 driving cycle	1 driving cycle
P0751	Not applicable	Shift solenoid-A performance or stuck off	While running in “D” range, engine speed as compared to vehicle speed higher or lower than specified value	2 driving cycles	Not applicable
P0756	Not applicable	Shift solenoid-B performance or stuck off			
P0753	61/62	Shift solenoid-A electrical	Output command from PCM and output voltage do not agree. (Solenoid circuit shorted to ground or open)	1 driving cycle	1 driving cycle
P0758	63/64	Shift solenoid-B electrical			

FAIL-SAFE TABLE

DTC No.	DETECTED ITEM	FAIL-SAFE OPERATION	
P0705	Transmission range sensor (switch) circuit malfunction	No signal inputted	PCM controls solenoids on “L” range base.
		Multiple signal inputted	PCM controls solenoids according to following priority order. L > R > D > 2 > N > P
P0720	Output speed sensor (A/T VSS) circuit malfunction	Gear is held at 3rd gear when in “D” range and at 2nd gear when in “2” range.	
P0753	Shift solenoid-A electrical	When short circuit is detected, PCM does not output ON command to shift solenoid until vehicle stops and selector lever is shifted to “P” or “N” range.	Gear is held at 3rd gear when in “D” range.
P0758	Shift solenoid-B electrical		Gear is not shifted to 1st gear when in “D” range or in “2” range.

VISUAL INSPECTION

Visually check following parts and systems.

INSPECTION ITEM	REFERRING SECTION
● A/T fluid– – – – – level, leakage, color	Section 0B
● A/T fluid hoses – – – – – disconnection, looseness, deterioration	Section 7B
● Throttle cable – – – – – play, installation	Section 6E1, 6E2, 6E3 or 6E4
● A/T oil pressure control cable and select cable – – – – – installation	Section 7B
● Engine oil – – – – – level, leakage	Section 0B
● Engine coolant – – – – – level, leakage	Section 0B
● Battery – – – – – fluid level, corrosion of terminal	
● Connectors of electric wire harness – – – – – disconnection, friction	Section 6E1, 6E3, 6-1 or 6-2
● Fuses – – – – – burning	Section 8
● Parts – – – – – installation, bolt – – – – – looseness	
● Parts – – – – – deformation	
● Other parts that can be checked visually	
Also check following items at engine start, if possible.	
● Malfunction indicator lamp	Section 6E1, 6E3, 6-1 or 6-2
● Charge warning lamp	Section 6H
● Engine oil pressure warning lamp	Section 8 (Section 6A1 or 6A3 for pressure check)
● Engine coolant temp. meter	
● Other parts that can be checked visually	

AUTOMATIC TRANSMISSION BASIC CHECK

This check is very important for troubleshooting when PCM (ECM) has detected no DTC and no abnormality has been found in visual inspection. Follow the flow table carefully.

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAG. FLOW TABLE”.
2	Check A/T Fluid. Warm transmission to normal operating temperature and check fluid level and contamination referring to “FLUID LEVEL CHECK” of “ON-VEHICLE SERVICE” in this section. Is it in good condition?	Go to Step 3.	Add or change fluid.
3	Check Fluid Pressure Control Cable. 1) Warm up engine to normal operating temperature. 2) Check fluid pressure control cable for play referring to “FLUID PRESSURE CONTROL CABLE” of “ON-VEHICLE SERVICE” in this section. Is it in good condition?	Go to Step 4.	Adjust.
4	Check Select Cable for Adjustment referring to “SELECT CABLE” of “ON-VEHICLE SERVICE” in this section. Is it adjusted correctly?	Go to Step 5.	Adjust.
5	Check Transmission Range Sensor (Switch) Circuit for Operation. When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range signal (P, R, N, D, 2 or L) on display when shifting manual selector to each range. See Fig. 1. Is applicable range indicated? When not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals C20-2, C20-3, C20-6, C20-12, C20-16 and C20-17 for vehicle with WU-TWC (C21-8, C21-9, C21-10, C21-19, C21-20 and C21-21 for vehicle without WU-TWC) respectively with selector lever shifted to each range. See Fig. 2. Taking terminal C20-16 for vehicle with WU-TWC (C21-10 for vehicle without WU-TWC) as an example, is battery voltage indicated only when selector lever is shifted to “2” range and 0 V for other ranges as shown in Fig. 3? Check voltage at other terminals likewise, referring to Fig. 3. Are check results satisfactory?	Go to Step 6.	Go to Step 3 of DTC P0705 Flow Table.
6	Check Engine Idle speed referring to section 6E1, 6E2, 6E3 or 6E4. Is it in good condition?	Go to “SYMPTOM-TO-INSPECTION TABLE” below.	Go to Section 6E1, 6E3, 6-1 or 6-2.

Fig. 1 for Step 5.

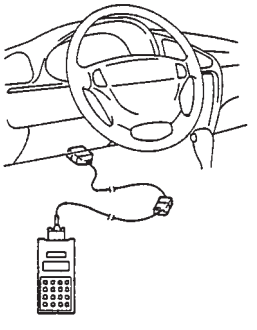


Fig. 2 for Step 5.

When not using SUZUKI scan tool:

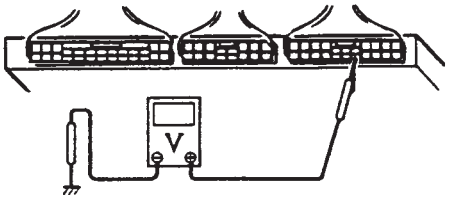


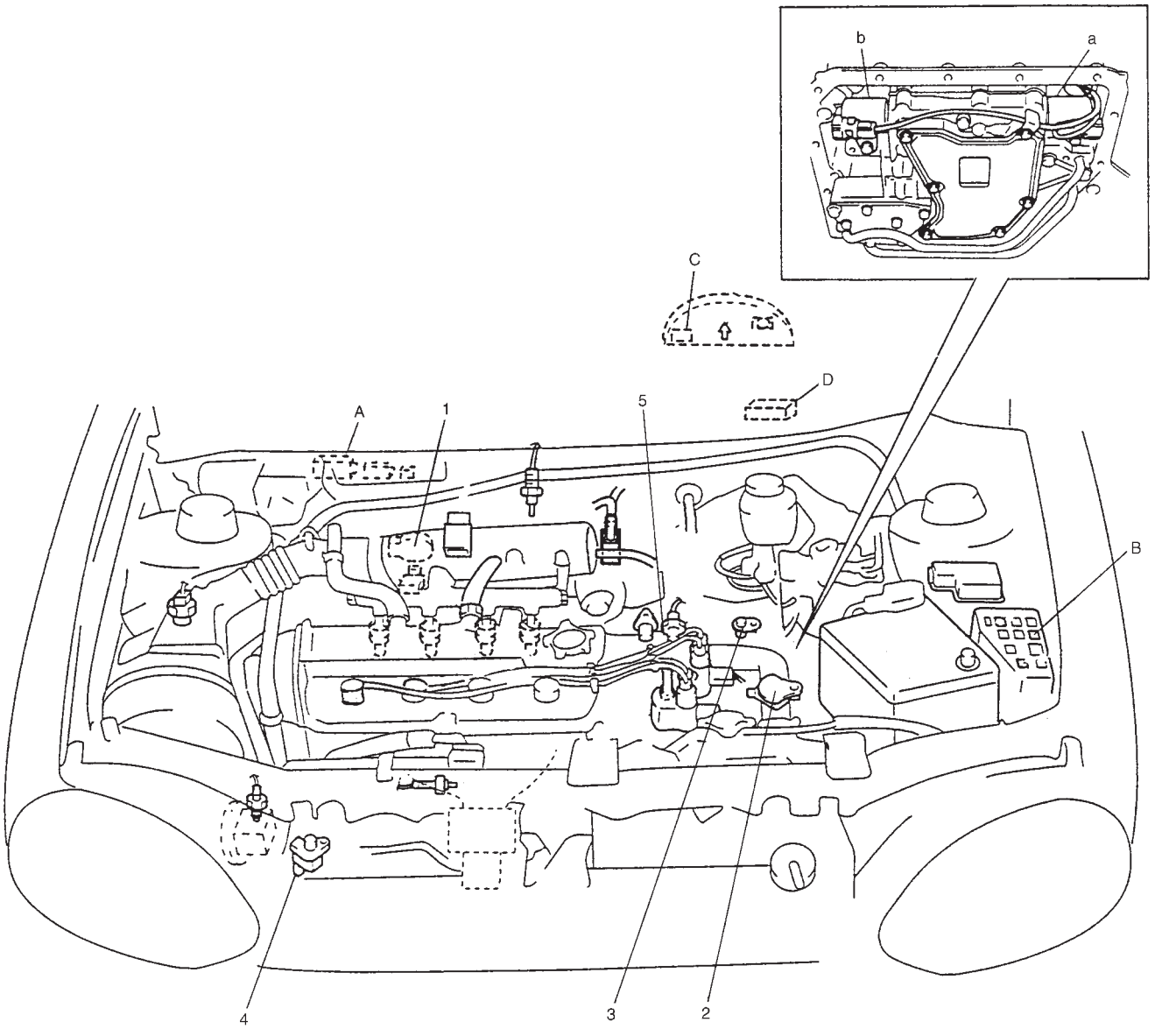
Fig. 3 for Step 5.

Terminal / Selector lever position	C20-3 (C21-8)	C20-2 (C21-19)	C20-12 (C21-9)	C20-6 (C21-20)	C20-16 (C21-10)	C20-17 (C21-21)
P	B + V	0 V	0 V	0 V	0 V	0 V
R	0 V	B + V	0 V	0 V	0 V	0 V
N	0 V	0 V	B + V	0 V	0 V	0 V
D	0 V	0 V	0 V	B + V	0 V	0 V
2	0 V	0 V	0 V	0 V	B + V	0 V
L	0 V	0 V	0 V	0 V	0 V	B + V

SYMPTOM-TO-INSPECTION TABLE

SYMPTOM	APPLICABLE DIAGNOSTIC FLOW TABLE. OR CHECK (DESCRIBED IN THIS SECTION)
No starting or slipping in any drive range	A/T DIAGNOSTIC FLOW TABLE A-1
Gear change failure	A/T DIAGNOSTIC FLOW TABLE A-2
Excessive shock at range selection or gear change	A/T DIAGNOSTIC FLOW TABLE A-3
Engine brake fails to operate	ENGINE BRAKE TEST
Gear shift failure in “D” or “2” range	A/T DIAGNOSTIC FLOW TABLE B-1
Gear is shifted to 2nd in “L” range	A/T DIAGNOSTIC FLOW TABLE B-2
Vehicle does not move backward in “R” range	

COMPONENT LOCATION



INFORMATION SENSORS

1. Throttle position sensor
2. Transmission range sensor
3. Output shaft speed sensor
4. Crankshaft position sensor
5. Engine coolant temp. sensor

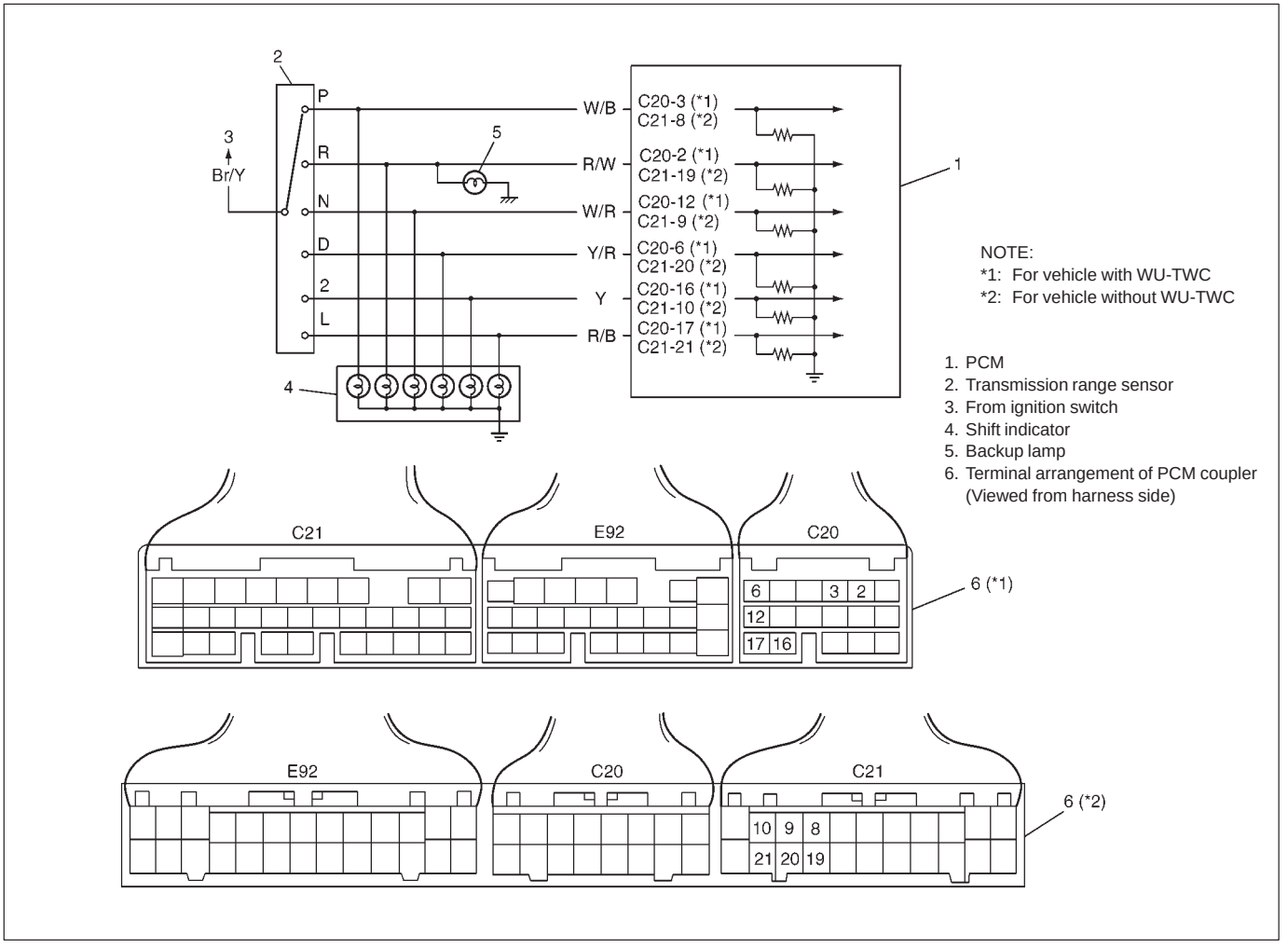
CONTROLLED DEVICES

a. Shift solenoid-A
(Direct clutch solenoid valve)
b. Shift solenoid-B
(2nd brake solenoid valve)
3. Malfunction indicator lamp

OTHERS

A. PCM
B. Main relay
D. Data link connector

DTC P0705/DTC NO.72 TRANSMISSION RANGE SENSOR (SWITCH) CIRCUIT MALFUNCTION



CIRCUIT DESCRIPTION – Refer to “GENERAL DESCRIPTION” in this section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC will set when either condition A or condition B occurs. A: No signal is inputted at ignition switch ON. B: Multiple signals are inputted while running at higher than specified vehicle speed with gear in 3rd gear of “D” range.	● “Br/Y”, “W/B”, “R/W”, “W/R”, “Y/R”, “Y” or “R/B” circuit open or short. ● Transmission range sensor malfunction. ● Select cable maladjusted. ● PCM malfunction.

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

1) Turn ignition switch OFF and then ON.
2) Clear DTC and warm up engine to normal operating temperature.
3) Shift selector lever to each of P, R, N, D, 2 and L ranges and hold it there for longer than 5 seconds each.
4) Check for DTC and if no DTC appears on display, proceed to the next step.
5) Drive vehicle at 40 mile/h, 60 km/h or more in 3rd gear of “D” range for longer than 5 sec.
6) Stop vehicle and check DTC.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Check Transmission Range Sensor Circuit for Operation. When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range signal (P, R, N, D, 2 or L) on display when shifting manual selector to each range. See Fig. 1. Is applicable range indicated? When not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals C20-2, C20-3, C20-6, C20-12, C20-16 and C20-17 for vehicle with WU-TWC (C21-8, C21-9, C21-10, C21-19, C21-20 and C21-21 for vehicle without WU-TWC) respectively with selector lever shifted to each range. See Fig. 2. Taking terminal C20-16 for vehicle with WU-TWC (C21-10 for vehicle without WU-TWC) as an example, is battery voltage indicated only when selector lever is shifted to “2” range and 0 V for other ranges as shown in Fig. 3? Check voltage at other terminals likewise, referring to Fig. 3. Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 3.
3	Check Select Cable for Adjustment referring to “SELECT CABLE” of “ON-VEHICLE SERVICE” in this section. Is it adjusted correctly?	Go to Step 4.	Adjust.
4	Check Transmission Range Sensor. 1) Remove TR sensor from A/T. 2) At each of P, R, N, D, 2 and L shift position, check continuity between terminals as well as each terminal and sensor case. See Fig. 4. Continuity should be indicated only between those terminals as shown in Fig. 4 and 5 at each shift position. Continuity should not exist between any terminal and sensor case. Are check results satisfactory?	Go to Step 5.	Replace TR sensor.
5	Check Transmission Range Sensor for Installation Position. 1) Install TR sensor to transmission referring to “TRANSMISSION RANGE SENSOR” of “ON-VEHICLE SERVICE” in this section. 2) Perform check as described in step 2 of this table. Is check result satisfactory?	Transmission range sensor maladjusted.	Check “Br/Y”, “W/B”, “R/W”, “W/R”, “Y/R”, “Y” or “R/B” circuit for open or short. If wires and connections are OK, substitute a known-good PCM and recheck.

Fig. 1 for Step 2.

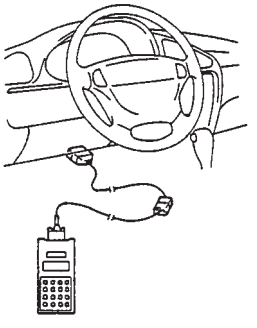


Fig. 2 for Step 2.

When not using SUZUKI scan tool:

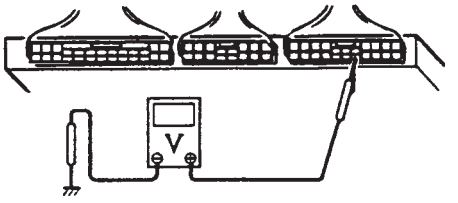


Fig. 3 for Step 2.

Terminal / Selector lever position	C20-3 (C21-8)	C20-2 (C21-19)	C20-12 (C21-9)	C20-6 (C21-20)	C20-16 (C21-10)	C20-17 (C21-21)
P	B + V	0 V	0 V	0 V	0 V	0 V
R	0 V	B + V	0 V	0 V	0 V	0 V
N	0 V	0 V	B + V	0 V	0 V	0 V
D	0 V	0 V	0 V	B + V	0 V	0 V
2	0 V	0 V	0 V	0 V	B + V	0 V
L	0 V	0 V	0 V	0 V	0 V	B + V

Fig. 4 for Step 4.

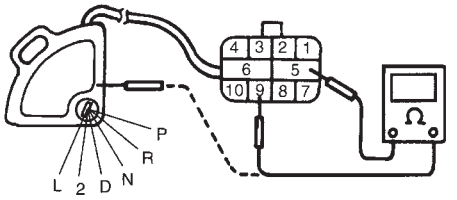
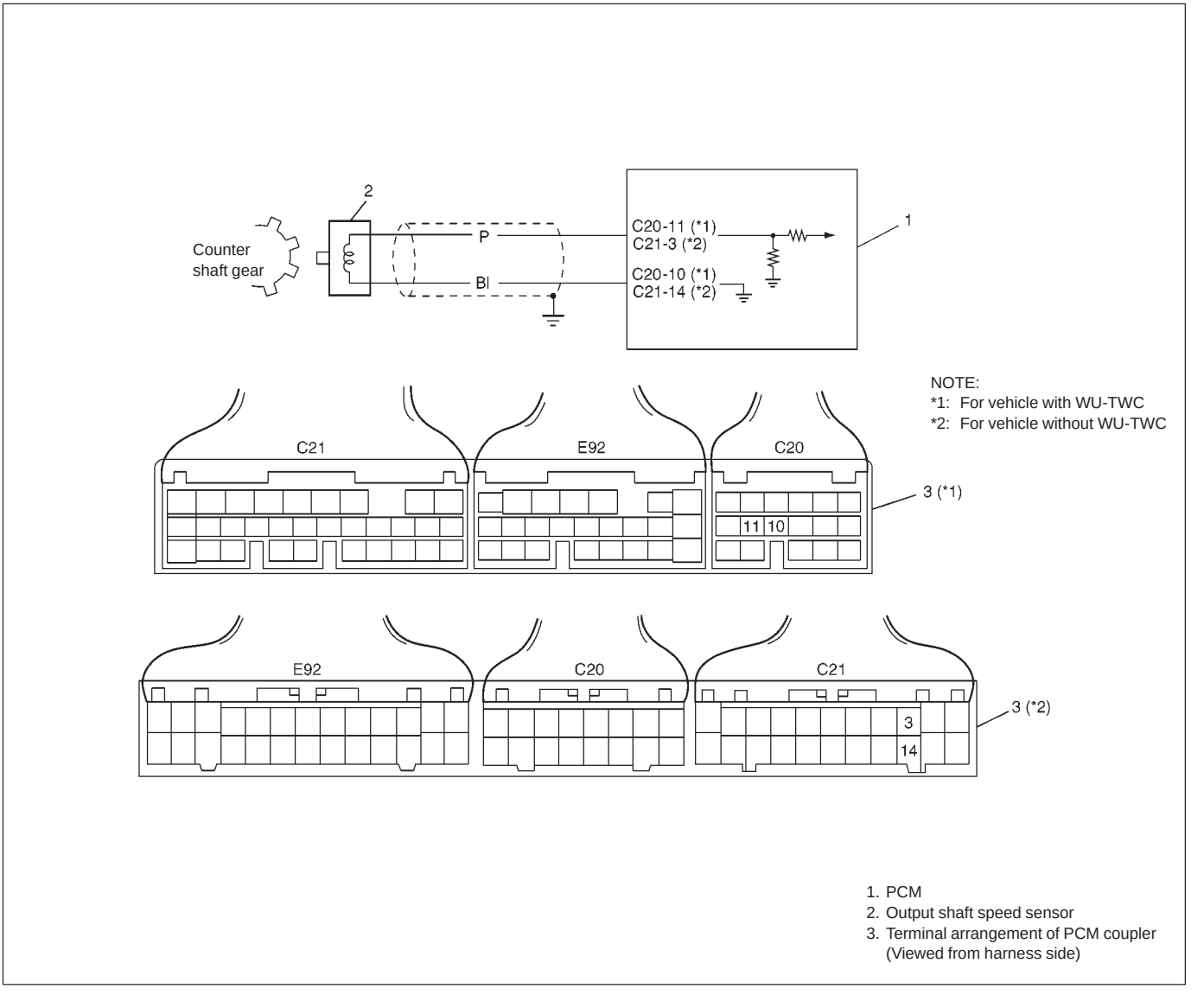


Fig. 5 for Step 4.

Terminal / Range	6	5	1	8	2	3	4	9	10
P	○	○							
				○				○	
R			○	○					
N	○	○							
				○					○
D				○	○				
2				○		○			
L				○			○		

DTC P0720/DTC NO.24 OUTPUT SPEED SENSOR (A/T VSS) CIRCUIT MALFUNCTION



CIRCUIT DESCRIPTION – Refer to “GENERAL DESCRIPTION” in this section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
No signal inputted while running vehicle with “D” or “2” range.	● “P” or “Bl” circuit open or short. ● Output shaft speed sensor malfunction. ● Foreign material being attached or sensor installed improperly. ● Gear damaged.

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

1) Turn ignition switch OFF and then ON.
2) Clear DTC, shift selector lever to “2” range and drive vehicle at 3500 r/min engine speed for 3.5 seconds.
3) Stop vehicle and check DTC.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to ”AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Check Output Shaft Speed Sensor for Resistance. 1) Disconnect output shaft speed sensor connector with ignition switch OFF. 2) Check for proper connection to output shaft speed sensor at “P” and “Bl” wire terminals. 3) If OK, then check resistance of output shaft speed sensor. See Fig. 1. Resistance between terminals : 100 – 300 I Resistance between terminal and transmission : 1 MI or more Are check results satisfactory?	Go to Step 3.	Replace output shaft speed sensor.
3	Check visually output shaft speed sensor and counter shaft gear for the following. See Fig. 2 and 3. ● No damage ● No foreign material attached ● Correct installation Are they in good condition?	“P” or “Bl” wire open or shorted to ground or poor C20-11 or C20-10 for vehicle with WU-TWC (C21-3 or C21-14 for vehicle without WU-TWC) connection. If wire and connection are OK, intermittent trouble or faulty PCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Clean, repair or replace.

Fig. 1 for Step 2.

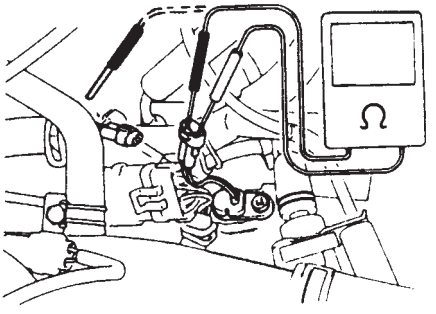


Fig. 2 for Step 3.

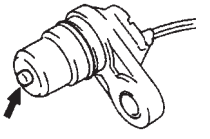
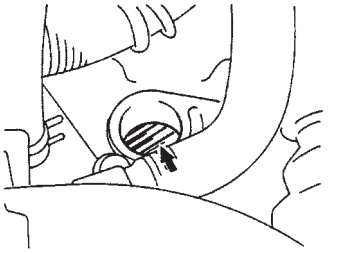
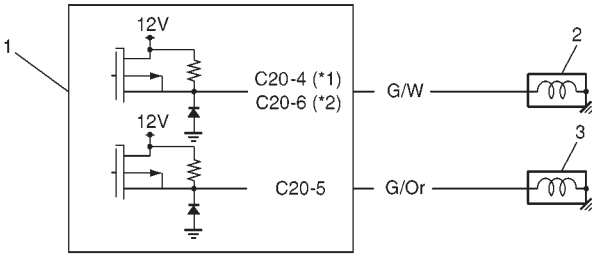


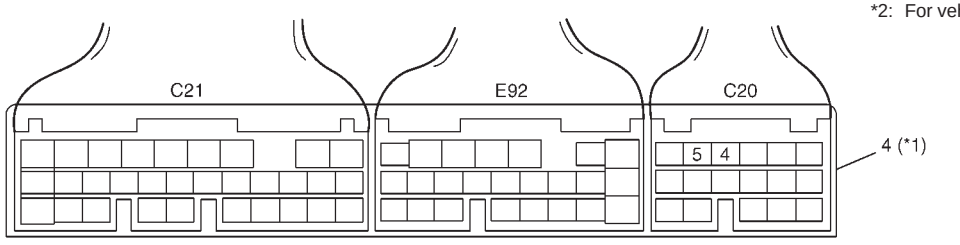
Fig. 3 for Step 3.

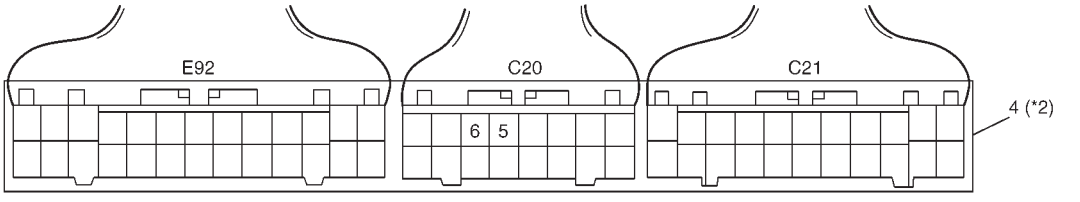


DTC P0753/DTC NO.61 OR 62 SHIFT SOLENOID-A (NO.1) ELECTRICAL
DTC P0758/DTC NO.63 OR 64 SHIFT SOLENOID-B (NO.2) ELECTRICAL



NOTE:
*1: For vehicle with WU-TWC
*2: For vehicle without WU-TWC





1. PCM
2. Shift solenoid-A (No.1, Direct clutch solenoid)
3. Shift solenoid-B (No.2, 2nd brake solenoid)
4. Terminal arrangement of PCM coupler (Viewed from harness side)

CIRCUIT DESCRIPTION – Refer to “GENERAL DESCRIPTION” of this section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
Output command from PCM and output voltage do not agree.	DTC P0753: ● “G/W” circuit open or short ● Shift solenoid-A malfunction ● PCM malfunction DTC P0758: ● “G/Or” circuit open or short ● Shift solenoid-B malfunction ● PCM malfunction

DTC CONFIRMATION PROCEDURE

1) Turn ignition switch OFF.
2) Clear DTC with ignition switch ON and warm up engine to normal operating temperature at “P” range.
3) Shift selector lever to “D” range for 1 sec. or longer.
4) Shift it to “P” range and check DTC.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Check Shift Solenoid Circuit. When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Select “Data list” mode on scan tool. See Fig. 1. 4) Check “SHIFT SOL A-MONI” or “SHIFT SOL B-MONI” on scan tool at “N” and “D” range. “N” range: OFF “D” range: ON Is OFF/ON displayed as described above? When not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminal C20-4 or C20-5 for vehicle with WU-TWC (C20-5 or C20-6 for vehicle without WU-TWC) of PCM connector connected. See Fig. 2. “N” range: 0 V “D” range: 10 – 14 V Is voltage displayed as described above?	Intermittent trouble. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 3.
3	Check Shift Solenoid for Resistance. 1) Turn ignition switch OFF. 2) Disconnect connector of shift solenoid. 3) Check resistance between solenoid terminal C33-1 or C33-2 and transmission. See Fig. 3. Is it 8 – 20 Ι ?	“G/W” or “G/Or” wire open or short, or poor C20-4 or C20-5 for vehicle with WU-TWC (C20-5 or C20-6 for vehicle without WU-TWC) connection. If wire and connection are OK, substitute a known-good PCM and recheck.	Replace shift solenoid.

Fig. 1 for Step 2.

When using SUZUKI scan tool:

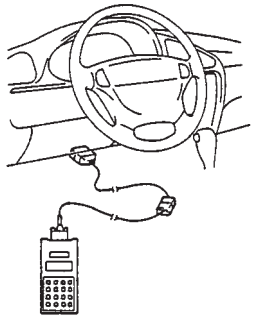


Fig. 2 for Step 2.

When not using SUZUKI scan tool:

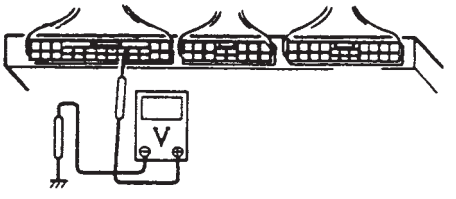
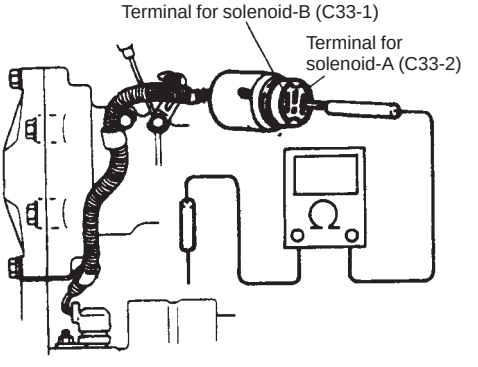


Fig. 3 for Step 3.

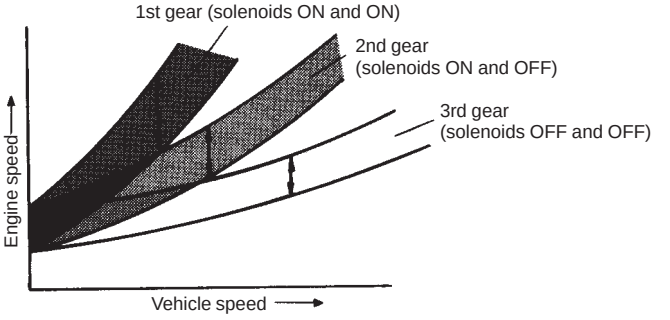


DTC P0751 SHIFT SOLENOID-A (No.1) PERFORMANCE OR STUCK OFF
DTC P0756 SHIFT SOLENOID-B (No.2) PERFORMANCE OR STUCK OFF

CIRCUIT DESCRIPTION

PCM monitors throttle opening, engine speed, vehicle speed and gear position and compares the actual engine speed and its specified value (i.e., engine speed obtained by PCM through calculation using the throttle opening/gear position and vehicle speed).

ACCEPTABLE RANGE



DTC DETECTING CONDITION	POSSIBLE CAUSE
● While running in “D” range after engine warmed up, engine speed as compared with vehicle speed is not within acceptable range. ⁎ 2 driving cycle detection logic, continuous monitoring.	● A/T oil pressure control cable maladjusted ● Selector cable maladjusted ● Mechanical malfunction of shift solenoid valve (stick or leakage) ● Mechanical malfunction in transmission ● Torque converter malfunction

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

1) Turn ignition switch OFF.
2) Clear DTC with ignition switch ON and warm up engine to normal operating temperature.
3) Shift selector lever to “D” range.
4) Start vehicle and increase vehicle speed to 25 – 35 mile/h, 40 – 55 km/h by depressing accelerator pedal half a stroke.
5) Keep vehicle at above speed for 5 sec. or longer.
6) Increase vehicle speed to 45 – 55 mile/h, 75 – 90 km/h by depressing accelerator pedal half a stroke and keep it at that speed for 5 sec. or longer.
7) Stop vehicle and check pending DTC and DTC.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Is DTC other than shift malfunction (DTC P0751/P0756) displayed?	Go to applicable DTC Flow Table.	Go to Step 3.
3	Perform Road Test to check if upshift and downshift take place at specified vehicle speed, referring to “ROAD TEST” in this section. Do they take place properly?	Intermittent trouble. Check electrical circuit of system for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 4.
4	Perform Manual Shift Road Test referring to “MANUAL ROAD TEST” in this section. Is test result satisfactory?	Go to Step 5.	Go to “A/T Basic Check”.
5	Check Transmission Range Sensor and Its Circuit according to Step 1 of DTC P0705 Flow Table. Are they in good condition?	Go to Step 6.	“D” range signal circuit shorted to other signal circuit or TR sensor malfunction.
6	Check Output Shaft Speed Sensor and Its Circuit referring to “OUTPUT SHAFT SPEED SENSOR CHECK” in this section. Are they in good condition?	Go to Step 7.	Output shaft speed sensor circuit open or short or output shaft speed sensor malfunction.
7	Check Shift Solenoid A and B for Operation referring to “SHIFT SOLENOID VALVE CHECK” in this section. Are they in good condition?	Substitute a known-good PCM and recheck.	Replace shift solenoid A or B.

TABLE A-1 NO STARTING OR SLIPPING IN ANY DRIVE RANGE

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Is engine rpm at stall test normal?	Transmission failure.	Go to Step 3.
3	Is engine rpm at stall test too low in any range?	Poor engine power or torque converter defective.	Go to Step 4.
4	Is engine rpm at stall test too high only in “D” range?	Go to Step 7.	Go to Step 5.
5	Is engine rpm at stall test too high only in “R” range?	Go to Step 9.	Go to Step 6.
6	Is line pressure proper?	Transmission failure.	Oil pump defective, Regulator valve operation failure, Throttle valve operation failure or Accelerator cable and oil pressure control cable maladjusted.
7	Does engine rpm at stall test become normal when coupler of solenoid valve wire is disconnected?	One-way clutch operation failure.	Go to Step 8.
8	Is line pressure proper?	Forward clutch worn.	Oil leak in forward clutch oil circuit or Oil leak in “D” range oil circuit.
9	Does engine rpm at stall test become normal when coupler of solenoid valve wire is disconnected?	1st-Reverse brake worn.	Go to Step 10.
10	Is line pressure proper?	Direct clutch worn.	Oil leak in direct clutch oil circuit or Oil leak in “R” range oil circuit.

TABLE A-2 GEAR CHANGE FAILURE

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Disconnect solenoid valve wire coupler and perform manual road test. Is upshift from 1st to 2nd possible?	Go to Step 3.	1-2 shift valve sticks or Shift solenoid-B (2nd brake solenoid) valve sticks.
3	Is upshift from 2nd to 3rd possible?	Gear shift control system defective. Go to A/T Diagnostic Flow Table B.	2-3 shift valve sticks or Shift solenoid-A (Direct clutch solenoid) valve sticks.

TABLE A-3 EXCESSIVE SHOCK AT RANGE SELECTION OR GEAR CHANGE

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Is line pressure proper?	Go to Step 3.	Regulator valve defective, Throttle valve defective or Accelerator cable maladjusted.
3	Does excessive shock occur when selecting “D” range from “N” range?	Forward clutch accumulator operation failure, Forward clutch worn or Forward clutch oil circuit check ball operation failure.	Go to Step 4.
4	Does excessive shock occur when selecting “R” range from “N” range?	1st-Reverse brake worn, 1st-Reverse brake oil circuit check ball operation failure.	Go to Step 5.
5	Does excessive shock occur at 1st to 2nd gear change?	2nd brake accumulator defective, 2nd brake worn, 2nd brake oil circuit check ball operation failure.	In case of excessive shock at 2nd to 3rd gear change, Direct clutch worn or Direct clutch oil circuit check ball operation failure.

STALL TEST

This test is to check overall performance of automatic transmission and engine by measuring stall speed at D and R ranges.
Be sure to perform this test only when transmission fluid is at normal operating temperature (70–80°C/158–176°F) and its level is between FULL HOT and LOW HOT. (Refer to “Fluid level” in this section.)

CAUTION:
Do not run engine at stall more than 5 seconds continuously, for oil temperature may rise excessively high.

1) Install tachometer.
2) Apply parking brake and block vehicle wheels.
3) Start engine with selector lever shifted to P range.
4) Depress brake pedal.

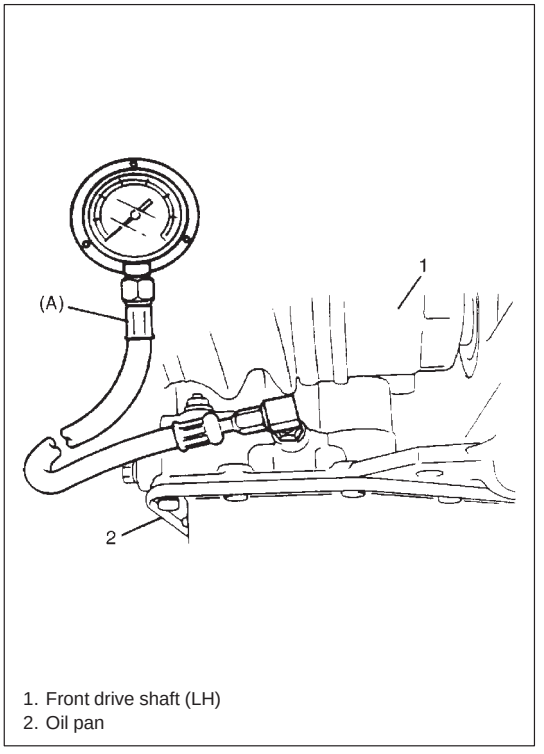
5) Shift selector lever to D range and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
6) Release accelerator pedal immediately after stall speed is checked.
7) In the same way, check stall speed at R range.

8) Stall speed should be within following specification.

   Stall speed: 2,500 – 2,900 r/min

9) Possible causes for out-of-specification stall speed are as follows. Check each part which is suspected to be the cause.

Stall speed measured	Possible causes
Lower than specification	● Engine output insufficient ● Torque converter defective
Higher than specification in D range	● Forward clutch slippage ● One-way clutch defective
Higher than specification in R range	● Direct clutch slippage ● 1st-reverse brake slippage



1. Front drive shaft (LH)
2. Oil pan

LINE PRESSURE TEST

This test is to check oil pressure system for operation by measuring oil pressure in oil pressure line. Make sure to perform this test only when transmission fluid is at normal operating temperature.

NOTE:

- **Make sure that transmission fluid level is between FULL HOT and LOW HOT marks on oil level gauge at normal operating temperature which corresponds to 70 – 80°C (155 – 176°F) of fluid. (Refer to "Fluid level" in this section.)**
- **Check that transmission is free from fluid leakage.**

1) With engine at stop, remove plug and connect oil pressure gauge to plug hole.

   Special Tool
   (A): 09925-37811-001

2) Install tachometer.
3) Apply parking brake and block vehicle wheels.
4) With selector lever shifted to P range, start engine.
5) Depress brake pedal fully.
6) Shift selector lever to D range and check oil pressure with engine running at idling speed and at stall speed respectively.
7) Repeat the same check as in step 6) with selector lever shifted to R range.

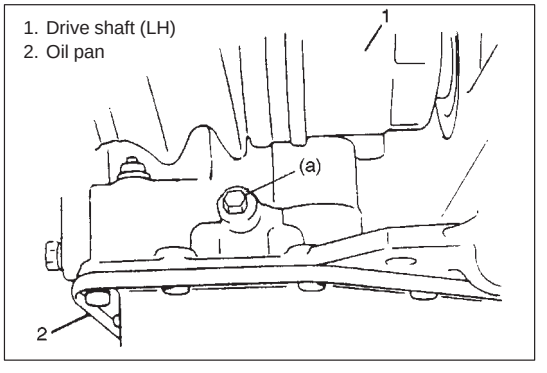
> **CAUTION:**
> **Do not run engine at stall more than 5 seconds continuously, for oil temperature may rise excessively high.**

8) If line pressure is within respective specification in table below, oil pressure system is in good condition.

Engine speed	Line pressure	
	D range	R range
Idling speed	260 – 460 kPa 2.6 – 4.6 kg/cm^2 40.0 – 65.4 psi	660 – 900 kPa 6.6 – 9.0 kg/cm^2 93.9 – 127.9 psi
Stall speed (2500 – 2900 r/min)	660 – 850 kPa 6.6 – 8.5 kg/cm^2 93.9 – 120.8 psi	Over 1,330 kPa Over 13.3 kg/cm^2 Over 189.2 psi

9) Possible causes for out-of-specification line pressure are as follows. Check each part which is suspected to be the cause.

Line pressure	Possible causes
Higher than specification in D and R ranges	● Regulator valve defective ● Throttle valve in valve body defective ● Accelerator cable and oil pressure control cable mal-adjusted
Lower than specification in D and R ranges	● Oil pump defective ● Regulator valve defective ● Throttle valve in valve body defective ● Accelerator cable and oil pressure control cable mal-adjusted
Lower than specification only in D range	● Forward clutch oil pressure system oil leakage ● D range oil pressure system oil leakage
Lower than specification only in R range	● Direct clutch oil pressure system oil leakage ● 1st-reverse brake oil pressure system oil leakage ● R range oil pressure system oil leakage



10) Reinstall plug and tighten it to specification.

Tightening Torque
(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

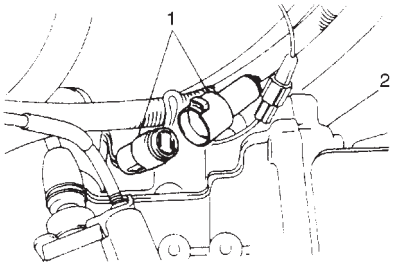
ROAD TEST

This test is to check if upshift and downshift take place at specified speeds while actually driving vehicle on a level road.

WARNING:
- **Carry out the test in very little traffic area to prevent an accident.**
- **The test requires 2 persons, a driver and a tester.**

1) Warm up engine.
2) With engine running at idle, shift selector lever to D range.
3) i) Accelerate vehicle speed by depressing accelerator pedal very little (within 4 deg. of throttle valve opening).
   ii) Check if upshift takes place from 1st to 2nd at about 18 km/h (11 mile/h) and from 2nd to 3rd at about 30 km/h (19 mile/h).
   iii) Stop vehicle once. Then start it again and while accelerating by depressing accelerator pedal fully, check if upshift takes place from 1st to 2nd at 60 km/h (37 mile/h) and from 2nd to 3rd at 113 km/h (70 mile/h).
   iv) Stop vehicle again.
   v) Start vehicle and keep it running at 25 km/h (15 mile/h) and then release accelerator pedal completely. 1 or 2 seconds later, depress accelerator pedal fully and check if downshift from 2nd to 1st takes place.
   vi) Keep vehicle running at 75 km/h (47 mile/h) and in the same way as in step v), check if downshift from 3rd to 2nd takes place.
   vii) If upshift or downshift fails to take place at each specified speed in the road test, possible causes for such failure are as follows. Check each part which is suspected to be the cause.

Condition	Possible causes
No upshift from 1st to 2nd	● 1 – 2 shift valve defective ● 2nd brake solenoid valve defective ● PCM defective, or disconnection or poor connection in electric circuit
No upshift from 2nd to 3rd	● 2-3 shift valve defective ● Direct clutch solenoid valve defective ● PCM defective, or disconnection or poor connection in electric circuit
No downshift from 2nd to 1st or 3rd to 2nd	● Throttle position sensor defective ● PCM defective, or disconnection or poor connection in electric circuit



1. Solenoid valve wire coupler (Disconnected)
2. Transmission

MANUAL ROAD TEST

This test checks the gears being used in L, 2 or D range when driven with unoperated gear shift control system.
Test drive vehicle on a level road.

1) With selector lever in P range, start engine and warm it up.
2) After warming up engine, disconnect coupler of solenoid valve wire as shown in left figure.
3) With selector lever in L range, start vehicle and accelerate to 30 km/h (19 mile/h). Check in this state that 1st gear is being used.
4) At 30 km/h (19 mile/h), shift selector lever to 2 range and accelerate to 60 km/h (37 mile/h).
   Check in this state that 2nd gear is being used.
5) At 60 km/h (37 mile/h), shift selector lever to D range and check that 3rd gear is used when speed is higher than 60 km/h (37 mile/h).
6) After above checks, stop vehicle then engine, and connect solenoid valve wire coupler.

ENGINE BRAKE TEST

WARNING:
Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

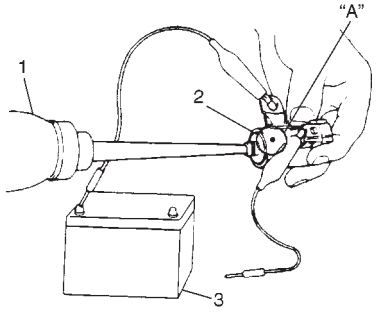
1) While driving vehicle in 3rd gear of D range, shift selector lever down to 2 range and check if engine brake operates.
2) In the same way as in step 1), check engine brake for operation when selector lever is shifted down to L range.
3) If engine brake fails to operate in above tests, possible cause for such failure are as follows.
   Check each part which is suspected to be the cause.

Condition	Possible causes
Fails to operate when shifted down to 2 range	Second brake defective
Fails to operate when shifted down to L range	1st-reverse brake defective

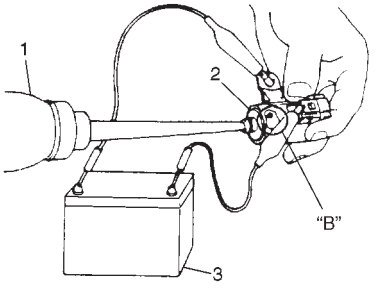
"P" RANGE TEST

1) Stop vehicle on a slope, shift selector lever to P range and at the same time apply parking brake.
2) After stopping engine, release parking brake lever gradually and check that vehicle remains stationary.

WITHOUT BATTERY VOLTAGE



WITH BATTERY VOLTAGE



1. Oiler (with transmission fluid)
2. Solenoid valve
3. 12V battery

"A": Side hole (Should be dry)
"B": Exhausting fluid

SHIFT SOLENOID VALVE CHECK

Whenever shift solenoid valves are removed from transmission, verify their valve function physically before they are reinstalled.

1) Apply oiler to solenoid valve and give compression by hands and then check to be sure that transmission fluid from oiler does not come out from side holes of solenoid valve when battery voltage is not conducted.
2) Holding the above condition, conduct battery voltage and then make sure that fluid is exhausted with vigor.

NOTE:
If fluid does not come out with vigor in above step 2) inspection, do not re-use that solenoid valve.

TABLE B-1 GEAR SHIFT FAILURE IN “D” OR “2” RANGE

STEP	ACTION	YES	NO
1	Was “TABLE A-2 GEAR CHANGE FAILURE” performed?	Go to Step 2.	Go to “TABLE A-2”.
2	Is gear no shift at all?	Go to Step 3.	Go to Step 4.
3	Perform vehicle speed sensor check refer to “OUTPUT SPEED SENSOR CHECK” in this section. Is check result satisfactory?	Go to Step 5.	Repair or replace.
4	Perform throttle position sensor check referring to DTC P0121 Flow Table in Section 6-1. Is check result satisfactory?	Go to Step 5.	Repair or replace.
5	Perform “SHIFT SOLENOID VALVE CIRCUIT CHECK” described later in this section. Is check result satisfactory?	Substitute a known-good PCM and recheck.	Replace shift solenoid-A (direct clutch solenoid) valve or shift solenoid-B (2nd brake solenoid) valve.

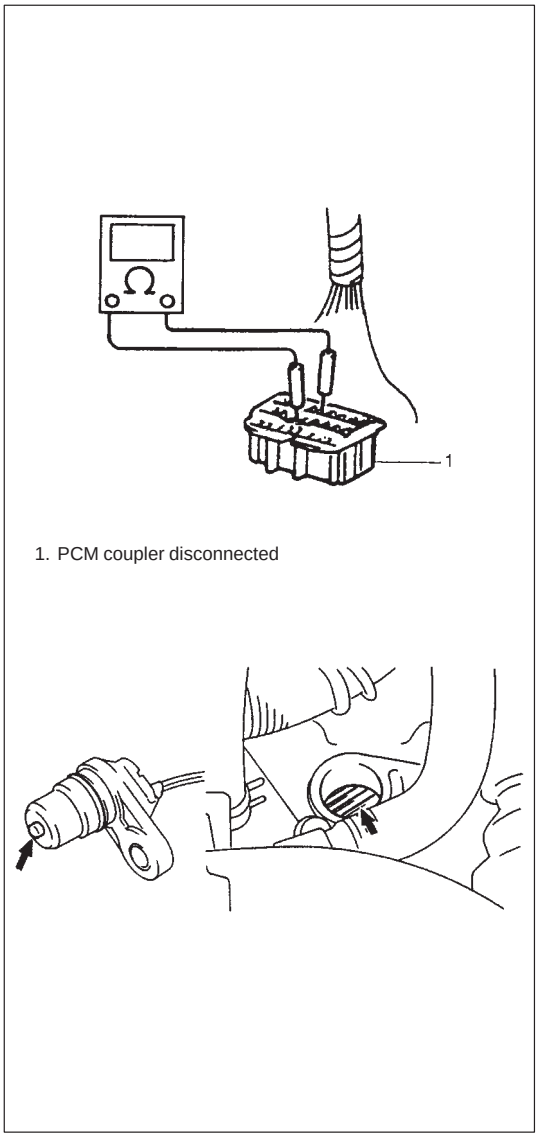
TABLE B-2 GEAR IS SHIFTED TO 2ND GEAR IN “L” RANGE VEHICLE DOES NOT MOVE BACKWARD IN “R” RANGE

NOTE:
Gear shift to 2nd may occur when selector lever is shifted from D or 2 to L, but this is normal.

STEP	ACTION	YES	NO
1	Was “TABLE A-2 GEAR CHANGE FAILURE” performed?	Go to Step 2.	Go to “TABLE A-2”.
2	Perform “SHIFT SOLENOID VALVE CIRCUIT CHECK” described later in this section. Is check result satisfactory?	Substitute a known-good PCM and recheck.	Replace shift solenoid-A (direct clutch solenoid) valve or shift solenoid-B (2nd brake solenoid) valve.

TRANSMISSION RANGE SENSOR CHECK

Check transmission range sensor referring to Step 2 of DTC P0705 Flow Table.



1. PCM coupler disconnected

OUTPUT SHAFT SPEED SENSOR CHECK

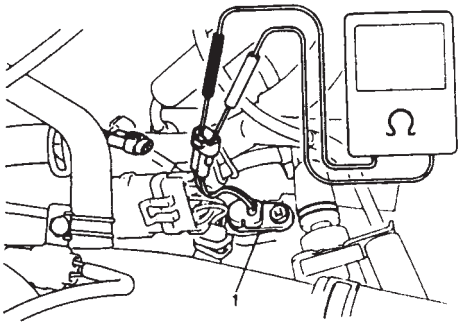
1) Turn OFF ignition switch.
2) Disconnect coupler(s) from powertrain control module.
3) Bring ohmmeter probes in touch with coupler terminals from harness side.
4) Check resistance of output shaft speed sensor.

   Resistance between terminals
   C20-10 and C20-11
   (For vehicle with WU-TWC)
   C21-3 and C21-14
   (For vehicle without WU-TWC) : 100 – 300 Ω

   Resistance between terminal
   and ground : 1 MΩ or more

   If resistance are out of specification, check wire harness and connector for open or short and output shaft speed sensor itself for resistance.
   If resistance are within above specifications, proceed to next step.
5) Visually check output shaft speed sensor and counter shaft gear for the following:
   - No damage
   - No foreign material attached
   - Correct installation

   If any malfunction is found, clean, repair or replace.



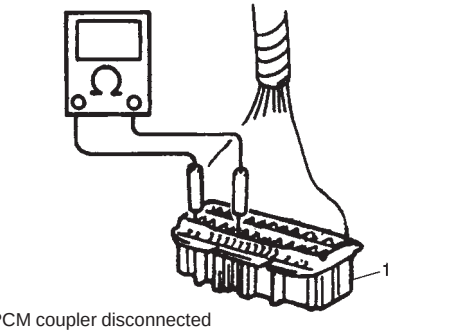
1. Output shaft speed sensor

Separately from the above inspection, output shaft speed sensor itself can be checked on its resistance by disconnecting coupler.

NOTE:

- **Function of output shaft speed sensor can be checked by measuring generated pulse as voltage.**
- **For its measurement, use an analog type voltmeter while spinning wheels on lift and with selector lever in "D" range.**

Output shaft speed sensor specifications	
Coil resistance	100 – 300 Ω
Output voltage at 40 km/h (25 mile/h)	Approximately 1 V



1. PCM coupler disconnected

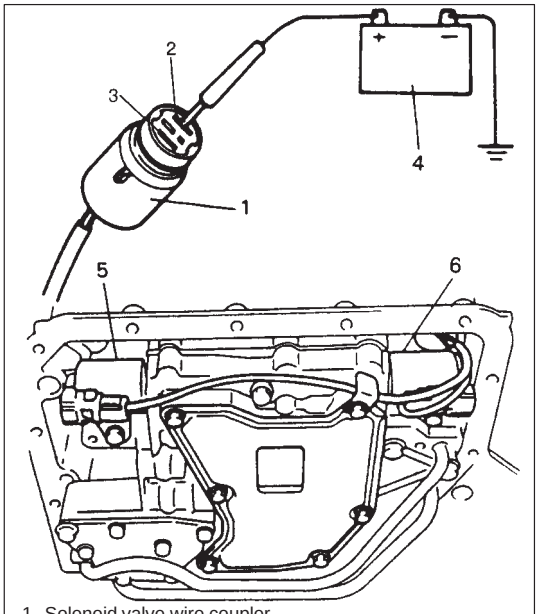
SHIFT SOLENOID VALVE CIRCUIT CHECK

1) With ignition switch turned OFF, disconnect PCM couplers.
2) Bring ohmmeter probes in touch with coupler terminals from harness side and measure each resistance.

Resistance between C20-4 and C21-1 for vehicle with WU-TWC (C20-6 and E92-2 for vehicle without WU-TWC) (Shift solenoid-A, direct clutch) : 8 – 20 Ω

Resistance between C20-5 and C21-1 for vehicle with WU-TWC (C20-5 and E92-2 for vehicle without WU-TWC) (Shift solenoid-B, 2nd brake) : 8 – 20 Ω

If resistance is out of specification, check shift solenoid itself for resistance (referring to Step 3 of DTC P0753/P0756 Flow Table) and wire harness for open or short.
If resistance is within specification, proceed to step 3).

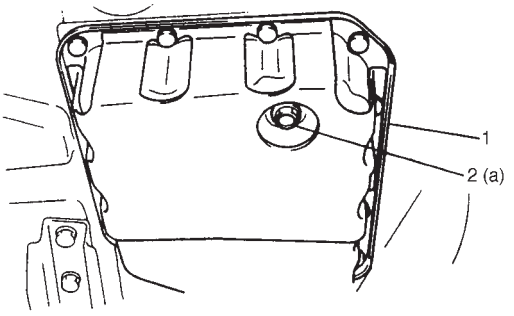


1. Solenoid valve wire coupler
2. Terminal for shift solenoid-A. (direct clutch solenoid)
3. Terminal for shift solenoid-B. (2nd brake solenoid)
4. 12 V battery
5. Shift solenoid-B. (2nd brake solenoid valve)
6. Shift solenoid-A. (Direct clutch solenoid valve)

3) Disconnect shift solenoid valve coupler from harness.
4) Apply 12 V to each terminal in solenoid valve coupler and check to be sure that a click sound is heard from each of shift solenoid-A and -B.
   If no click sound is heard, check lead wire and connections in oil pan, and then replace applicable shift solenoid-A or B if wire and connections are in good condition.
   If click sound is heard from each of shift solenoids A and B, shift solenoid electrical circuits are in good condition. Proceed to "SHIFT SOLENOID VALVE CHECK" previously described in this section.

THROTTLE POSITION SENSOR CHECK

Check throttle position sensor and its circuit referring to DTC P0121 Flow Table in Section 6E1, 6E3, 6-1 or 6-2.



1. Oil pan
2. Drain plug

ON-VEHICLE SERVICE

MAINTENANCE SERVICE

CHANGING FLUID

1) Raise vehicle.
2) With transmission cool, remove drain plug and drain fluid.
3) Install drain plug gasket and drain plug to oil pan, and tighten drain plug to specification.

Tightening Torque
(a): 21 N·m (2.1 kg–m, 15.5 lb-ft)

4) Remove oil level gauge from oil filler tube, and add new fluid from oil filler tube. Use DEXRON® -IIE, DEXRON® -III or equivalent automatic transmIssion fluid.

NOTE:
- **About 0.8 liters (1.7/1.4 US/Imp.pt) of fluid would be necessary to refill oil pan.**
- **Draining or refilling volume of fluid may change depending on draining time or temperature etc.**

5) Check fluid level with transmission at room temperature and at normal operating temperature as previously outlined. (Refer to ‘‘FLUID LEVEL’’ in this section.)

A/T fluid specification
An equivalent of DEXRON® -IIE, DEXRON® -III

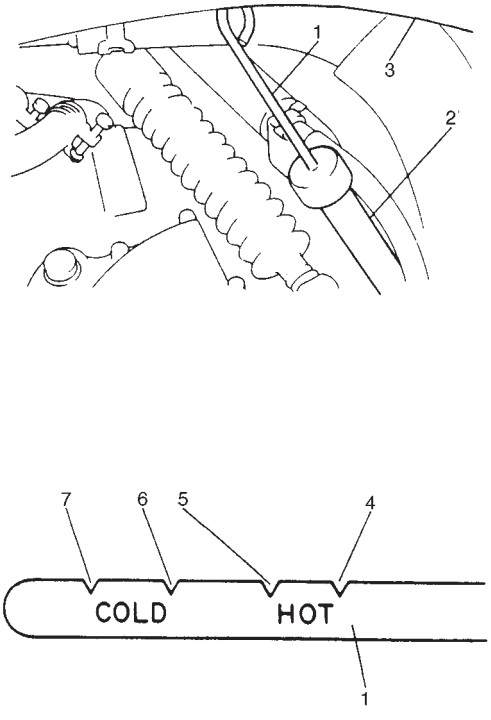
Fluid capacity	
Pan and valve body removal (left for 2 hours or more)	3.5 liters (7.4/6.2 US/Imp. pt)
Overhaul (assembled with a new torque converter)	4.9 liters (10.4/8.6 US/Imp. pt)

FLUID LEVEL

HOT Level Check at Normal Operating Temperature

Be sure to check fluid level at every engine oil change. As automatic transmission is designed to operate at normal operating temperature which corresponds to 70°C–80°C (158°F – 176°F) of fluid, perform fluid level check when fluid temperature is within the above temperature range. Driving at 60 km/h (37 mile/h) in D range for about 15 minutes will raise fluid temperature to normal operating temperature.

1) Place vehicle on level surface.
2) Apply parking brake and block vehicle wheels.
3) With selector lever in P position, start engine.
   But do not race engine.
4) Run engine at idle speed and move selector lever through each range and put it in P position again.



1. Oil level gauge
2. Oil filler tube
3. Radiator hose
4. FULL HOT mark
5. LOW HOT mark
6. FULL COLD mark
7. LOW COLD mark

5) With engine running at idle, remove oil level gauge from oil filler tube and wipe off oil level gauge with clean cloth.
6) Reinsert oil level gauge all the way into oil filler tube.
7) Take up the gauge and check oil level on it. The level should be between FULL HOT and LOW HOT marks. If level is below LOW HOT mark, add fluid to bring level to FULL HOT mark.

A/T fluid specification
An equivalent of DEXRON® -IIE, DEXRON® -III

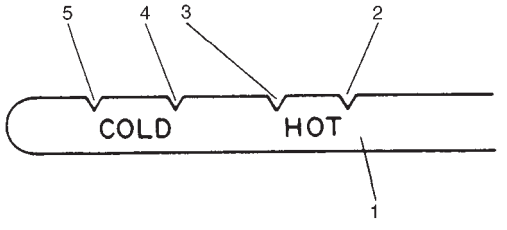
NOTE:

- **Do not overfill. Overfilling can cause foaming and loss of fluid through vent. Then slippage and transmission failure can result.**
- **Bringing fluid level from LOW HOT to FULL HOT requires 0.35 liters (0.74/0.62 US/Imp. pt).**
- **Lesser volume than the following table may fill up transmission, in case that oil pan only is removed leaving valve body as it is and reinstalled soon.**

COLD Level Check at Room Temperature of About 25°C (77°F)

If transmission was overhauled or fluid was drained for oil pan (and or valve body) service, refill fluid after assembling and check its level according to following procedure.

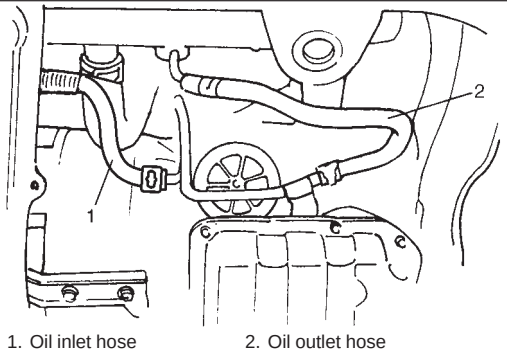
1) Place vehicle on level surface.
2) Apply parking brake and block vehicle wheels.
3) With selector lever in P position, start engine and run it at idle for 5 minutes. Do not race engine.



1. Oil level gauge
2. FULL HOT mark
3. LOW HOT mark
4. FULL COLD mark
5. LOW COLD mark

4) Move selector lever through each range and put it in P position again.
5) With engine running at idle, check fluid level on oil level gauge. Fluid level should be between FULL COLD and LOW COLD marks on oil level gauge.
6) If level is below LOW COLD mark, add fluid to bring level between LOW COLD and FULL COLD marks. Use DEXRON® -IIE, DEXRON® -III or equivalent automatic transmission fluid. Do not overfill.

The above COLD level check is strictly temporary. Therefore, as a final check perform HOT level check. (Refer to "HOT level check at normal operating temperature" as described previously.)

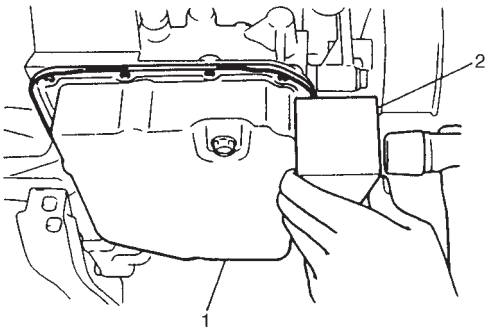


1. Oil inlet hose 2. Oil outlet hose

OIL COOLER HOSES

Rubber hoses for oil cooler should replaced every 3 years or 60,000 km (36,000 miles), when replacing it, be sure to note the following.

○ Replace clamps at the same time.
○ Check for fluid leakage after replacing.
○ Confirm fluid level at normal operating temperature.



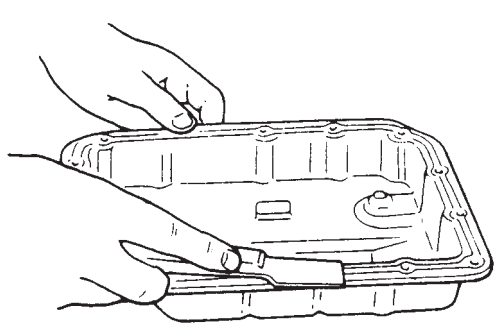
1. Oil pan
2. Wood block

OIL PAN GASKET

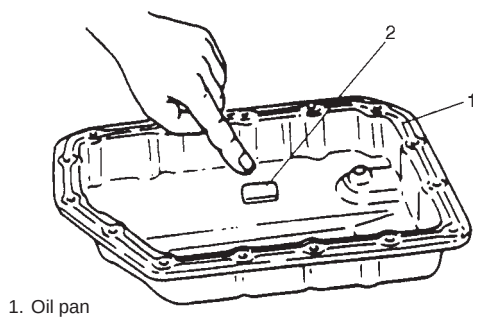
REMOVAL

1) Raise vehicle and drain transmission fluid.
2) Remove oil pan from transmission.
   After removing oil pan bolts, tap around oil pan lightly with a plastic hammer for removal.

CAUTION:
- **Never hammer oil pan hard, or it may get deformed. It is recommended to hit oil pan indirectly through wood block.**
- **Do not force oil pan off by using a flat tip screwdriver or the like as it may cause damage to gasketed surface.**



3) Remove gasket on mating surface thoroughly.

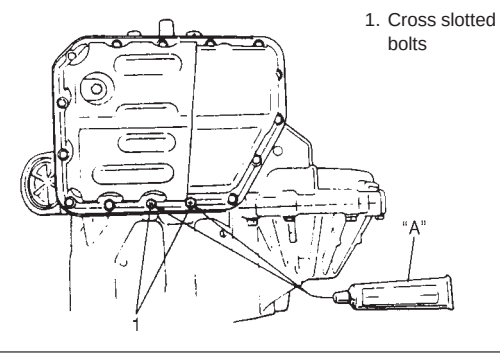


1. Oil pan
2. Oil cleaner magnet

INSTALLATION

For oil pan installation, reverse its removal procedure using care for the following.

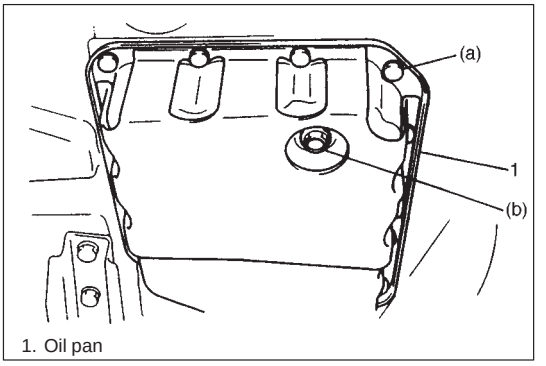
1) Make sure to use new gasket.
2) Clean inside of oil pan before installation.
3) Clean oil cleaner magnet and install it in the position right below oil strainer.



4) There are 15 oil pan securing bolts in all and two of them have cross slot in their heads.
   Mount these cross slotted bolts in such positions as shown in figure after applying sealant to their threads. However, do not apply sealant to other 13 bolts.

CAUTION:
Do not use sealant to gasket surface.

"A": SUZUKI BOND No.1215, 99000-31110



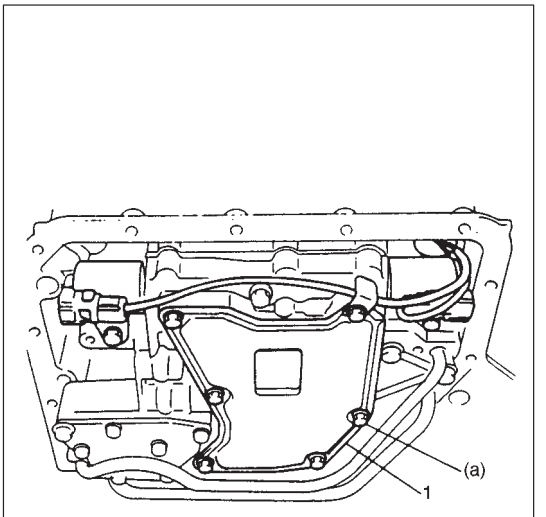
1. Oil pan

5) Tighten oil pan bolts to the following torque one after another diagonally.

CAUTION:
Over tightening of bolts may cause fluid leakage.

Tightening Torque
(a): 5 N·m (0.5 kg-m, 4.0 lb-ft)
(b): 21 N·m (2.1 kg-m, 15.0 lb-ft)

6) Upon completion of installation, warm up transmission and check for fluid level and leakage. (Refer to “Fluid level”.)



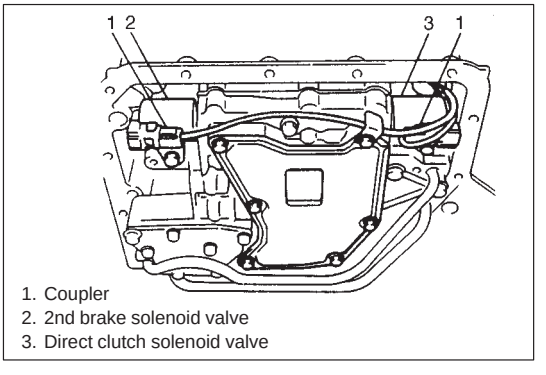
1. Oil strainer

OIL STRAINER

1) Drain transmission fluid.
2) Remove oil pan.
3) Remove oil strainer.
4) Clean oil strainer.
5) Install oil strainer to lower valve body.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

6) Reinstall oil pan and refill transmission fluid.
7) Upon completion of installation, warm up transmission and check for fluid level and leakage. (Refer to “Fluid level”.)

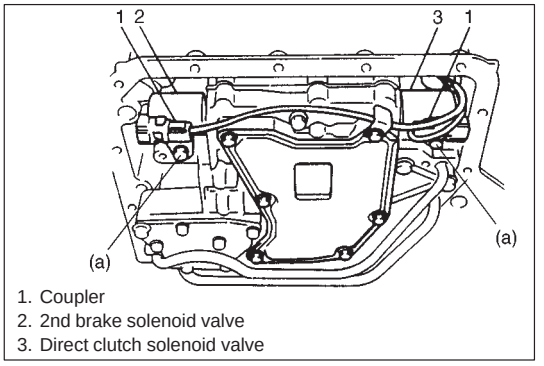


1. Coupler
2. 2nd brake solenoid valve
3. Direct clutch solenoid valve

SHIFT SOLENOID VALVES

REMOVAL

1) Drain transmission fluid and remove oil pan.
2) Disconnect couplers from direct clutch and 2nd brake solenoid valves, and then remove solenoid valves.
3) Remove solenoid valve wire harness with grommet from upper side.



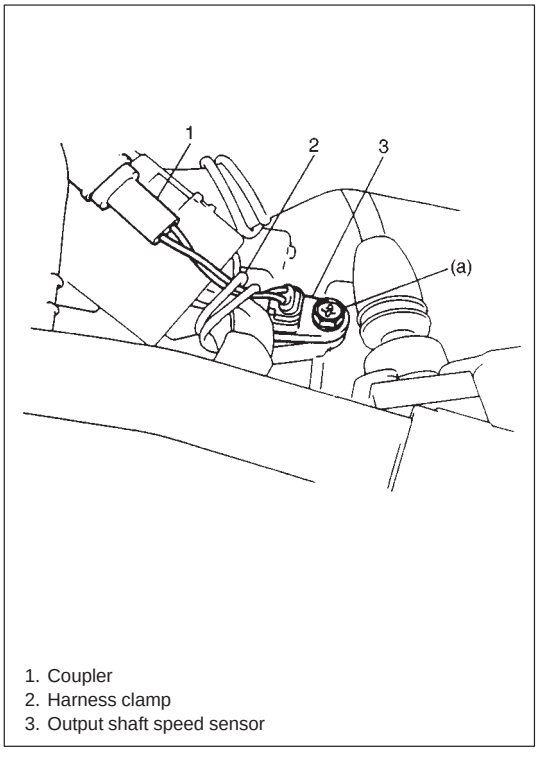
1. Coupler
2. 2nd brake solenoid valve
3. Direct clutch solenoid valve

INSTALLATION

1) Install solenoid valve wire harness to transmission case. If grommet seal (O ring) is damaged, replace.
2) Install direct clutch and 2nd brake solenoid valves to lower valve body. If solenoid seal (O ring) is damaged, replace.

   Tightening Torque
   (a): 8 N·m (0.8 kg-m, 6.0 lb-ft)

3) Connect solenoid valve wires to each solenoid valve.
4) Install oil pan to transmission and then refill transmission fluid.
5) Connect solenoid valve wire harness coupler.
6) Upon completion of installation, warm up transmission and check for fluid level and leakage. (Refer to “FLUID LEVEL”.)



1. Coupler
2. Harness clamp
3. Output shaft speed sensor

OUTPUT SHAFT SPEED SENSOR (A/T VSS)

1) Undo wiring harness clamp.
2) Disconnect output shaft speed sensor coupler.
3) Remove output shaft speed sensor bolt.
4) Pull out output shaft speed sensor by gripping sensor body.
5) For installing, reverse removal procedure.

   NOTE:
   Check to be sure that O ring is in good condition.

   Tightening Torque
   (a): 8 N·m (0.8 kg-m, 6.0 lb-ft)

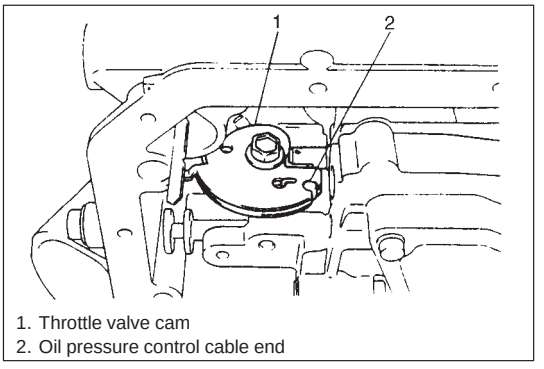
VEHICLE SPEED SENSOR (VSS, SPEEDOMETER DRIVEN GEAR)

Refer to SECTION 7A.

OIL PRESSURE CONTROL CABLE

REMOVAL

1) Disconnect oil pressure control cable from accelerator cable after removing cable cover.
2) Drain transmission fluid.
3) Remove oil pan.



1. Throttle valve cam
2. Oil pressure control cable end

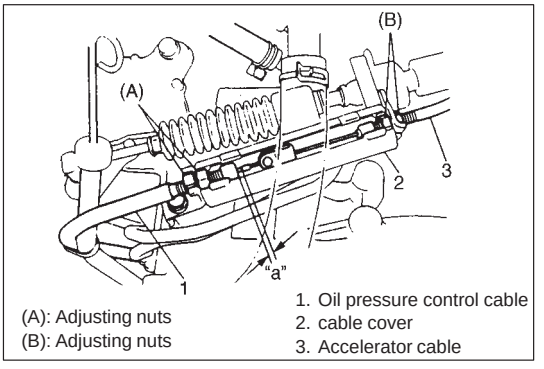
4) Disconnect oil pressure control cable from throttle valve cam.

   NOTE:
   Oil pressure control cable can be disconnected from throttle valve cam without removal of 2nd brake solenoid.

5) Disconnect oil pressure control cable from transmission case.

INSTALLATION

Reverse removal procedure for installation.
After connecting oil pressure control cable to accelerator cable, check and adjust oil pressure control cable play. Adjusting procedure is below.
Upon completion of installation, warm up transmission and check for fluid level and leakage. (Refer to “FLUID LEVEL”.)



(A): Adjusting nuts
(B): Adjusting nuts

1. Oil pressure control cable
2. cable cover
3. Accelerator cable

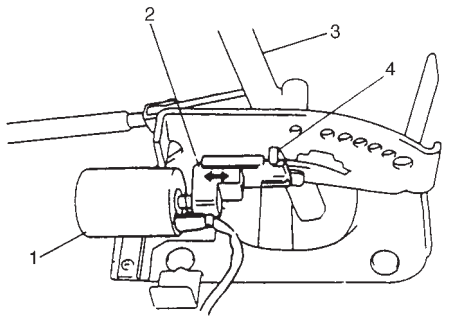
ADJUSTMENT

1) With cable cover removed, adjust clearance “a” to specification by turning nuts (B). Nuts (A) can be used for this adjustment if necessary.

   Clearance “a”: 0 – 0.5 mm (0 – 0.02 in.)

2) Tighten nuts and install cable cover.

   Tightening Torque
   (A): 13 N·m (1.3 kg-m, 9.5 lb-ft)
   (B): 13 N·m (1.3 kg-m, 9.5 lb-ft)



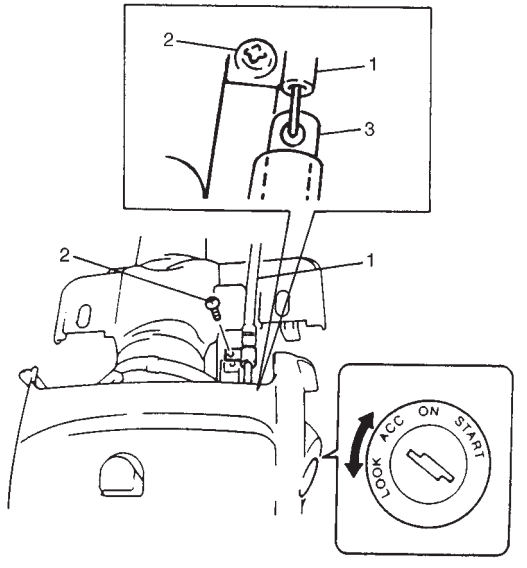
1. Shift lock solenoid assembly
2. Lock plate
3. Selector lever (in "P")
4. Detent pin

SHIFT LOCK SOLENOID (If equipped)

1) Remove console box, and then select indicator.
2) Replace shift lock solenoid.
3) Install indicator and cover as they were.

NOTE:

- **Shift selector lever to L range to facilitate work.**
- **Check that detent pin is locked at "P" position by lock plate.**
- **Check to confirm that lock plate is pulled in when ignition key is turned to "ON" and brake pedal is depressed, so allowing detent pin to be pushed down.**



1. Interlock cable
2. Screw
3. Release shaft

INTERLOCK CABLE (If equipped)

NOTE:

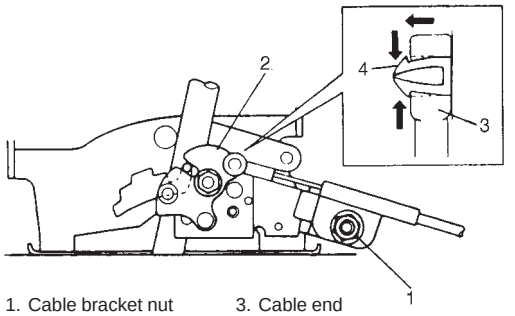
Don't bend interlock cable excessively when removing and installing it, or system will not operate correctly.

REMOVAL

1) If vehicle is equipped with air bag system, disconnect negative cable at battery and disable air bag system, referring to "DISABLING AIR BAG SYSTEM" in Section 9J.
2) Remove steering column hole cover and steering joint cover.
3) Disconnect steering shaft upper joint bolt and steering column mounting nuts.

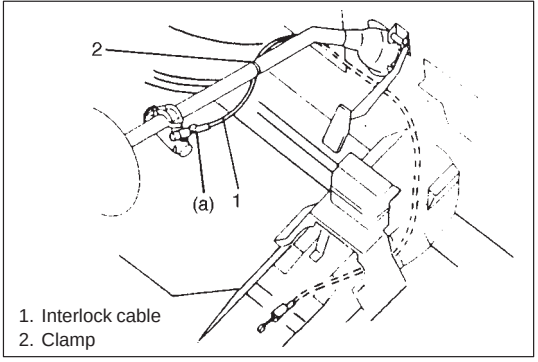
> **CAUTION:**
> **Steering column mounting nuts should be loosened with steering shaft joint upper side tightened as this could cause damage to shaft joint bearing.**

4) Remove interlock cable clamp screw located at ignition switch and disconnect interlock cable from release shaft with ignition switch turned at "ACC" position. And then turn ignition switch to "LOCK" position.



1. Cable bracket nut
2. Key release cam
3. Cable end
4. Cam boss

5) Remove console box.
6) Remove cable bracket nut and detach cable end from key release cam while pressing claws of release cam boss. At this time, be careful not to cause damage to its claws.
7) Remove interlock cable.

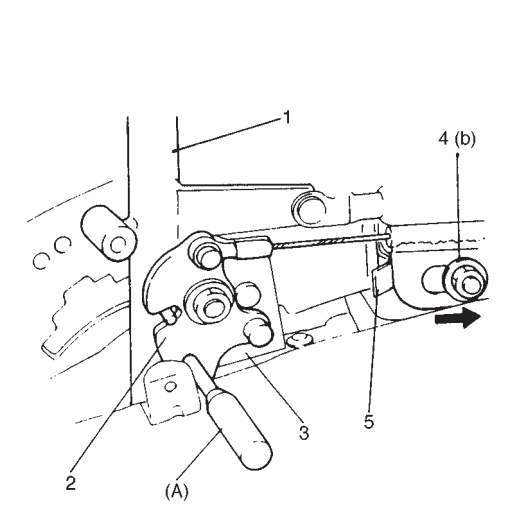


1. Interlock cable
2. Clamp

INSTALLATION

1) Install interlock cable as shown in left figure.
2) Connect cable end to steering lock and tighten cable clamp screw to specified torque.

Tightening Torque
(a): 2.2 N·m (0.22 kg-m, 1.6 lb-ft)



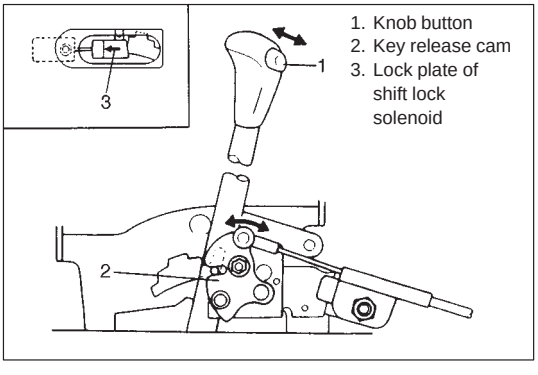
1. Selector lever
   ("P" position and pushing knob button)
2. Key release cam
3. Selector bracket
4. Cable bracket nut
5. Leaf spring

3) Shift selector to P range and with lock plate manually moved toward front side of vehicle, push knob button of selector lever.
4) Under above condition, fix key release cam inserting special tool into holes on cam and selector bracket.

Special Tool
(A): 09925-78210 (6 mm)

5) Connect cable end to key release cam.
6) With cable bracket pushed in arrow direction by spring force, tighten cable bracket nut.

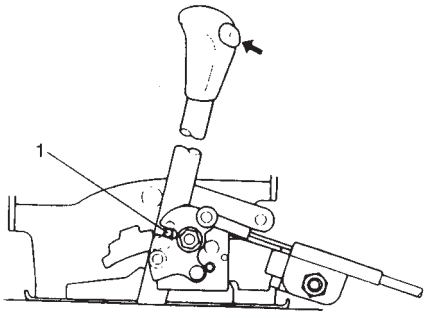
Tightening Torque
(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Knob button
2. Key release cam
3. Lock plate of shift lock solenoid

7) Remove special tool. Then with lock plate of shift lock solenoid manually moved toward front side of vehicle, check that key release cam moves smoothly by operating knob button of selector lever.

1. Detent pin position when knob button is pressed at P range.

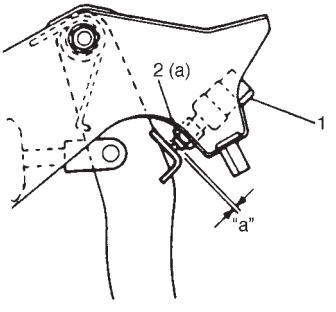


8) With selector lever set at P range, turn ignition key to “ACC” position and then check for following conditions.
   ○ With knob button released, ignition key can be turned from “ACC” position to “LOCK” position.
   ○ With knob button pressed, ignition key cannot be turned from “ACC” position to “LOCK” position.
9) Install steering column. (If vehicle is equipped with air bag system, refer to Section 3C1, and if not equipped, refer to Section 3C.)
10) Install steering column hole cover and steering joint cover.
11) If vehicle is equipped with air bag system, connect negative cable at battery and enable air bag system, referring to “ENABLING AIR BAG SYSTEM” in Section 9J.

STOP LAMP SWITCH

REMOVAL AND INSTALLATION

1) Remove negative battery cable from battery.
2) Remove steering joint cover to gain access to stop lamp switch.
3) Disconnect stop lamp switch electrical connector.
4) Remove stop lamp switch from pedal bracket.
5) To install stop lamp switch, reverse removal procedure.



1. Stop lamp switch
2. Lock nut

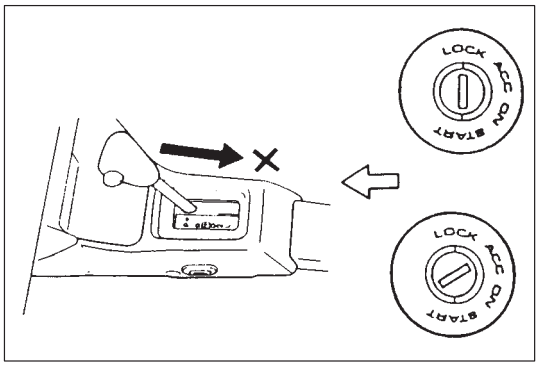
ADJUSTMENT

Adjustment should be made as follows when installing stop lamp switch.

Pull up brake pedal toward you and while holding it there, adjust switch position so that clearance between the end of thread and brake pedal contact plate (shown as “a” in left figure) is within specified clearance. Then tighten lock nut to the specified torque.

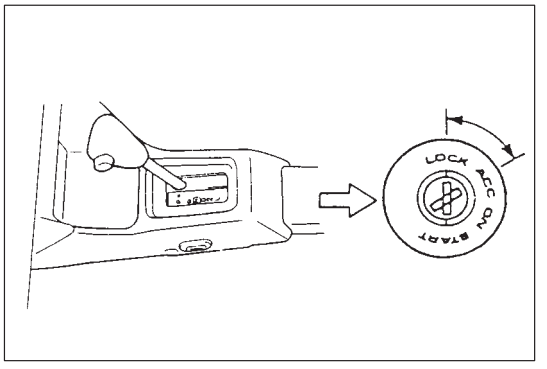
Clearance “a”: 1.5 – 2.0 mm (0.06 – 0.08 in.)

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.0 lb-ft)

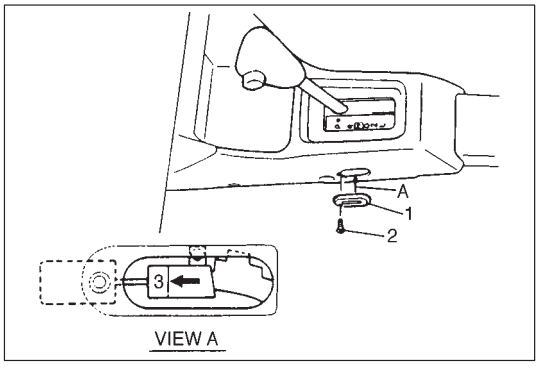


SYSTEM INSPECTION (If equipped with interlock system)

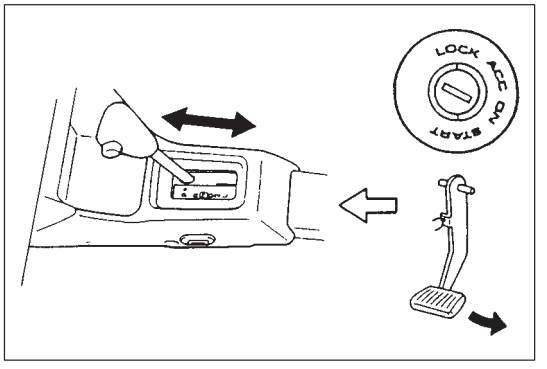
1) Check to make sure that selector lever cannot be moved to any other range from P range when ignition switch key is at “ACC” or “LOCK” position or it is removed from keyhole of ignition switch.



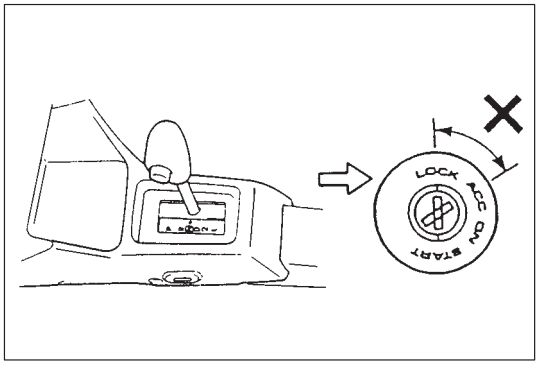
2) Shift selector lever to P range and check for the following.
   ○ Ignition key can be turned between “LOCK” and “ACC” positions back and forth and also it can be removed from ignition switch.



   ○ With manual release plate moved in arrow direction and ignition key turned to “ACC” position, selector lever can be shifted from P range to any other range.
   ○ With manual release plate moved in arrow direction and Ignition key turned to “LOCK” position, selector lever can not be shifted from P range to any other range.

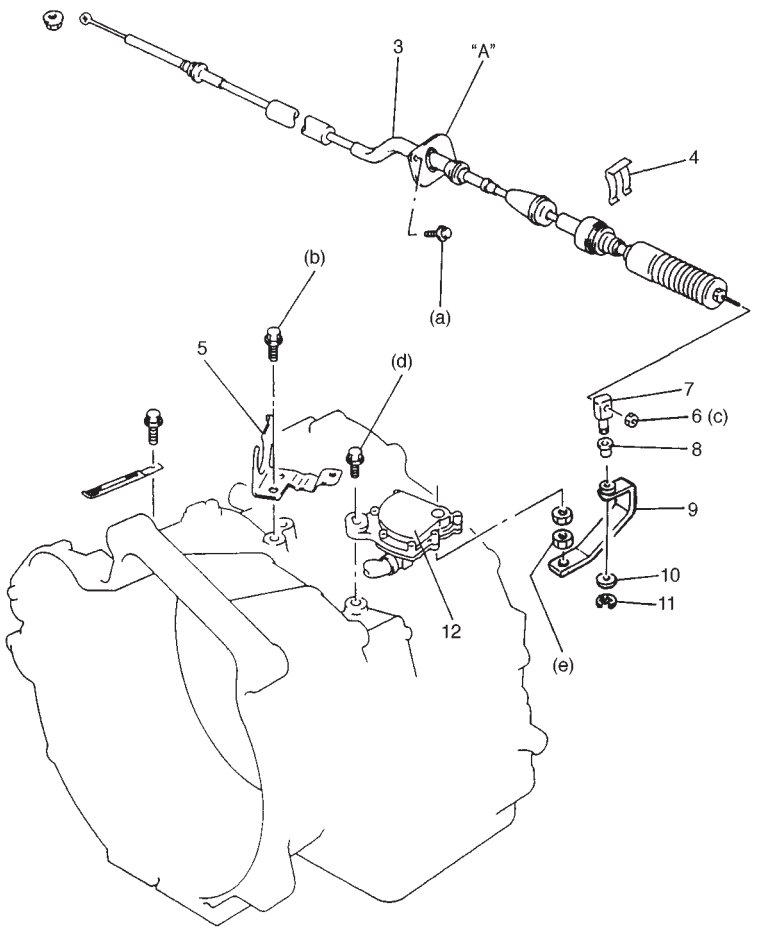


   ○ When ignition switch is turned “ON” and brake pedal is depressed, selector lever can be shifted from P range to any other range.



3) Under each of following condition, check that ignition key cannot be turned between “ACC” and “LOCK” positions in either direction and it cannot be removed from ignition switch unless it is at “LOCK” position.
   ○ When selector lever is shifted to any position other than P range.
   ○ When knob button of selector lever is pushed at P range.

SELECT CABLE



1. Blank
2. Blank
3. Select cable
4. E ring (largest)
5. Cable bracket
6. Nut
7. Manual selector cable joint
8. Bush
9. Manual shift lever
10. Washer
11. E ring (small)
12. Transmission range sensor

"A": Apply water tight sealant (Sealing compound 366E 99000-31090)

REMOVAL

1) Remove parking brake lever cover.
2) Remove console box.
3) Disconnect select cable from selector lever and then from floor bracket.
4) Disconnect select cable from transmission.
5) Disconnect select cable from dash panel.

INSTALLATION

Install select cable by reversing removal procedure.
The important steps in installation are as follows.

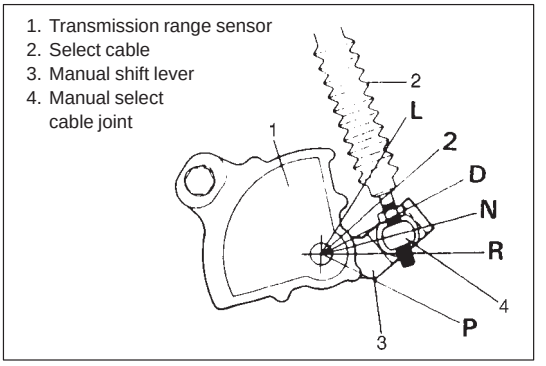
○ Apply grease to pin and cable joint.

"A": SEALING COMPOUND 366E (99000-31090)

○ Tighten bolts and nut in upper figure to specified torque.

Tightening Torque
(a): 6.5 N·m (0.65 kg-m, 5.0 lb-ft)
(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)
(c): 7 N·m (0.7 kg-m, 5.0 lb-ft)
(d): 18 N·m (1.8 kg-m, 13.0 lb-ft)
(e): 30 N·m (3.0 kg-m, 22.0 lb-ft)

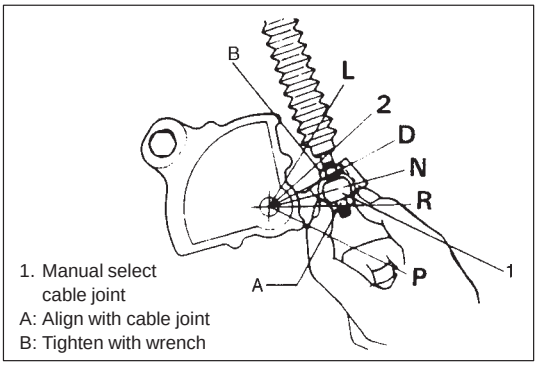
○ Adjusting procedure is as follows.



ADJUSTMENT

1) Before tightening cable end nut, shift selector lever to N range.
2) Also shift manual shift lever to N range.

NOTE:
Make sure that nut and cable joint have clearance under above conditions.



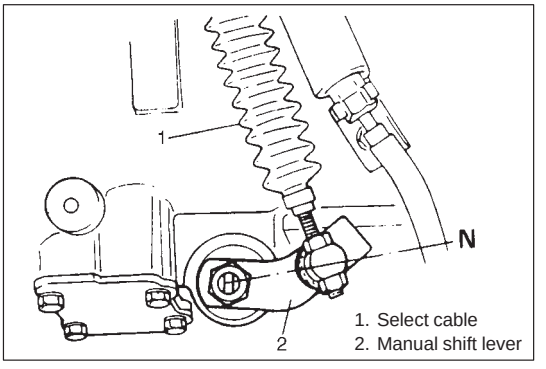
3) Turn nut A by hand till it contacts manual select cable joint. Then tighten nut B with wrench.
4) After select cable was installed, check for the following.
   - ○ Push vehicle with selector lever shifted to P range. Vehicle should not move.
   - ○ Vehicle can not be driven in N range.
   - ○ Vehicle can be driven in D, 2 and L ranges.
   - ○ Vehicle can be backed in R range.

TRANSMISSION RANGE SENSOR (SHIFT SWITCH)

REMOVAL

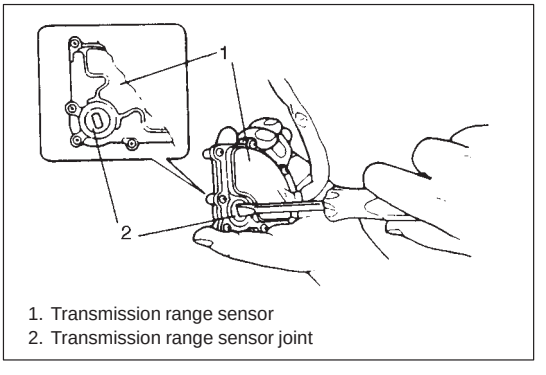
1) Disconnect transmission range sensor coupler.
2) Remove transmission range sensor from transmission.

CAUTION:
Do not overhaul transmission range sensor.

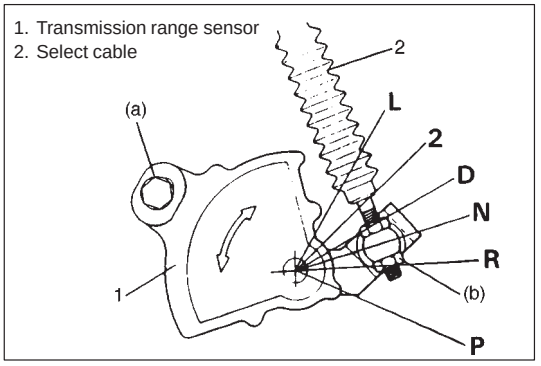


INSTALLATION

1) Shift manual shift lever to N range, that is, to shift selector lever to N range.



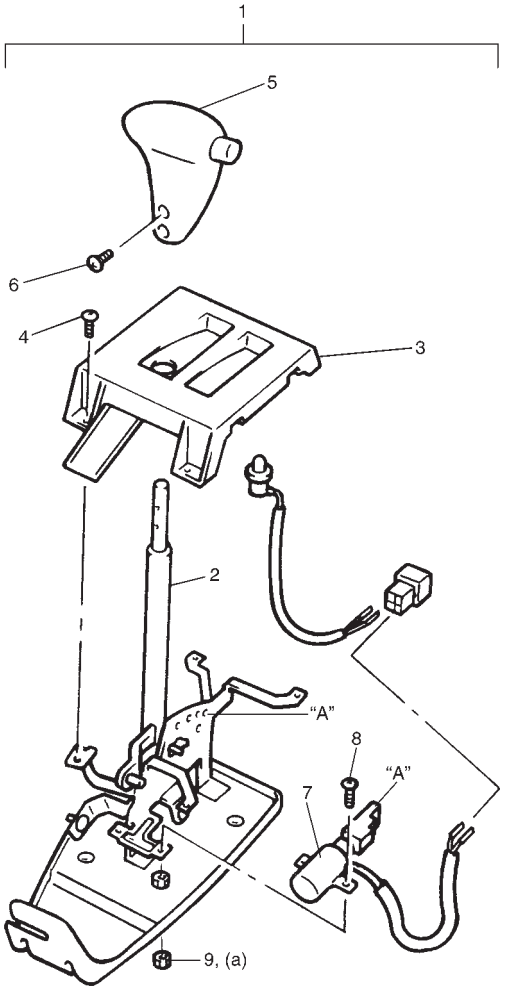
2) Using flat tip screwdriver, turn transmission range sensor joint clockwise or counterclockwise to the position shown in figure and check that a “click” is heard from joint at this position.



3) After installing transmission range sensor to manual shift shaft, move transmission range sensor by hand in arrow direction as shown in left figure. Stop at the position where a "click" from joint is heard or felt by hand and then secure it.

Tightening Torque
(a): 18 N·m (1.8 kg-m, 13.0 lb-ft)
(b): 7 N·m (0.7 kg-m, 5.0 lb-ft)

4) Connect coupler and clamp wire harness.
5) Upon completion of transmission range sensor installation, check for its proper installation according to the following.
   i) Apply parking brake and block vehicle wheels.
   ii) With selector lever shifted to P range, turn starter switch ON and check that this causes starting motor to operate.
   iii) Shift selector lever from P to N range, turn starter switch ON and check that this causes starting motor to operate.
   iv) Shift selector lever from N to L range and then back to N range, turn starter switch ON and check that this causes starting motor to operate.
   v) Shift selector lever from N to P range and check starting motor for operation as in step iv).
   vi) Check to make sure that in any other range than P and N ranges, starting motor doesn't operate even when starter switch is turned ON.
   vii) Turn ignition switch ON (without starting engine) and shift selector lever to R range. Then check that backup lamp light.
6) If any check result was unsatisfactory in step v), remove transmission range sensor and perform step i) to iv) all over again.



1. Selector assembly
2. Selector lever assembly
3. Indicator assembly
4. Screw
5. Knob assembly
6. Screw
7. Solenoid (if equipped)
8. Screw (if equipped)
9. Housing nut

MANUAL SELECTOR

REMOVAL

1) Remove selector knob screws and then selector knob.
2) Remove parking brake lever cover and then console box.
3) Remove select indicator assembly.
4) Remove illumination lamp coupler.
5) Remove select cable from selector lever. (if equipped)
6) Remove interlock cable. (if equipped)
7) Remove shift lock solenoid coupler. (if equipped)
8) Raise vehicle.
9) Remove 4 housing nuts.
10) Remove lever housing with selector lever from floor.

NOTE:

- **Knob and push button must not be disassembled.**
- **Do not drive out detent pin.**

INSTALLATION

Assemble selector by reversing removal procedure, replacing parts with new ones as necessary.
Apply grease to portions indicated as "A" in left figure.

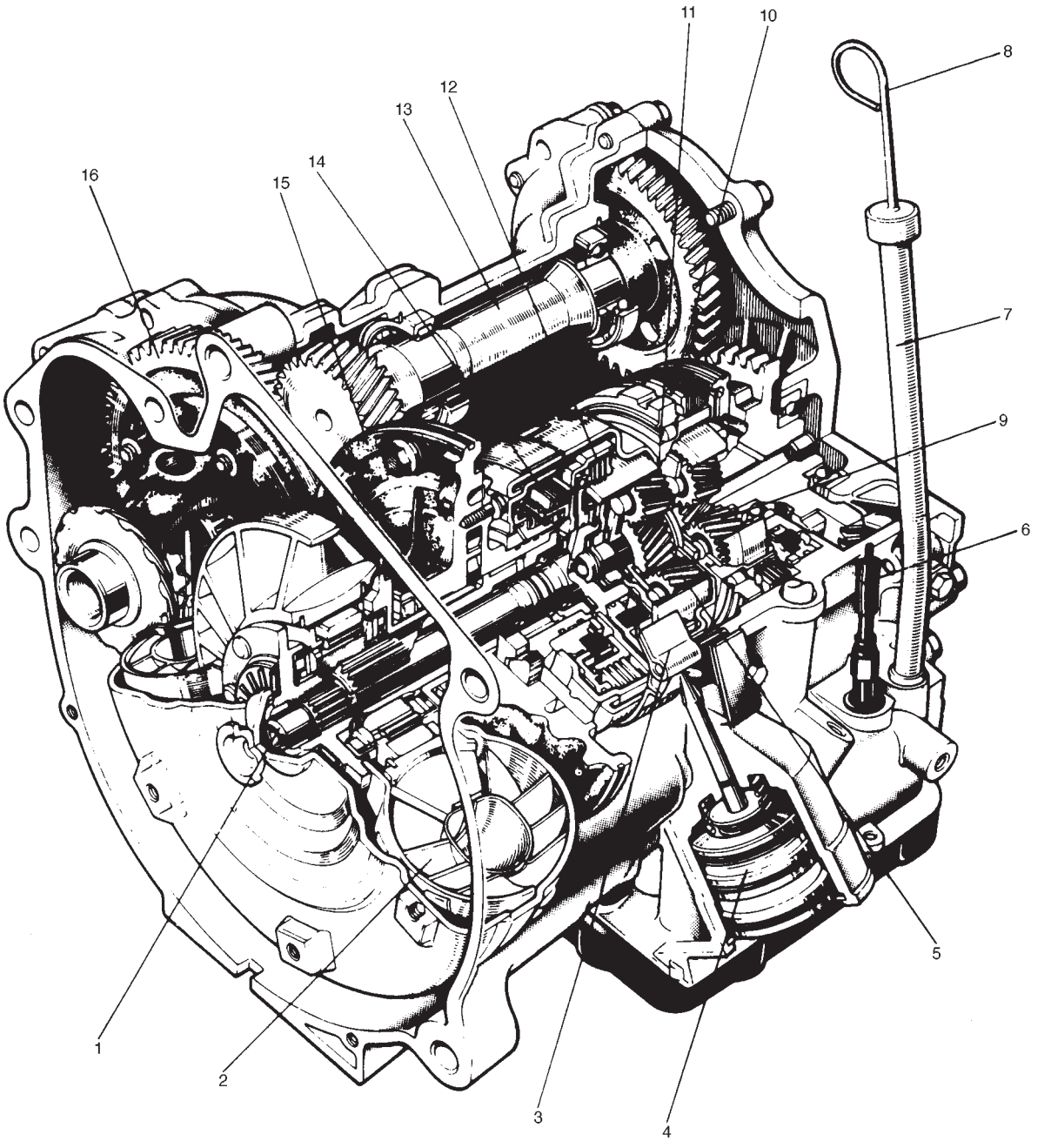
"A": SUZUKI SUPER GREASE A (99000-25010)

NOTE:

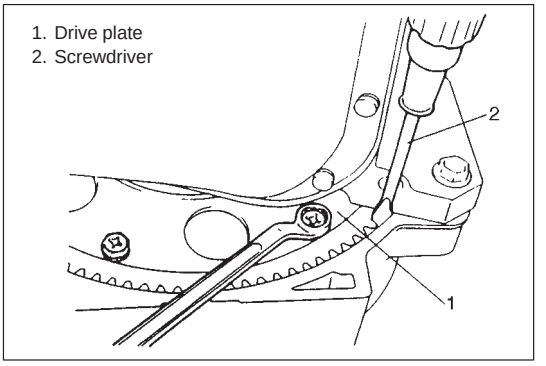
- **When installing knob, make sure that there is a slight clearance between detent pin and cam bottom when knob button is pushed in all the way.**
- **Check selector for proper operation as follows.**
  1. **With knob bottom pushed half way, N to R and D to 2 shifts are available (but not any other shift).**
  2. **With knob button pushed all the way in, 2 to L and R to P shifts are available.**
- **For adjustment of interlock cable, refer to "INTERLOCK CABLE" in this Section.**
- **Check that illumination lamp lights when light switch is turned ON.**

Tightening Torque
(a): 20 N·m (2.0 kg-m, 14.5 lb-ft)

TRANSMISSION UNIT REPAIR OVERHAUL

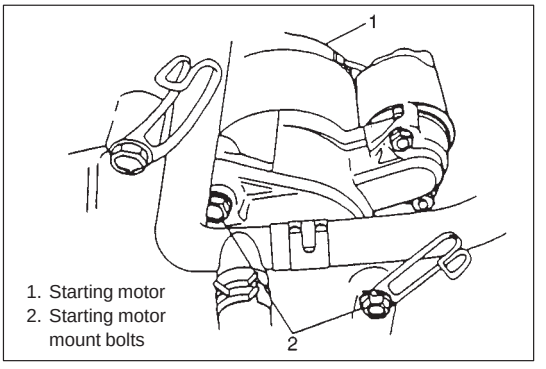


1. Input shaft
2. Torque converter
3. Second brake band
4. Second brake piston cover
5. Front planetary gear
6. Oil pressure control cable
7. Oil filler tube
8. Oil level gauge
9. Rear planetary gear
10. 1st-reverse brake
11. One-way clutch
12. Forward clutch
13. Countershaft
14. Direct clutch
15. Oil pump
16. Differential

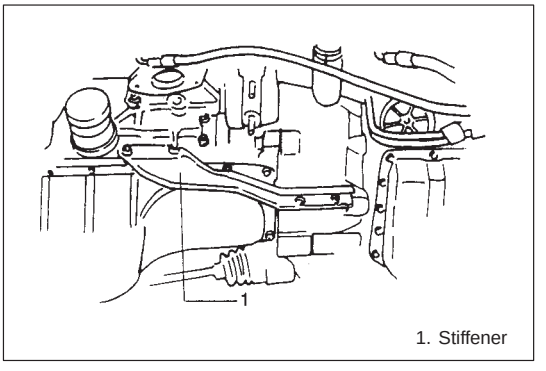


DISMOUNTING

1) Take down engine with transmission. (Refer to Section 6A1.)
2) Remove torque converter housing lower plate.
3) Remove drive plate bolts.
   To lock drive plate, engage a minus screwdriver with the drive plate gear.



4) Remove starter motor.

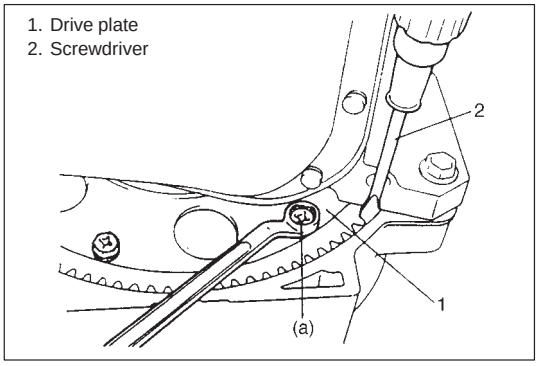


5) Remove transmission stiffener.

6) Remove bolts and nuts fastening engine and transmission, and remove transmission from engine. (Refer to Section 6A1.)

NOTE:
When removing transmission from engine, move it in parallel with crankshaft and use care so as not to apply excessive force to drive plate and torque converter.

WARNING:
Be sure to keep transmission with torque converter horizontal or facing up throughout the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury

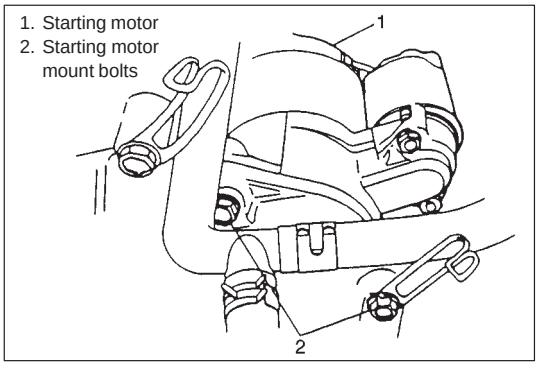


REMOUNTING

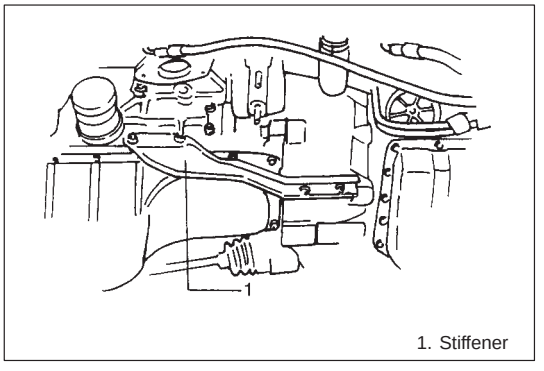
Reverse dismounting procedure.
The important steps in installation are as follows.

○ Tighten drive plate bolts to specified torque.

Tightening Torque
(a): 18.5 N·m (1.85 kg-m, 13.5 lb-ft)



○ Tighten starting motor mounting bolts.



○ Tighten transmission stiffener mounting bolts.
○ Remount engine with transmission according to procedure described in Section 6A1.

○ Set each clamp for wiring securely.
○ Adjust oil pressure control cable.
○ Adjust select cable.
○ Refill fluid and adjust its level at normal operating temperature.
○ Check to confirm engine and transmission function acceptably.
○ Make sure that these is no evidence of fluid leakage.

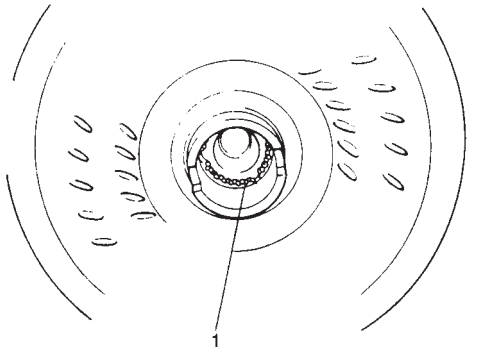
COOLER LINE FLUSHING

In a major transmission failure, where particles of metal have been carried with the fluid throughout transmission, it will be necessary to flush out oil cooled and connecting lines thoroughly.

TORQUE CONVERTER DIAGNOSIS

STATOR ASSEMBLY FREEWHEELS

If the stator roller clutch becomes ineffective, the stator assembly freewheels at all times in both directions. With this condition, the vehicle tends to have poor acceleration from a standstill. If poor acceleration problems are noted, what to be checked first are that the exhaust system is not blocked, the engine is running properly and the transmission is in 1st gear when starting out.



1. Stator inner race
   (should turn freely clockwise)

STATOR ASSEMBLY REMAINS LOCKED UP

If the stator assembly remains locked up at all times, the engine rpm and vehicle speed will tend to be limited or restricted at high speeds. The vehicle performance when accelerating from a standstill will be normal. Engine overheating may be noted. Visual examination of the converter may reveal a blue color from the overheating that will result.

Under above conditions, if the converter has been removed from the transmission, the stator roller clutch can be checked by inserting a finger into the splined inner race of the roller clutch and trying to turn the race in both directions.
The inner race should turn freely clockwise, but be heavy to turn counterclockwise.

NOTE:

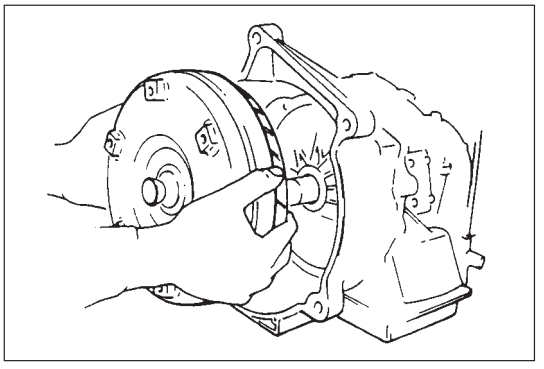
- ○ **Converter placed with its flange upright does not fit for this inspection.**
- ○ **For proper checking, position converter with its flange horizontal.**
- ○ **Turn stator inner race clockwise as quickly as possible with finger, then turn reversely at the same speed and feel difference of enertia.**

DO NOT REPLACE CONVERTER FOR THE FOLLOWING CONDITIONS:

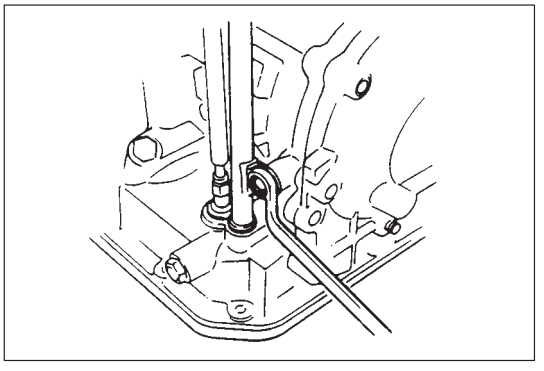
1) The fluid has an odor, is discolored, and there is no evidence of metal particles. There is no indication of existence of internal damage, or oil pump damage. Dump out as much fluid as possible from the converter and replace only the oil pump screen in the pan.
2) A small amount of wear (sometimes referred to as fretting wear) appears on the hub where the oil pump drive gear is located. A certain amount of such wear is normal for both the hub and oil pump gear. Neither the converter nor the oil pump assembly should be replaced.

DISASSEMBLY

CAUTION:
- **Thoroughly clean transmission exterior before overhauling it.**
- **Keep working table, tools and hands clean while overhauling.**
- **Use special care to handle aluminum parts so as not to damage them.**
- **Do not expose removed parts to dust. Keep them clean always.**



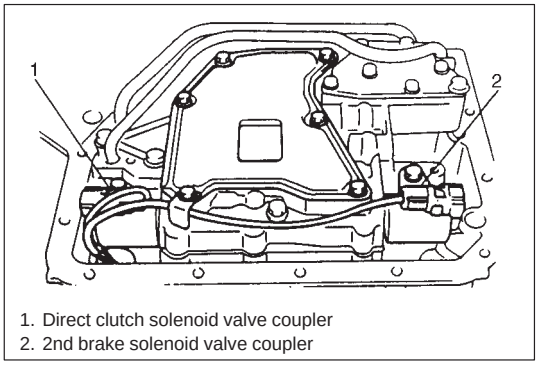
1) Remove torque converter.



2) Remove engine mounting LH bracket.
3) Remove oil level gauge and oil filler tube.
4) Drain transmission fluid.
   To drain fluid better, tilt transmission in various directions.

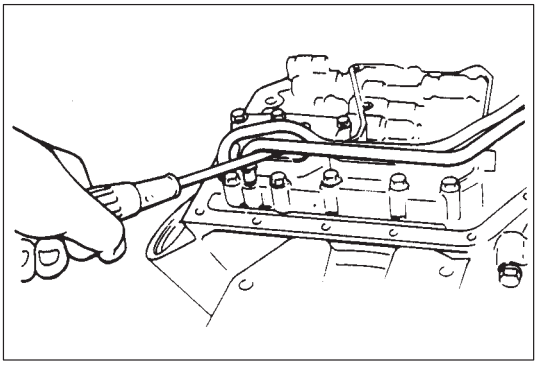
5) Remove oil pan and oil pan gasket.

   NOTE:
   - **For removal of oil pan, do not turn transmission over as this will contaminate valve body with foreign matters in the bottom of oil pan.**
   - **When removing oil pan, tap around it lightly with a plastic hammer. Do not force it off by using a screwdriver or the like.**

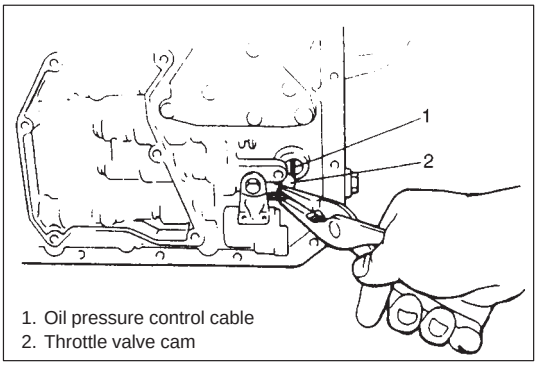


1. Direct clutch solenoid valve coupler
2. 2nd brake solenoid valve coupler

6) Disconnect couplers of direct clutch and 2nd brake solenoid valves.

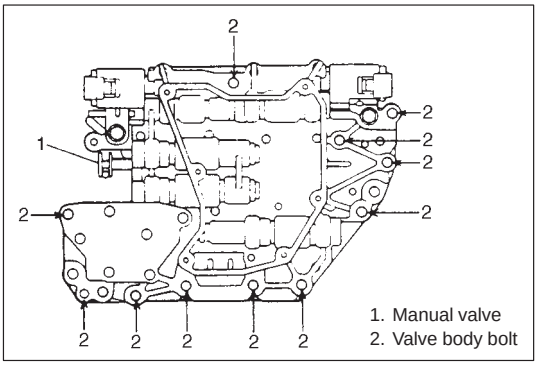


7) Remove 2 oil tubes from lower valve body.
Remove them by pulling up tube end with a screwdriver.



1. Oil pressure control cable
2. Throttle valve cam

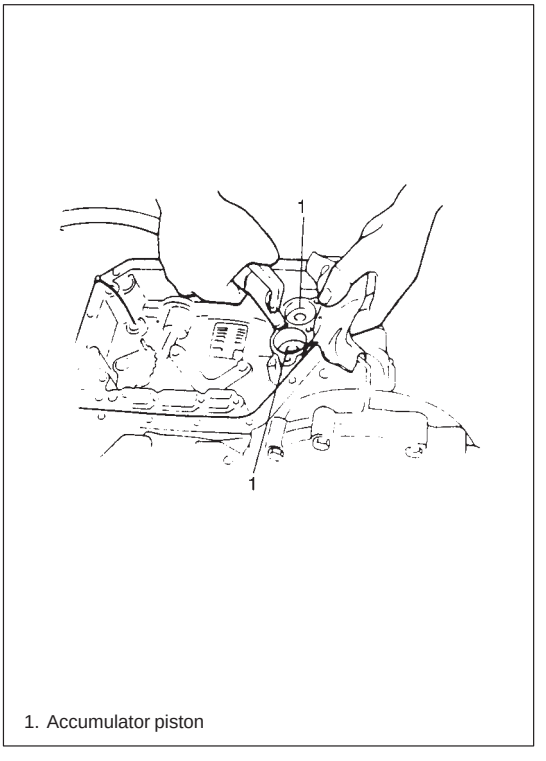
8) Disconnect oil pressure control cable from throttle valve cam and then remove cable.



1. Manual valve
2. Valve body bolt

9) Remove oil strainer and lower valve body.
For removal of lower valve body, remove 11 bolts as shown.

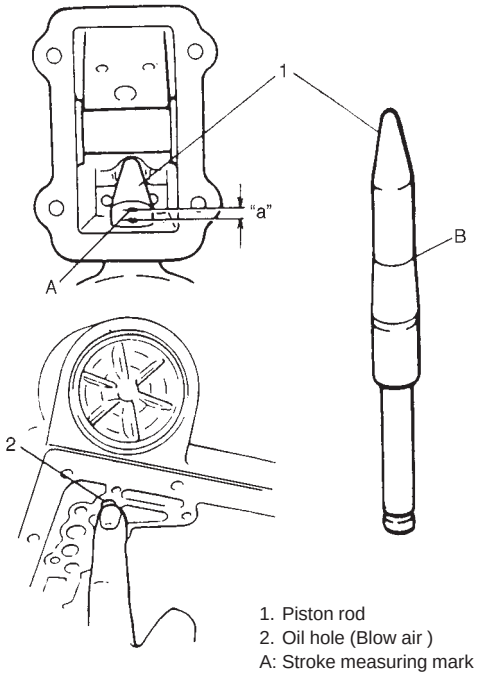
CAUTION:
Be careful not to let manual valve fall off when removing valve body assembly.



1. Accumulator piston

10) Remove second brake accumulator upper spring and remove accumulator pistons and springs.
Position a rag on pistons to catch each piston.
To remove pistons, force low-pressure compressed air (1 kg/cm^2, 15 psi, 100 kPa, max) into hole as shown, and pop each piston into the rag.

NOTE:
Do not push accumulator pistons with fingers or anything before removing them. Pushing them may cause compressed fluid in accumulator to spew out of hole at face and clothes

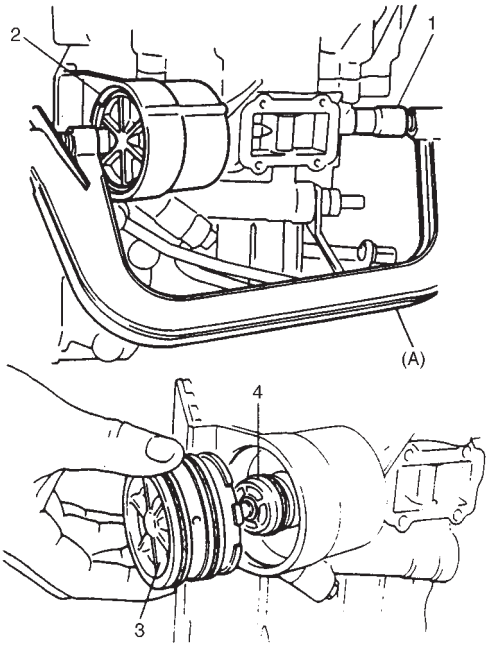


1. Piston rod
2. Oil hole (Blow air)
A: Stroke measuring mark
B: Identification mark

11) Remove second brake band cover and gasket.
12) After removing second brake band cover, check second brake piston stroke as follows.
    i) Scribe mark on piston rod as shown.
    ii) Blow air into oil hole and measure rod stroke.
    iii) If stroke is out of specification, replace piston rod with the one of different length or replace second brake band.
    2nd brake piston rod of 2 different lengths are available as spare parts.

	Piston rod length	Identification mark
Available piston rod	121.3 mm (4.77 in.)	Unmarked
	122.7 mm (4.83 in.)	Marked

Piston rod stroke "a": 1.5 – 3.0 mm (0.06 – 0.11 in.)



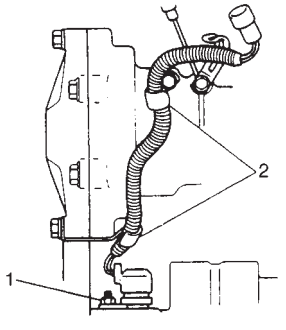
1. 17 mm socket (Install with bolt)
2. Snap ring
3. Piston cover
4. Second brake piston

13) Remove second brake piston.
    i) Install 17 mm socket with 8 mm bolt.
    ii) Apply valve lifter as illustrated and push in piston cover.

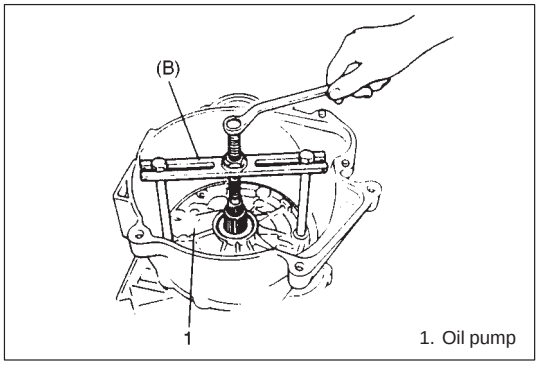
    Special Tool
    (A): 09916-14510

    iii) Remove snap ring by using screwdriver(s) or the like.
    iv) Remove tools and take out 2nd brake piston cover and piston. Tap cover head lightly to pull out cover.

1. Solenoid wire hold plate nut
2. Solenoid wire harness clamp



14) Remove solenoid wire harness.
    i) Remove wire hold plate securing nut.
    ii) Remove 2 wire clamps on transmission and pull out solenoid wire.

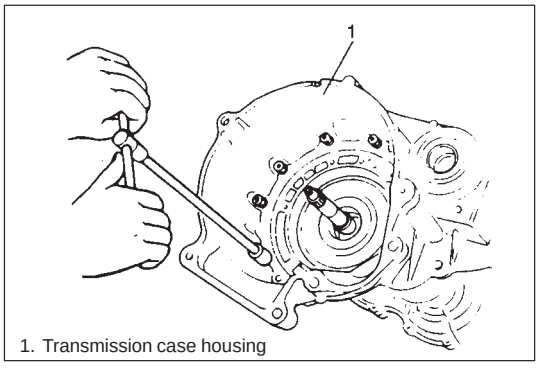


1. Oil pump

15) Remove oil pump.
   i) Remove 6 oil pump securing bolts.
   ii) Remove oil pump by using special tool.

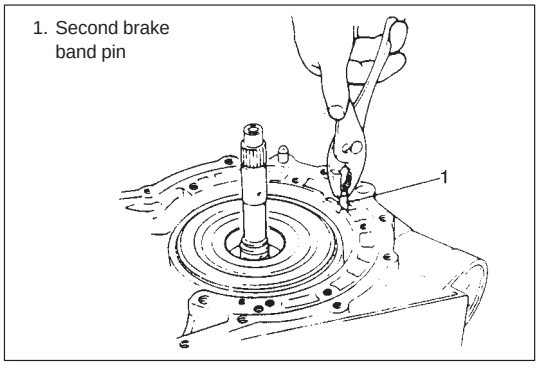
CAUTION:
Make sure that 2nd brake piston and piston rod have been removed before oil pump removal. If not, they may cause breakage of 2nd brake band.

Special Tool
(B): 09918-48210

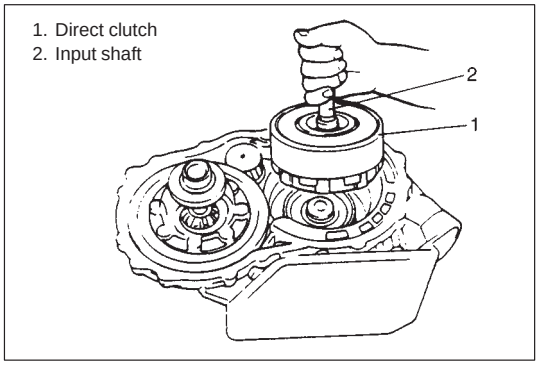


1. Transmission case housing

16) Remove transmission case housing.
   i) Remove housing internal bolts and external bolts.
   ii) Remove housing while tapping around it lightly with a plastic hammer.

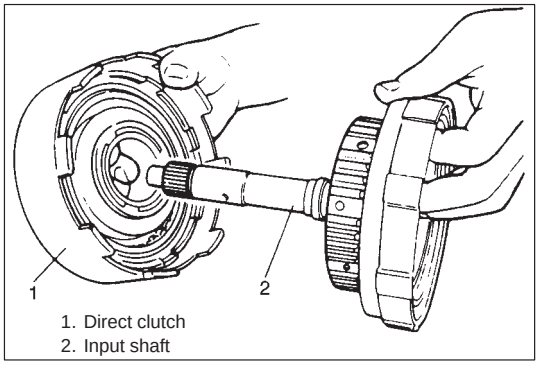


17) Remove second brake band pin.

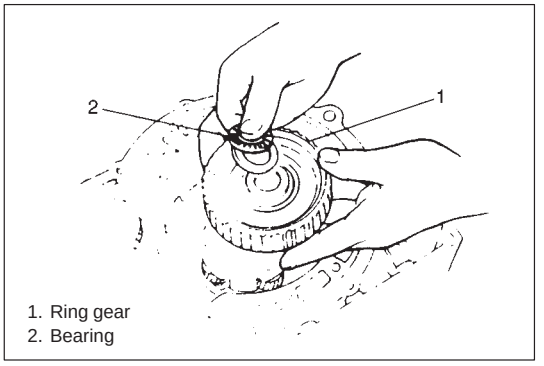


18) Remove direct clutch and forward clutch at the same time while holding input shaft.

NOTE:
Be careful not to loose ring gear race and bearing which may sometimes stick to input shaft.

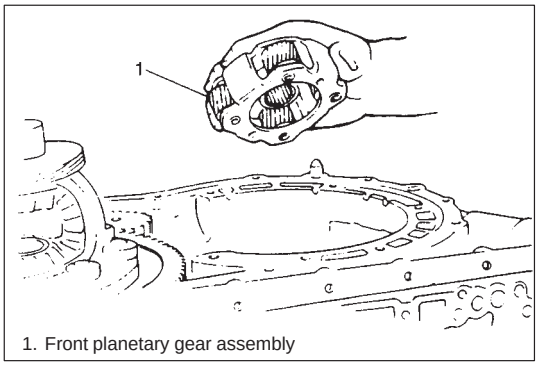


19) Remove direct clutch assembly from input shaft.
20) Remove second brake band.



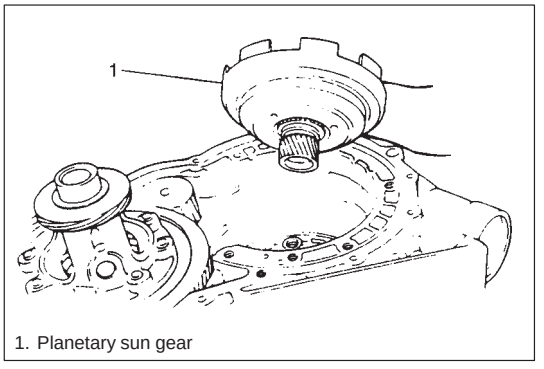
1. Ring gear
2. Bearing

21) Remove front planetary ring gear and ring gear bearing.



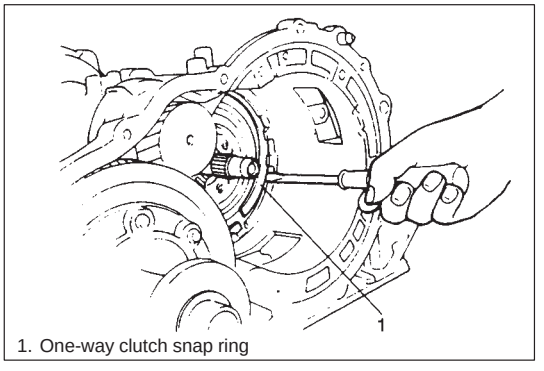
1. Front planetary gear assembly

22) Remove front planetary gear assembly.



1. Planetary sun gear

23) Remove planetary sun gear and front planetary gear bearing.

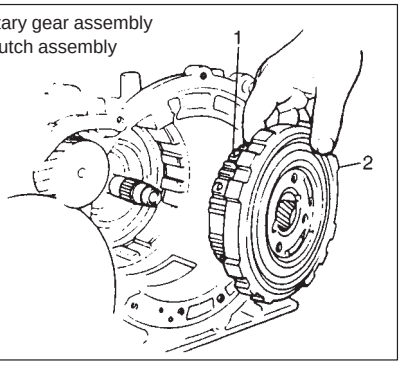


1. One-way clutch snap ring

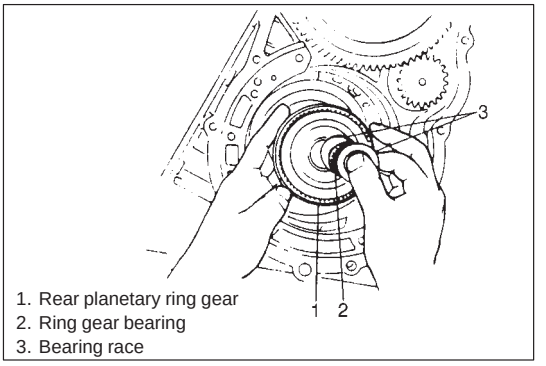
24) Remove one way clutch snap ring by using a screwdriver.

NOTE:
Use care not to damage transmission case when removing snap ring.

1. Rear planetary gear assembly
2. One-way clutch assembly

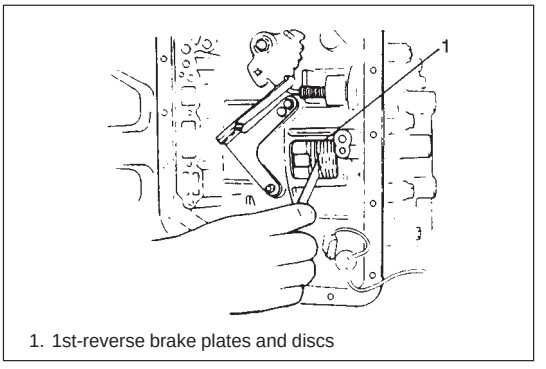


25) Remove one way clutch and rear planetary gear.



1. Rear planetary ring gear
2. Ring gear bearing
3. Bearing race

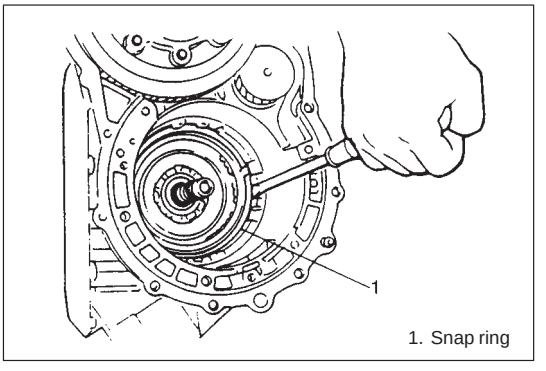
26) Remove rear planetary ring gear, ring gear bearing and washers.



1. 1st-reverse brake plates and discs

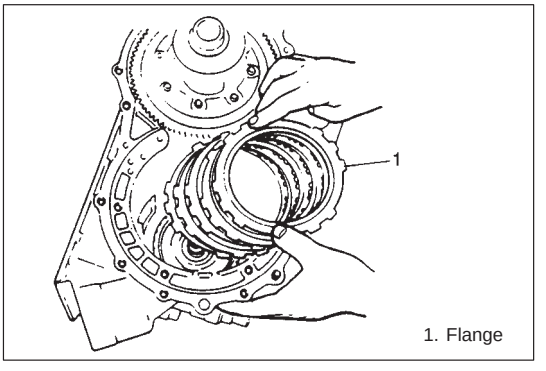
27) Check 1st-reverse brake clearance.
Measure clearance between snap ring and flange with feeler gauge. If out of specification, replace 1st-reverse brake discs or plates.

1st-reverse brake clearance
0.58 – 1.92 mm (0.023 – 0.075 in.)



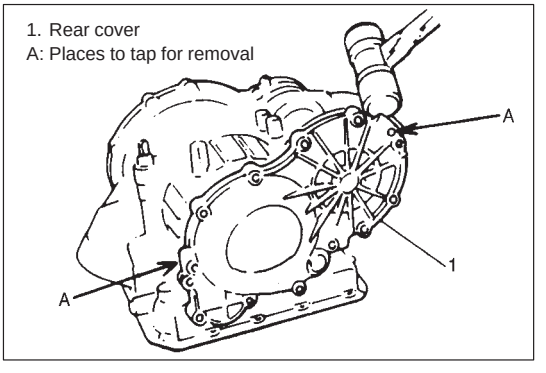
1. Snap ring

28) Remove 2 snap rings by using a flat tip screwdriver.



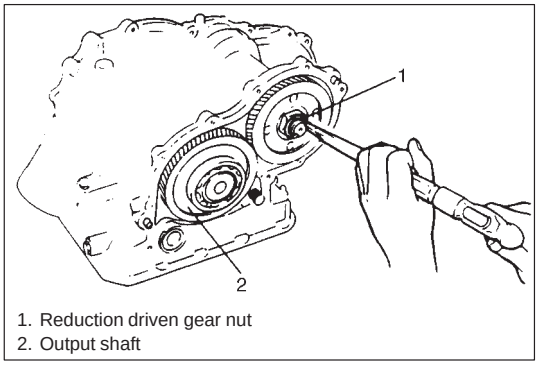
1. Flange

29) Remove 1st-reverse brake flange, discs, plates and damper plate.
30) Remove differential gear assembly.



1. Rear cover
A: Places to tap for removal

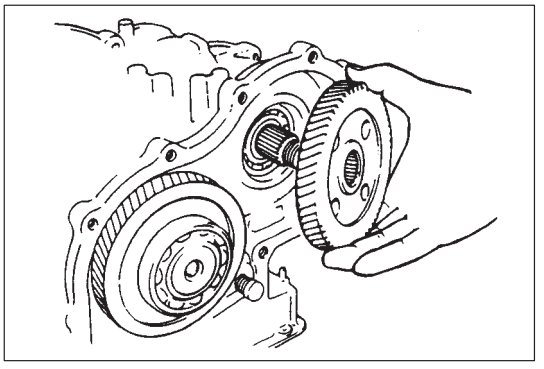
31) Remove rear cover.
   i) Remove 10 bolts and 2 nuts.
   ii) Remove rear cover by tapping A with plastic hammer as shown.



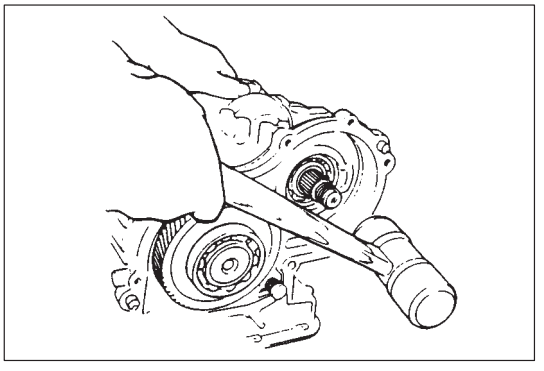
1. Reduction driven gear nut
2. Output shaft

32) Remove reduction driven gear nut.
   i) Undo caulking.
   ii) Shift manual shift lever to P range so that output shaft is locked.
   iii) Loosen nut.

CAUTION:
Calmly apply torque to loosen nut so as not to damage reduction gear or parking lock pawl.

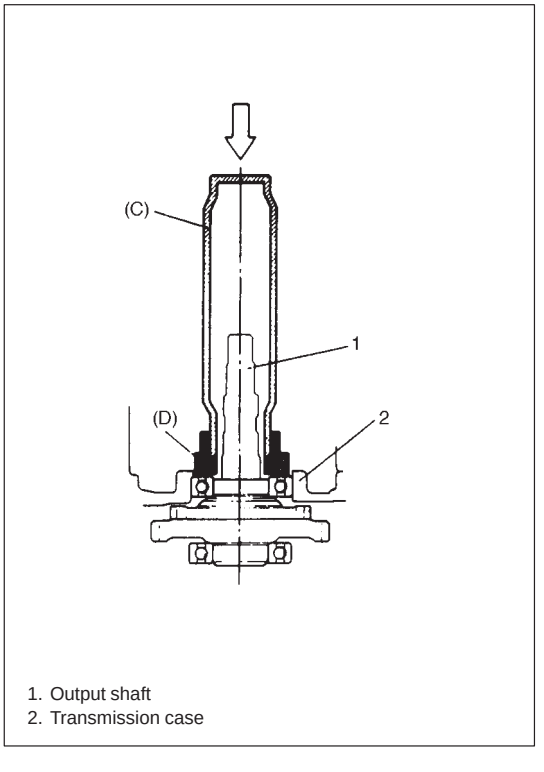


33) Pull out reduction driven gear.



34) Drive countershaft out with a plastic hammer.

CAUTION:
To avoid unnecessary damage of speed sensor due to contact with countershaft gear, it should be removed previously.

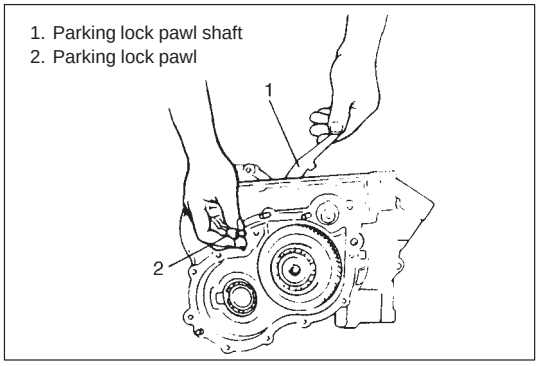


1. Output shaft
2. Transmission case

35) Remove output shaft by pushing outer race of internal output shaft bearing with special tools from inside of transmission case.

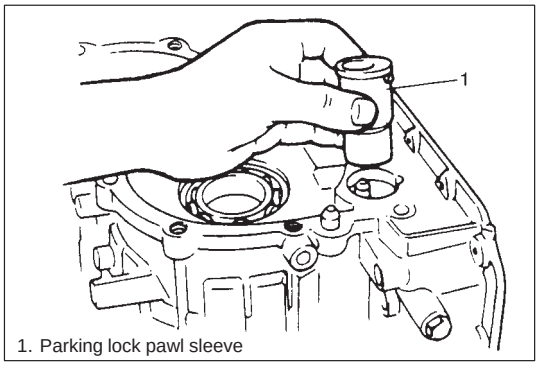
CAUTION:
- **Do not hit output shaft or shaft end will be damaged.**
- **Hold special tools by hand while hitting them and avoid their bounce.**

Special Tool
(C): 09925-18011
(D): 09927-08210



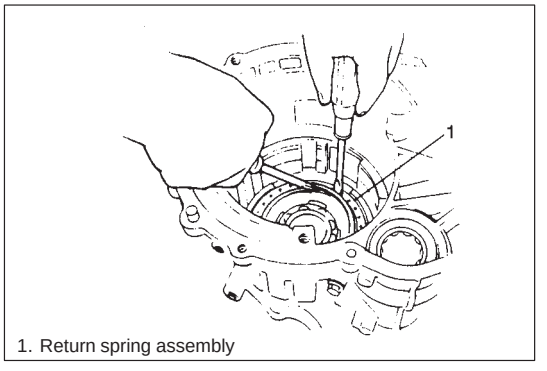
1. Parking lock pawl shaft
2. Parking lock pawl

36) Remove parking lock pawl, pawl shaft and sleeve, etc.
   i) Pull out parking lock pawl shaft and spring.
   ii) Remove parking lock pawl.



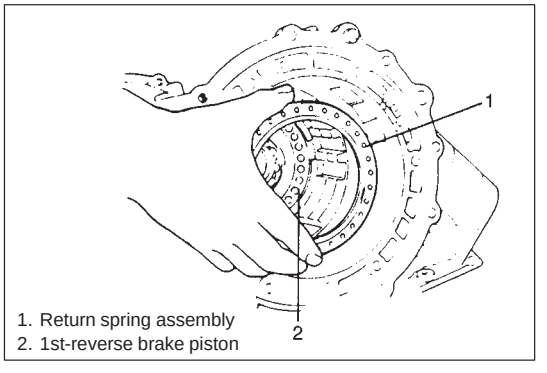
1. Parking lock pawl sleeve

   iii) Pull out parking lock pawl sleeve.
   iv) Remove manual detent spring assembly and manual shift shaft.



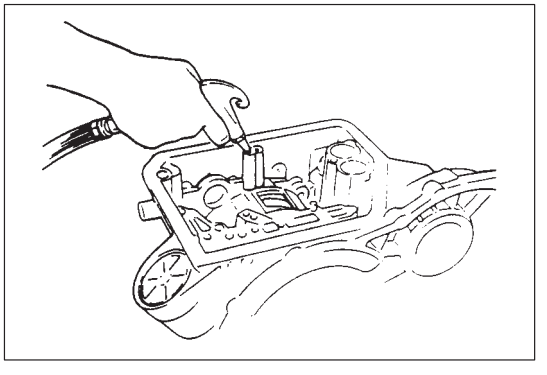
1. Return spring assembly

37) Remove 1st-reverse brake piston.
   i) Push down return spring assembly and remove snap ring.



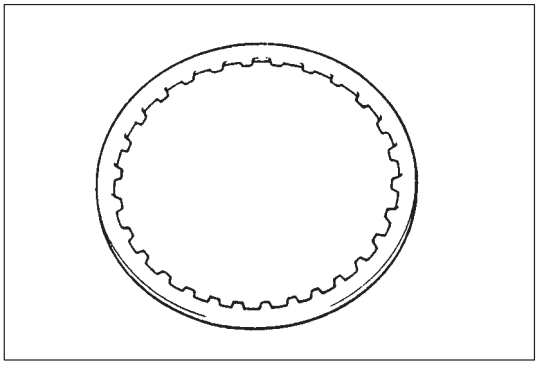
1. Return spring assembly
2. 1st-reverse brake piston

   ii) Take out return spring assembly.



   iii) By blowing air, push out 1st-reverse brake piston.

CAUTION:
- **Blow air very carefully, or outer O ring will be damaged.**
- **Pull out piston by using long nose pliers, if failed to remove it by air blow.**
- **Without replacing O rings prepared, do not attempt to remove piston.**

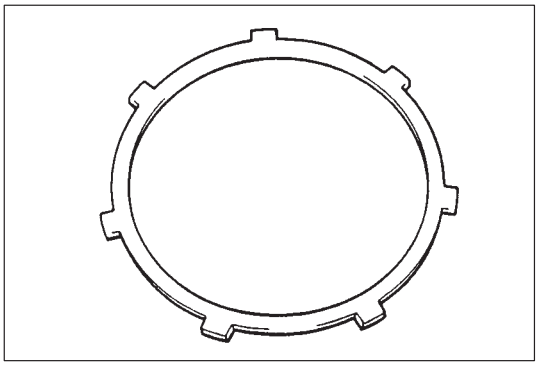


CLUTCH AND BRAKE PARTS DIAGNOSIS

SYMPTOMS

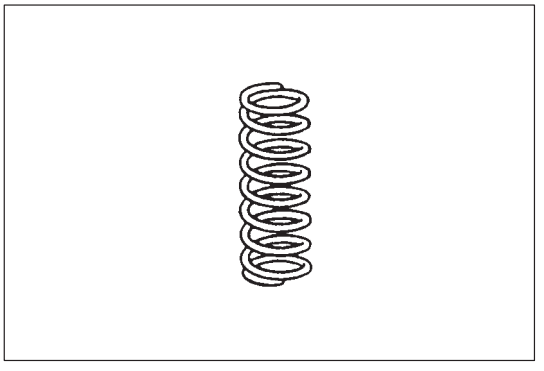
Clutch Discs and Brake Band

Dry and inspect them for pitting, flaking, wear, glazing, cracking, charring and chips or metal particles imbedded in lining. If discs or brake band show any of the above conditions, replacement is required.



Clutch Steel Plates

Dry plates and check for discoloration. If plate surface is smooth and even color smear is indicated, the plate should be reused. If severe heat spot discoloration or surface scuffing is indicated, the plate must be replaced.



Clutch or Brake Return Spring Assembly

Evidence of extreme heat or burning in the area of clutch may have caused springs to take a heat set and would require their replacement.

POSSIBLE CAUSES OF BURNING

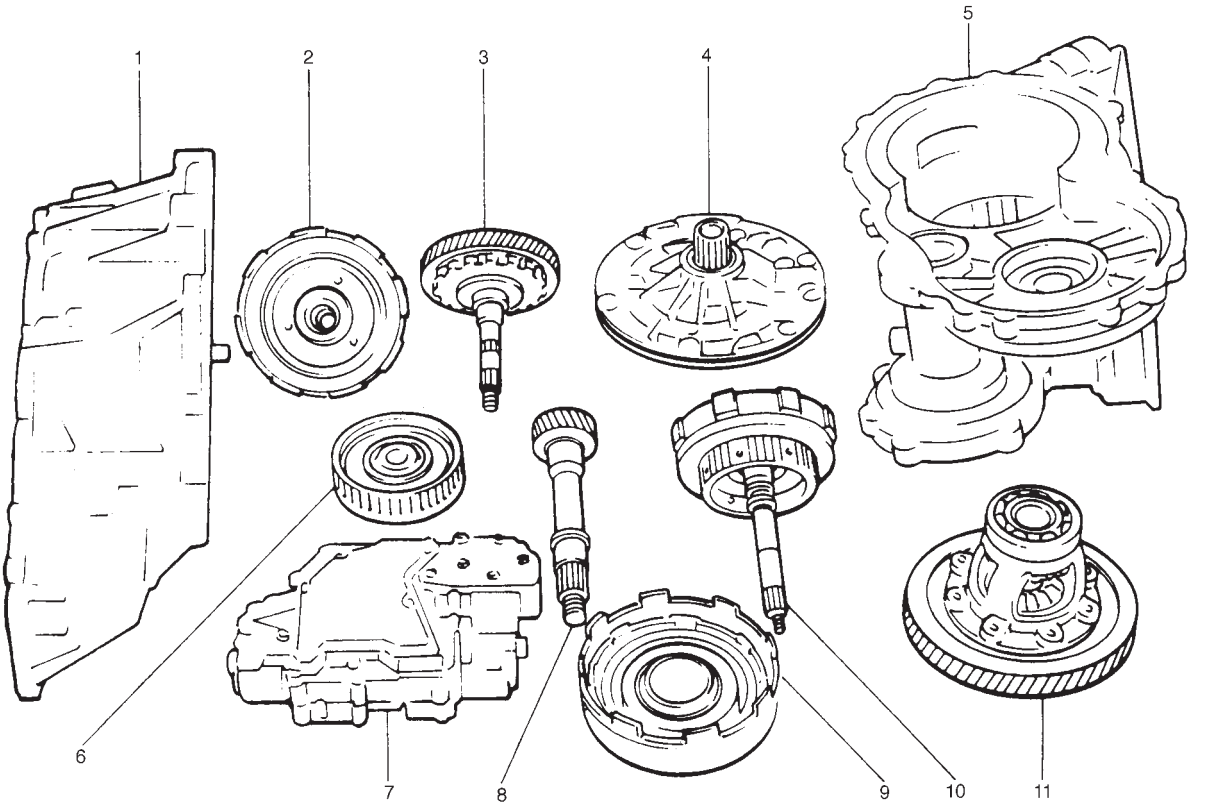
Forward and Direct Clutch Discs

- ○ Stuck or leak in check ball in clutch piston.
- ○ Damaged clutch piston seals.
- ○ Worn or broken seal rings.
- ○ Obstruction in solenoid valves or shift valves.
- ○ Disconnected speed sensor, solenoid or controller.
- ○ Leak in valve body gaskets.
- ○ Low line pressure.

1st/REV Brake Discs and 2nd Brake Band

- ○ Damaged piston seals.
- ○ Obstruction in solenoid valves or shift valves.
- ○ Leak in valve body gaskets.
- ○ Low line pressure.

SUB ASSEMBLY SERVICE

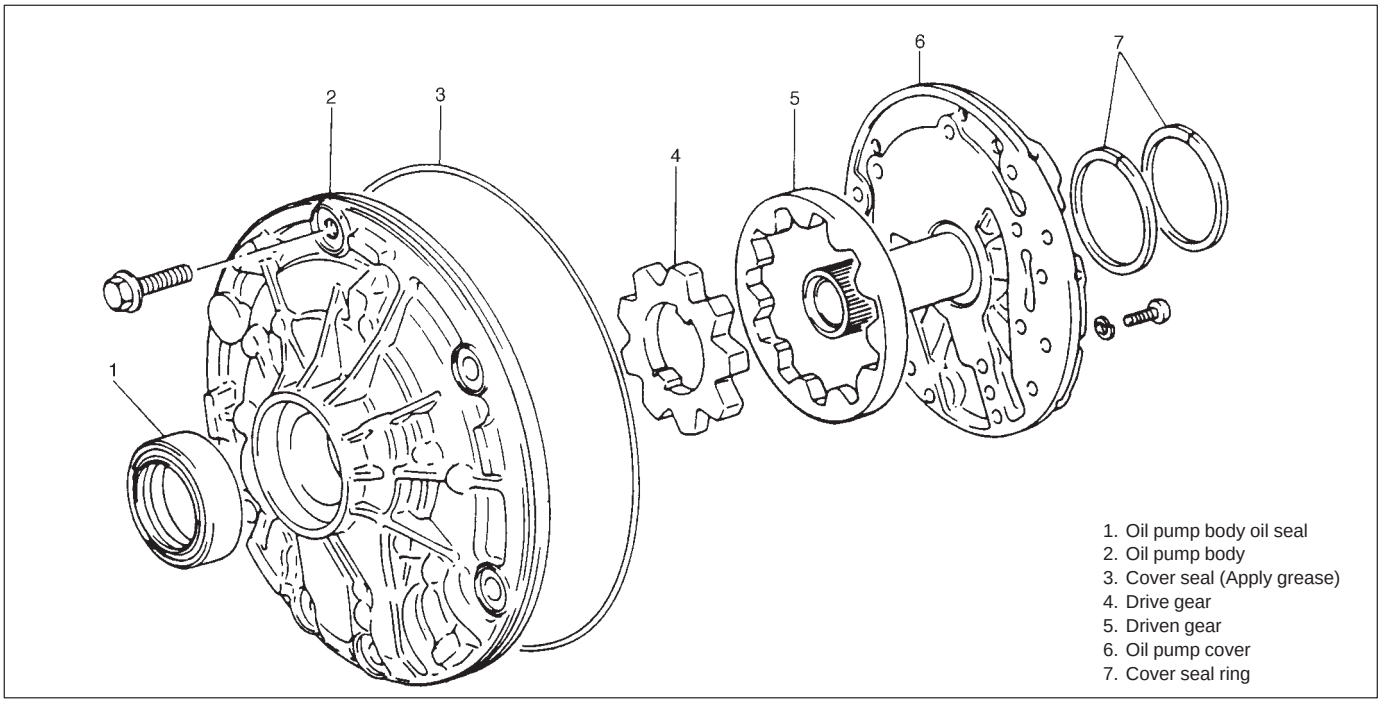


1. Transmission case housing
2. Sun gear & sun gear input drum
3. Output shaft
4. Oil pump
5. Transmission case
6. Front planetary ring gear
7. Upper & lower valve bodies
8. Countershaft
9. Direct clutch
10. Input shaft
11. Differential

CAUTION:

- **Keep component parts in group for each sub assembly and avoid mixing them up.**
- **Clean all parts with cleaning solvent thoroughly and air dry them.**
- **Use kerosene or automatic transmission fluid as cleaning solvent.**
- **Do not use wiping cloths or rags to clean or dry parts.**
- **All oil passages should be blown out and checked to make sure that they are not obstructed.**
- **Keep face and eyes away from solvent spray while air blowing parts.**
- **Check mating surface for irregularities and remove them, if any, and clean it again.**
- **Soak new clutch discs and brake band in transmission fluid for 2 hours or more before assembly.**
- **Replace all gaskets and O rings with new ones.**
- **Apply automatic transmission fluid to all O rings except oil pump cover seal.**
- **When installing seal ring, be careful so that it is not expanded excessively, extruded or caught.**
- **Replace oil seals that are removed and apply grease to their lips.**
- **Before installing, be sure to apply automatic transmission fluid to sliding, rolling and thrusting surface of all component part. Also after installation, make sure to check each part for proper operation.**
- **Always use torque wrench when tightening bolts.**

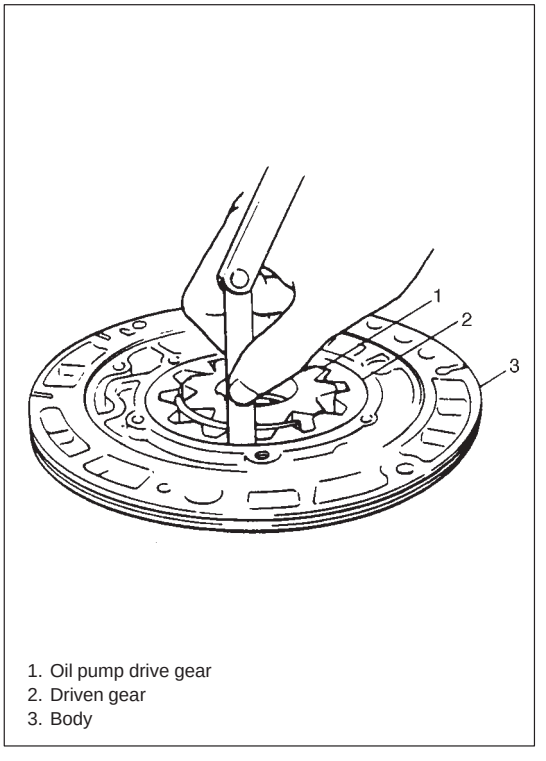
OIL PUMP



1. Oil pump body oil seal
2. Oil pump body
3. Cover seal (Apply grease)
4. Drive gear
5. Driven gear
6. Oil pump cover
7. Cover seal ring

Removal

1) Remove 2 oil pump cover seal rings.
2) Remove oil pump cover seal (O ring).
3) Remove 11 bolts.
4) Remove oil pump cover.



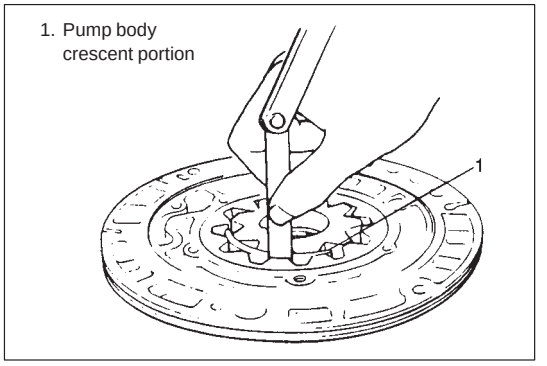
1. Oil pump drive gear
2. Driven gear
3. Body

Inspection

1) Inspect pump body oil seal.
   Check for wear, damage or cracks.
   Replace oil seal if necessary and apply grease to its lip portion slightly when it is installed.
2) Check body clearance of driven gear.
   Push driven gear to one side of body. Using a feeler gauge, measure clearance between driven gear and body.
   If clearance exceeds its limit, replace gear.

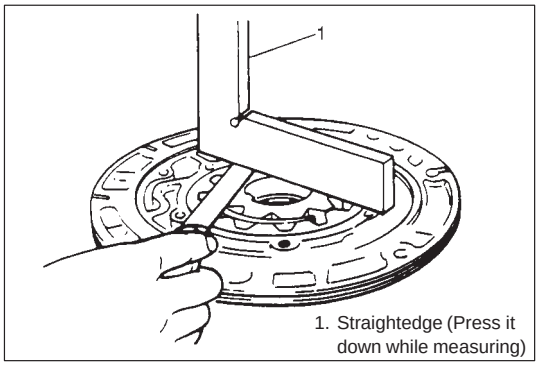
Body clearance

Standard : 0.07 – 0.15 mm (0.0028 – 0.0059 in.)
Limit : 0.3 mm (0.011 in.)



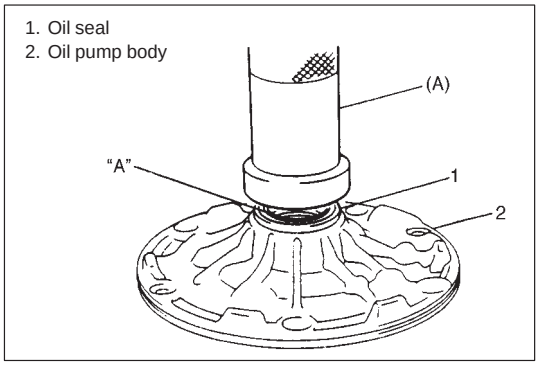
3) Check tip clearance of both drive and driven gears.
Measure radial clearance between gear tooth and crescent. If clearance exceeds its limit, replace gear.

Tip clearance
Standard : 0.11 – 0.14 mm (0.0044 – 0.0055 in.)
Limit : 0.3 mm (0.011 in.)



4) Check side clearance of both gears.
Using a straightedge and a feeler gauge, measure side clearance between gear and pump body.

Side clearance
Standard :0.02 – 0.05 mm (0.0008 – 0.0019 in.)
Limit : 0.1 mm (0.0039 in.)



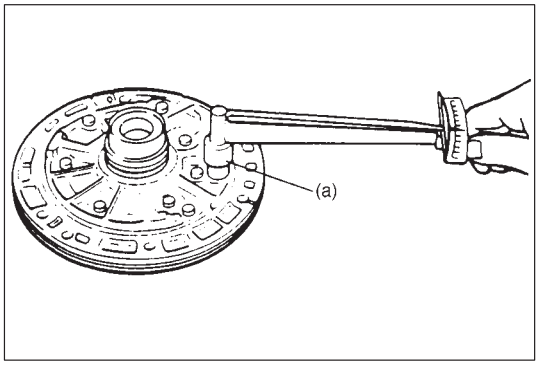
Installation

1) Install pump body oil seal.
Use special tool and hammer to install it, and then apply grease to its lip portion.

Special Tool
(A): 09913-85210

"A": SUZUKI SUPER GREASE C, 99000-25030

2) Install driven gear and drive gear to pump body after applying fluid to gears.



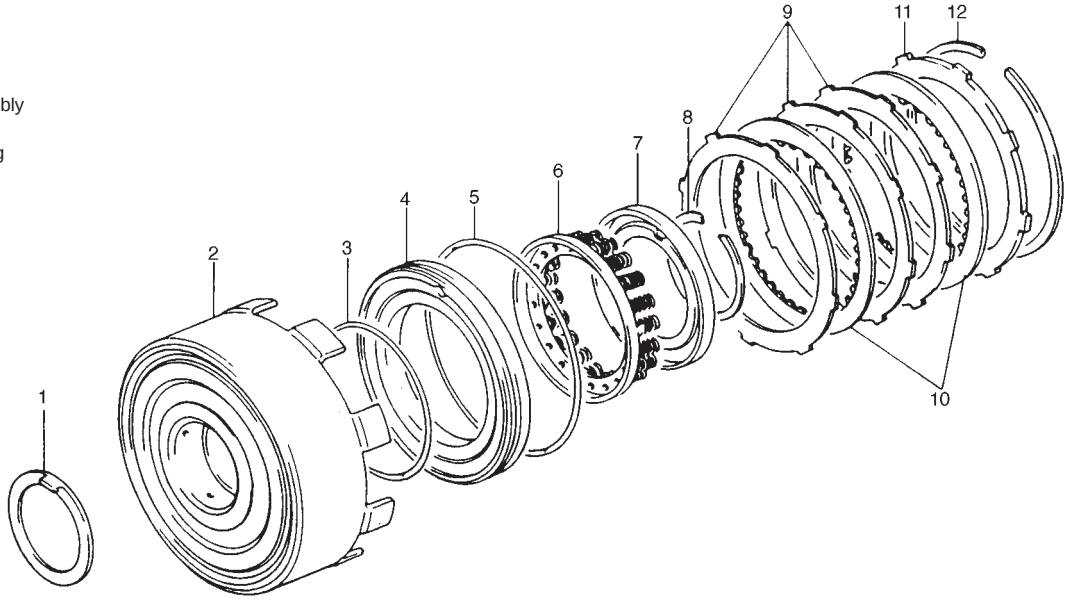
3) Install pump cover to pump body and tighten 11 pump cover bolts to specification.

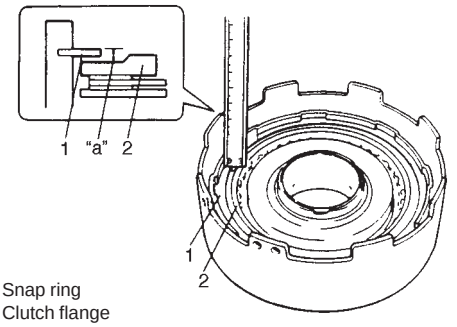
Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

4) Install 2 oil pump cover seal rings.
5) Apply transmission fluid to oil pump bushes and 2 seal rings.
6) Install cover seal (O ring) applied with grease and make sure that it is not twisted or extruded.
7) Check drive gear for smooth rotation.

DIRECT CLUTCH

1. Direct clutch washer
2. Direct clutch drum
3. Inner seal
4. Direct clutch piston
5. Outer seal
6. Return spring assembly
7. Return spring seat
8. Spring seat snap ring
9. Clutch plate
10. Clutch disc
11. Clutch flange
12. Clutch plate snap





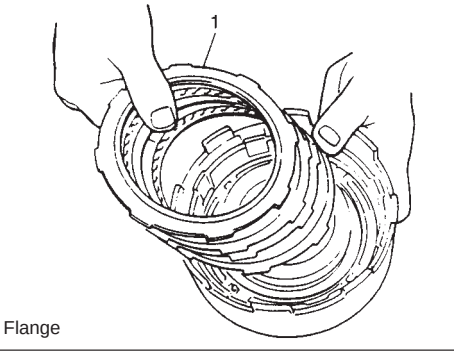
1. Snap ring
2. Clutch flange

Preliminary Check

Check direct clutch clearance before disassembly.

For checking clearance, measure height between snap ring and clutch flange by using vernier as shown in figure. If height is within specification, it means that clutch clearance is within specification. If height is out of specification, replace clutch discs or plates with new ones.

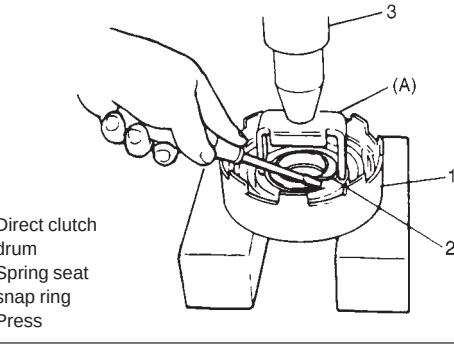
Height "a": 2.49 – 3.06 mm (0.098 – 0.120 in.)



1. Flange

Removal

1) Remove clutch plate snap ring.
2) Remove clutch flange, discs and plates.

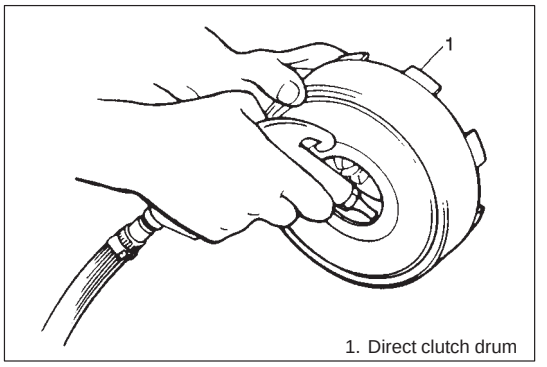


1. Direct clutch drum
2. Spring seat snap ring
3. Press

3) Remove spring seat snap ring.
   Compress piston return springs by using special tool and then remove snap ring.

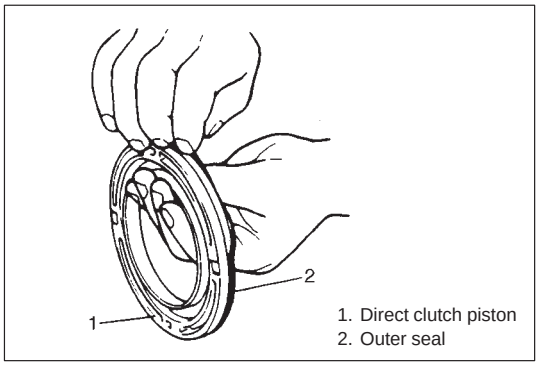
CAUTION:
Do not compress spring seat too much. Excessive compression may cause to spring seat to become distorted.

Special Tool
(A): 09926-98310



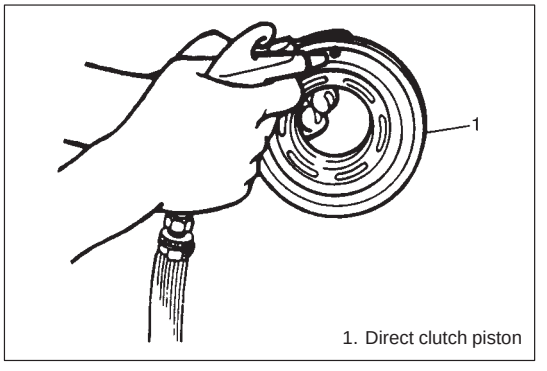
1. Direct clutch drum

4) Remove spring seat and return spring assembly.
5) Remove direct clutch piston.
   Blow compressed air through drum oil hole to remove piston. If piston does not pop out, take out piston with long nose pliers.



1. Direct clutch piston
2. Outer seal

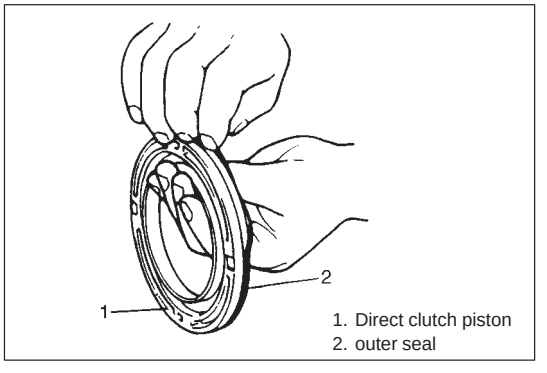
6) Remove inner seal from drum.
7) Remove outer seal from piston.



1. Direct clutch piston

Inspection

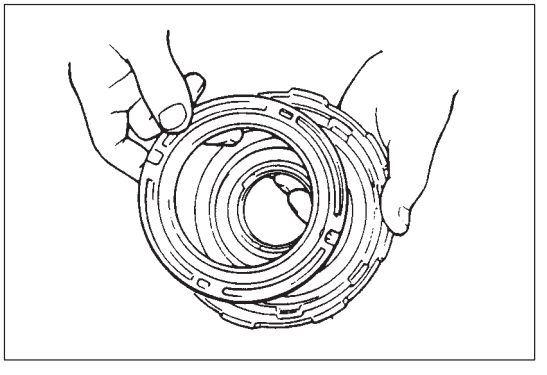
1) Check valve (steel ball) for free movement in piston.
2) Check valve for leakage by using low pressure air. If found faulty, replace piston.



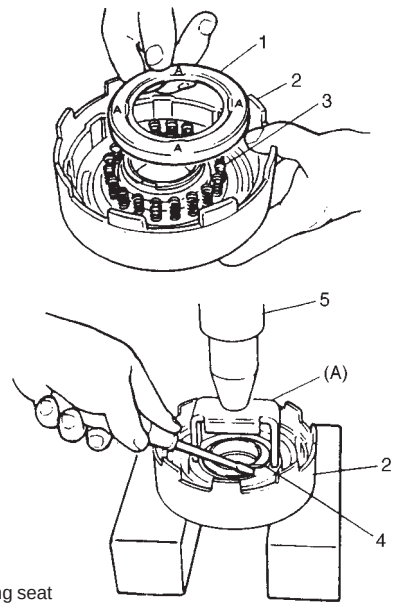
1. Direct clutch piston
2. outer seal

Installation

1) Install inner seal (O ring).
   Apply transmission fluid to inner seal and fit it in drum. Use new inner seal.
2) Install outer seal (O ring).
   Apply transmission fluid to outer seal and fit it to piston. Use new outer seal.



3) Install piston into drum.
   Be careful so that seals (O rings) do not get twisted or caught.



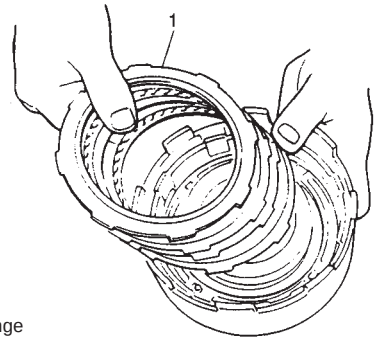
1. Spring seat
2. Direct clutch drum
3. Return spring assembly
4. Spring seat snap ring
5. Press

A: Projection to retain snap ring

4) Install clutch return spring assembly.
5) Install spring seat.
6) Install snap ring.
   Compress return springs and install spring seat snap ring in groove. Place special tool (clutch spring compressor) on spring seat and compress springs with press, and then, install snap ring using a screwdriver.

CAUTION:
- **Check to make sure that snap ring is securely fitted in 4 projections A of spring seat.**
- **Do not compress return spring more than necessary.**

Special Tool
(A): 09926-98310

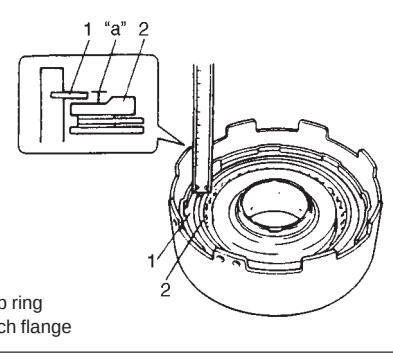


1. Flange

7) Install discs, plates and flange in the following order.
   i) Plate → ii) Disc → iii) Plate → iv) Plate → v) Disc → vi) Flange

   NOTE:
   If new clutch discs are installed, soak them in automatic transmission fluid for 2 hours or more before assembly.

8) Install clutch plate snap ring.

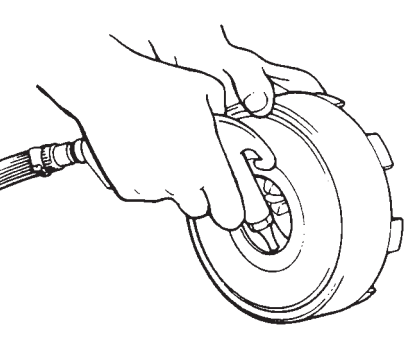


1. Snap ring
2. Clutch flange

9) After installing clutch plate snap ring, measure height between snap ring and clutch flange as previously outlined. If height is out of specification even when new clutch discs and plates are installed, install flange of different thickness. The following 2 types of clutch flanges are available as spare parts.

Height "a": 2.49 – 3.06 mm (0.098 – 0.120 in.)

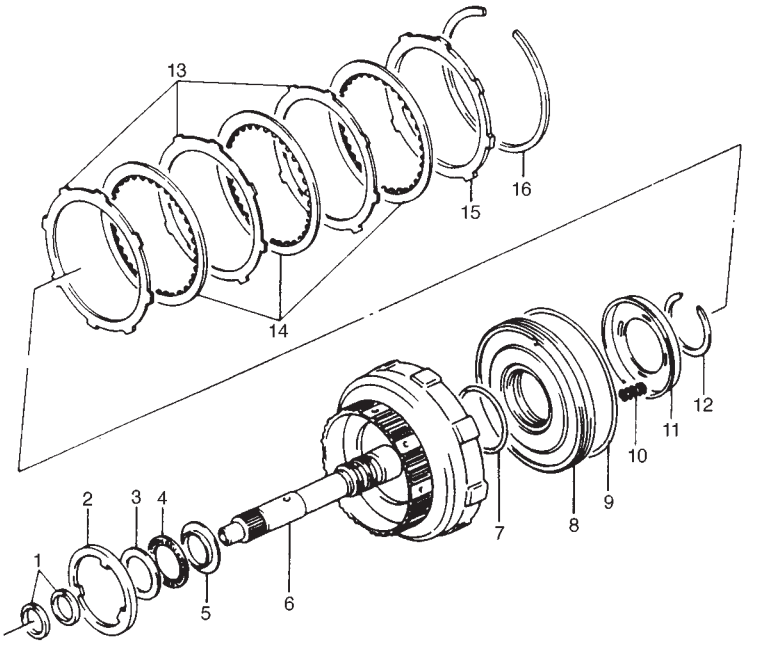
Available clutch flange size (thickness)	3.00 mm/0.118 in.
	3.37 mm/0.132 in.



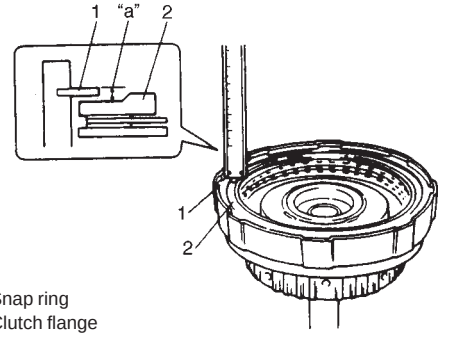
10) Check piston for movement by blowing air through oil hole in drum.

CAUTION:
Apply only low pressure air for checking movement. Excessive air pressure may cause damage to spring seat.

FORWARD CLUTCH



1. Input shaft seal ring
2. Direct clutch washer
3. Input shaft bearing race
4. Input shaft bearing
5. Bearing race
6. Input shaft
7. Inner seal
8. Forward clutch piston
9. Outer seal
10. Return spring
11. Return spring seat
12. Spring seat snap ring
13. Clutch plate
14. Clutch disc
15. Clutch flange
16. Clutch plate snap ring



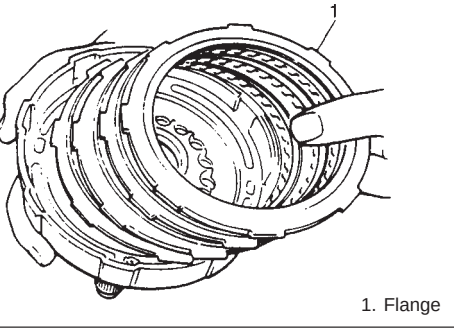
1. Snap ring
2. Clutch flange

Preliminary Check

Check forward clutch clearance before disassembly.

For checking clearance, measure height between snap ring and clutch flange by using vernier as shown in figure. If height is within specification, it means that clutch clearance is within specification. If height is out of specification, replace clutch discs or plates with new ones.

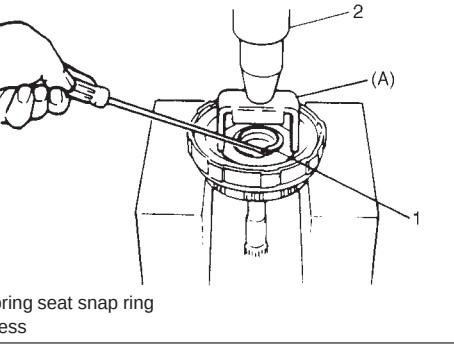
Height "a": 2.01 – 2.68 mm (0.079 – 0.105 in.)



1. Flange

Removal

1) Remove clutch plate snap ring.
2) Remove flange, discs and plates.

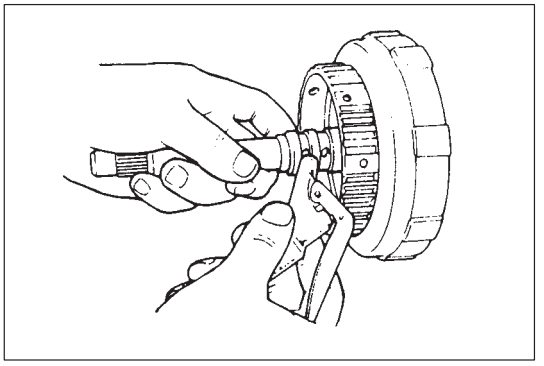


1. Spring seat snap ring
2. Press

3) Remove seat snap ring.
   Compress piston return springs and remove snap ring. Place special tool (clutch spring compressor) on spring seat and compress spring with a press, and then, remove snap ring, using a screwdriver.

CAUTION:
Do not push down return spring more than necessary.

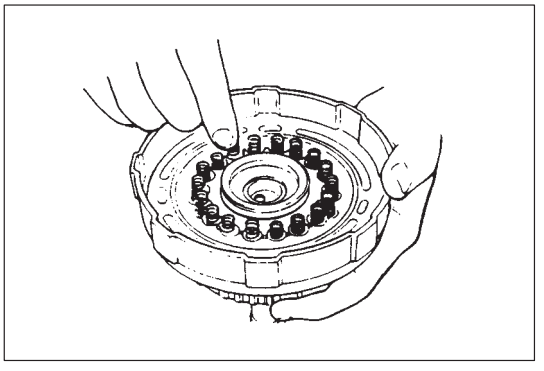
Special Tool
(A): 09926-98310



4) Remove spring seat and springs.
5) Remove forward clutch piston.
   Blow compressed air through input shaft oil hole to remove piston. If piston does not pop out, take it out with long nose pliers.
6) Remove inner and outer seals (O rings) from piston.

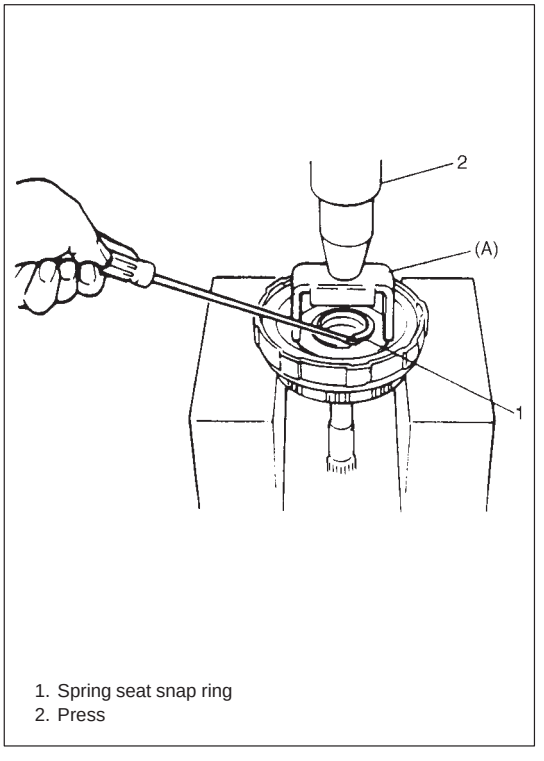
Inspection

1) Check valve (ball) for free movement in clutch piston.
2) Check valve for leakage by using low pressure air. If found faulty, replace clutch piston.



Installation

1) Install inner and outer seals (O rings) to clutch piston.
   Apply transmission fluid to them and fit to piston. Use new seals.
2) Install piston into input shaft drum.
   Use care so that seals do not get twisted or caught.
3) Install 18 piston return springs and spring seat.

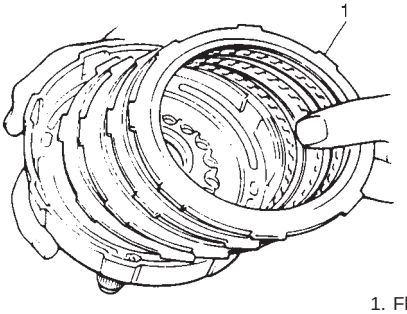


1. Spring seat snap ring
2. Press

4) Install spring seat snap ring.
   Compress return springs and install snap rings in groove by using a screwdriver.
   Place special tool (clutch spring compressor) on spring seat and compress springs with a press.

CAUTION:
- **Check to make sure that snap ring is securely fitted in 4 projections of spring seat.**
- **Do not compress return spring more than necessary.**

Special Tool
(A): 09926-98310

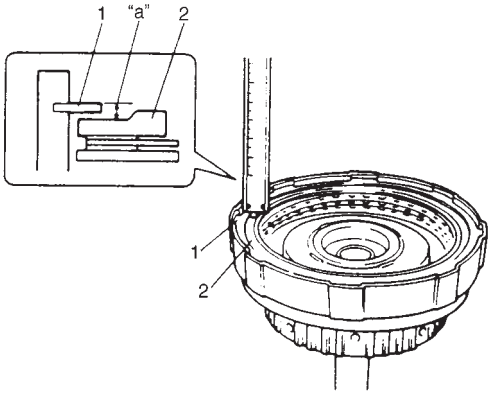


1. Flange

5) Install discs, plates and flange in following order.
i) Plate → ii) Disc → iii) Plate → iv) Disc → v) Plate → vi) Disc → vii) Flange

NOTE:
Before assembly, new discs should be soaked in automatic transmission fluid for 2 hours or more.

6) Install clutch plate snap ring.

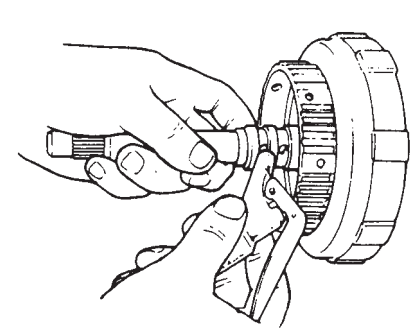


1. Snap ring
2. Clutch flange

7) After installing clutch plate snap ring, measure height between snap ring and clutch flange as previously outlined. If discs and plates are new and yet out of specification, install flange of different thickness. The following 2 types of clutch flanges are available as spare parts.

Height "a": 2.01 – 2.68 mm (0.079 – 0.105 in.)

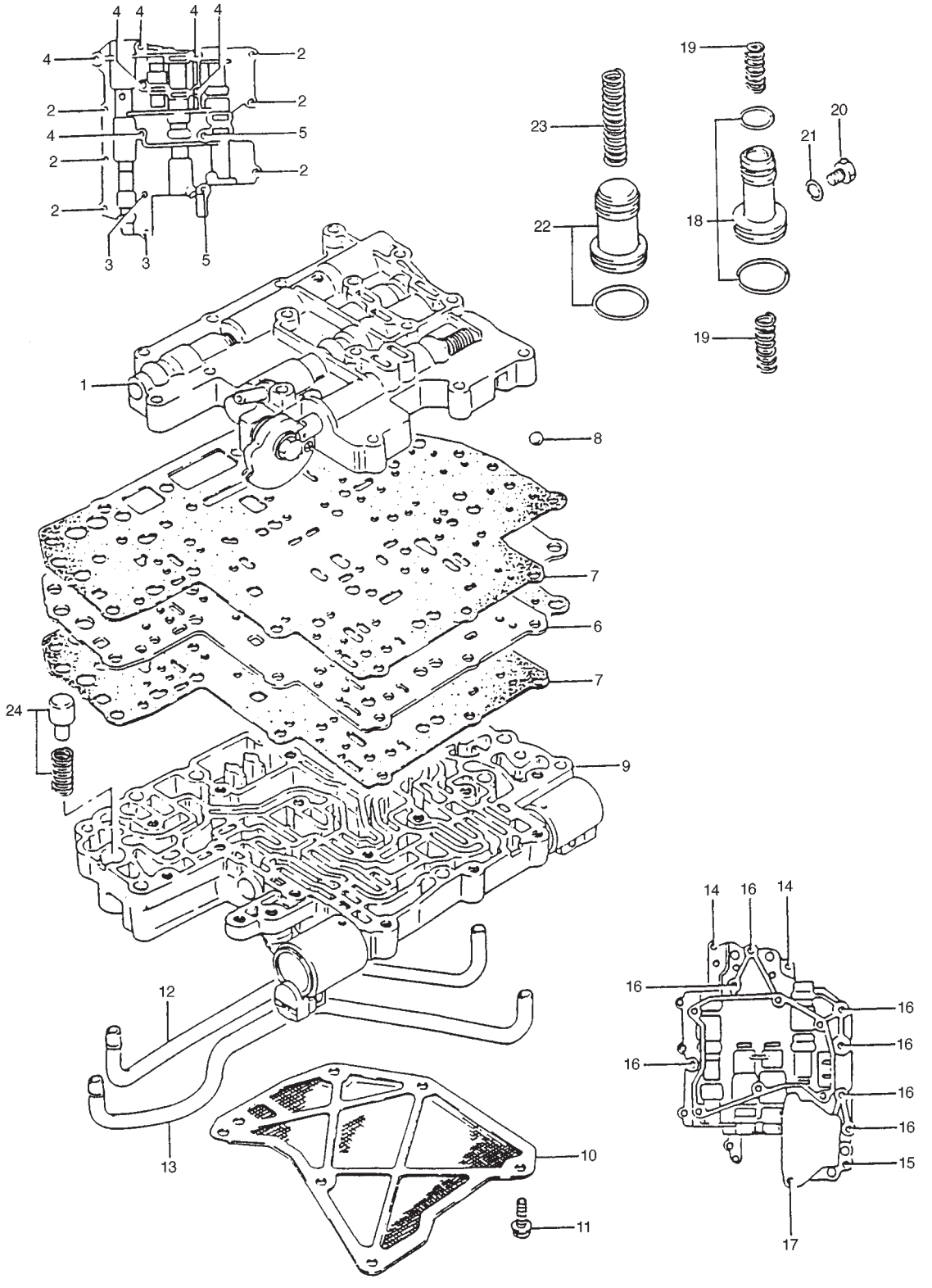
Available clutch flange size (thickness)	3.00 mm/0.118 in.
	3.37 mm/0.132 in.



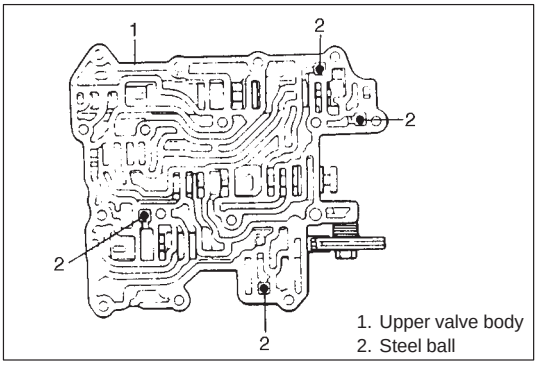
8) Check clutch piston for movement by blowing air through input shaft oil hole.

CAUTION:
Apply only low pressure air, or spring seat may be damaged.

VALVE BODY



1. Upper valve body assembly
2. Valve body bolt
3. Valve body bolt
4. Valve body bolt
5. Valve body bolt
6. Valve body plate
7. Valve body gasket
8. Valve body ball
9. Lower valve body assembly
10. Oil strainer
11. Bolt
12. Forward clutch accumulator tube
13. 2nd brake
14. Bolt
15. Bolt
16. Bolt
17. Bolt
18. 2nd brake accumulator piston
19. B1 accumulator spring
20. Booster plug
21. O-ring
22. Accumulator forward clutch piston
23. Accumulator spring
24. Cooler by-pass valve



Important Steps in Disassembly and Reassembly of Valve Bodies

○ When disassembling valve body, be sure to keep each valve together with its corresponding spring.
○ When removing upper valve body from lower one, be careful not to let 4 steel balls shown in figure fall off.
○ When assembling, install these four (4) steel balls in such in upper valve body as shown.

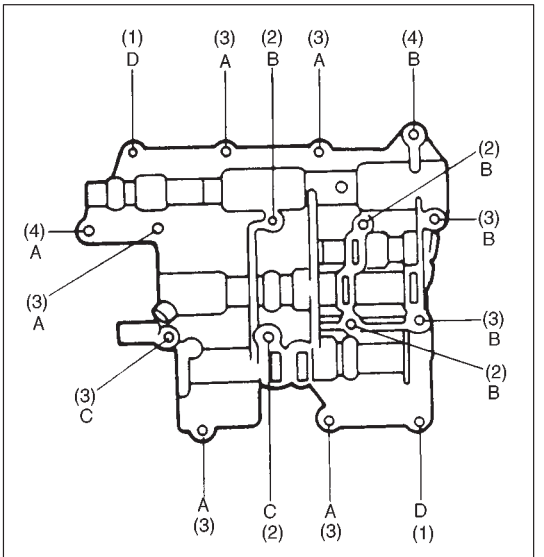
○ Replace each gasket with new one. Make sure that new gasket is the same as old one before installation.
○ When installing each valve to valve body, use special care for proper installing direction.
○ Several of throttle valve rings are used at throttle valve in upper valve body. Be sure to install the same number of throttle valve rings as those used before disassembly.

○ When installing lower valve body cover and gasket to lower valve body, tighten lower valve body bolts to specified torque.

Tightening Torque for lower valve body cover bolts
5.0 N·m (0.5 kg-m, 4.0 lb-ft)

○ Tighten throttle valve cam bolt to specified torque.

Tightening Torque for cam bolt
7.5 N·m (0.75 kg-m, 5.5 lb-ft)

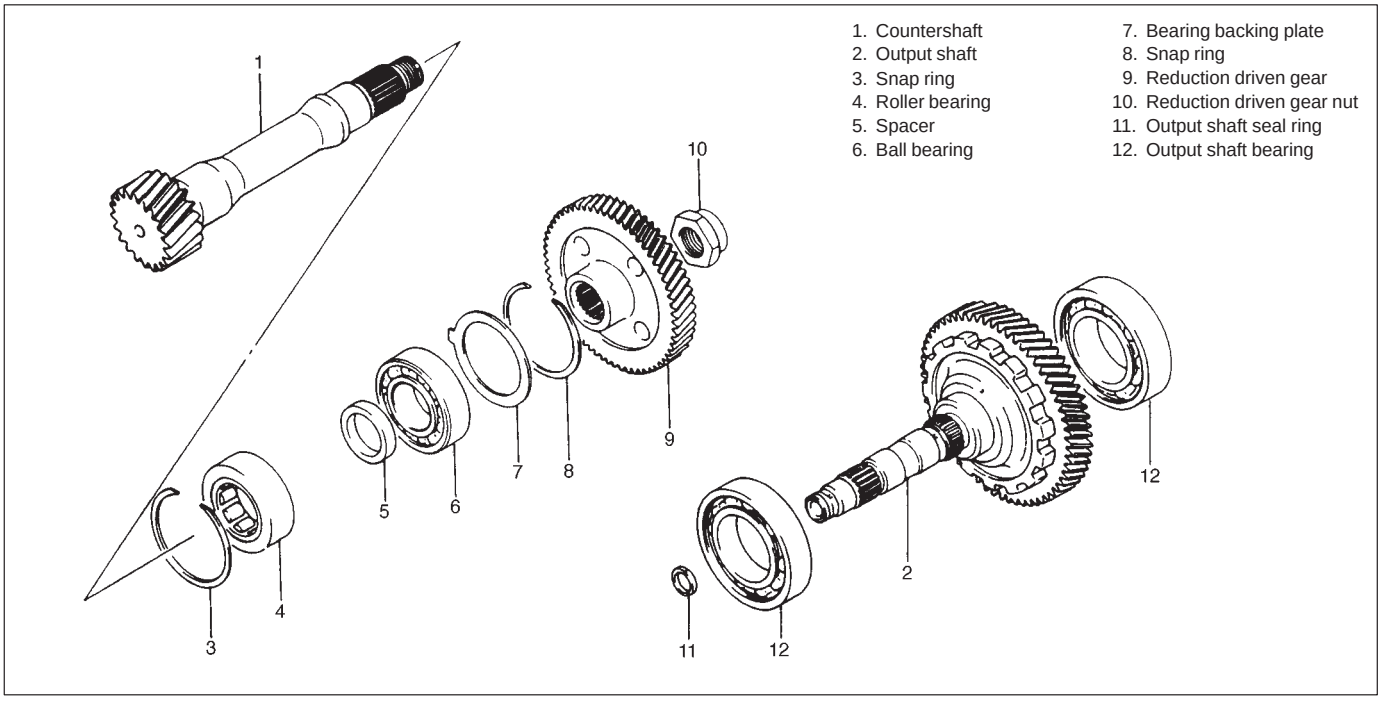


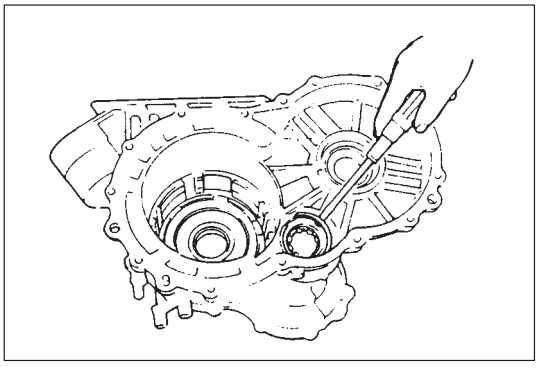
Bolt	Length	Bolt head shape	Pieces
A	29.5 mm (1.16 in.)	Deep recess	6
B	38 mm (1.49 in.)	Deep recess	6
C	44 mm (1.73 in.)	Deep recess	2
D	Reamer bolt	Normal recess	2

○ When installing upper valve body to lower one, install 16 upper valve body bolts and tighten them to specified torque.
1) – Lightly install 2 reamer bolts (positioning bolts) to D.
2) – Install all other 14 bolts.
3) – Tighten 4 bolts (2) to specified torque.
4) – Tighten 8 bolts (3) to specified torque.
5) – Tighten 2 bolts (4) and 2 reamer bolts (1) to specified torque.

Tightening Torque for upper valve body bolts
5.5 N·m (0.55 kg-m, 4.0 lb-ft)

COUNTERSHAFT AND OUTPUT SHAFT

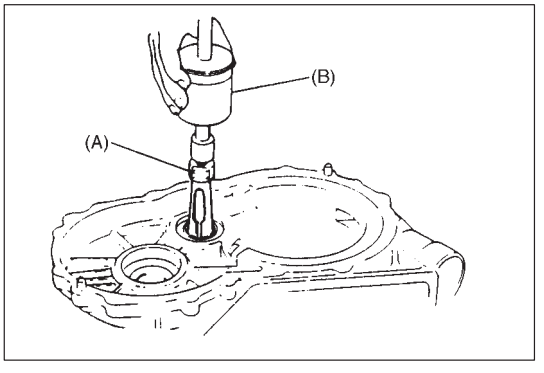




Countershaft Bearings

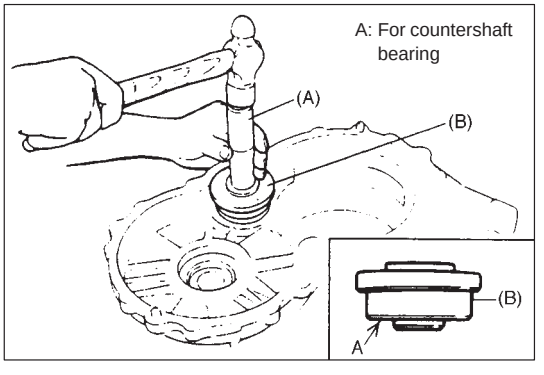
Removal

1) Remove snap rings by using a screwdriver.



2) Remove backing plate (rear cover side).
3) Remove front and rear counter shaft bearings.
   i) Using special tools (Bearing remover and sliding shaft), remove bearing.
   ii) Remove other side of bearing in the same way.

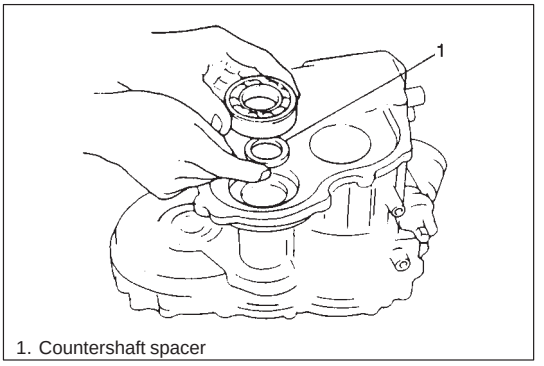
Special Tool
(A): 09941-64511
(B): 09930-30104



Installation

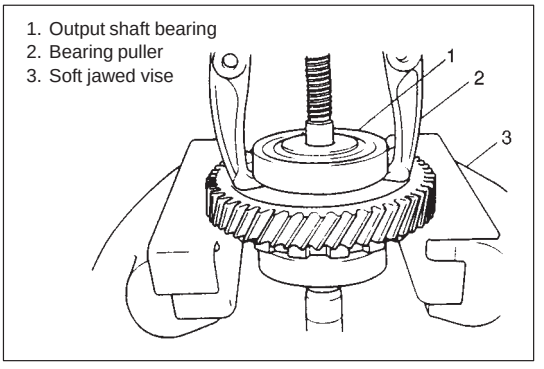
1) Install countershaft bearing (Roller bearing) to case.
   Use special tools (Bearing installer attachment and installer handle).
   The bearing installer attachment has two sides.
   Use small side A for installation of countershaft bearings.

Special Tool
(A): 09924-74510
(B): 09926-88310



1. Countershaft spacer

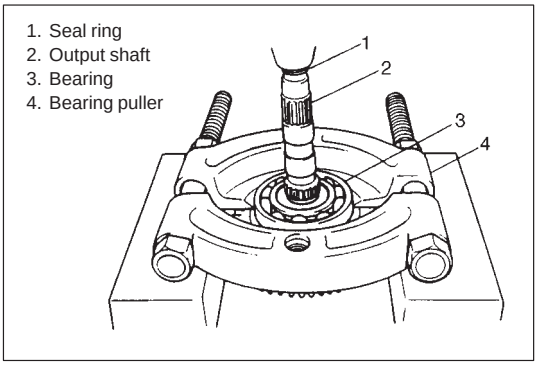
2) Install snap ring.
3) Install countershaft spacer to case.
4) Install another countershaft bearing (ball bearing) to case.
   Use special tools (Bearing installer attachment and installer handle).
5) Install bearing backing plate and snap ring.



Output Shaft Bearings

Removal

1) Remove cover side bearing.
   Hold output shaft with soft jawed vise and remove bearing by using bearing puller.



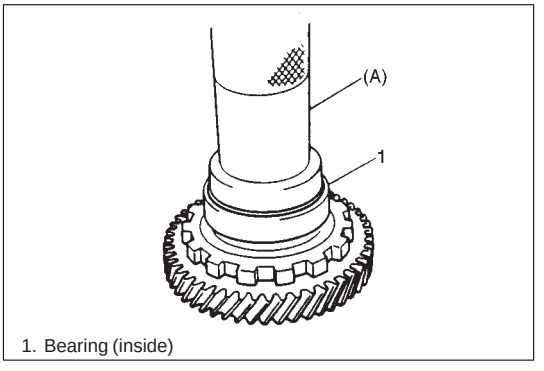
2) Install inside bearing.
   Hold bearing by using bearing puller and drive out shaft with press.

CAUTION:
Never hit shaft end where seal ring is installed so as not to distort ring slit.

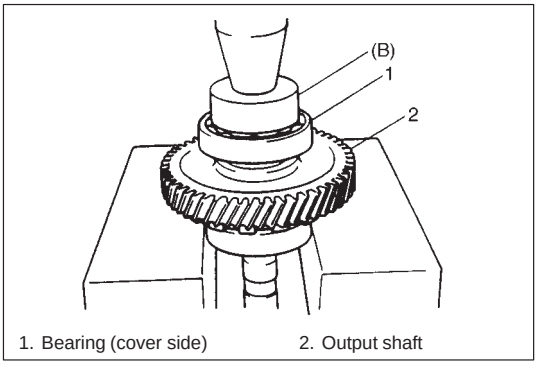
Installation

1) Install inside bearing.
   Use special tool with press.

   Special Tool
   (A): 09913-85210



1. Bearing (inside)



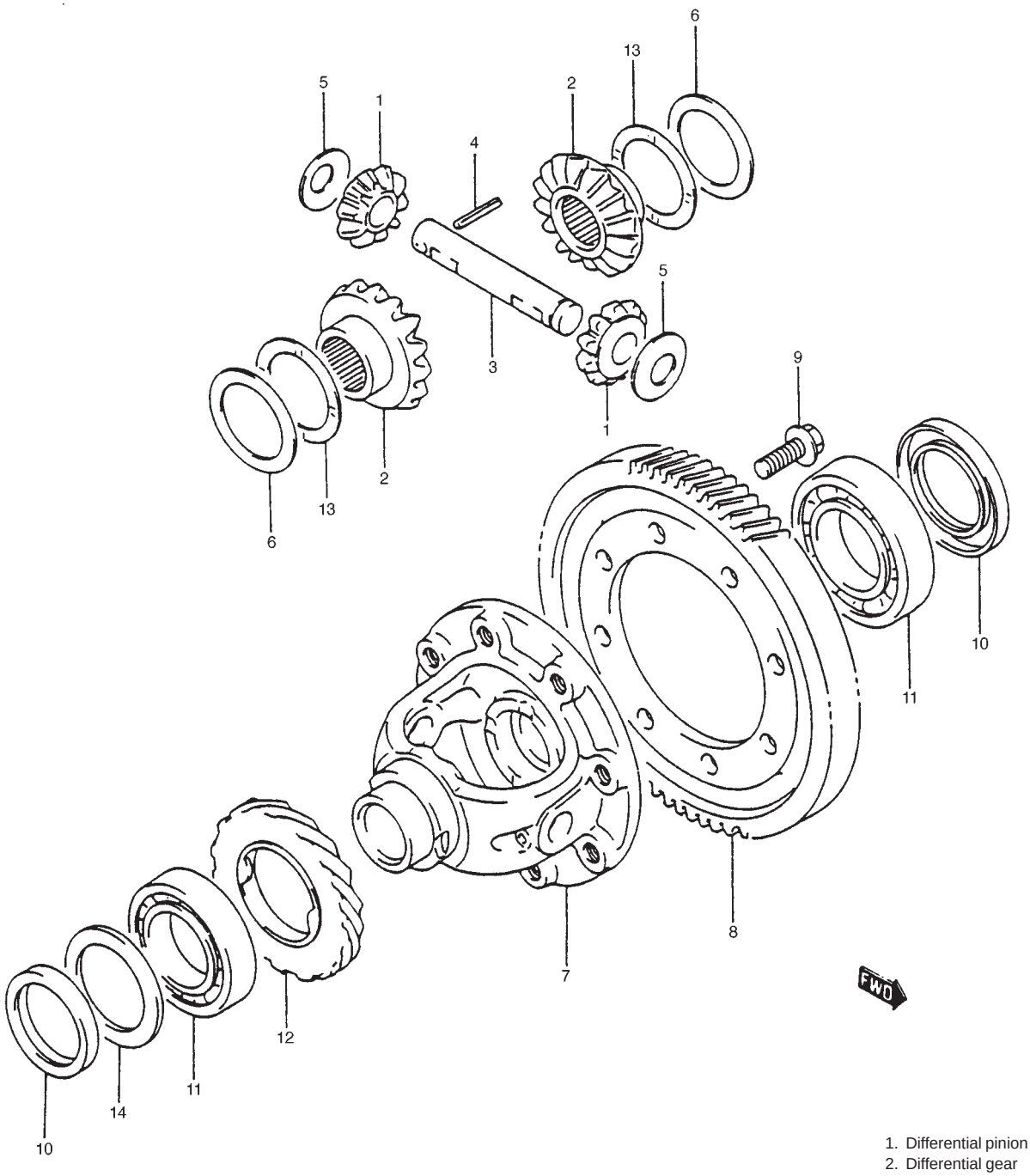
1. Bearing (cover side) 2. Output shaft

2) Install cover side bearing.
   Hold shaft at parking lock gear and press-fit bearing by using special tool with press.

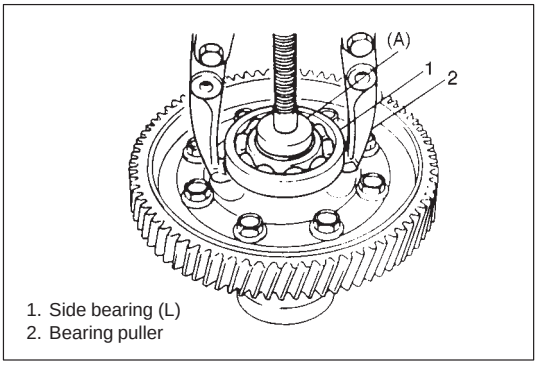
   Special Tool
   (B): 09944-66020

DIFFERENTIAL ASSEMBLY

Servicing procedure for differential assembly is similar to that for manual transmission. Refer to “DIFFERENTIAL ASSEMBLY” in Section 7A for further information.



1. Differential pinion
2. Differential gear
3. Side pinion shaft
4. Spring pin
5. Side pinion washer
6. Side gear washer (selection)
7. Differential case
8. Final gear
9. Final gear bolt
10. Differential side oil seal
11. Differential side bearing
12. Speedometer drive gear
13. Washer
14. Side beaning shim (Selection)

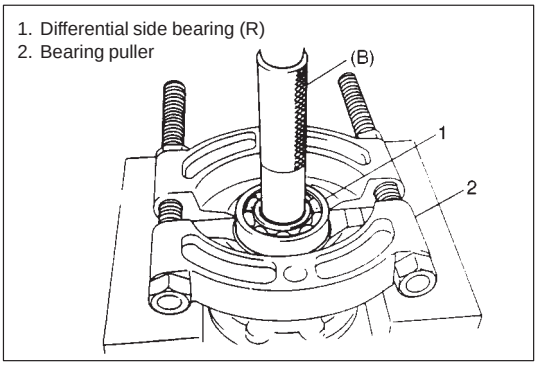


1. Side bearing (L)
2. Bearing puller

Disassembly

1) Remove differential side bearing (L).
   Use special tool and puller for its removal.

   Special Tool
   (A): 09925-88210

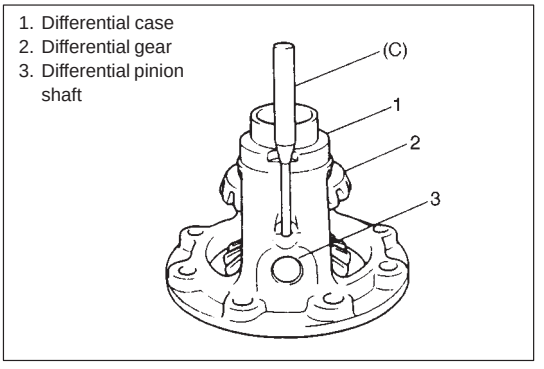


1. Differential side bearing (R)
2. Bearing puller

2) Remove final gear.
   Hold differential case with soft jawed vise and remove 8 bolts then take out final gear.
3) Remove differential side bearing (R).
   Drive it out by using special tool, bearing puller and press.

   Special Tool
   (B): 09913-80112

4) Remove speedometer drive gear.



1. Differential case
2. Differential gear
3. Differential pinion shaft

5) Remove side pinion shaft pin.
   Use special tool and hammer for its removal.

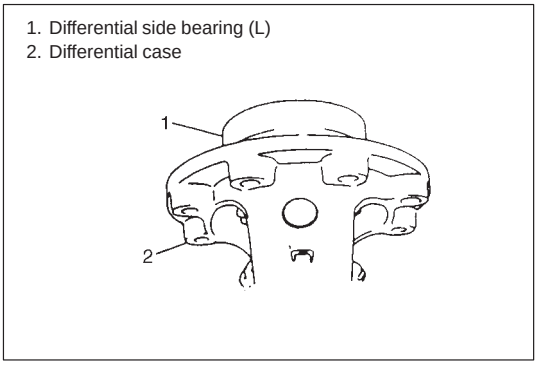
   Special Tool
   (C): 09922-85811

6) Remove side pinion shaft, differential pinions with each washer, differential gears with each washer.

Adjustment and Reassembly

Prepare replacing parts as required and proceed to reassembly. Make sure that all parts are clean.

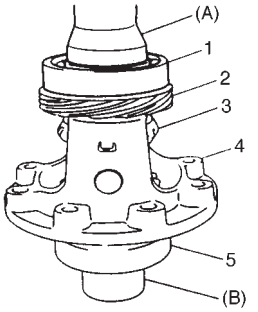
1) Install differential gears.
   Measure and adjust thrust play referring to “DIFFERENTIAL ASSEMBLY” in Section 7A, and then assemble them with suitable thrust washers.
2) Drive in side pinion shaft pin from right side till it is flush with diff. case surface.



1. Differential side bearing (L)
2. Differential case

3) Install diff. side bearing (L). Face its seal side inward (differential case side) and press-fit by using special tool.

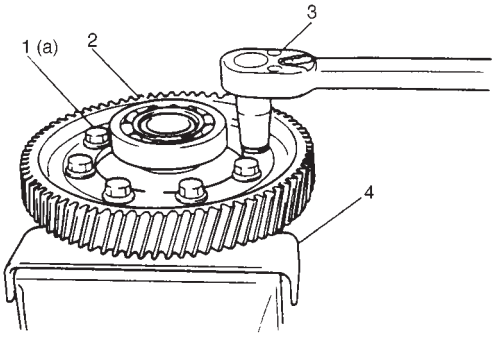
   Special Tool
   (A): 09951-76010



1 Differential side bearing (R)
2. Speedometer drive gear
3. Differential gear
4. Differential case
5. Differential side bearing (L)

4) Install speedometer drive gear.
5) Install diff. side bearing (R). Face its seal side inward and press-fit it by using special tool with copper hammer. While press-fitting, support differential assembly as illustrated so that left hand bearing is floating.

Special Tool
(A): 09951-76010
(B): 09951-16060



1. Final gear bolt
2. Final gear
3. Torque wrench
4. Soft jawed vise

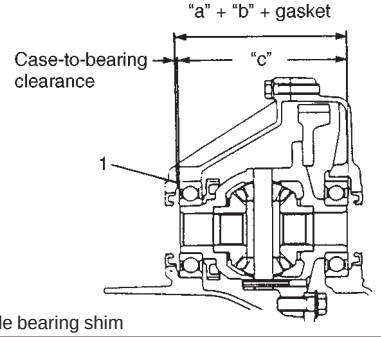
A: Deeper flange side from gear edge

6) Hold differential assembly with soft jawed vise, install final gear and then tighten it with 8 bolts to specified torque.

NOTE:
Place offset side of final gear flange toward differential case.

CAUTION:
Use of any other bolts than specified ones is prohibited.

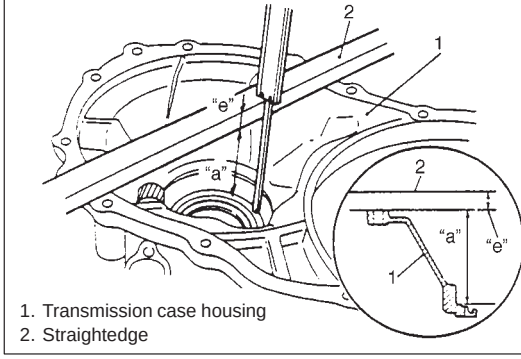
Tightening Torque
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



1. Side bearing shim

Shim Adjustment For Differential Side Bearing

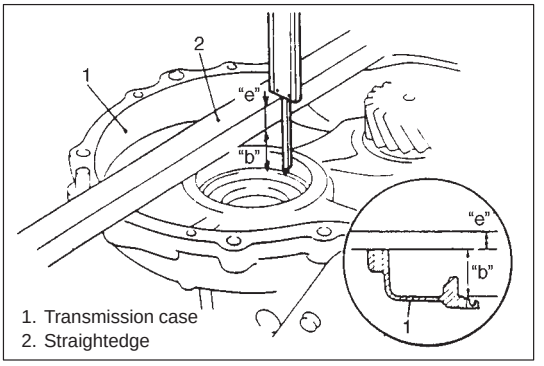
Before installing differential assembly to transmission case, select a differential side bearing shim as follows.



1. Transmission case housing
2. Straightedge

1) With gasket removed, measure dimension "a" of transmission case housing (from mating surface to bearing bore bottom) by using straightedge and vernier caliper.
The dimension "a" can be obtained by subtracting straightedge width "d" from measured value.

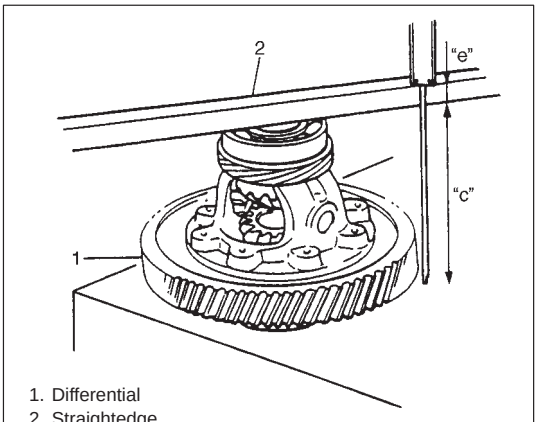
Dimension "a" = measured value – straightedge width "e"



1. Transmission case
2. Straightedge

2) In the same manner as the above 1), measure dimension "b" of transmission case (from mating surface to bearing bore bottom).

Dimension "b" = measured value – straightedge width "e"



1. Differential
2. Straightedge

3) Place differential assembly on surface plate and measure dimension "c" (bearing-to-bearing).

Dimension "c" = measured value – straightedge width "d"

4) Obtain case-to-bearing clearance "d" in following calculation.

"d" = ("a" + "b" + 0.4) – ("c" + 0.2)

0.4 mm (0.016 in.): Gasket thickness
0.2 mm (0.008 in.): Intended to absorb the measurement error

5) Select a shim from among available sizes and install it between transmission case and side bearing.

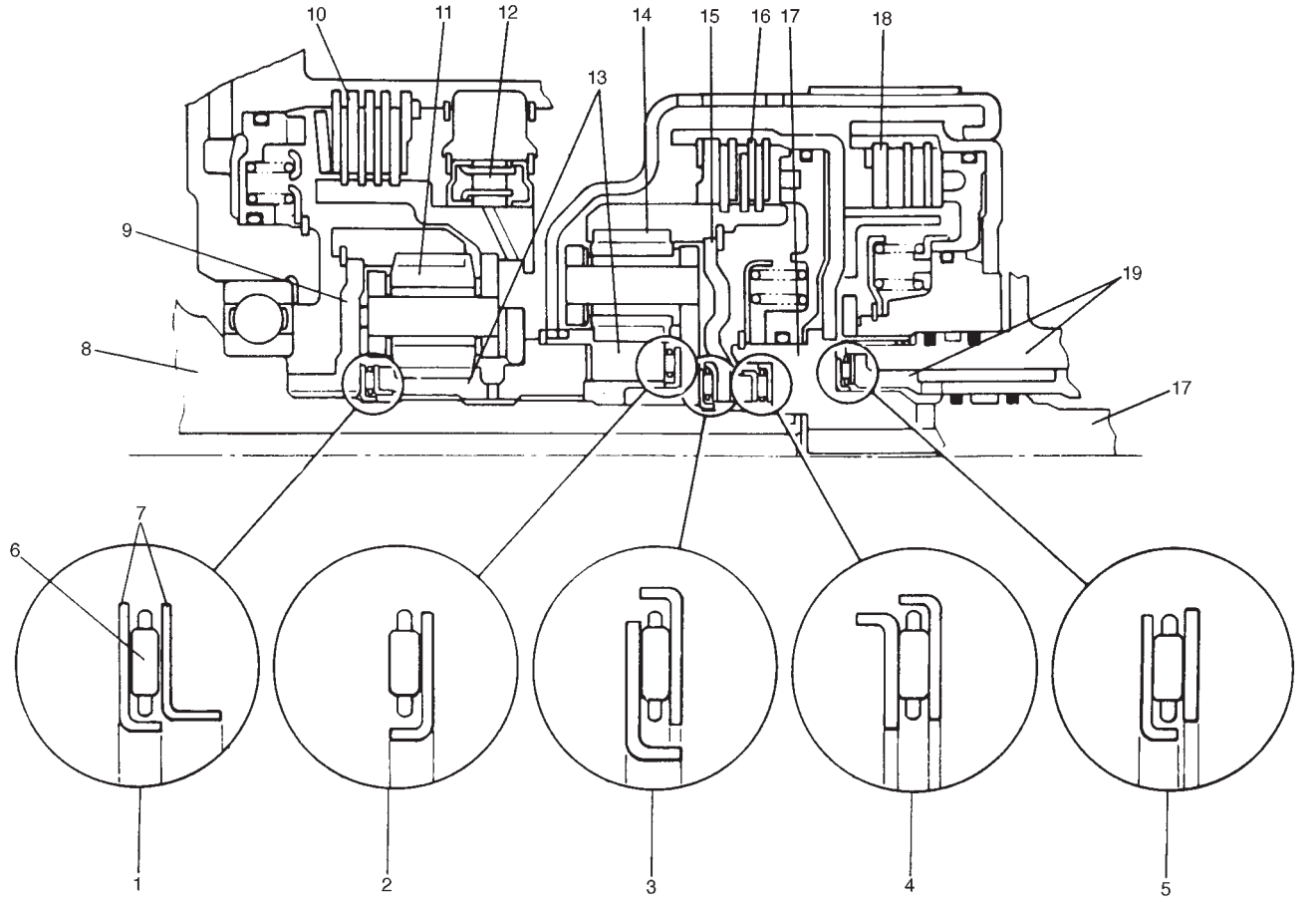
Case-to-bearing clearance "d"	Available shim size
0.56 – 0.7 mm (0.022 – 0.028 in.)	0.56 mm (0.022 in.)
0.7 – 0.8 mm (0.028 – 0.031 in.)	0.7 mm (0.028 in.)
0.8 – 0.9 mm (0.031 – 0.035 in.)	0.8 mm (0.031 in.)
0.9 – 1.12 mm (0.035 – 0.044 in.)	0.9 mm (0.035 in.)

CAUTION:
Installing of over sized shim beyond specification may cause tight rotation and consequential bearing damage.

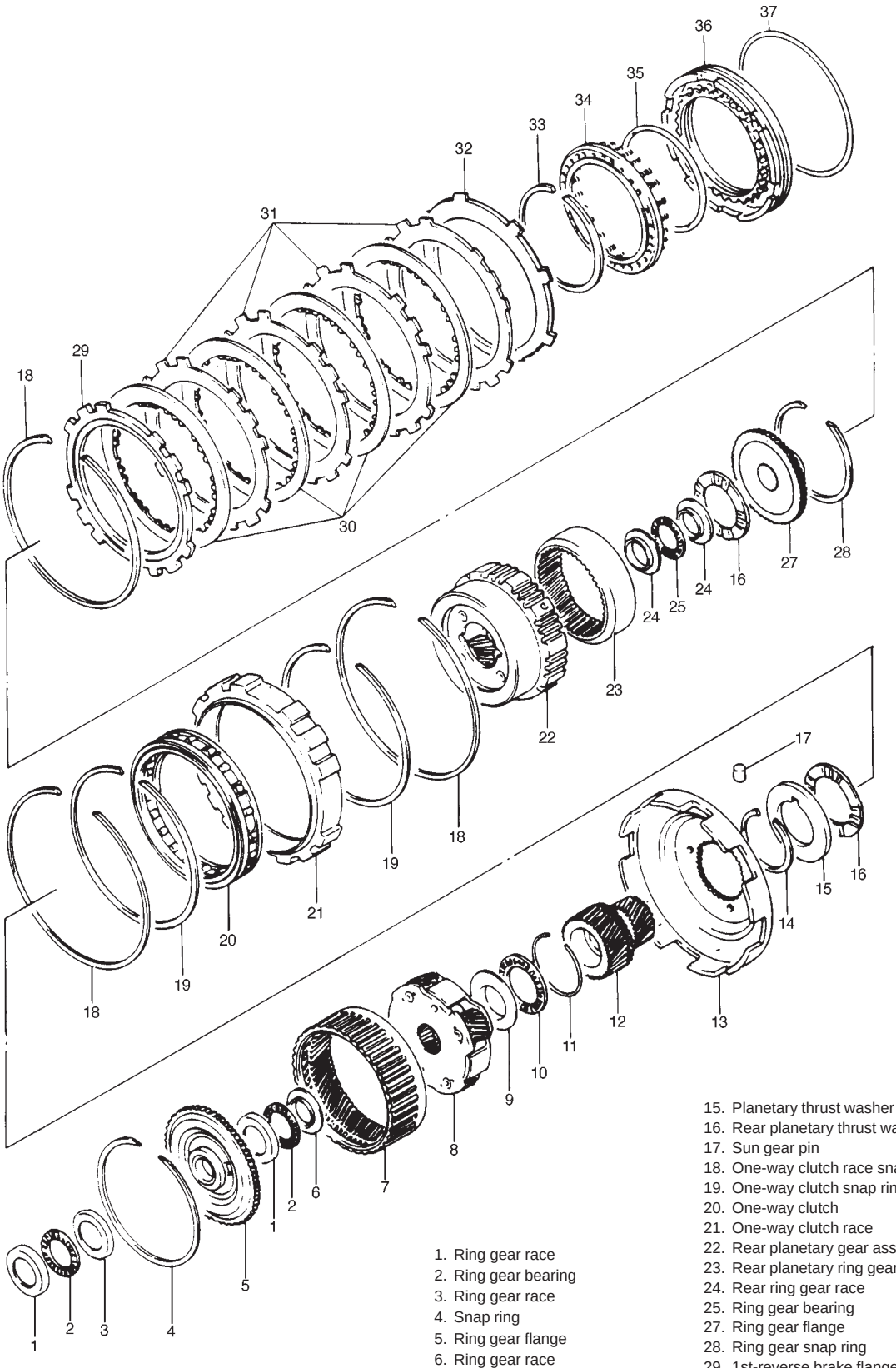
ASSEMBLING UNIT

CAUTION:

- **Automatic transmission consists of highly precise parts. As even a flaw in a small part may cause oil leakage or decrease in function, check each part carefully before installation.**
- **Clean all parts with compressed air. Never use wiping cloths or rags.**
- **Before assembling new clutch discs and brake band, soak them in automatic transmission fluid for at least 2 hours.**
- **Be sure to use new gaskets and O rings.**
- **Lubricate O rings with automatic transmission fluid.**
- **Apply automatic transmission fluid on sliding or rotating surfaces of the parts before assembly.**
- **Use yellow petrolatum grease or Suzuki super grease C to retain parts in place.**
- **Be sure to install thrust bearings and races in correct direction and position as shown in figure below.**
- **Make sure that snap ring ends are not aligned with one of cutouts and are installed in groove correctly.**
- **Do not use adhesive cements on gaskets and similar parts.**
- **Be sure to torque each bolt and nut to specification.**

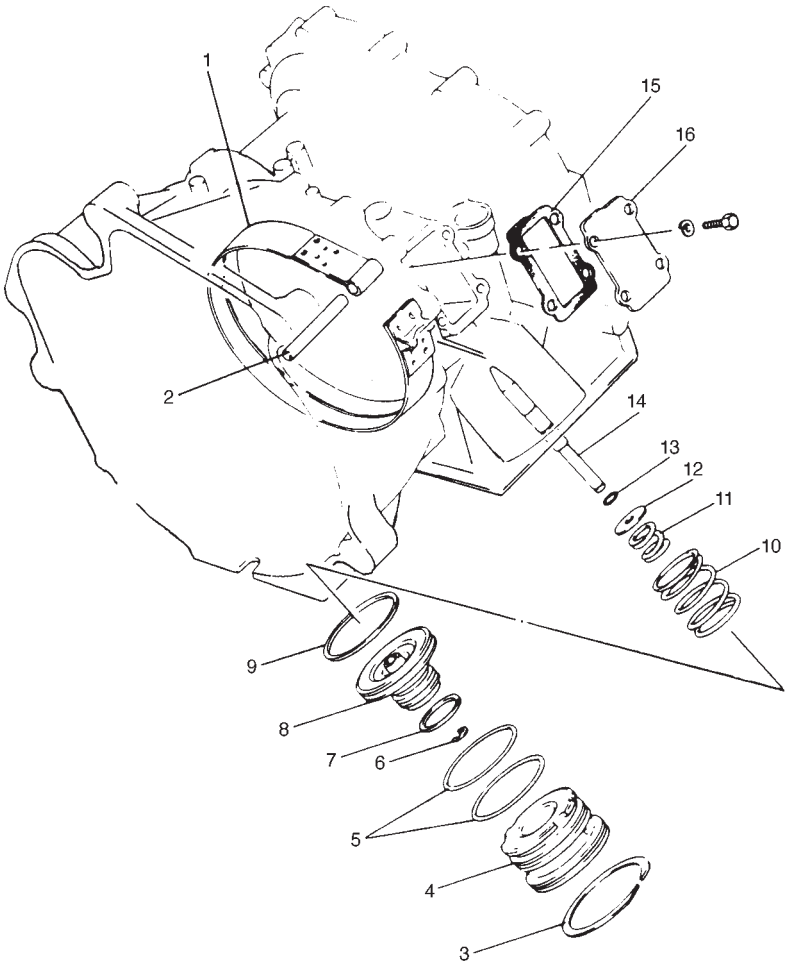


1. Rear ring gear races and bearing
2. Front planetary gear race and bearing
3. Ring gear races and bearing
4. Ring gear races and bearing
5. Input shaft bearing and races
6. Bearing
7. Race
8. Output shaft
9. Ring gear flange
10. 1st-reverse brake
11. Rear planetary gear
12. One-way clutch
13. Sun gear
14. Front planetary gear
15. Ring gear flange
16. Forward clutch
17. Input shaft
18. Direct clutch
19. Oil pump

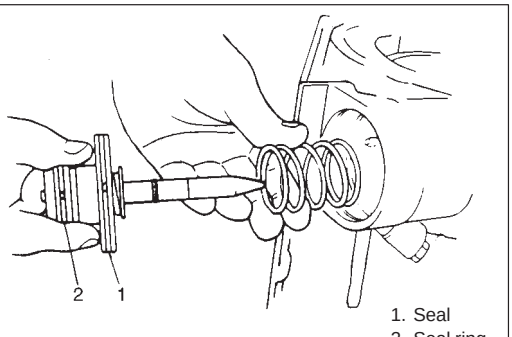


1. Ring gear race
2. Ring gear bearing
3. Ring gear race
4. Snap ring
5. Ring gear flange
6. Ring gear race
7. Front planetary ring gear
8. Front planetary gear assembly
9. Front planetary gear race
10. Front planetary gear bearing
11. Input drum snap ring
12. Planetary sun gear
13. Sun gear input drum
14. Snap ring
15. Planetary thrust washer
16. Rear planetary thrust washer
17. Sun gear pin
18. One-way clutch race snap ring
19. One-way clutch snap ring
20. One-way clutch
21. One-way clutch race
22. Rear planetary gear assembly
23. Rear planetary ring gear
24. Rear ring gear race
25. Ring gear bearing
27. Ring gear flange
28. Ring gear snap ring
29. 1st-reverse brake flange
30. 1st-reverse brake disc
31. 1st-reverse brake plate
32. 1st-reverse brake damper plate
33. Return spring snap ring
34. 1st-reverse brake return spring
35. Piston inner seal
36. 1st-reverse brake piston
37. Piston outer seal

INSTALLATION

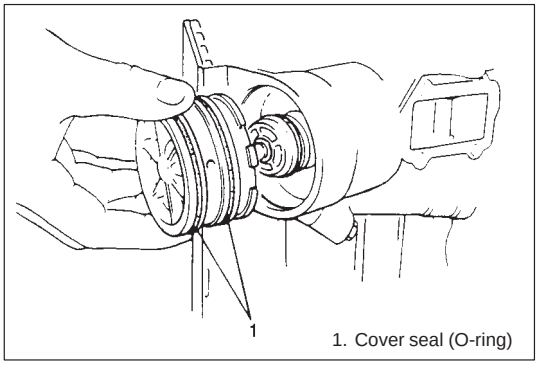


1. Second brake band
2. Pin
3. Piston cover snap ring
4. Piston cover
5. Cover seal (O ring)
6. Retainer (E ring)
7. Seal ring
8. Second brake piston
9. Piston seal
10. Piston spring
11. Brake rod spring
12. Washer
13. Piston rod seal (O ring)
14. Second brake piston rod
15. Cover gasket
16. Cover



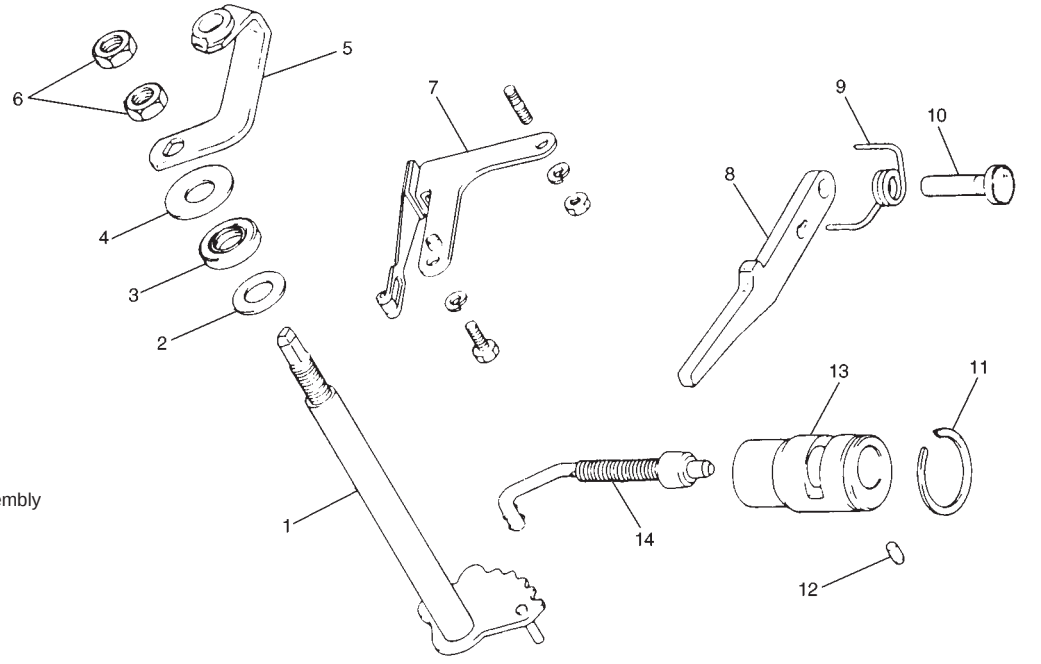
1. Seal
2. Seal ring

1) Install 2nd brake piston.
   i) Put piston spring in transmission case and insert piston assembly into case after applying fluid to piston rod, seal and seal ring.

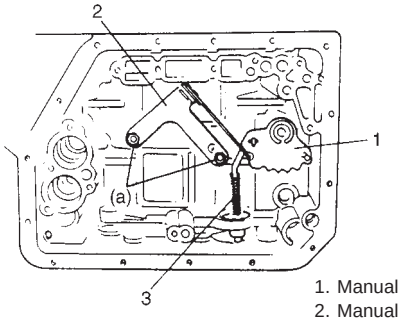


1. Cover seal (O-ring)

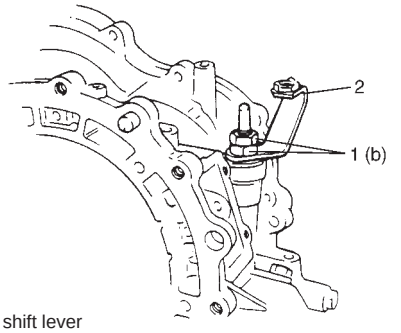
   ii) Install piston cover to case after applying fluid to 2 cover seals.
   iii) Push down piston cover by using valve lifter with 17 mm socket and install snap ring. Refer to step 13) of “DISASSEMBLY” in this section.



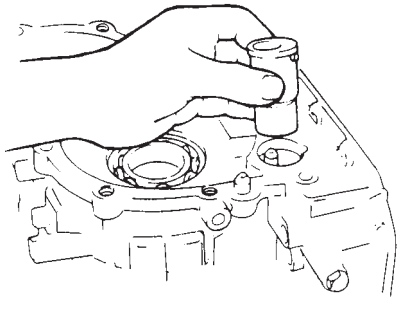
1. Manual shift shaft
2. Lower washer
3. Oil seal
4. Upper washer
5. Manual shift lever
6. Nut
7. Manual detent spring assembly
8. Parking lock pawl
9. Lock paw spring
10. Lock pawl shaft
11. Sleeve snap ring
12. Pin
13. Parking lock pawl sleeve
14. Parking lock rod



1. Manual shift shaft
2. Manual detent spring
3. Parking lock rod



1. Nut
2. Manual shift lever



2) Install manual shift shaft and parking lock pawl.
   i) Install lower washer and parking lock rod to manual shift shaft.
   ii) Install manual shift shaft into transmission case, and then, manual detent spring.
   Use special care so that manual shift shaft will not damage oil seal lip when passing through it.

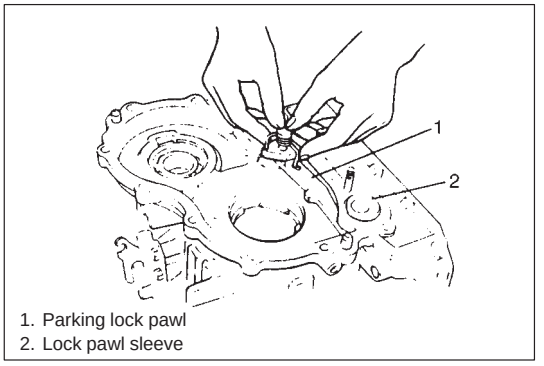
   Tightening Torque
   (a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

   iii) Install shift shaft upper washer and then manual shift lever to manual shift shaft. Tighten lower nut first and then upper nut.

   Tightening Torque
   (b): 30 N·m (3.0 kg-m, 22.0 lb-ft)

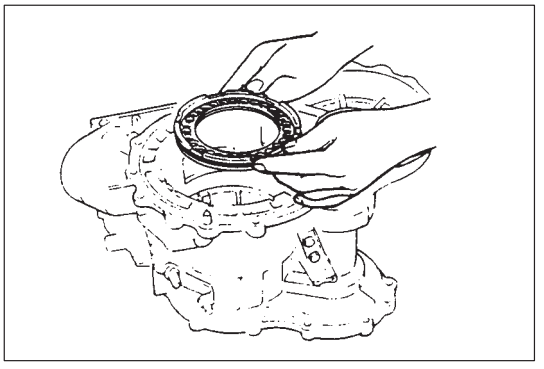
   iv) After tightening nuts, check manual shift shaft for smooth rotation.

   v) Install restrictor pin and snap ring to parking lock pawl sleeve. And then install it to case.

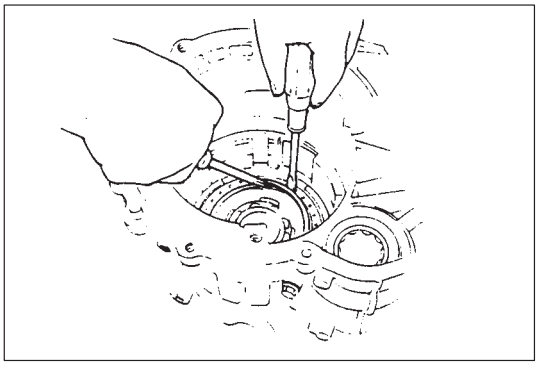


1. Parking lock pawl
2. Lock pawl sleeve

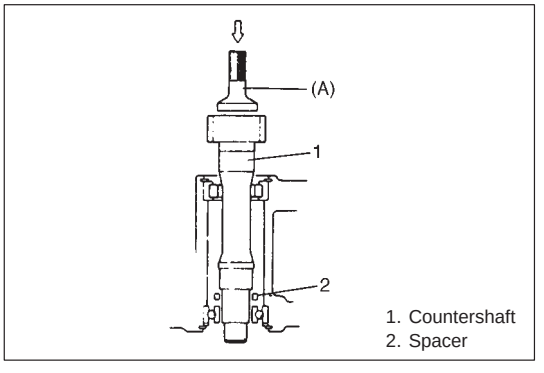
vi) Install parking lock pawl.
   a. Shift manual shift lever to a position other than P.
   b. Install parking lock pawl.
   c. Install lock pawl shaft and lock pawl spring, and then, check to make sure that parking lock pawl moves smoothly when manual shift lever is moved.



3) Install 1st-reverse brake piston.
   i) Apply fluid to inner and outer seals (O rings) and fit them to piston. Use new seals.
   ii) Insert piston into case in such way that the side with spring holes comes to the top. Make sure that seals are not twisted or caught.
   iii) Place return spring assembly on piston. Check to make sure that each spring of return spring assembly is fitted securely in spring hole in piston.



iv) Push down return spring assembly and install snap ring.

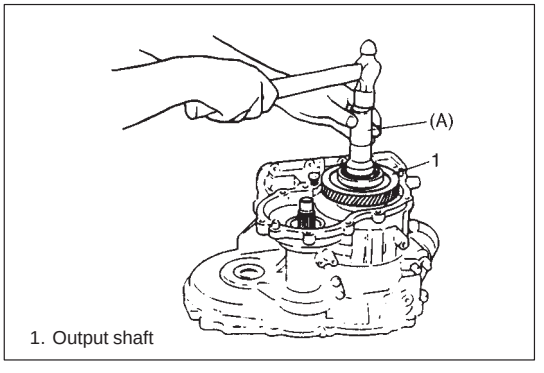


1. Countershaft
2. Spacer

4) Using a special tool (Bearing installer) and a hammer, install countershaft.
When inserting countershaft into case, check to make sure that spacer is in such position as shown in figure.

CAUTION:
Do not hammer shaft excessively hard, or snap ring and case will be damaged.

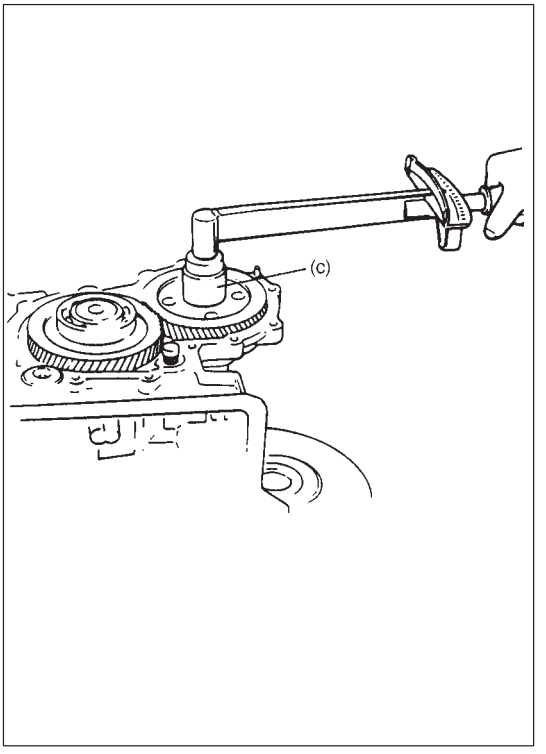
Special Tool
(A): 09951-76010



1. Output shaft

5) Install output shaft.
   i) Shift manual shift lever to a position other than P.
   ii) Using a special tool (Bearing installer) and hammer, install output shaft.

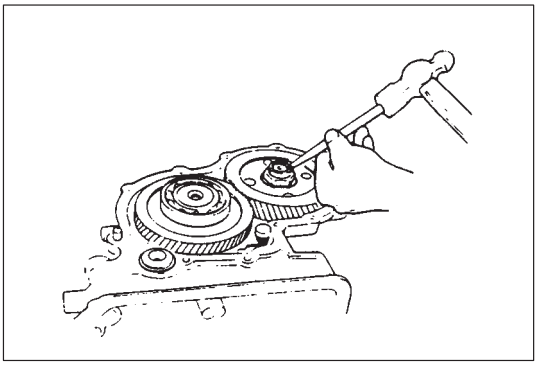
Special Tool
(A): 09951-76010



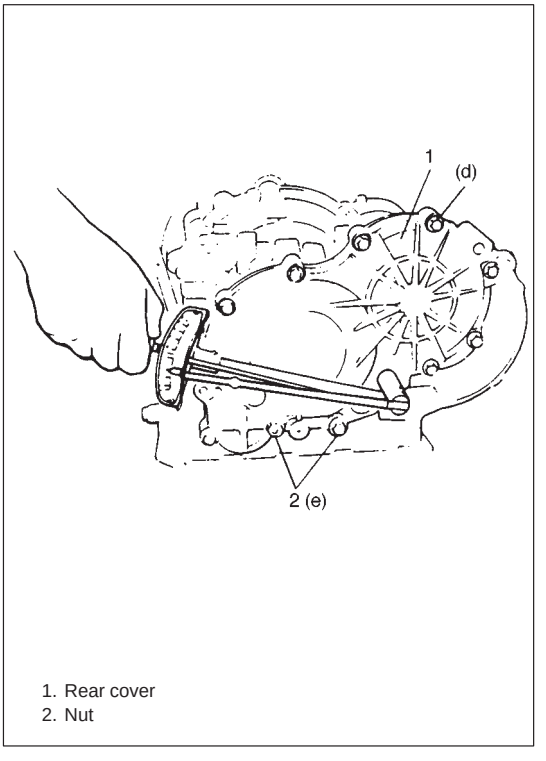
6) Install reduction driven gear on countershaft.
   i) Shift manual shift lever to P position so that output shaft is locked and cannot turn.
   ii) Tighten driven gear nut to specification.

> **CAUTION:**
> ○ **Tighten nut by turning wrench by hand.**
> ○ **Tightening nut by hammering wrench may cause damage to parking lock pawl, output shaft and reduction gear.**

Tightening Torque
(c): 130 N·m (13.0 kg-m, 94.0 lb-ft)



iii) Using a chisel and a hammer, caulk driven gear nut at 2 places.

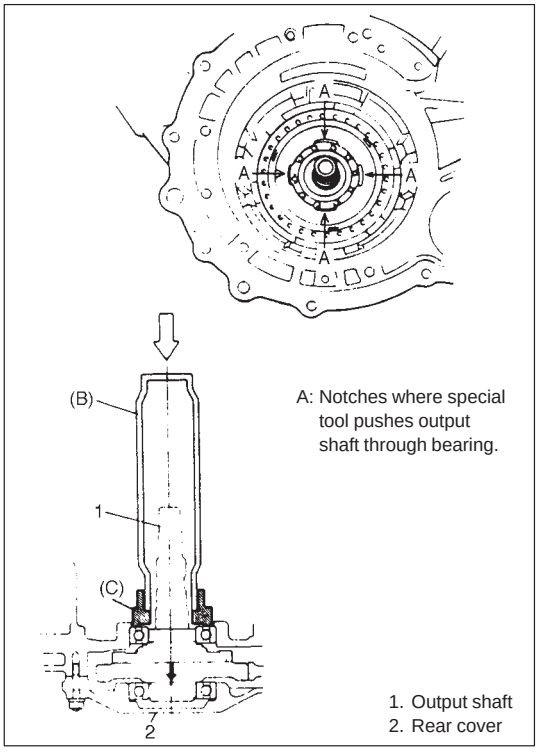


1. Rear cover
2. Nut

7) Install transmission rear cover.
   i) Install rear cover gasket.
   ii) Install rear cover.
   Check that output shaft bearing enters to rear cover bearing hole smoothly.
   iii) Install 10 bolts and 2 nuts.
   Torque bolts and nuts to the following specifications.

NOTE:
Check to make sure that the shafts rotate smoothly without abnormal noise.

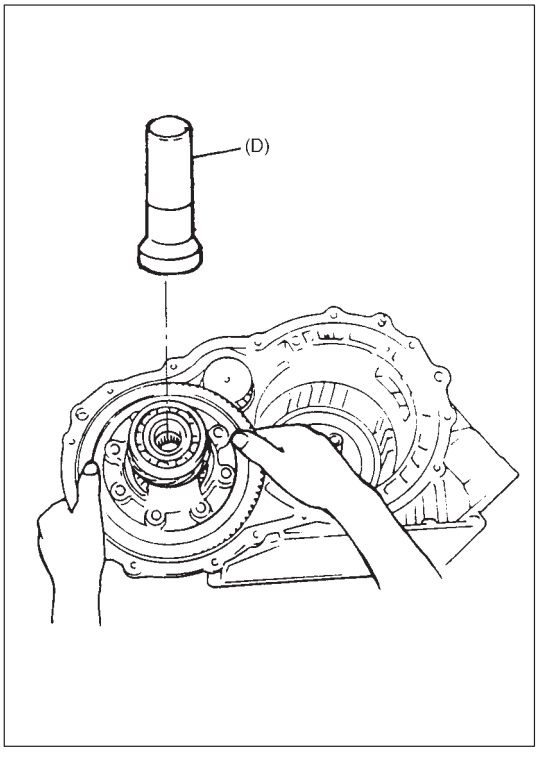
Tightening Torque
(d): 20 N·m (2.0 kg-m, 14.5 lb-ft)
(e): 13 N·m (1.3 kg-m, 9.5 lb-ft)



8) Using special tools (Output shaft remover and Bearing remover handle), push output shaft against rear cover side.
   i) Fit 4 projections of special tool (Output shaft remover) to 4 notches A in case.
   ii) Push bearing and output shaft against rear cover side by tapping special tool (Bearing remover handle) with a hammer lightly.

CAUTION:
- **Do not hit output shaft directly, or shaft end will be damaged.**
- **Be careful not to hammer with special tool too hard.**

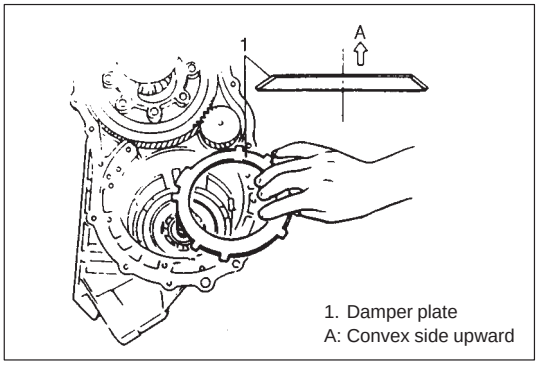
Special Tool
(B): 09925-18010
(C): 09927-08210



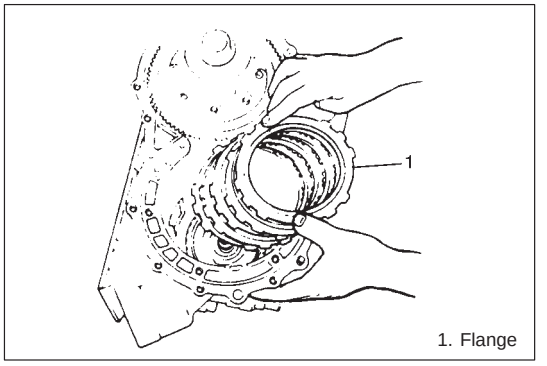
9) After engaging teeth of final gear and countershaft gear, install differential assembly.

CAUTION:
- **Be careful not to damage gear tooth by hitting it with other one.**
- **Make sure that differential assembly is placed on case straightly, while installing it.**
- **Drive in differential by giving force to side bearing inner race through special tool (bearing installer).**

Special Tool
(D): 09951-76010



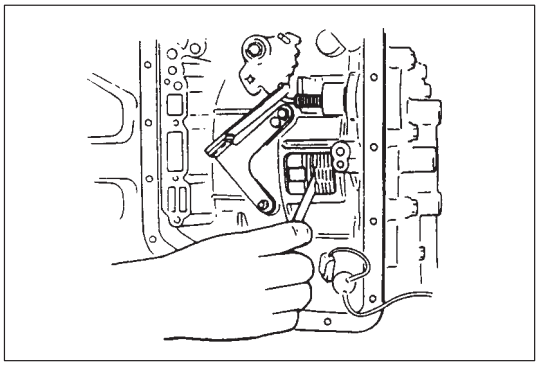
10) Install 1st-reverse brake parts.
   i) Install damper plate to return spring assembly with convex side upward. Use care not to install in reverse direction.



ii) Install discs, plates and flange in following order:
(1) Plate ➡ (2) Disc ➡ (3) Plate ➡ (4) Disc ➡ (5) Plate ➡ (6) Disc ➡ (7) Plate ➡ (8) Disc ➡ (9) Flange (Flat side down)

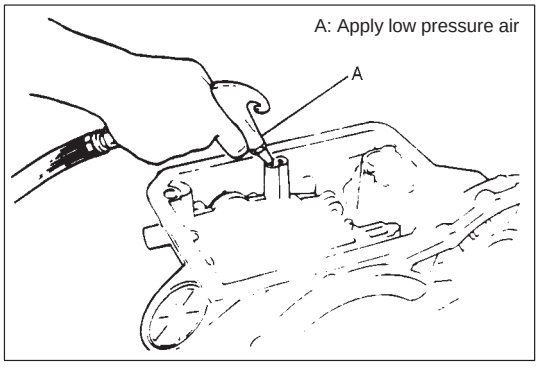
NOTE:
When using new discs for installation, soak them in fluid for more than 2 hours before installation.

iii) Install snap ring.

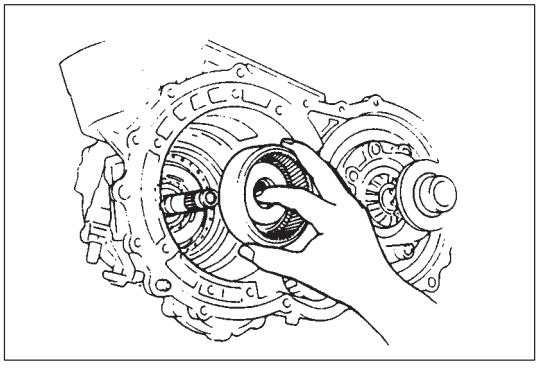


11) Measure 1st-reverse brake clearance.
Measure clearance between snap ring and flange.

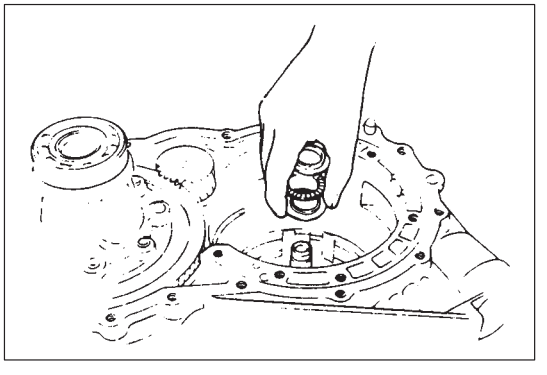
1st-reverse brake clearance
0.58 – 1.92 mm (0.023 – 0.075 in.)



12) Check 1st-reverse brake piston for operation.
Check for piston movement by blowing air into oil hole.



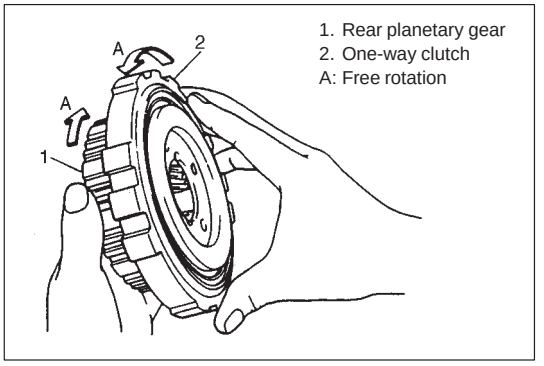
13) Install rear planetary ring gear.
Engage ring gear and output shaft spline, and insert.



14) Install rear planetary ring gear races and bearing.
Install in following order:

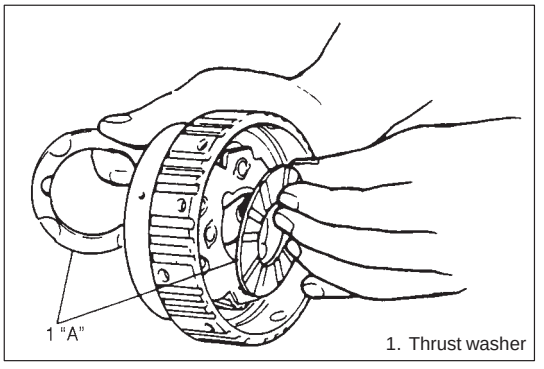
i) Race (flange side up)
ii) Bearing
iii) Race (flange side up)

For proper positions and directions of ring gear races installation, refer to “ASSEMBLING UNIT” in this section.



1. Rear planetary gear
2. One-way clutch
A: Free rotation

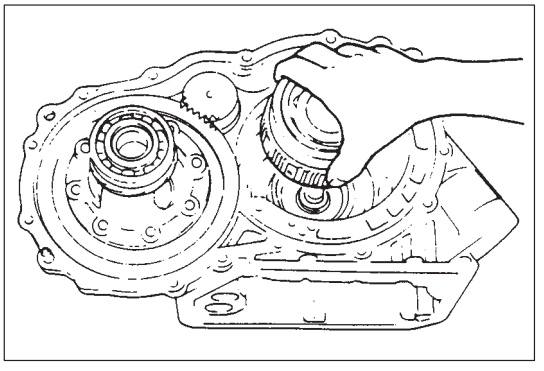
15) Check one-way clutch direction.
Provisionally assemble one-way clutch and rear planetary gear, then turn them by hand.
They should rotate freely in arrow direction A but lock in the other way.
Remove one-way clutch and keep its correct side in mind until it is installed into transmission.



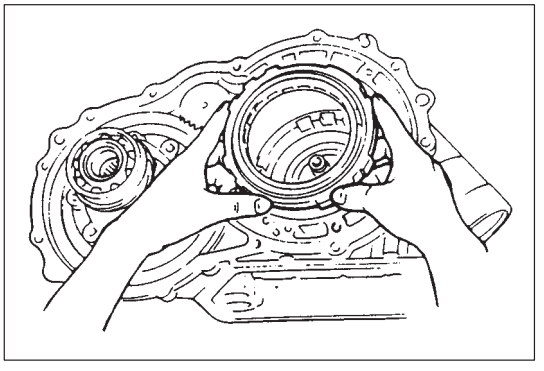
1. Thrust washer

16) Install rear planetary thrust washers on rear planetary gear.
Apply grease to thrust washers and fit them before and behind planetary gear, one each.
Make sure that different lug shapes match slots in planetary gear.

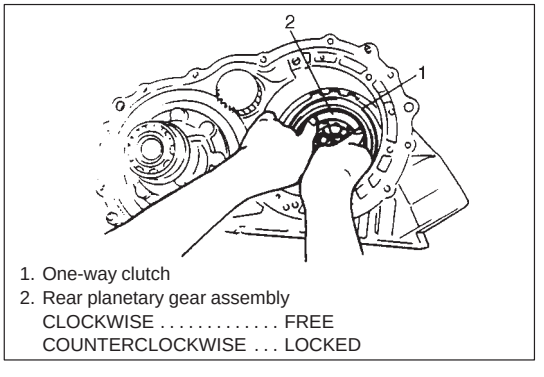
"A": SUZUKI SUPER GREASE C, 99000-25030



17) Install rear planetary gear with teeth of 1st-reverse brake discs aligned.
After installing rear planetary gear, check thrust washers and races for proper installation by moving rear planetary gear up and down lightly by hand. If gear assembly makes clear sound like "Click" when moved up and down, washers and races are installed in place. But if no sound or thick one is heard, it is possible that they are out of place
In such case, remove gear assembly and check.



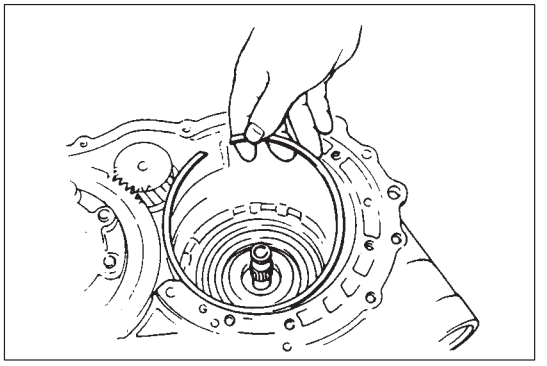
18) Install one-way clutch race snap ring into groove of transmission case.
19) Place one-way clutch on rear planetary gear and while turning planetary gear clockwise by hand, insert one-way clutch to correct position.



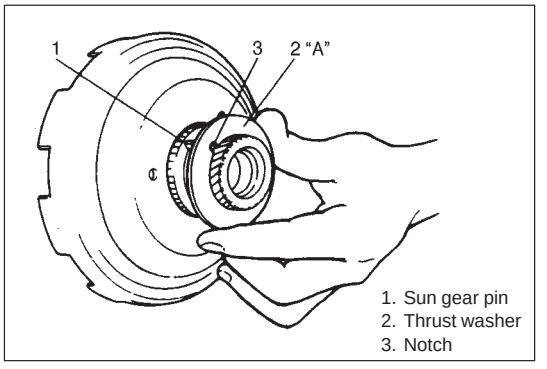
1. One-way clutch
2. Rear planetary gear assembly
CLOCKWISE . . . . . FREE
COUNTERCLOCKWISE . . . LOCKED

After installing one-way clutch to rear planetary gear, check to confirm that planetary gear turns clockwise but locks in the other way

NOTE:
Rotation check must be performed without fail.



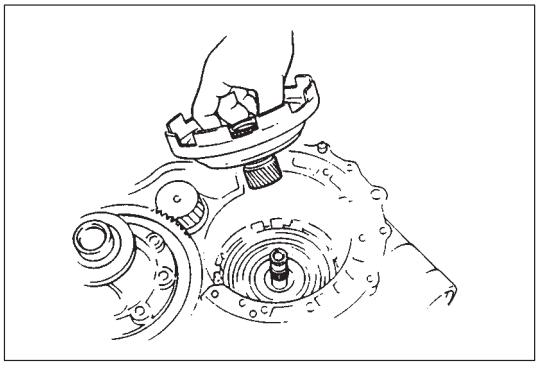
20) Push one-way clutch race snap ring into place by hand.
Visually check to make sure that ring is fully seated.
Also, make sure that ends of snap ring are between lugs.



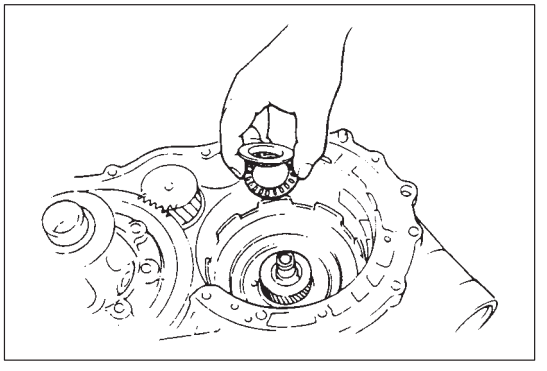
1. Sun gear pin
2. Thrust washer
3. Notch

21) Install sun gear pin and thrust washer on sun gear assembly.
Apply grease to thrust washer so that it will not fall off.
Check to make sure that pin is fitted in thrust washer notch.

"A": SUZUKI SUPER GREASE C, 99000-25030



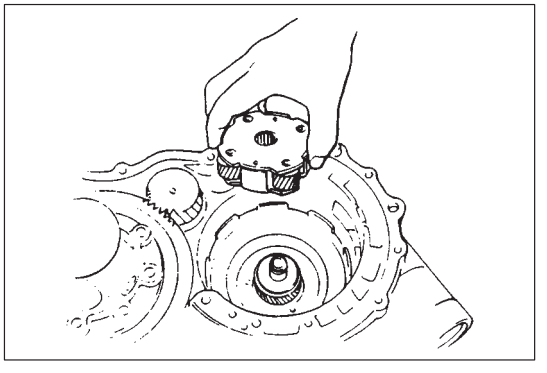
22) Push in sun gear assembly while engaging it with rear planetary gear. Be careful not to damage bushing inside sun gear. After installing sun gear, check thrust washers for proper installation by moving sun gear up and down lightly with finger. If sun gear makes clear sound like "Click" when moved up and down, washers are installed in place. But if no sound or thick one is heard, it is possible that they are out of places. In such case, remove sun gear and check.



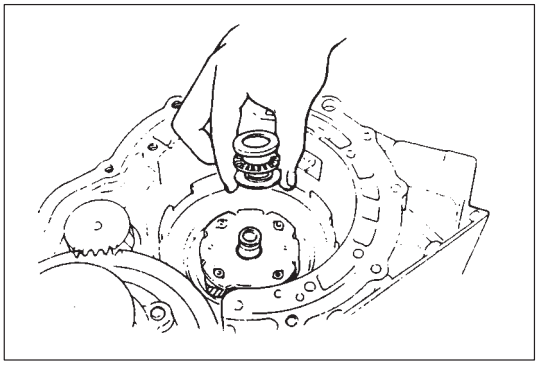
23) Install front planetary gear bearing and race to sun gear in the following order.

i) Bearing
ii) Race (flange side down)

Refer to "ASSEMBLING UNIT" in this section for installation.



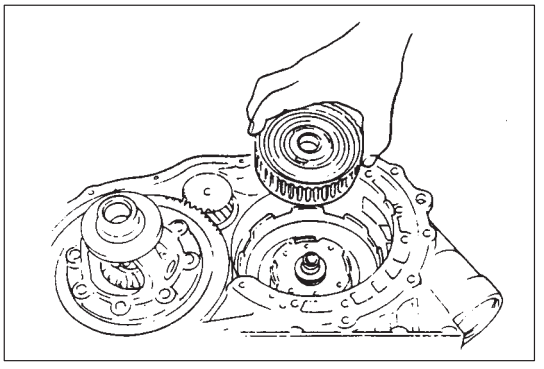
24) Install front planetary gear assembly while turning it back and forth. After installing front planetary gear assembly, check bearing and race installed in step 23) for proper installation by moving planetary gear assembly up and down lightly with finger. If planetary gear makes clear sound like "Click" when moved up and down, bearing and race are installed in place. But if no sound or thick one is heard, it is possible that they are out of place. In such case, remove planetary gear assembly and check.



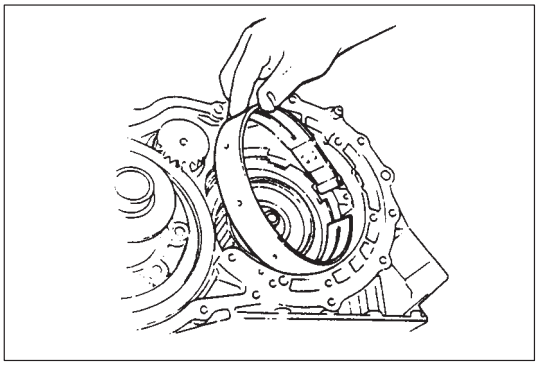
25) Install ring gear bearing and races on front planetary gear assembly in following order:

i) Race (flange side up)
ii) Bearing
iii) Race (flange side down)

Refer to “ASSEMBLING UNIT” in this section for proper installation.

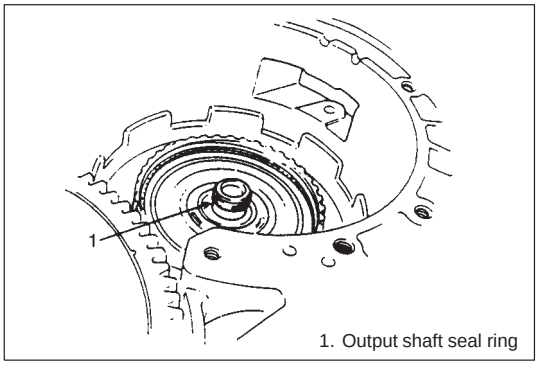


26) Install front planetary ring gear assembly.
After installing front planetary ring gear assembly, check bearing and races installed in step 25) for proper installation by moving ring gear assembly up and down lightly with finger. If ring gear assembly makes clear sound like “Click” when moved up and down, bearing and races are installed in place. But if no sound or thick one is heard, it is possible that they are out of place. In such case, remove ring gear assembly and check.



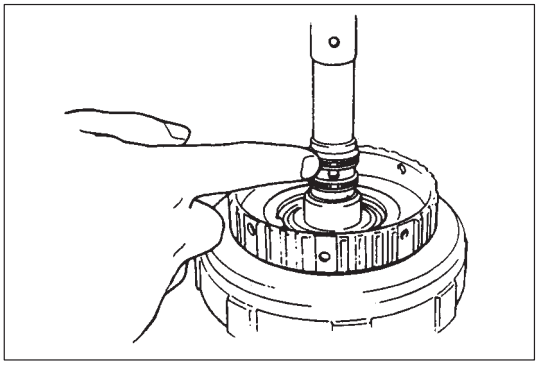
27) After making sure for its correct installing direction, install 2nd brake band in case.
Be careful not to bend it too much, or damage it.

NOTE:
When installing a new brake band, soak it in transmission fluid for more than 2 hours in advance.

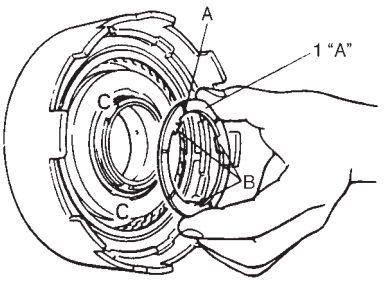


1. Output shaft seal ring

28) Inspect output shaft seal ring for wear or damage, and replace if necessary.
Do not expand seal ring excessively when installing.



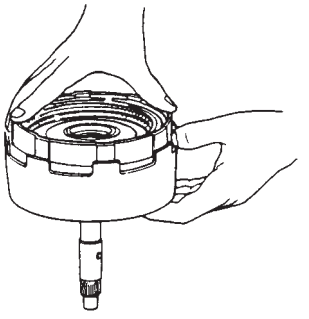
29) Install input shaft seal rings on input shaft, if replacing is required.
When installing input shaft seal rings, apply grease to grooves in input shaft before installation.
Do not expand seal ring excessively.



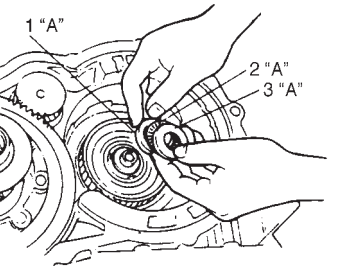
1. Washer
A: Groove
B: Protrusions to be engaged in drum grooves C

30) Apply grease to direct clutch washer, and install it on direct clutch with its grooved face outward and aligning washer protrusions to direct clutch drum groove.

"A": SUZUKI SUPER GREASE C, 99000-25030



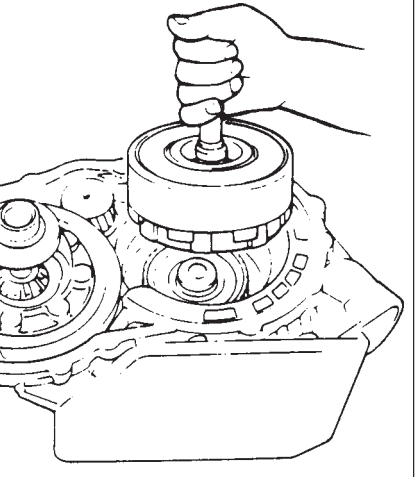
31) Align teeth of direct clutch discs and then install direct clutch on input shaft.
After installing direct clutch, check it for proper installation by moving it up and down lightly by hand. If direct clutch makes clear sound like "Click" when move up and down, it is installed in place. But if no sound or thick one is heard, it is possible that direct clutch is not installed correctly. In such case, remove direct clutch and reinstall.



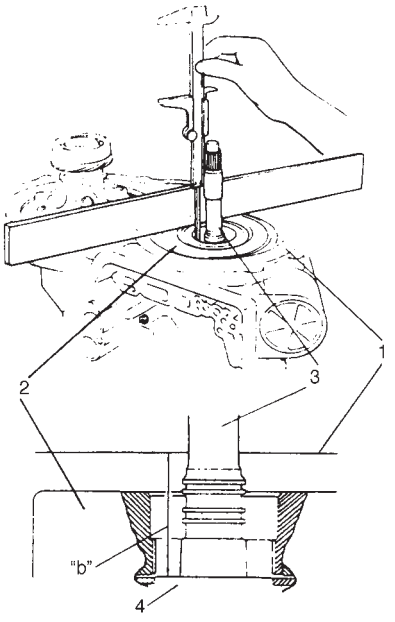
1. Ring gear race (OD: 35.8 mm/l .41 in.)
2. Bearing
3. Ring gear race (OD: 37.9 mm/l .49 in.)

32) Apply grease to ring gear races and bearing.
Install ring gear race (OD: 35.8 mm/1 .41 in.) on ring gear with its flange side down. Another ring gear race (OD: 37.9 mm/1.49 in.) and bearing are attached on input shaft.
Refer to "ASSEMBLING UNIT" in this section for proper installation.

"A": SUZUKI SUPER GREASE C, 99000-25030



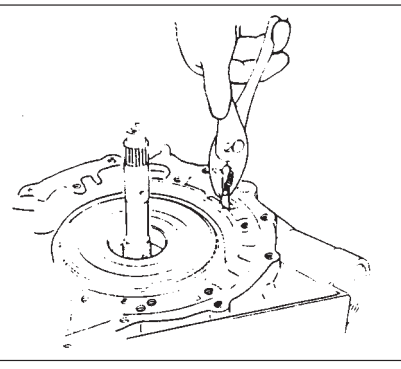
33) Install input shaft and forward and direct clutch assemblies.
Hold input shaft with direct clutch installed by hand and while turning it back and forth, insert it into case.
Align teeth of forward clutch discs before installation.
When installing input shaft, be careful so that its bearing and race will not fall off.
Be careful not to damage output shaft seal.
After installing input shaft, check it for proper installation by moving it up and down lightly by hand. If input shaft makes clear sound like "Click" when moved up and down, it is installed in place. But if it doesn't, try again for proper installation.



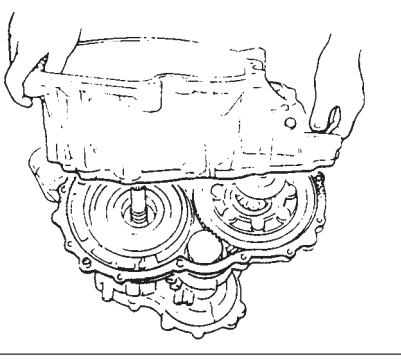
1. Transmission case end surface
2. Direct clutch drum
3. Input shaft
4. Input shaft flange

34) Check for correct installation of each component parts as follows.
After installing input shaft, check to make sure that each component is installed properly according to the following description.
Place straightedge on transmission case end surface and measure the distance “b” by using vernier. For the distance “b”, subtract the width of straightedge from vernier reading. If measured distance “b” is within following specification, it means that component parts other than direct clutch are installed properly.
If out of specification, remove input shaft with direct clutch and reinstall them properly.

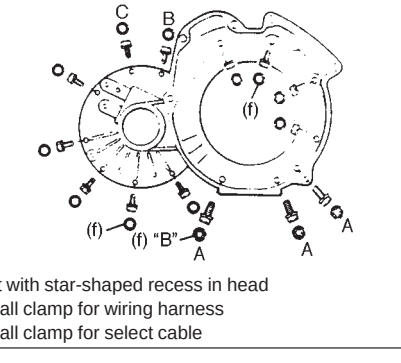
Distance “b”: 49.82 – 51.06 mm (1.962 – 2.010 in.)



35) Align hole in second brake band with case pin hole and insert second brake band pin.
Apply fluid to brake band pin before installation.



36) Install case gasket and transmission case housing.
Use new gasket. Install gasket using care so that it will not protrude inside.

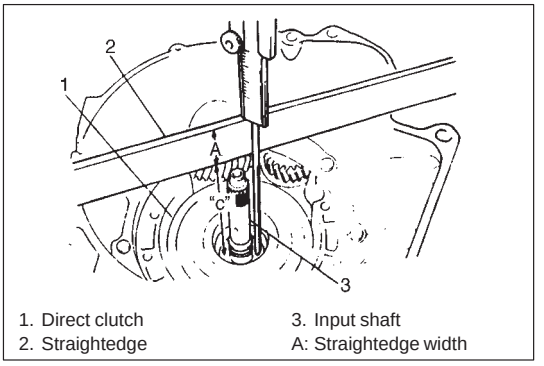


A: Bolt with star-shaped recess in head
B: Install clamp for wiring harness
C: Install clamp for select cable

37) Among 14 bolts of case housing bolts, 3 bolts have star-shaped recess in their heads.
Install these 3 bolts in such positions as shown by A in figure after applying sealant to their threads. Do not apply thread locking compound to housing bolts. Tighten case housing bolts to specification.

“B”: SUZUKI BOND No.1215, 99000-31110

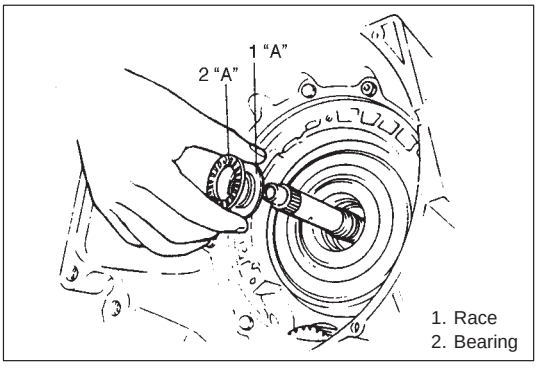
Tightening Torque
(f): 20 N·m (2.0 kg-m, 14.5 lb-ft)



1. Direct clutch
2. Straightedge
3. Input shaft
A: Straightedge width

38) Measure input shaft position.
Seated position of input shaft can also be measured after installing case housing as distance “c” (Measured straight-edge width A), and it should be188.37 – 189.91 mm (7.416 – 7.477 in.).

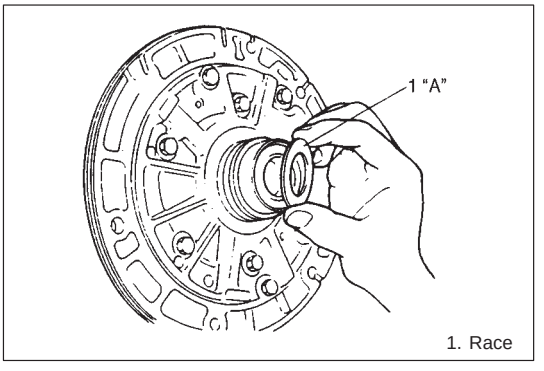
Distance “C”: 188.37 – 189.91 mm (7.416 – 7.477 in.)



1. Race
2. Bearing

39) Install input shaft bearing race and bearing on input shaft.
Grease bearing race and install it with its flange side outward together with bearing.
Install so that bearing does not get on bearing race flange.

“A”: SUZUKI SUPER GREASE C, 99000-25030



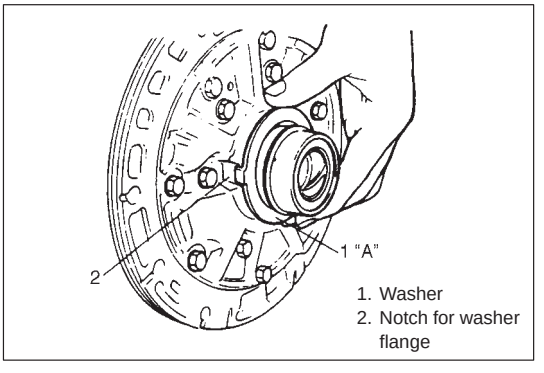
1. Race

40) Install another input shaft bearing race on oil pump.
Grease bearing race and attach it to oil pump body.

NOTE:

- **With this bearing race, input shaft thrust play is adjusted. Refer to step 44) for measuring procedure.**
- **Make sure seal rings are installed in pump cover flange in good condition lubricated with automatic transmission fluid.**

“A”: SUZUKI SUPER GREASE C, 99000-25030

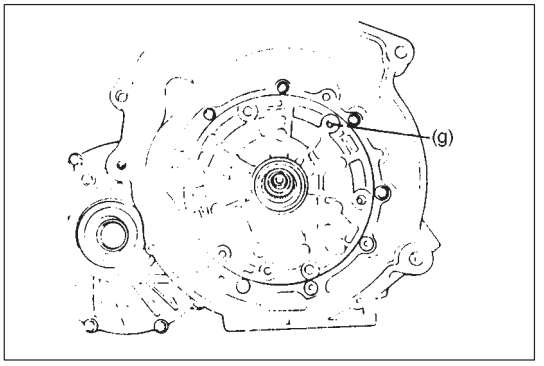


1. Washer
2. Notch for washer flange

41) Attach greased direct clutch washer on oil pump.
Fit washer flange into notch of oil pump body.

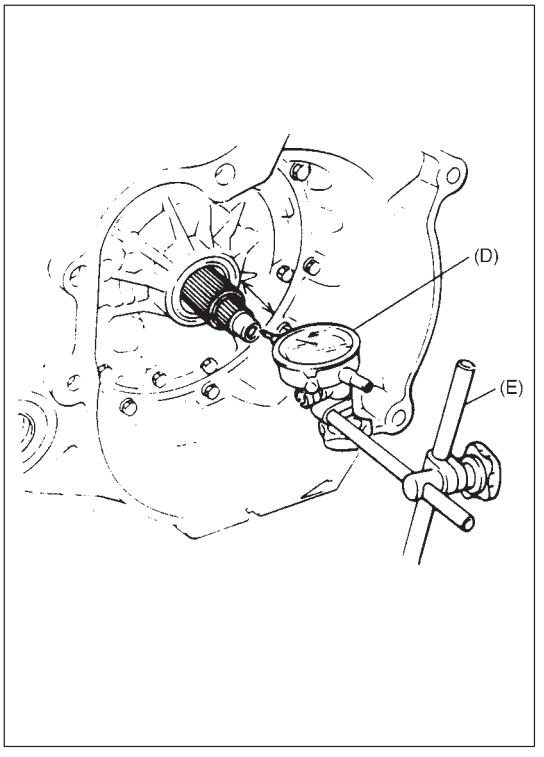
“A”: SUZUKI SUPER GREASE C, 99000-25030

42) Install greased new oil pump cover seal (O ring) in outer groove of oil pump.
Make sure that cover seal is not twisted or extruded.



43) Align oil pump bolt hole with case bolt hole and push in pump gently by hand until it contacts case. Use care so that direct clutch washer does not fall off, and input shaft seal rings and pump cover seal rings will not come off or get damaged.
While making sure smooth rotation of input shaft, tighten 6 oil pump bolts gradually to specification.

Tightening Torque
(g): 23 N·m (2.3 kg-m, 16.5 lb-ft)



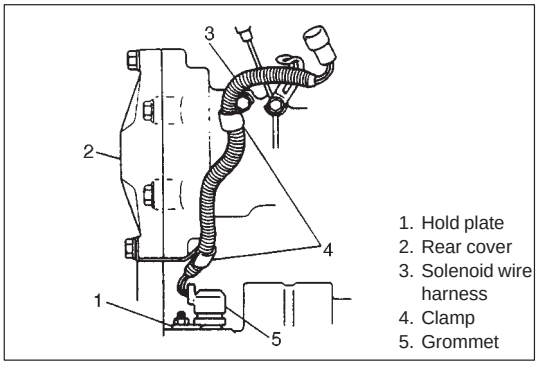
44) Check input shaft end play.
Apply dial gauge onto input shaft end surface and measure thrust play of input shaft.
If out of specification, remove oil pump and replace input shaft bearing race on oil pump side (Refer to step 40)).

NOTE:
Check to be sure that input shaft turns smoothly.

Special Tool
(D): 09900-20606
(E): 09900-20701

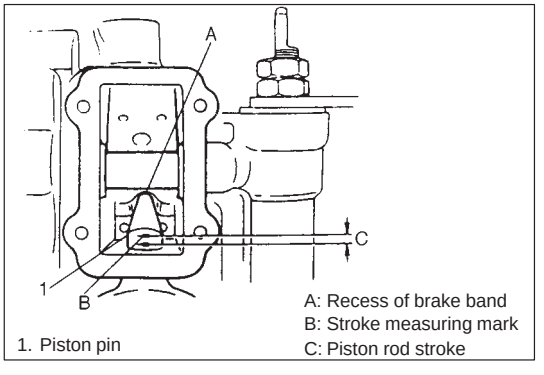
Input shaft thrust play: 0.3 – 0.9 mm (0.012 – 0.035 in.)

Available input shaft bearing race (oil pump side) thickness	0.8 mm/0.031 in.
	1.4 mm/0.055 in.



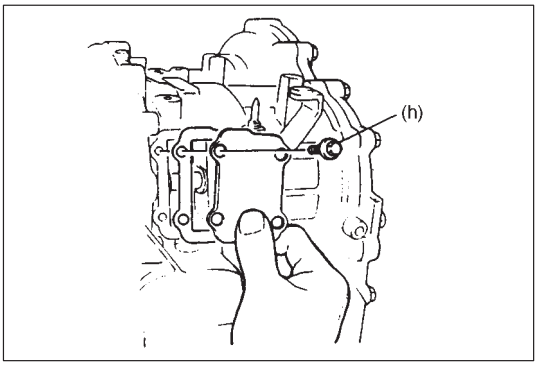
45) Install solenoid wire harness to case.
i) Insert solenoid wire hold plate in groove in solenoid wire grommet and install it to stud bolt of transmission case.
ii) Secure hold plate with lock washer and nut.
iii) Install solenoid wire clamps to rear cover and case. Secure harness with them.

NOTE:
When inserting grommet into case bore, check to be sure that its O ring is in good condition.



46) Check second brake band for proper installation.
Looking through second brake band cover hole, check that second brake piston rod end is aligned with the center of recess in brake band as shown in left figure.
If rod end contacts outside of brake band recess, pull up second brake band by inserting thin wire in brake band fitting so that band recess aligns with rod end properly.

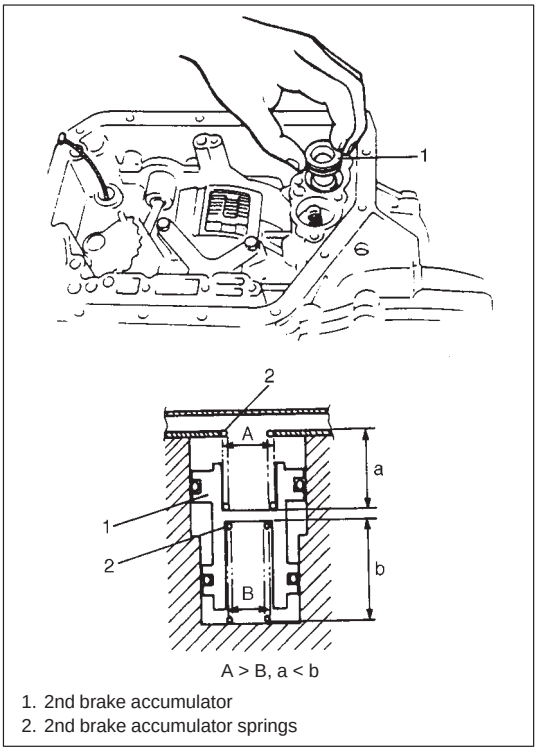
47) Check second brake piston stroke as previously described. For checking procedure, refer to step 12) of "DISASSEMBLY" in this section.



48) Install second brake band cover with new gasket.

Tightening Torque
(h): 8 N·m (0.8 kg-m, 6.0 lb-ft)

49) Install oil pressure control cable in case.

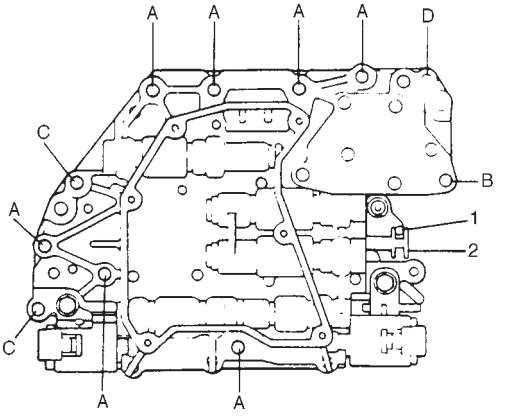


1. 2nd brake accumulator
2. 2nd brake accumulator springs

50) Install accumulator springs and pistons.
   i) Install new seal rings on pistons, if required.
      Be sure to apply automatic transmission fluid to pistons and seal rings.
   ii) Insert springs into accumulator bores.

      NOTE:
      Install 2nd brake accumulator springs as shown in left figure.

   iii) Install pistons into case.
   iv) Install spring into 2nd brake accumulator piston.



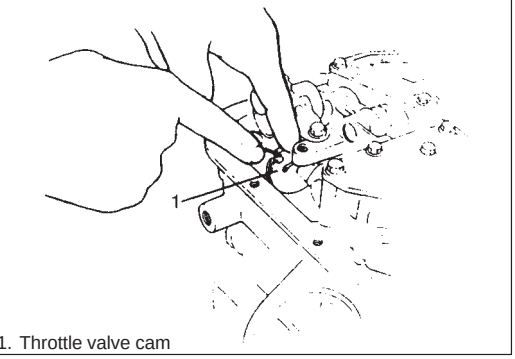
1. Pin
2. Manual valve

A: Bolt 135 mm/1.38 in – 7 pcs)
B: Bolt (47 mm/1.85 in – 1 pc)
C: Reamer bolt (25 mm/1 in – 2 pcs)
D: Reamer bolt (32 mm!1 .26 in – 1 pc)

51) Install valve body assembly to case.
Align manual valve with pin on manual shift lever and lower valve body into place.
Install 11 bolts in lower valve body.
Each bolt length is given in figure.
First, tighten 3 reamer bolts (positioning bolts) C and D lightly.
Then tighten all bolts in diagonal order.

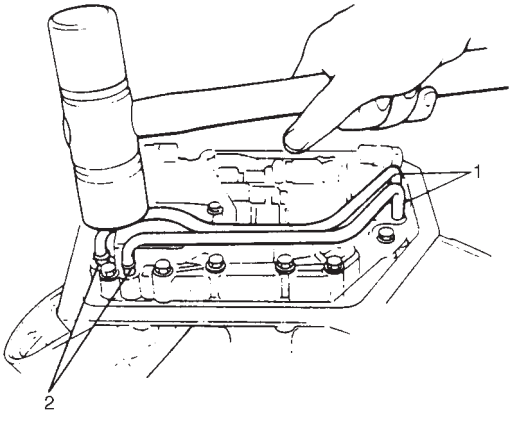
CAUTION:
Care should be taken to put manual shift lever pin in between two flanges at end of manual shift valve.

Tightening Torque for lower valve body bolts
10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Throttle valve cam

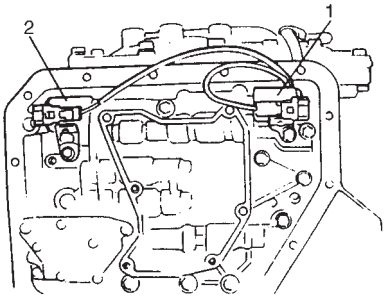
52) Connect oil pressure control cable on throttle valve cam.
While holding cam down with fingers, slip cable end into slot.



1. End with no flange
2. Flange

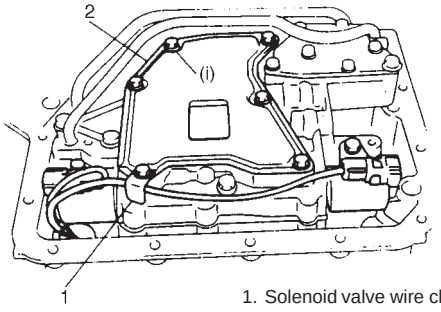
53) Install oil tubes to lower valve body.
First put the end of oil tube without flange about 2 mm (0.08 in.) into lower valve body, then insert the one with flange and push both ends of tube by hand. Next, tap them in lightly with a plastic hammer as far as flange position.

NOTE:
- ○ **Install them horizontally to valve body.**
- ○ **Make sure to insert them up to flange position securely.**
- ○ **Care should be taken not to deform tubes.**



1. Direct clutch solenoid valve
2. 2nd brake solenoid valve

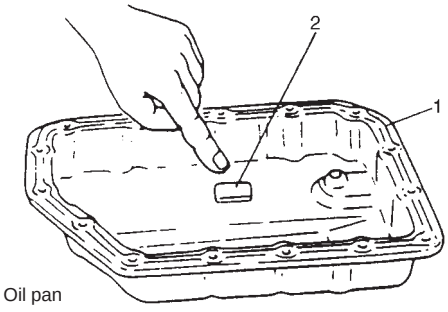
54) Connect 2 solenoid valve wires; one to direct clutch solenoid valve and the other to second brake solenoid valve.



1. Solenoid valve wire clamp
2. Oil strainer

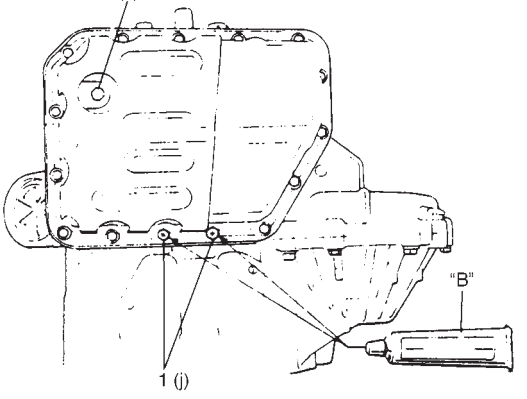
55) Install oil strainer and solenoid valve wire clamp.
Clamp solenoid valve wire by fastening solenoid valve wire clamp with oil strainer bolt in the position as shown.

Tightening Torque
(i): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Oil pan
2. Magnet

56) Install magnet in oil pan and oil pan with new gasket.
   i) Install magnet in oil pan right under oil strainer.
   ii) Check to make sure that oil tubes are not in contact with oil pan.



1. cross slotted bolt

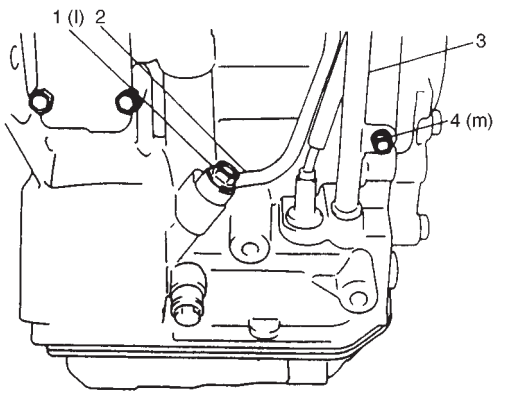
   iii) There are 15 oil pan bolts in all and two of them have cross slot in their heads. Mount these two cross slotted bolts in such positions as shown in left figure after applying sealant to their threads.
   Tighten 15 oil pan bolts to specification.

   "B": SUZUKI BOND No.1215, 99000-31110

   Tightening Torque
   (j): 5.0 N·m (0.5 kg-m, 4.0 lb-ft)

   iv) Tighten oil pan drain plug to specification.

   Tightening Torque
   (k): 21 N·m (2.1 kg-m, 15.0 lb-ft)



1. Union bolt
2. Oil outlet pipe
3. Oil filler tube
4. Bolt

57) Install oil pipes.
   i) If oil outlet pipe has been removed or replaced, tighten it with union bolt with new gaskets to specified torque.

      Tightening Torque
      (l): 22 N·m (2.2 kg-m, 16.0 lb-ft)

   ii) Clamp pipes with oil pipe plate through rubber tubes.

      Tightening Torque for plate bolts
      8 mm: 13 N·m (1.3 kg-m, 9.5 lb-ft)
      6 mm: 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

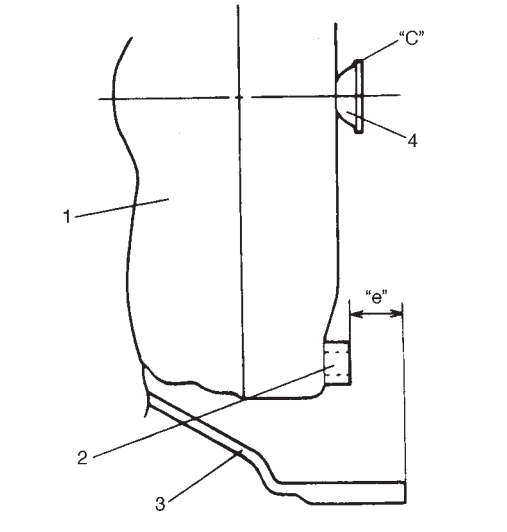
58) Install oil filler tube with O ring.
   Insert oil filler tube in case as far as its flange and tighten with bolt.

   NOTE:
   Check to make sure that oil filler tube O ring is in good condition.

   Tightening Torque
   (m): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

59) Install engine mounting LH bracket.
   Tighten bolts to specification. (Refer to “ENGINE ASSEMBLY” in Section 6A1.)

   Tightening Torque for bracket bolts
   55 N·m (5.5 kg-m, 40.0 lb-ft)



1. Torque converter
2. Flange nut
3. Transmission case housing
4. Cup

60) Install torque converter to input shaft.
   i) Install torque converter, using care not to damage oil seal of oil pump.
   ii) After installing torque converter, check to make sure that distance “e” is within specification.

      Distance “e”: More than 21.4 mm (0.85 in.)

   iii) Check torque converter for smooth rotation.
   iv) Apply grease around cup at the center of torque converter.

      “C”: SUZUKI SUPER GREASE A, 99000-25010

CAUTION:
- **Before installing converter, make sure that its pump hub portion is free from nicks, burrs or damage which may cause oil seal to leak.**
- **Be very careful not to drop converter on oil pump gear. Damage in gear, should it occur, may cause a critical trouble.**

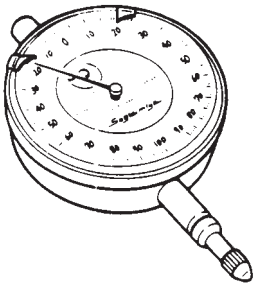
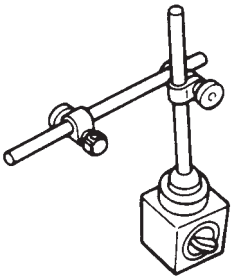
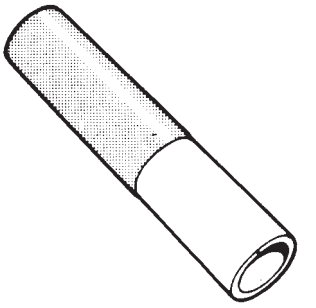
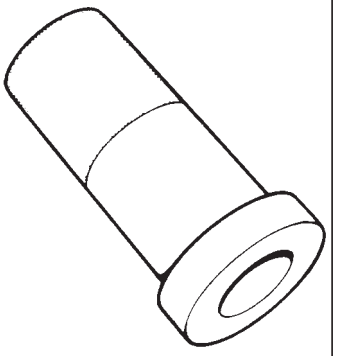
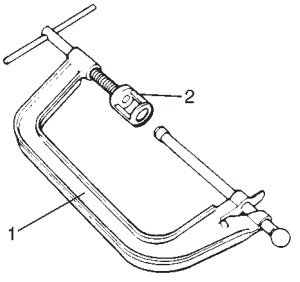
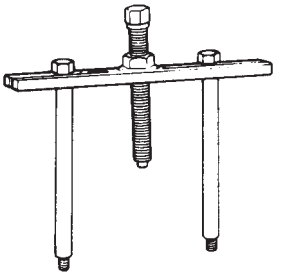
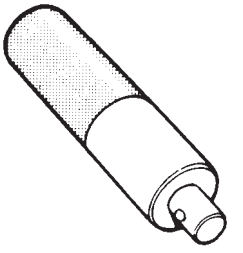
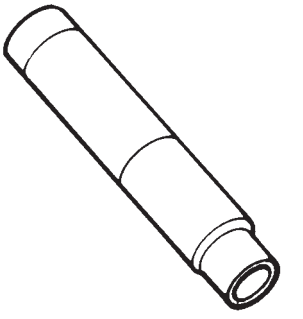
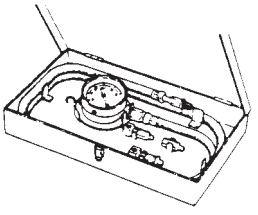
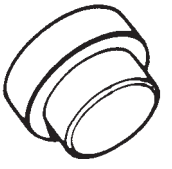
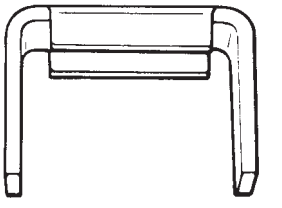
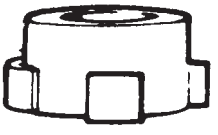
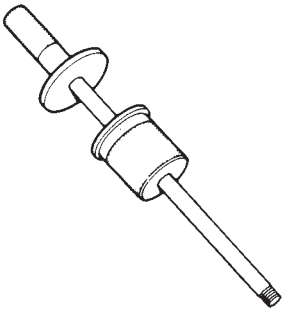
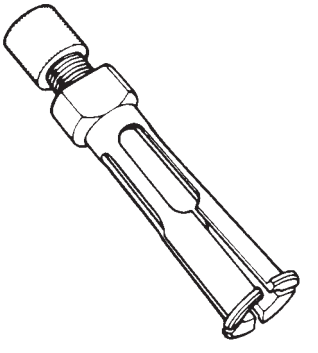
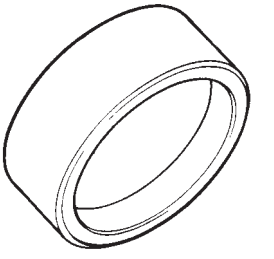
DIMENSION DATA

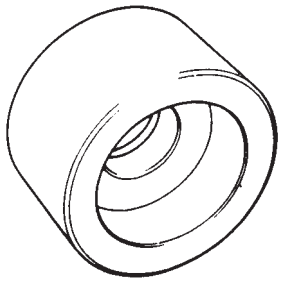
ITEM			DATA	
			Standard	Limit
Oil pump	Driven gear-to-body clearance		0.07 – 0.15 mm 0.0028 – 0.0059 in	0.3 mm 0.011 in
	Gear tooth tip clearance		0.11 – 0.14 mm 0.0043 – 0.0055 in	0.3 mm 0.011 in
	Gear side clearance		0.02 – 0.05 mm 0.0008 – 0.0019 in	0.1 mm 0.0039 in
Planetary gear	Side clearance		0.2 – 0.5 mm 0.008 – 0.019 in	0.7 mm 0.027 in
Bush bore	Oil pump body		38.113 – 38.138 mm 1.500 – 1.501 in	38.188 mm 1.503 in
	Direct clutch drum		51.520 – 51.545 mm 2.028 – 2.029 in	51.595 mm 2.031 in
	Planetary sun gear		22.025 – 22.046 mm 0.867 – 0.868 in	22.096 mm 0.870 in
	Ring gear flange		19.025 – 19.050 mm 0.749 – 0.750 in	19.100 mm 0.752 in
Clutch, brake and 2nd piston	Height between snap ring and clutch flange	Direct clutch	2.49 – 3.06 mm 0.098 – 0.120 in	3.26 mm 0.128 in
		Forward clutch	2.01 – 2.68 mm 0.079 – 0.105 in	2.88 mm 0.113 in
	1st-reverse brake clutch clearance		0.58 – 1.92 mm 0.023 – 0.075 in	2.12 mm 0.083 in
	2nd brake piston rod stroke		1.5 – 3.0 mm 0.06 – 0.11 in	———
Input shaft	Thrust play		0.3 – 0.9 mm 0.012 – 0.035 in	———
Torque converter	Converter flange to housing end		More than 21.4 mm 0.85 in	———

TIGHTENING TORQUE SPECIFICATIONS

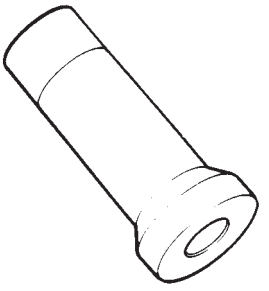
	Fastening Portion		Tightening Torque		
			N·m	kg-m	lb-ft
ON-CAR SERVICE	1. Transmission case plug		7.5	0.75	5.5
	2. Drain plug		21	2.1	15.5
	3. Oil pan bolts		5.0	0.5	4.0
	4. Oil strainer bolts		5.5	0.55	4.0
	5. Shift solenoid bolts		8	0.8	6.0
	6. Output shaft speed sensor bolt				
	7. Accelerator cable nut		13	1.3	9.5
	8. Transmission range sensor bolt		18	1.8	13.0
	9. Manual shift shaft nuts		30	3.0	22.0
	10. Select cable adjusting nut		7	0.7	5.0
	11. Select cable bracket bolts		13	1.3	9.5
	12. Select cable bolts		6.5	0.65	5.0
	13. Selector housing nuts		20	2.0	14.5
MOUNTING	1. Transmission to engine bolts and nuts		50	5.0	36.5
	2. Drive plate to converter bolts		18.5	1.85	13.5
	3. Engine mounting & bracket bolt & nut		Refer to Section 6A1.		
TRANSMISSION OVERHAUL	1. Oil pump cover bolts		10	1.0	7.5
	2. Lower valve body cover bolts		5	0.5	4.0
	3. Throttle valve cam bolt		7.5	0.75	5.5
	4. Upper valve body bolts		5.5	0.55	4.0
	5. Lower valve body bolts		10	1.0	7.5
	6. Differential final gear bolts		85	8.5	61.5
	7. Manual detent spring bolt and nut		10	1.0	7.5
	8. Reduction driven gear nut		130	13.0	94.0
	9. Rear cover bolts		20	2.0	14.5
	10. Rear cover nuts		13	1.3	9.5
	11. Transmission case housing bolts		20	2.0	14.5
	12. Oil pump bolts		23	2.3	17.0
	13. Second brake band cover bolts		8.0	0.8	6.0
	14. Oil pipe union bolts		22	2.2	16.0
	15. Oil pipe plate bolt	8 mm	13	1.3	9.5
		6 mm	5.5	0.55	4.0
	16. Oil filler tube bolt				

SPECIAL TOOLS

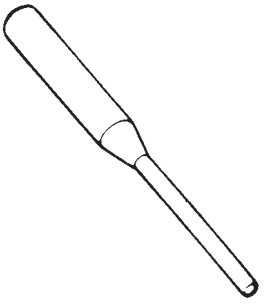
 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09913-80112 Bearing installer	 09913-85210 Bearing installer
 1. 09916-14510 Valve lifter (Attachment 2 is included)	 09918-48211 Oil pump remover	 09924-74510 Installer handle	 09925-18011 Remover handle
 09925-37811-001 Oil pressure gauge	 09925-88210 Bearing puller attachment	 09926-88310 Bearing installer attachment	 09926-98310 Clutch spring compressor
 09927-08210 Output shaft remover	 09930-30104 Sliding shaft	 09941-64511 Bearing remover	 09944-66020 Bearing installer



09951-16060
Bush remover

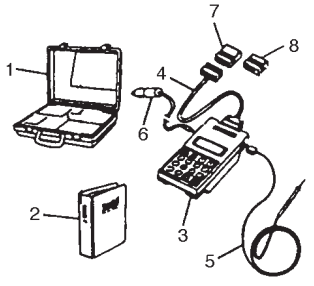


09951-76010
Bearing installer



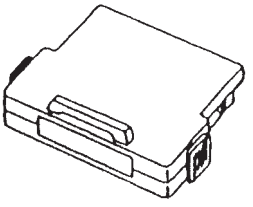
09922-85811
Spring pin remover (4.5 mm)

BLANK

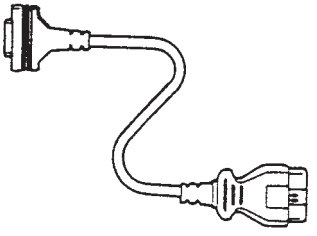


1. Storage case
2. Operator's manual
3. SUZUKI scan tool
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

09931-76011
SUZUKI scan tool kit



Mass storage cartridge



09931-76030
16/14 pin DLC cable

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Automatic transmission fluid	An equivalent of DEXRON® -IIE or DEXRON® III	○Automatic transmission ○Parts lubrication when installing
Sealant	SUZUKI BOND NO.1215 (99000-31110)	○Case housing star-shaped recess bolts (3 pcs only) ○Oil pan cross slotted bolts (2 pcs only)
Lithium grease	SUZUKI SUPER GREASE C (99000-25030)	○Retaining parts in place when assembling ○Oil seal lips ○Oil pump O ring
	SUZUKI SUPER GREASE A (99000-25010)	○Cable ends ○Converter center cup
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	Select cable fastening portion with dash panel

Prepared by

SUZUKI MOTOR CORPORATION

Overseas Service Department

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SECTION 7B1

AUTOMATIC TRANSMISSION (4 A/T)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

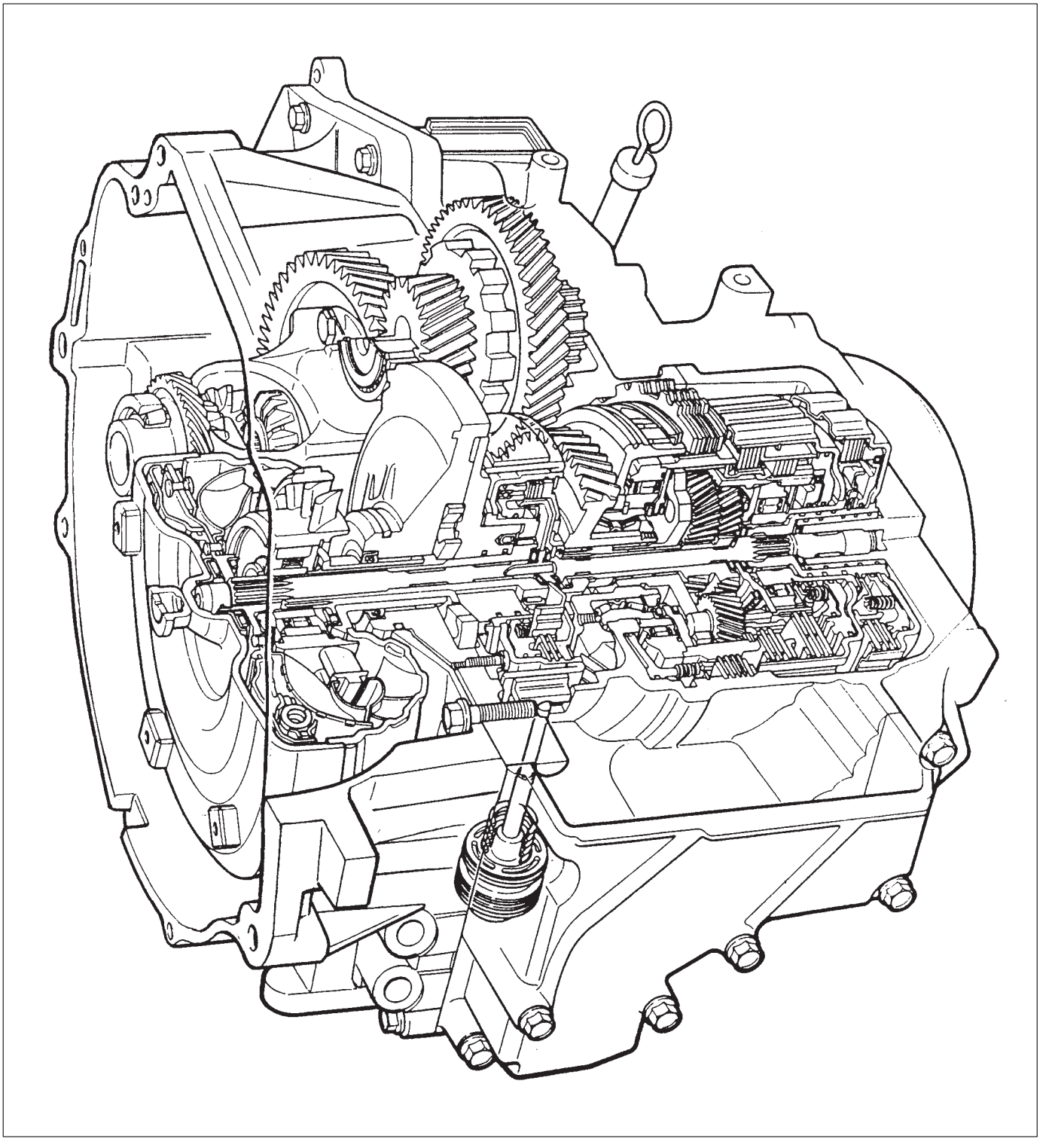
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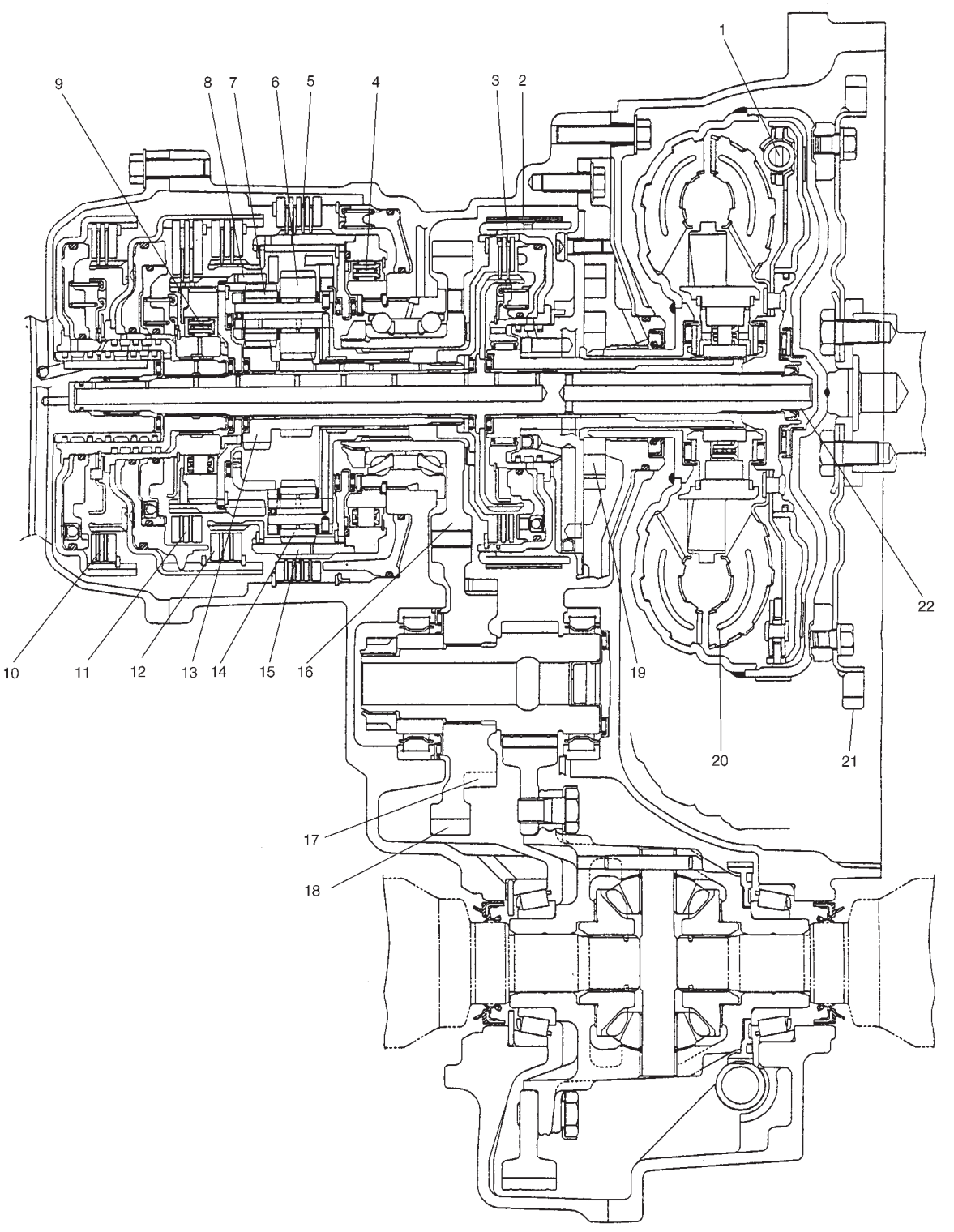
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GENERAL DESCRIPTION

This automatic transmission is a full automatic type with 3-speed plus overdrive (O/D).
The torque converter is a 3-element, 1-step and 2-phase type and is equipped with an electronically controlled lock-up mechanism. The gear shift device consists of 2 sets of planetary gear units, 4 disc type clutches, a disc type brake, a band type brake and 2 one-way clutches. The gear shift is done by selecting one of 6 positions (“P”, “R”, “N”, “D”, “2” and “L”) by means of the select lever installed on the floor. On the shift knob, there is an overdrive (O/D) cut switch which allows shift-up to the overdrive mode and shift-down from the overdrive mode. Also, by using the mode selector switch located on the parking brake lever cover, it is possible to select the gear change timing (and gear) of 3 modes, normal, power and snow.

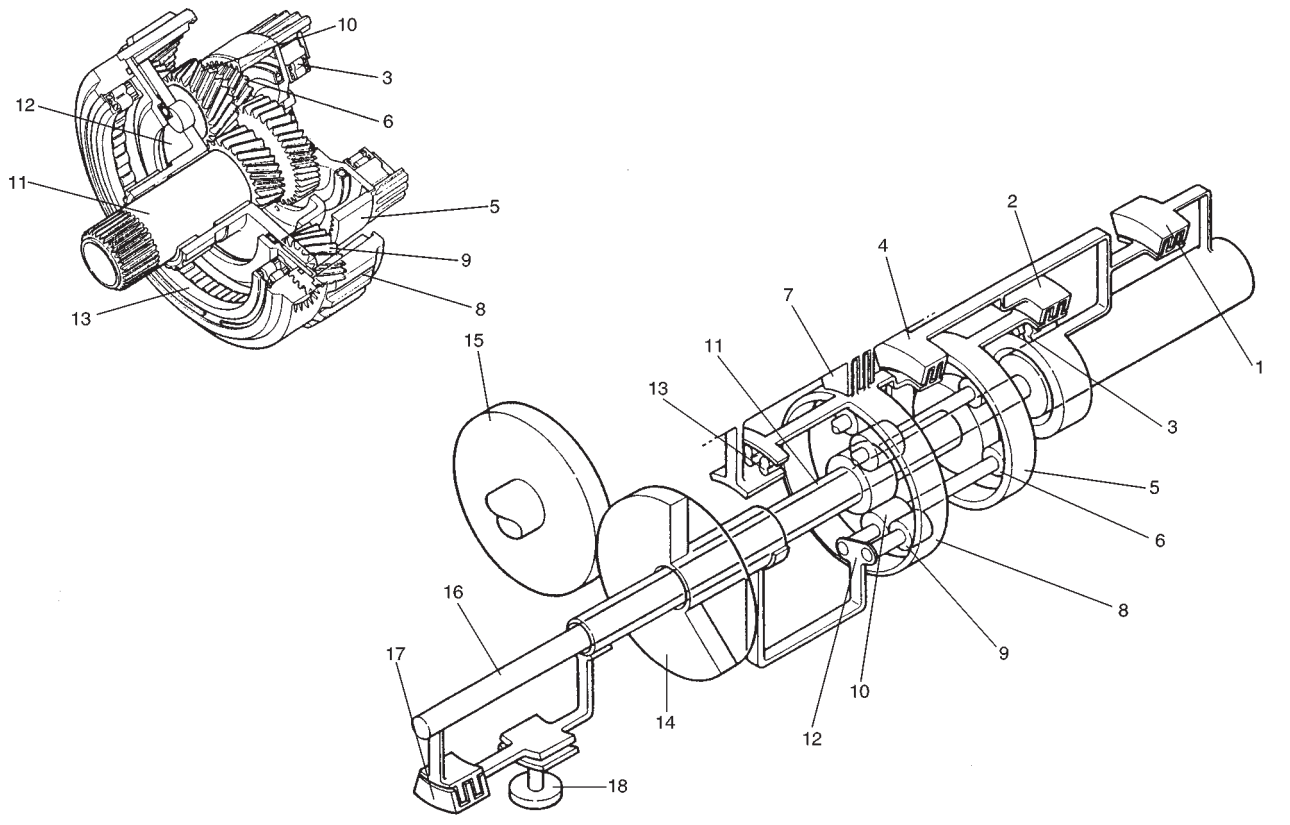




1. Torque converter clutch (TCC)
2. 2nd and 4th brake band
3. Reverse clutch
4. One-way clutch No.1
5. 1st and reverse brake
6. Front large planetary pinion
7. Rear planetary pinion
8. Rear planetary ring gear
9. One-way clutch No.0
10. Forward clutch
11. Coast clutch
12. Overdrive clutch
13. Planetary sun gear
14. Front small planetary pinion
15. Front planetary ring gear
16. Counter drive gear (Reduction gear)
17. Parking lock gear
18. Counter driven gear (Reduction gear)
19. Oil pump
20. Torque converter
21. Drive plate
22. Input shaft

Item			Specifications		
Torque converter	Type Stall torque ratio		3-element, 1-step, 2-phase type (with TCC (lock-up) mechanism) More than 2.0		
Oil pump	Type Drive system		Internal gear type oil pump Engine driven		
Gear change device	Type		Forward 4-step, reverse 1-step planetary gear type		
	Shift position		“P” range: Gear in neutral, output shaft fixed, engine start “R” range: Reverse “N” range: Gear in neutral, engine start “D” range (O/D ON) POWER or NORMAL mode: Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change “D” range (O/D ON) SNOW mode: Forward 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change “D” range (O/D OFF) POWER or NORMAL mode: Forward 1st ↔2nd ↔ 3rd ← 4th automatic gear change “D” range (O/D OFF) SNOW mode: Forward 2nd ↔ 3rd ← 4th (O/D) automatic gear change “2” range POWER or NORMAL mode: Forward 1st ↔ 2nd ← 3rd ← 4th automatic gear change “2” range SNOW mode: Forward 2nd ← 3rd reduction, and fixed at 2nd gear “L” range: Forward 1st ← 2nd reduction, and fixed at 1st gear		
	Gear ratio	1st	2.807	Number of teeth: Front sun gear : 26 Rear sun gear : 35 Front large pinion gear : 28 Front small pinion gear : 19 Rear pinion gear : 19 Front internal gear : 98 Rear internal gear : 73	
		2nd	1.479		
		3rd	1.000		
		4th (overdrive gear)	0.734		
		Reverse (reverse gear)	2.769		
	Control elements		Wet type multi-disc clutch . . . . . 4 sets Band type brake . . . . . 1 set Wet type multi-disc brake . . . . . 1 set One-way clutch . . . . . 2 sets		
	Reduction gear ratio		1.018		
	Final gear reduction ratio		3.783		
Lubrication	Lubrication system		Force feed system by oil pump		
Cooling	Cooling system		Radiator assisted cooling (water-cooled)		
Fluid used			DEXRON®-III or DEXRON®-IIE		

CLUTCH/BRAKE/PLANETARY GEAR



1. Forward clutch
2. Coast clutch
3. One-way clutch No.0
4. Overdrive clutch
5. Rear planetary ring gear
6. Rear planetary pinion gear
7. 1st and reverse brake
8. Front planetary ring gear
9. Front small planetary pinion gear
10. Front large planetary pinion gear
11. Planetary sun gear
12. Planetary carrier
13. One-way clutch No.1
14. Counter drive gear
15. Counter driven gear
16. Input shaft
17. Reverse clutch
18. 2nd and 4th brake

FUNCTIONS

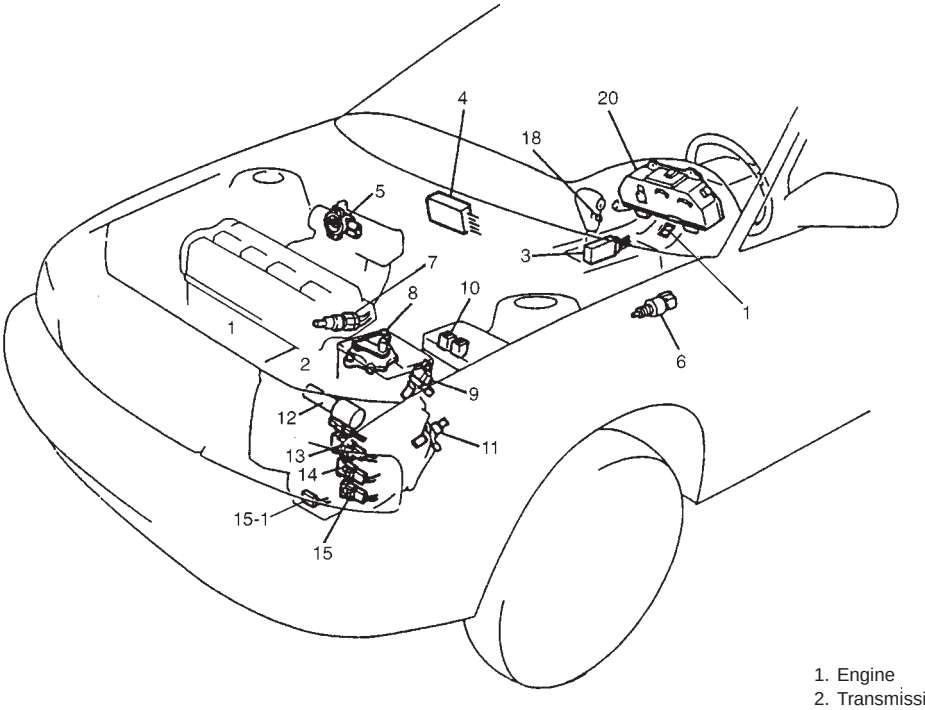
PART NAME	FUNCTION
2nd and 4th brake	Fixes planetary sun gear
Reverse clutch	Meshes input shaft and sun gear
One-way clutch No.1	Prevents front planetary ring gear from turning counterclockwise (reverse direction of engine input rotation direction)
1st and reverse brake	Fixes front planetary ring gear
Overdrive clutch	Meshes front planetary ring gear and input shaft only when forward clutch is at work
One-way clutch No.0	Prevents rear planetary ring gear from turning counterclockwise (reverse direction of engine input rotation direction) only when forward clutch is at work.
Coast clutch	Meshes rear planetary ring gear and input shaft only when forward clutch is at work.
Forward clutch	Meshes rear planetary and front planetary ring gear only when overdrive clutch is at work, and meshes input shaft and rear planetary ring gear only when coast clutch is at work.

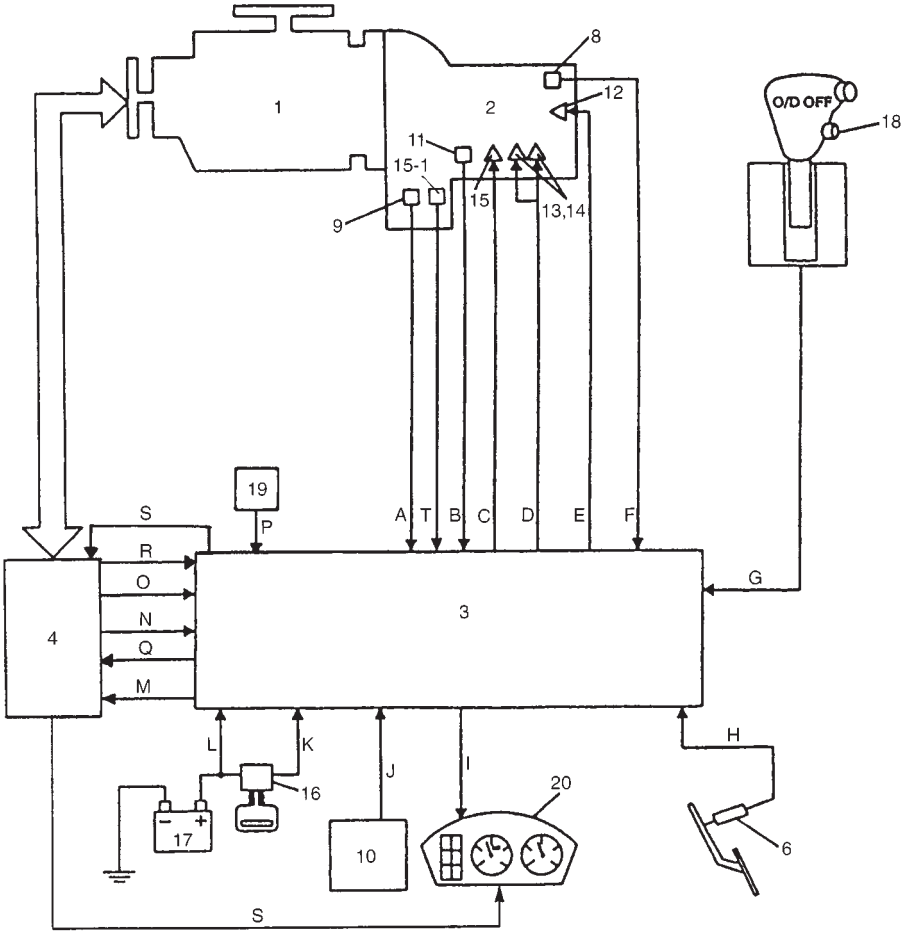
TABLE OF COMPONENT OPERATION

Selector position / Gear position / Part	Solenoid valve No.1	Solenoid valve No.2	TCC control solenoid	Forward clutch	Reverse clutch	Coast clutch	Over-drive clutch	2nd/4th brake	1st/ reverse brake	One-way clutch No.1	One-way clutch No.0
P	○	X	X	X	X	○	X	X	X	X	X
R	○	X	X	X	○	○	X	X	○	X	X
N	○	X	X	X	X	○	X	X	X	X	X
D 1st	○	X	X	○	X	○	X	X	X	○	○
D 2nd	○	○	X	○	X	○	X	○	X	X	○
D 3rd	X	○	△	○	X	○	○	X	X	X	○
D 4th (O/D)	X	X	△	○	X	X	○	○	X	X	X
2 1st	○	X	X	○	X	○	X	X	X	○	○
2 2nd	○	○	X	○	X	○	X	○	X	X	○
L 1st	○	X	X	○	X	○	X	X	○	○	○

○: ON X: OFF △: ON only when TCC is operating

ELECTRONIC SHIFT CONTROL SYSTEM





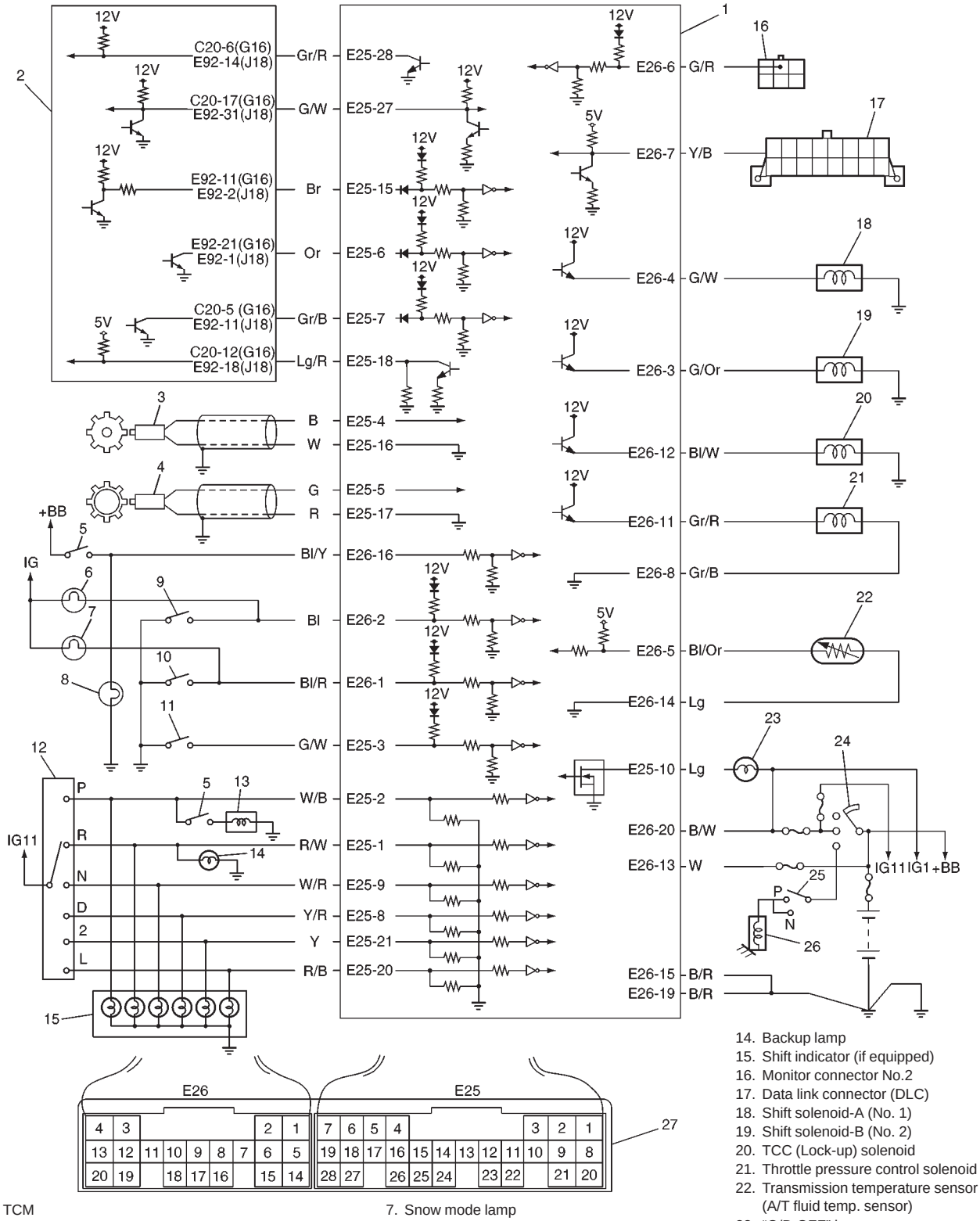
1. Engine
2. Transmission
3. Transmission control module (TCM)
4. Engine control module (ECM)
5. Throttle position sensor
6. Brake lamp (stop lamp) switch
7. Engine coolant temperature sensor
8. Transmission range sensor
9. Output shaft speed sensor (A/T VSS)
10. Monitor connector No.2
11. Input shaft speed sensor (Forward clutch cylinder revolution sensor)
12. Throttle pressure control solenoid valve
13. Shift solenoid valve-A No.1
14. Shift solenoid valve-B No.2
15. TCC solenoid valve
15-1. Transmission temperature sensor (A/T fluid temp. sensor)
16. Ignition switch
17. Battery
18. O/D off switch
19. Mode select switch (if equipped)
20. “O/D OFF” lamp and Malfunction indicator lamp

A. Vehicle speed
B. Forward clutch cylinder revolution
C. TCC control
D. Automatic shift control
E. Throttle pressure control
F. Transmission range signal
G. “O/D OFF” signal
H. Brake signal
I. “O/D OFF” lamp control
J. Diagnosis switch signal
K. Power supply
L. Power supply for back-up
M. Transmission range sensor signal
N. Engine coolant temperature signal
O. Throttle opening signal
P. Mode select signal
Q. Serial data signal
R. Engine speed signal
S. Torque reduction signal
T. A/T fluid temperature signal

TRANSMISSION CONTROL MODULE (TCM)

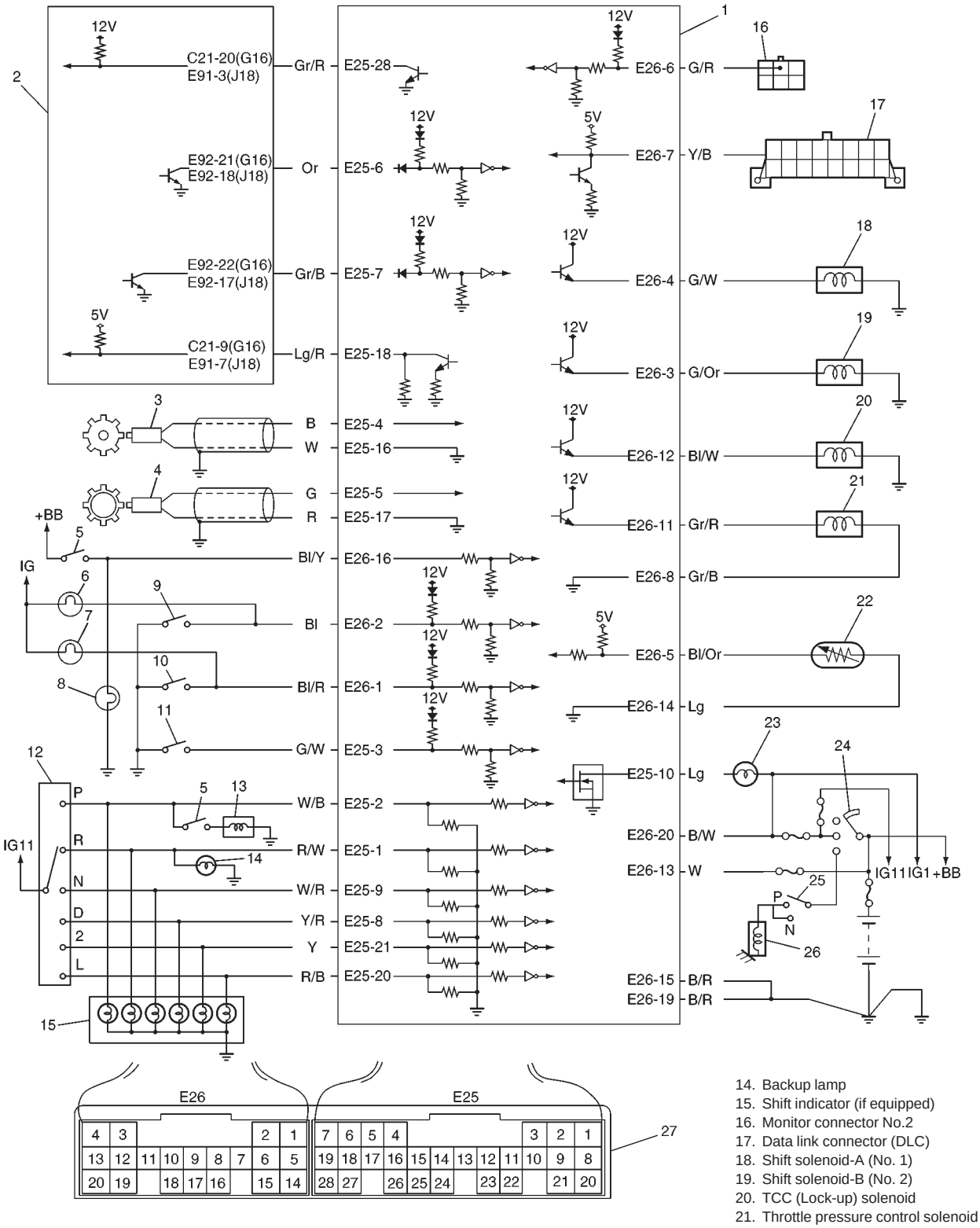
The TCM is an electronic circuit component that controls gear shift and idle-up according to the signal from each sensor. It is a microcomputer of an IC, transistor, diode, etc. It is installed at the right side of the steering column.

For Vehicle with WU-TWC



1. TCM
2. ECM
3. Output shaft speed sensor (A/T VSS)
4. Input shaft speed sensor (Forward clutch cylinder revolution sensor)
5. Brake lamp switch
6. Power mode lamp
7. Snow mode lamp
8. Brake lamp
9. Power mode switch
10. Snow mode switch
11. O/D off switch
12. Transmission range sensor (Shift switch)
13. Shift lock solenoid (if equipped)
14. Backup lamp
15. Shift indicator (if equipped)
16. Monitor connector No.2
17. Data link connector (DLC)
18. Shift solenoid-A (No. 1)
19. Shift solenoid-B (No. 2)
20. TCC (Lock-up) solenoid
21. Throttle pressure control solenoid
22. Transmission temperature sensor (A/T fluid temp. sensor)
23. "O/D OFF" lamp
24. Ignition switch
25. Inhibitor switch
26. Starter relay
27. Terminal arrangement of TCM coupler (viewed from harness side)

For Vehicle without WU-TWC



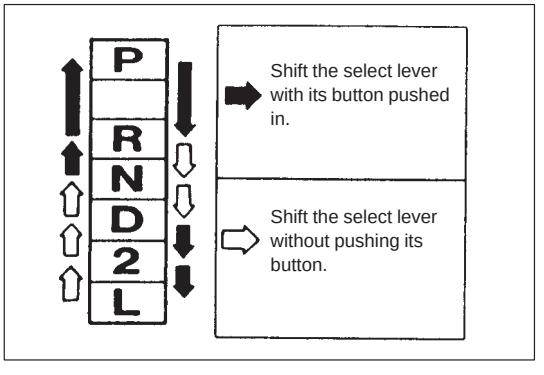
1. TCM
2. ECM
3. Output shaft speed sensor (A/T VSS)
4. Input shaft speed sensor (Forward clutch cylinder revolution sensor)
5. Brake lamp switch
6. Power mode lamp
7. Snow mode lamp
8. Brake lamp
9. Power mode switch
10. Snow mode switch
11. O/D off switch
12. Transmission range sensor (Shift switch)
13. Shift lock solenoid (if equipped)
14. Backup lamp
15. Shift indicator (if equipped)
16. Monitor connector No.2
17. Data link connector (DLC)
18. Shift solenoid-A (No. 1)
19. Shift solenoid-B (No. 2)
20. TCC (Lock-up) solenoid
21. Throttle pressure control solenoid
22. Transmission temperature sensor (A/T fluid temp. sensor)
23. “O/D OFF” lamp
24. Ignition switch
25. Inhibitor switch
26. Starter relay
27. Terminal arrangement of TCM coupler (viewed from harness side)

FAIL SAFE FUNCTION

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails.

The table below shows the fail safe function for each fail condition of sensor, solenoid or its circuit.

DTC (NO.)	DETECTED ITEM	FAIL-SAFE OPERATION	
P0705 (34)	Transmission range sensor (switch) circuit malfunction	No signal inputted	○Control on “D” range base ○TCC solenoid: OFF
		Multiple signal inputted	○Control according to the following priority order. N > R > L > 2 > D
P0715 (37)	Input/Turbine speed sensor (Forward clutch cylinder revolution sensor) circuit malfunction	○Shift solenoids: OFF ○TCC solenoid: OFF ○*Reverse inhibit control: OFF (*Reverse inhibit control: Control to prohibit gear change to reverse gear while vehicle is running forward even when select lever is shifted to “R” range.)	
P0720 (31)	Output speed sensor (A/T vehicle speed sensor) circuit malfunction		
P0745 (41/42)	Pressure control solenoid malfunction	○Power supply for all solenoids: OFF	
P0753 (21/22)	Shift solenoid-A (NO.1) electrical		
P0758 (23/24)	Shift solenoid-B (NO.2) electrical		
P1702 (52)	Internal control module memory		
P0743 (25/26)	TCC system electrical	○TCC solenoid: OFF	
P1700 (32/33)	Throttle position signal circuit	○Shift solenoids: OFF ○TCC solenoids: OFF ○Pressure control solenoid: Full (High) pressure position	
P1705 (51)	Engine coolant temp. signal circuit	○Control assuming that engine coolant temp. is 122°F (50°C) or more.	



Change Mechanism

The same select pattern shift lever is used as the floor type and frequently used “N” and “D” ranges are made selectable freely.

AUTOMATIC GEAR SHIFT DIAGRAM (FOR G16 ENGINE MODEL)

Automatic shift schedule as a result of shift control is shown below. In case that select lever is shifted to L at a higher than 62 km/h (39 mile/h) speed, 2nd gear is operated and then down shifts to 1st at a speed lower than that. No up shift is available in L.

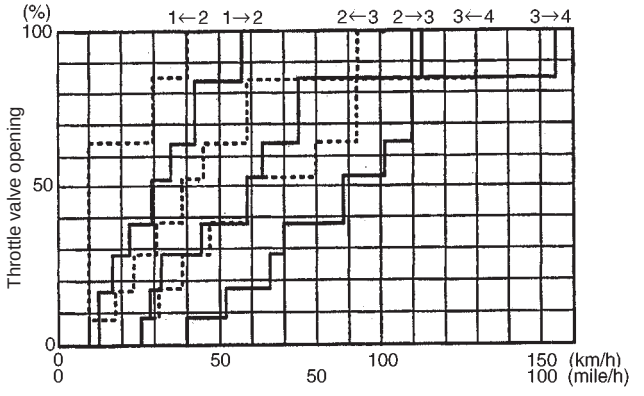
The same as, the select lever is shifted to 2 at a higher than 115 km/h (71.5 mile/h) speed, 3rd gear is operated and then down shifts to 2nd at a speed lower than that. No up shift is available in 2.

Unit: km/h (mile/h)

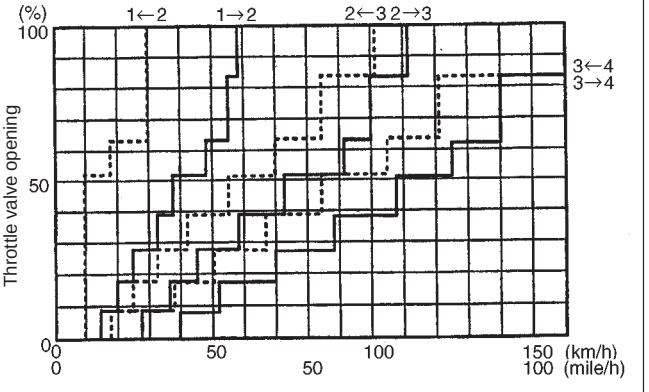
MODE	Shift / Throttle opening	1 2	2 3	3 4	4 3	3 2	2 1
NORMAL	Full throttle	57 (35)	113 (71)	155 (97)	140 (87)	95 (59)	41 (26)
	Closed throttle	14 (9)	24 (15)	40 (25)	19 (12)	10 (6)	10 (6)
POWER (if equipped)	Full throttle	58 (36)	113 (71)	More than 160 (100)	More than 160 (100)	103 (64)	47 (29)
	Closed throttle	15 (9)	28 (18)	40 (25)	19 (12)	10 (6)	10 (6)
SNOW (if equipped)	Full throttle	———	113 (71)	155 (97)	140 (88)	95 (59)	———
	Closed throttle	———	24 (15)	40 (25)	19 (12)	10 (6)	———

Gear Shift Diagram

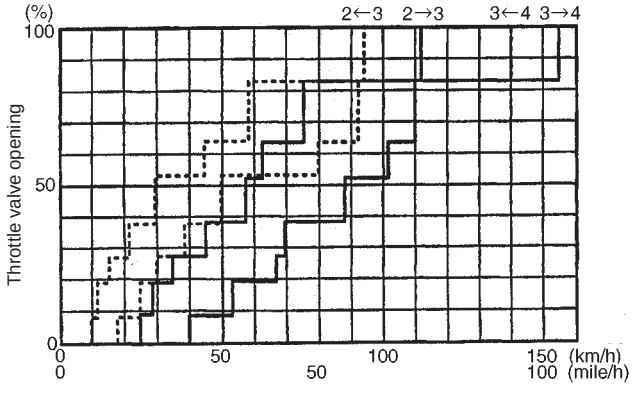
D range NORMAL mode



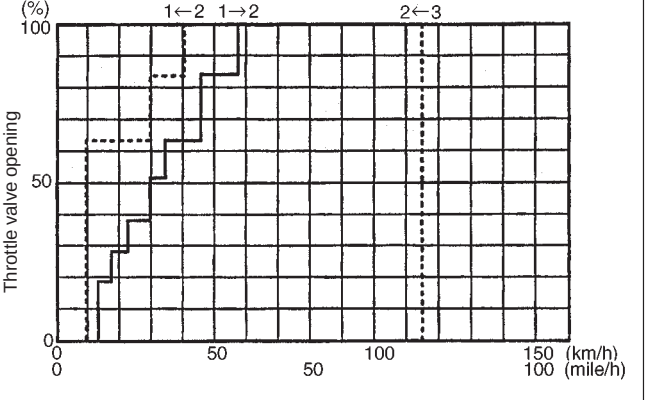
D range POWER mode



D range SNOW mode

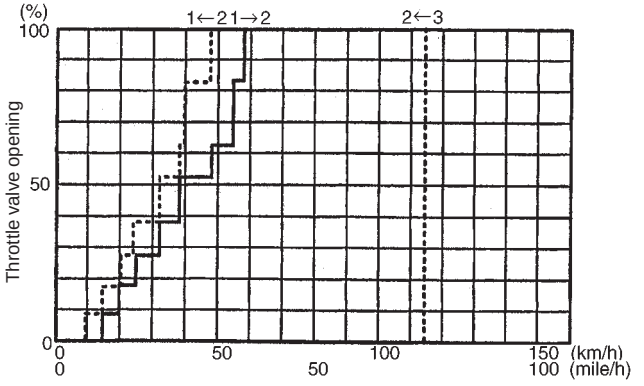


2 range NORMAL mode

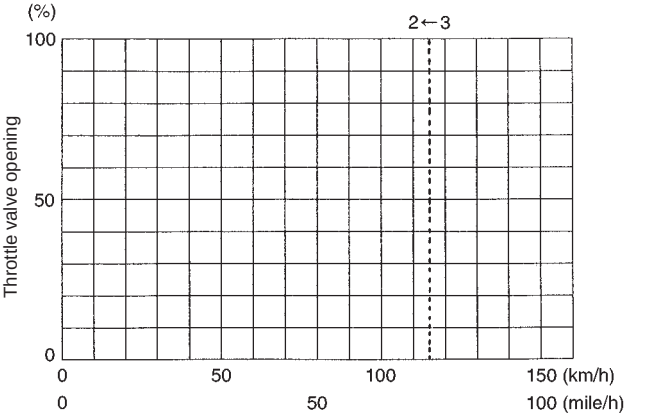


———: Upshift
- - - - -: Downshift

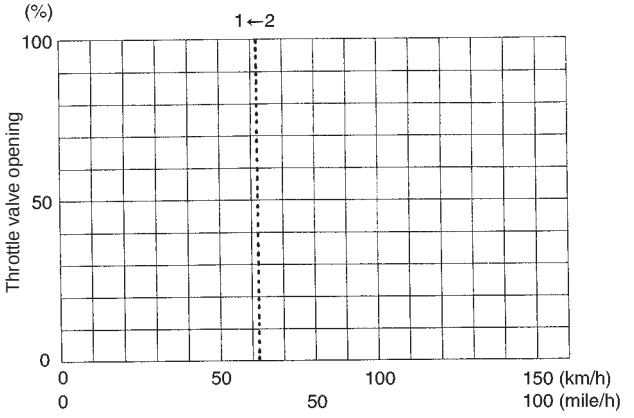
2 range POWER mode



2 range SNOW mode



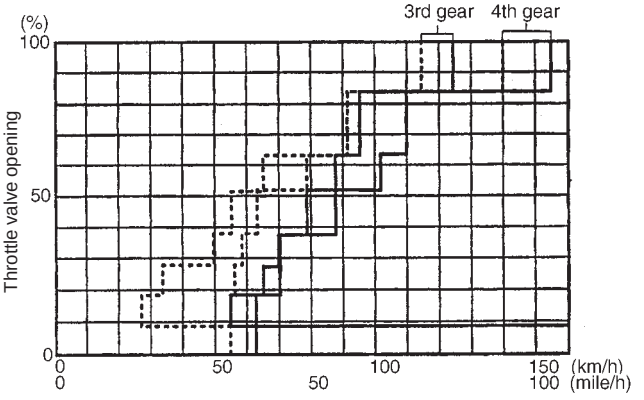
L range



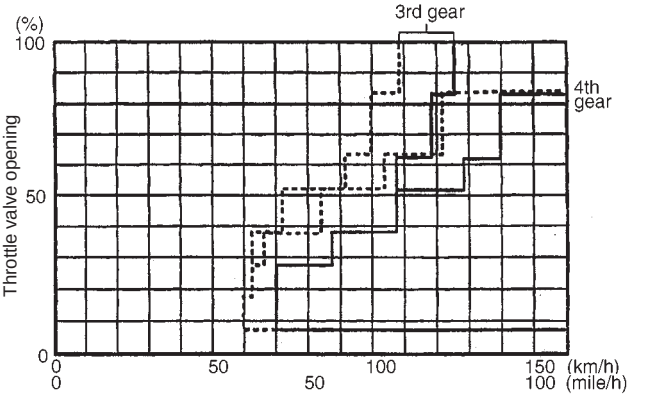
———: Up shift
- - - - -: Down shift

TCC Lock-up Diagram

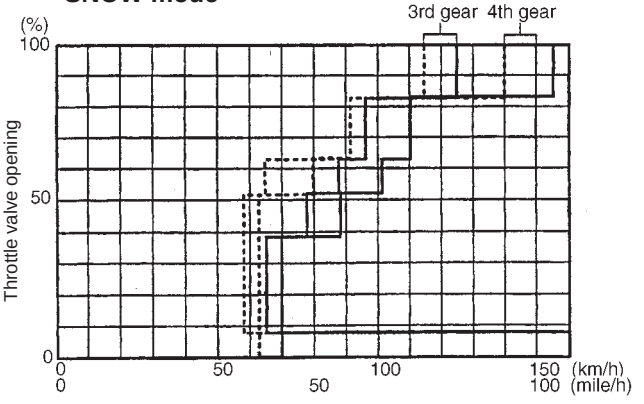
NORMAL mode



POWER mode



SNOW mode



———: TCC ON
- - - - -: TCC OFF

AUTOMATIC GEAR SHIFT DIAGRAM (FOR J18 ENGINE MODEL)

Automatic shift schedule as a result of shift control is shown below. In case that select lever is shifted to L at a higher than 52 km/h (33 mile/h) speed, 2nd gear is operated and then down shifts to 1st at a speed lower than that. No up shift is available in L.

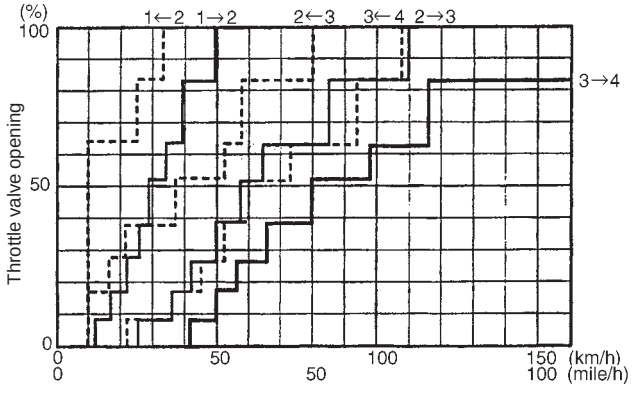
The same as, the select lever is shifted to 2 at a higher than 110 km/h (68.8 mile/h) speed, 3rd gear is operated and then down shifts to 2nd at a speed lower than that. No up shift is available in 2.

Unit: km/h (mile/h)

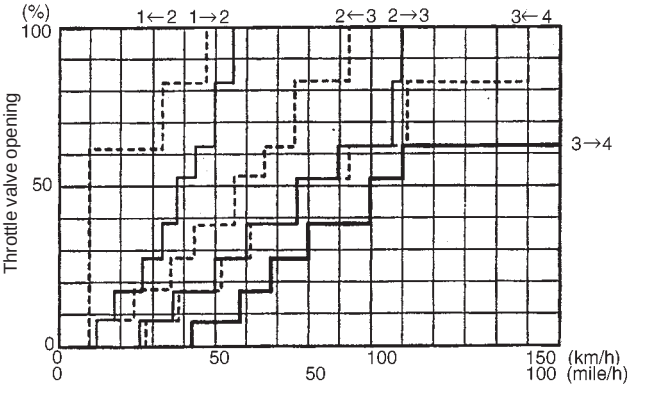
MODE	Shift / Throttle opening	1 2	2 3	3 4	4 3	3 2	2 1
NORMAL	Full throttle	55 (34)	110 (64)	163 (102)	108 (68)	80 (50)	33 (21)
	Closed throttle	12 (8)	26 (16)	42 (26)	22 (14)	10 (6)	10 (6)
POWER (if equipped)	Full throttle	55 (34)	110 (69)	184 (115)	150 (94)	93 (58)	46 (29)
	Closed throttle	12 (8)	26 (16)	42 (26)	28 (18)	10 (6)	10 (6)
SNOW (if equipped)	Full throttle	———	110 (69)	163 (102)	108 (68)	80 (50)	———
	Closed throttle	———	25 (16)	46 (29)	22 (14)	10 (6)	———

Gear Shift Diagram

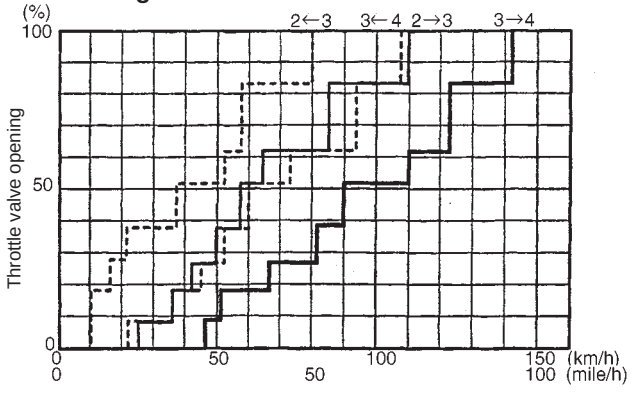
D range NORMAL mode



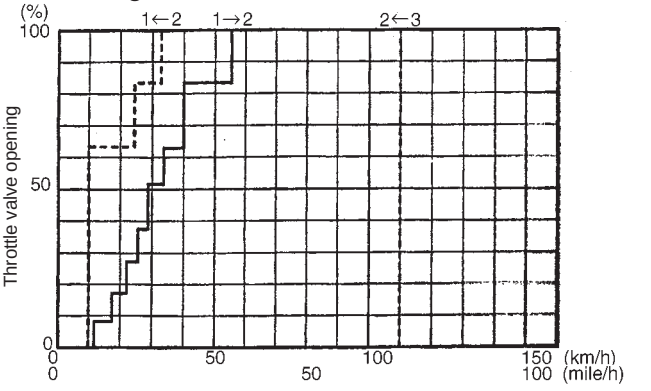
D range POWER mode



D range SNOW mode

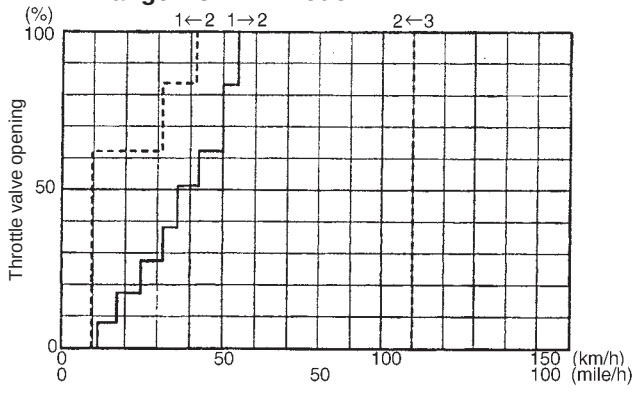


2 range NORMAL mode

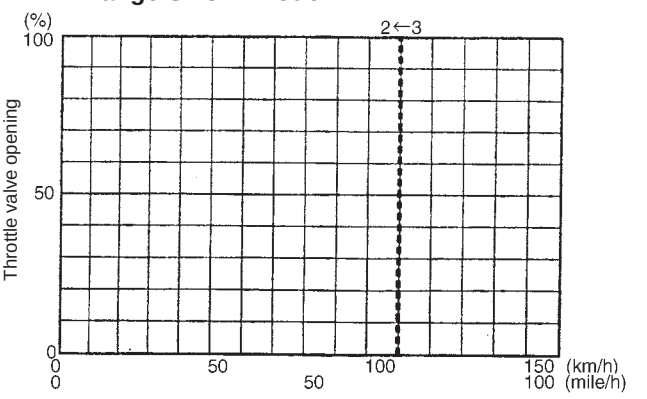


———: Upshift
- - - - -: Downshift

2 range POWER mode

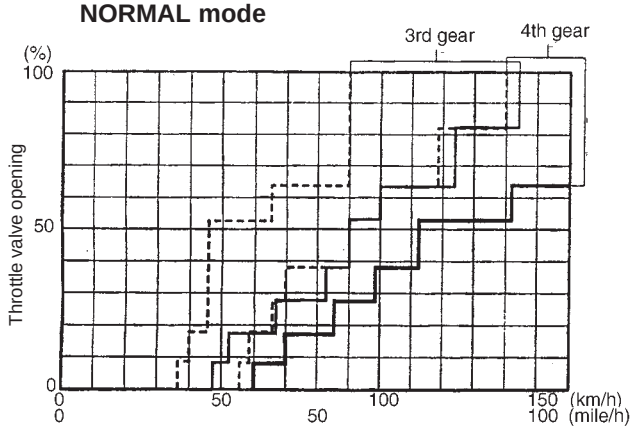


2 range SNOW mode

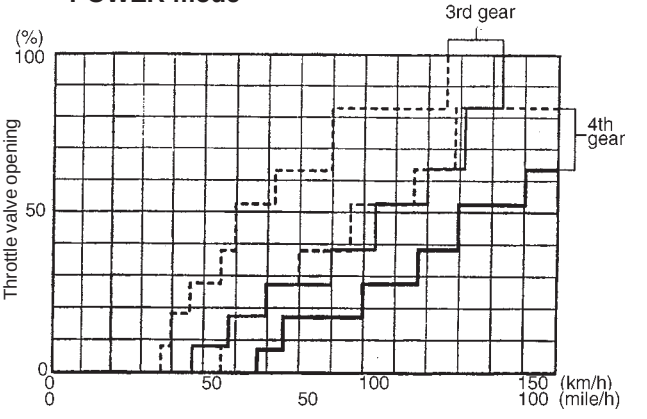


TCC Lock-up Diagram

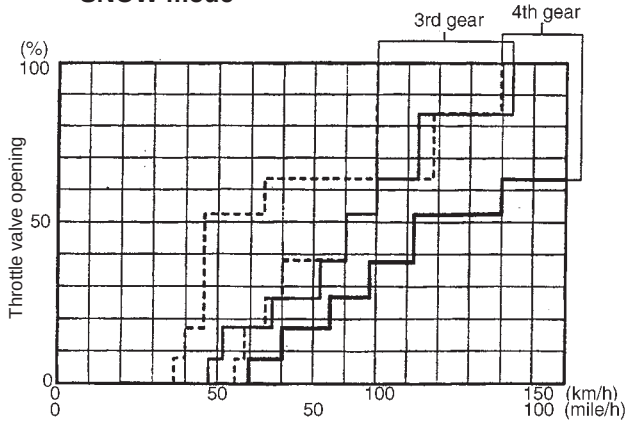
NORMAL mode



POWER mode



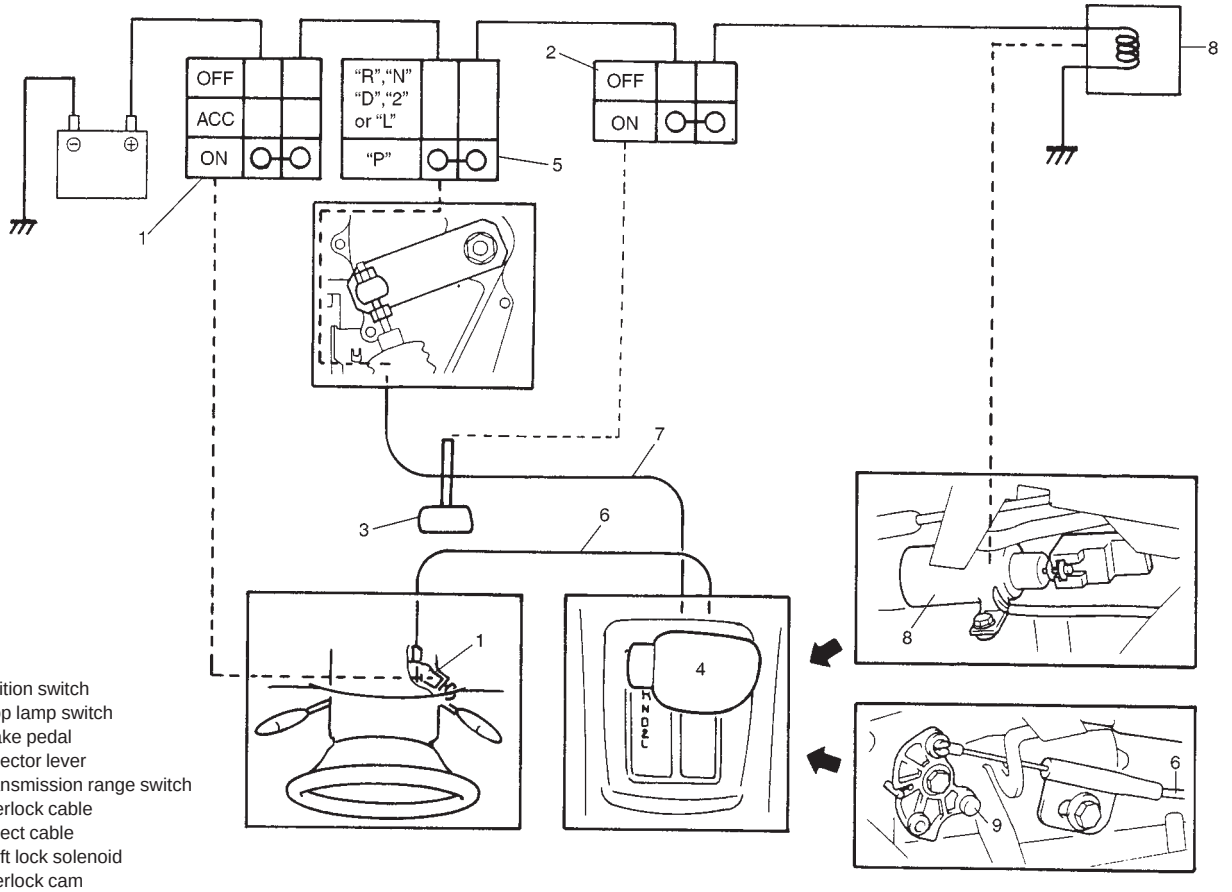
SNOW mode



——: TCC ON
- - - - -: TCC OFF

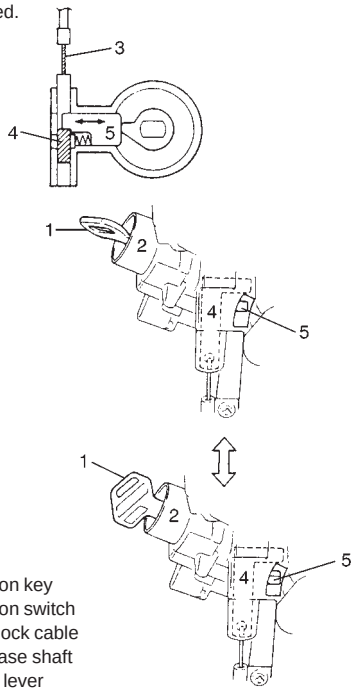
BRAKE INTERLOCK SYSTEM (if equipped)

This system is so designed that select lever cannot be shifted from “P” range position unless the ignition switch is turned to “ON” and brake pedal is depressed. Also, ignition key cannot be pulled out of key hole unless selector lever is in “P”. These mechanism are as follows.



1. Ignition switch
2. Stop lamp switch
3. Brake pedal
4. Selector lever
5. Transmission range switch
6. Interlock cable
7. Select cable
8. Shift lock solenoid
9. Interlock cam

When selector lever is shifted to P and its knob button is released.

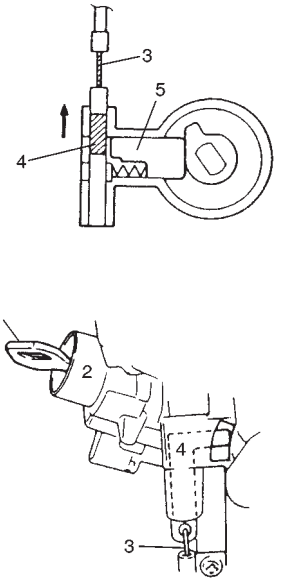


1. Ignition key
2. Ignition switch
3. Interlock cable
4. Release shaft
5. Lock lever

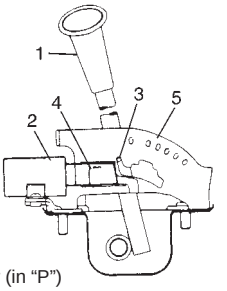
STEERING LOCK

When selector lever is in position other than “P”, lock lever interrupts key cylinder to turn to “LOCK” position, thus steering is kept to be operated free. However, when selector lever is shifted in “P”, lock lever is released, thus allowing ignition key to be removed and then steering is locked.

When selector lever is shifted to any range other than P or when selector lever knob button is pushed at P.



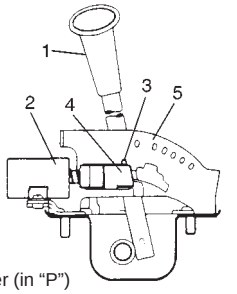
1. Ignition key
2. Ignition switch
3. Interlock cable
4. Release shaft
5. Lock lever



1. Selector lever (in "P")
2. Shift lock solenoid
3. Detent pin
4. Lock plate
5. Detent plate

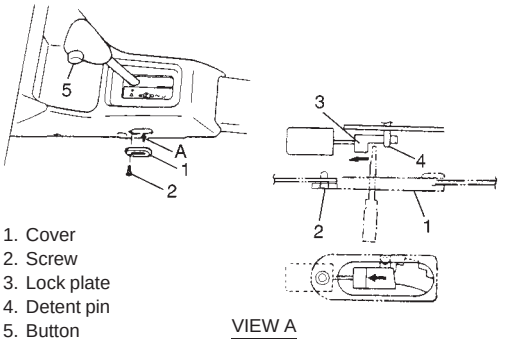
SHIFT LOCK SOLENOID

When the select lever is in "P" range, the ignition key position is "ON" and depressing the brake pedal cause the electric current to flow to the solenoid. As the lock plate is drawn toward the solenoid in this state, it frees the detent pin, which then allows the select lever to be shifted from "P" range to any other position.



1. Selector lever (in "P")
2. Shift lock solenoid
3. Detent pin
4. Lock plate
5. Detent plate

Even when the select lever is in "P" range, if the ignition key position is "LOCK" or "ACC" or the brake pedal is not depressed, the electric current does not flow to the solenoid. In this state, the lock plate is pushed away from the solenoid by spring force and it obstructs the detent pin movement. Thus the select lever button does not work even when pressed and the select lever shift is prevented.



1. Cover
2. Screw
3. Lock plate
4. Detent pin
5. Button

VIEW A

MANUAL RELEASE PROCEDURE FOR SHIFT LOCK SOLENOID

Shift lock solenoid can be manually released by the following procedure.

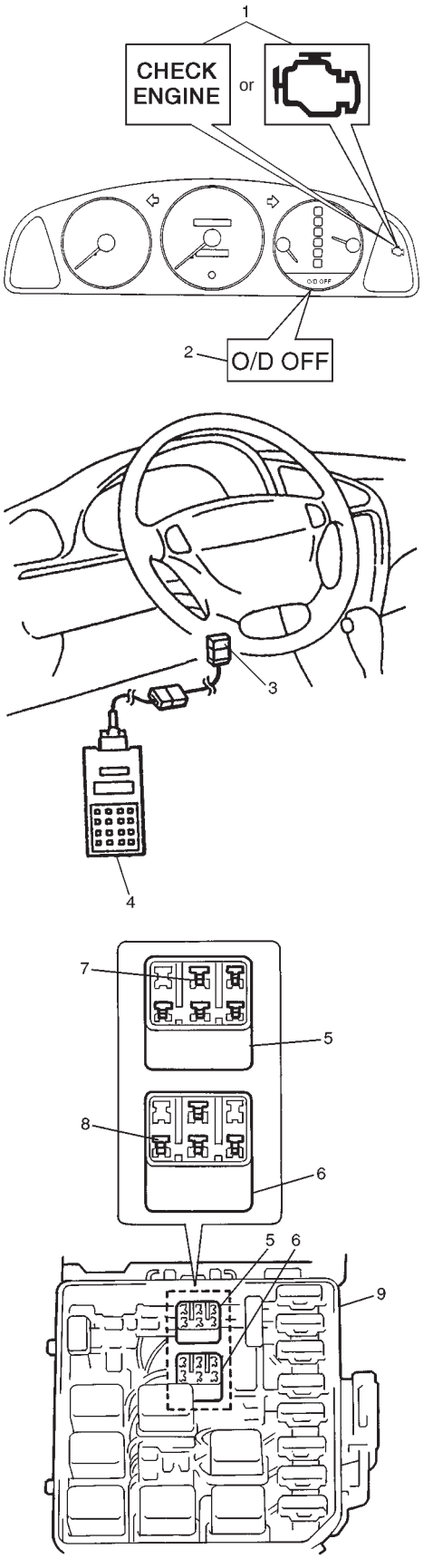
1) Remove access hole cover by unfastening screw.
2) Turn ignition key to "ACC" position and move lock plate toward front side of vehicle by using screw driver or the like until detent pin becomes free.
3) In this state, selector lever can be moved to any range or position regardless of brake pedal operation.

DIAGNOSIS

GENERAL DESCRIPTION

This vehicle is equipped with an electronic transmission control system, which controls the automatic shift up and shift down timing, TCC operation, etc. suitably to vehicle driving conditions.
TCM has an On-Board Diagnosis System which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission.
When diagnosing a trouble in transmission including this system, be sure to have full understanding of the outline of “ON-BOARD DIAGNOSTIC SYSTEM” and each item in “PRECAUTION IN DIAGNOSING TROUBLE” and execute diagnosis according to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” given below to obtain correct result smoothly.

NOTE:
There are two types of ON-BOARD DIAGNOSTIC SYSTEM depending on vehicle specifications. The type of system for vehicle being serviced can be identified by whether equipped with WU-TWC or not. Identify vehicle referring to “IDENTIFICATION WHETHER VEHICLE EQUIPPED WITH WU-TWC OR NOT” in Section 0A.



1. MIL
2. "O/D OFF" lamp
3. DLC
4. SUZUKI scan tool
5. Monitor connector No.2
6. Monitor connector No.1
7. Diagnosis switch terminal
8. Ground terminal
9. Relay/Fuse box

ON-BOARD DIAGNOSTIC SYSTEM

[For vehicle with WU-TWC]

For automatic transmission control system, TCM has following functions.

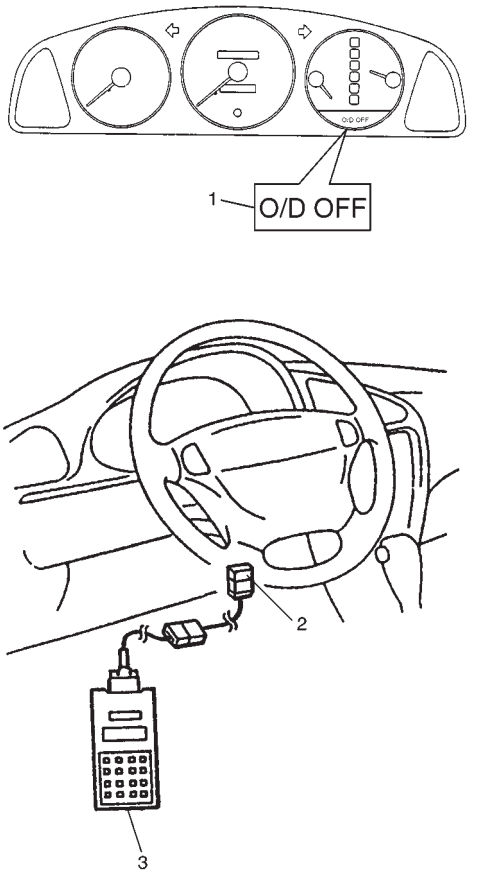
- ○ When ignition switch is turned ON with O/D off switch turned OFF and no malfunction in A/T control system is detected, "O/D OFF" lamp lights for about 2 sec. after ignition switch is turned ON and then goes OFF for bulb check. If O/D off switch is ON at this time, however, "O/D OFF" lamp remains ON to let driver known that gear is not shifted to overdrive gear (4th gear).
- ○ When TCM detects a malfunction in A/T control system, it flashes "O/D OFF" lamp except DTC P1895 and P0710, stores malfunction DTC and at the same time transmits DTC of that malfunction to ECM. (Based on this signal, ECM turns ON malfunction indicator lamp (MIL) and stores DTC/freeze frame data then in its memory.)
- ○ If no malfunction is detected after detecting above malfunction, TCM immediately turns off flashing " O/D OFF" lamp and halts to transmit DTC of that malfunction to ECM, however, DTC stored in TCM memory will remain. If ECM receives no DTC of malfunction for 3 driving cycles continuously, it turns OFF MIL although DTC stored in ECM memory will also remain.
- ○ It is possible to communicate with ECM and/or TCM through data link connector (DLC) by using SUZUKI scan tool (Tech-1). (Diagnostic information can be checked and erased by using a scan tool.)
- ○ It is also possible to check DTC stored in TCM memory by flashing of " O/D OFF" lamp with diagnosis switch terminal of monitor connector No.2, which is located in relay/fuse box, grounded. If no malfunction DTC is stored in TCM memory, DTC No.12 is outputted repeatedly. If one or more DTCs are stored in TCM memory, they are outputted starting from smallest code number in increasing order. After all DTCs are outputted, all DTCs are outputted repeatedly.

2 Driving Cycle Detection Logic

When a malfunction is detected during initial driving cycle, it is stored in TCM memory and at the same time TCM transmits a data to inform ECM of malfunction occurrence. At this time, ECM stores a corresponding pending DTC in its memory. (Neither lighting of MIL nor flashing of "O/D OFF" lamp takes place then.) If the same malfunction is also detected in next driving cycle, TCM flashes "O/D OFF" lamp and ECM lights MIL when it receives a data informing occurrence of a malfunction from TCM.

Freeze Frame Data

Refer to Section 6-1 or 6-2 for details.



1. "O/D OFF" lamp
2. DLC
3. SUZUKI scan tool
4. Monitor connector No.2
5. Monitor connector No.1
6. Diagnosis switch terminal
7. Ground terminal
8. Relay/Fuse box

[For vehicle without WU-TWC]

For automatic transmission control system, TCM has following functions.

- ○ When ignition switch is turned ON with O/D off switch turned OFF and no malfunction in A/T control system is detected, "O/D OFF" lamp lights for about 2 sec. after ignition switch is turned ON and then goes OFF for bulb check. If O/D off switch is ON at this time, however, "O/D OFF" lamp remains ON to let driver known that gear is not shifted to overdrive gear (4th gear).
- ○ When TCM detects a malfunction in A/T control system, it flashes "O/D OFF" lamp.
- ○ It is possible to communicate with TCM through data link connector (DLC) by using SUZUKI scan tool (Tech-1).
  (Diagnostic information can be checked and erased by using a scan tool except DTC No.27, 36 and 38.)
- ○ It is also possible to check DTC stored in TCM memory by flashing of " O/D OFF" lamp with diagnosis switch terminal of monitor connector No.2, which is located in relay/fuse box, grounded. If no malfunction DTC is stored in TCM memory, DTC No.12 is outputted repeatedly. If one or more DTCs are stored in TCM memory, they are outputted starting from smallest code number in increasing order. After all DTCs are outputted, all DTCs are outputted repeatedly.

PRECAUTION IN DIAGNOSING TROUBLE

○ Don't disconnect couplers form TCM and/or ECM, battery cable from battery, TCM and/or ECM ground wire harness from engine or main fuse before checking the diagnosis information (DTC, freeze frame data, etc.) stored in TCM and/or ECM memory.
Such disconnection will clear memorized information in TCM and/or ECM memory.

○ Using SUZUKI scan tool (Tech-1) the diagnostic information stored in ECM memory can be checked and cleared as well. Before its use, be sure to read Operator's (instruction) Manual supplied with it carefully to have good understanding of its functions and usage.

○ DTC stored in TCM can not be cleared by using ECM application of SUZUKI scan tool (Tech-1) in mass storage cartridge. Be sure to follow "DIAGNOSTIC TROUBLE CODE CLEARANCE" in this section when cleaning it.

○ Priorities for diagnosing troubles
If two or more diagnostic trouble codes (DTCs) are stored, proceed to flow table (chart) of DTC which was detected earliest in order and follow instruction in that table (chart).
If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.

1. Diagnostic trouble codes (DTCs) other than DTC P0171/P0172 (Fuel system too lean/too rich), DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected) and DTC P0400 (EGR flow malfunction)
2. DTC P0171/P0172 (Fuel system too lean/too rich) and DTC P0400 (EGR flow malfunction)
3. DTC P0300/P0301/P0302/P0303/P0304 (Misfire detected)

○ Be sure to read "PRECAUTION FOR ELECTRICAL CIRCUIT SERVICE" in Section 0A before inspection and observe what is written there.

○ TCM and/or ECM replacement
When substituting a known-good TCM and/or ECM, check for following conditions.
Neglecting this check may result in damage to good TCM and/or ECM.

– All relays and actuators have resistance of specified value.
– MAF sensor, TP sensor and fuel tank pressure sensor (if equipped) are in good condition. Also, the power circuit of these sensors is not shorted to the ground.

AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE

Refer to the following pages for the details of each step.

STEP	ACTION	YES	NO
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed according to instruction on the next page?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC (including pending DTC) referring to the next page. Is there any DTC(s)?	1) Print DTC and freeze frame data or write them down and clear them by referring to "DTC CLEARANCE" in this section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the next page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC CHECK" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to "DTC CHECK" in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 10.
8	Automatic Transmission Basic Inspection and Symptom-To-Diagnosis Table 1) Check and repair according to "A/T BASIC CHECK" and "TROUBLE DIAGNOSIS TABLE" in this section. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Troubleshooting for DTC 1) Check and repair according to applicable DTC flow Table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

1. CUSTOMER COMPLAINT ANALYSIS (See CUSTOMER PROBLEM INSPECTION FORM)

Record details of the problem (failure, complaint) and how it occurred as described by the customer.
For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK, RECORD AND CLEARANCE

First, referring to "DTC CHECK" in this section, check DTC (including pending DTC). If DTC exists, print or write down DTC and freeze frame data and then clear malfunction DTC(s) by referring to "DTC CLEARANCE" in this section. Malfunction DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.
Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in an faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

3 and 4. VISUAL INSPECTION

As a preliminary step, be sure to perform visual check of the items that support proper function of the engine and automatic transmission referring to "VISUAL INSPECTION" in this section.

5. TROUBLE SYMPTOM CONFIRMATION

Check trouble symptoms based on information obtained in Step 1 CUSTOMER COMPLAINT ANALYSIS and Step 2 DTC/FREEZE FRAME DATA CHECK.

6 and 7. RECHECKING AND RECORD OF DTC/FREEZE FRAME DATA

Refer to "DTC CHECK" in this section for checking procedure.

8. AUTOMATIC TRANSMISSION BASIC CHECK AND TROUBLE DIAGNOSIS TABLE

Perform basic check of A/T according to "AUTOMATIC TRANSMISSION BASIC CHECK FLOW TABLE" first. When the end of the flow table has been reached, check the parts of the system suspected as a possible cause referring to "TROUBLE DIAGNOSIS TABLE" and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or A/T basic check) and repair or replace faulty parts, if any.

9. DIAGNOSTIC TROUBLE CODE FLOW TABLE (See each DTC Flow Table)

Based on the DTC indicated in Step 6/7 and referring to "DIAGNOSTIC TROUBLE CODE FLOW TABLE" in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, TCM or other part and repair or replace faulty parts.

10. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A and related circuit of DTC recorded in Step 2.

11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the vehicle is free from any abnormal conditions.
If what has been repaired is related to the malfunction DTC, clear the DTC once and check to ensure that no malfunction DTC is indicated.

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

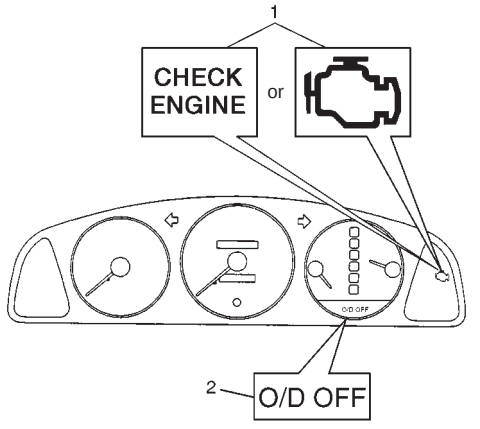
User name:	Model:	VIN:	
Date of issue:	Date of Reg.:	Date of problem:	Mileage:

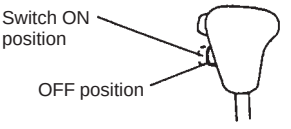
PROBLEM SYMPTOMS
© Vehicle does not move (R, D, 2, L or any range)
© No upshift automatically (© 1st to 2nd © 2nd to 3rd © 3rd to 4th (O/D) © 2 range © D range)
© No downshift automatically (© 3rd to 2nd © 2nd to 1st © 4th (O/D) to 3rd © 2 range © D range)
© No gear change manually (© 1st × 3rd © 3rd × 4th)
© TCC no lock-up © TCC no lock-up off
© Automatic shift point too high or too low
© Excessive gear change shock (1st/2nd/3rd/4th (O/D)/Reverse)
© No kickdown
© Transmission slipping in (1st/2nd/3rd/4th (O/D)/Reverse)
© Others _____

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental Condition	
Weather Temperature Frequency Road	© Fair © Cloudy © Rain © Always © Other _____ (℉/ ℃) © Hot © Warm © Cool © Cold © always © Always © Sometimes (times/ day, month) © Only once © Under certain condition © Urban © Suburb © Highway © Mountainous © Uphill © Downhill © Tarmacadam © Gravel © Other _____
Vehicle Condition	
Engine & transmission condition	© Cold/ © Warming up phase/ © Warmed up Engine speed (r/min.) Throttle opening (© Idle/ © About % © full) O/D cut switch (© ON/ © OFF)
Vehicle condition	© At stop/ © During driving (© Constant speed © Accelerating © Decelerating © Braking) © Right hand corner © Left hand corner © Vehicle speed (km/h Mile/h) © Other _____

"O/D OFF" lamp	© Blink © DTC indicated © Always ON © Sometimes ON © Always OFF © Good condition
Malfunction indicator lamp	© Blink © Always ON © Sometimes ON © Always OFF © Good condition
Diagnostic trouble code	First check: © No code © Malfunction code ( )
	Second check: © No code © Malfunction code ( )

NOTE:
The above form is a standard sample. It should be modified according to conditions characteristic of each market.





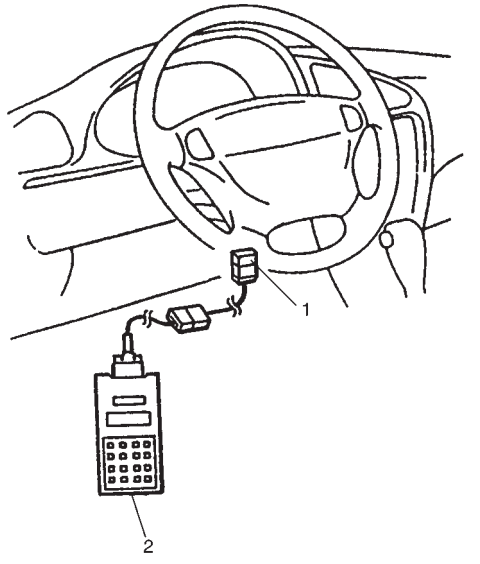
1. MIL
2. "O/D OFF" lamp

MALFUNCTION INDICATOR LAMP (MIL) CHECK

Refer to the same item in Section 6-1 or 6-2 for checking procedure.

"O/D OFF" LAMP CHECK

1) Check that O/D off switch button is at OFF position (pushed).
2) Turn ON ignition switch.
3) Check that "O/D OFF" lamp lights for about 2 sec. and then goes OFF.
   If anything faulty is found, advance to "DIAGNOSTIC FLOW TABLE A-1", "DIAGNOSTIC FLOW TABLE A-2" or "DIAGNOSTIC FLOW TABLE A-3".



1. DLC
2. SUZUKI scan tool

DIAGNOSTIC TROUBLE CODE (DTC) CHECK

A/T DTC can be checked using any one of the following 3 methods.

A. Reading DTC from ECM using SUZUKI scan tool with mass storage cartridge.
   – For more information on this method, refer to the same item in Section 6-1 or 6-2.

NOTE:
Method "A" is available only for vehicle with WU-TWC.

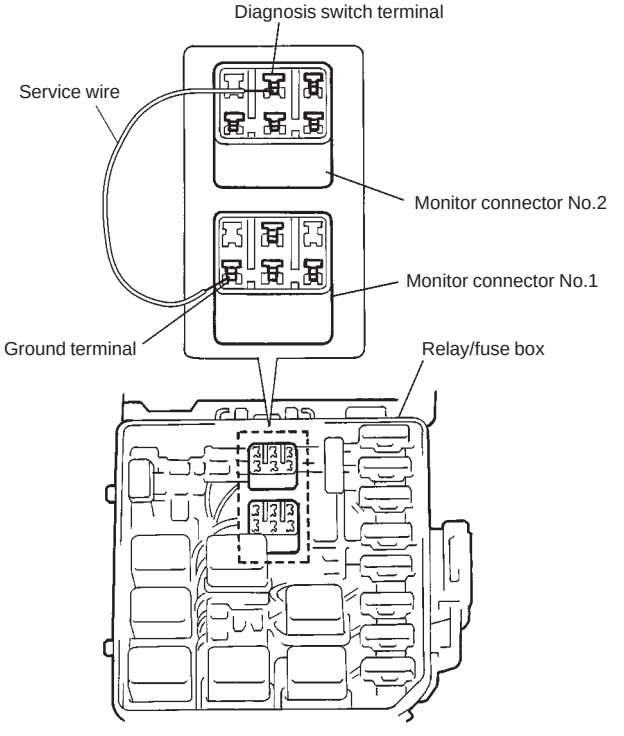
B. Reading DTC from TCM by using SUZUKI scan tool with mass storage cartridge.
   1) Set mass storage cartridge to scan tool and connect scan tool to DLC with ignition switch OFF.
   2) Turn ignition switch ON.
   3) Read DTC according to instructions displayed on scan tool and print it or write it down. Refer to scan tool operator's manual for further details.
   4) After computing the check, turn ignition switch off and disconnect scan tool from DLC.

C. Identifying flashing pattern of "O/D OFF" lamp.
   – Refer to flow table for "DTC CHECK USING "O/D OFF" LAMP".

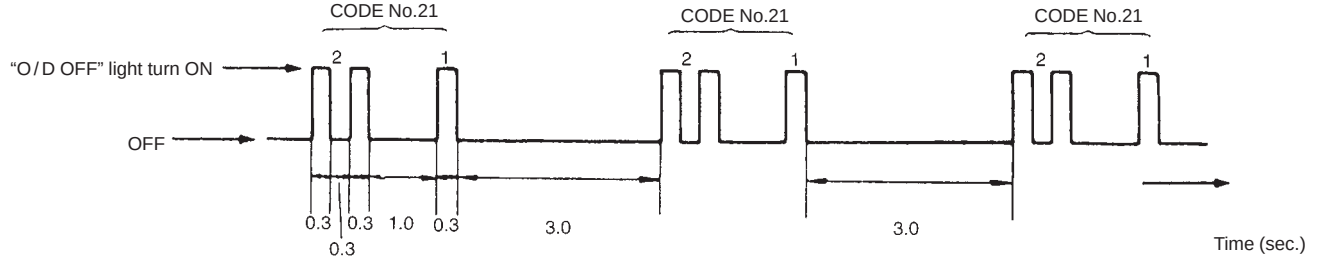
DIAGNOSTIC TROUBLE CODE (DTC) CHECK USING "O/D OFF" LAMP

STEP	ACTION	YES	NO
1	Check "O/D OFF" Lamp for Operation. 1) Check that O/D off switch is turned OFF. (Switch button is pushed). 2) Turn ignition switch ON. Does "O/D OFF" lamp light for about 2 sec. and then go OFF?	Go to Step 2.	Go to Step 3.
2	Check "O/D OFF" Lamp for Blinking Pattern. 1) Using service wire, connect A/T diag. switch terminal of monitor connector No.2 to ground terminal of monitor connector No.1. See Fig. Is DTC indicated as shown in DTC table?	Write all malfunction DTC down.	Check diagnosis switch terminal circuit for open. If wire and connections are OK, substitute a known-good TCM and recheck.
3	Does "O/D OFF" lamp come ON?	Go to Step 4.	Go to Table A-1.
4	Does "O/D OFF" lamp come ON steadily?	Go to Table A-2.	Go to Table A-3.

Fig.1 for Step 2



EXAMPLE OF "O/D OFF" LAMP BLINKING PATTERN: SHIFT SOLENOID-A (No.1) ELECTRICAL (DTC No.21)



If two or more malfunction DTCs are stored, "O/D OFF" lamp indicates applicable DTC three times each from the smallest DTC number in the increasing order and they are repeated.

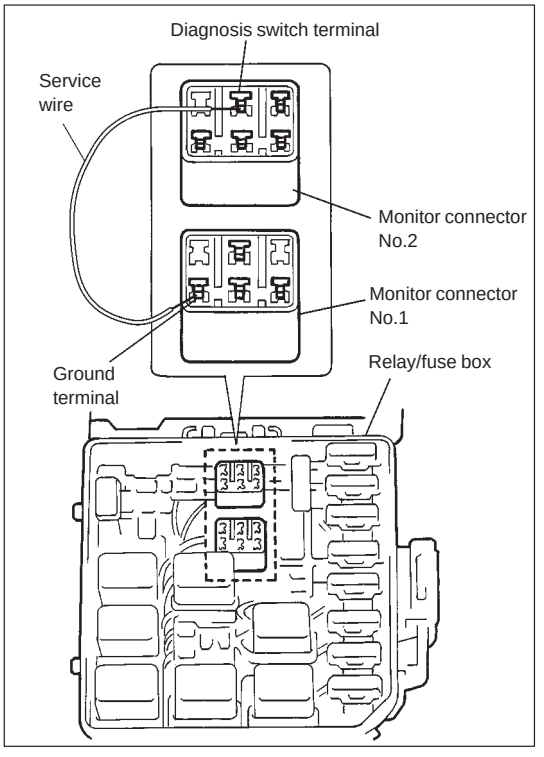
DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

As A/T DTC is stored in memory of ECM and TCM respectively, be sure to clear it from both ECM and TCM by using either method “A” and “B” or “A” and “C” of the following 3 methods.

NOTE:
For vehicle without WU-TWC, method “A” is not necessary to be performed, because A/T DTC is not stored in memory of ECM.

A. To clear DTC stored in ECM
   – Refer to DTC clearance in Section 6-1 for clearance procedure.

B. To clear DTC stored in TCM using SUZUKI scan tool
   1) Turn ignition switch OFF.
   2) Set mass storage cartridge to SUZUKI scan tool and connect scan tool to DLC.
   3) Turn ignition switch ON.
   4) Clear DTC according to instructions displayed on scan tool.



C. To clear DTC stored in TCM without scan tool
   1) Turn ignition switch OFF.
   2) Turn ignition switch ON.
   3) After 6 sec. or more, repeat shorting and opening between diagnosis switch terminal and ground terminal 5 times at about 1 sec. intervals within 10 sec., using service wire.
   4) Check TCM that no malfunction DTC remains in memory of it.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

A: Using scan tool for vehicle with WU-TWC
B: Using scan tool for vehicle without WU-TWC and not using scan tool
C: Driving cycles when MIL lighting and "O/D OFF" lamp flashing for vehicle with WU-TWC
D: Driving cycles when "O/D OFF" lamp flashing for vehicle without WU-TWC (MIL lighting is not applicable to vehicle without WU-TWC)

DTC NO.		DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	C	D
A	B				
P0705	34	Transmission range sensor circuit malfunction	"D" and another range signals are inputted simultaneously. No signal is inputted while running at higher than specified vehicle speed.	1 driving cycle	*3 1 driving cycle
P0710	*1 36	Transmission fluid temperature sensor circuit malfunction	Voltage at sensor terminal of TCM is high. (sensor circuit open)	*3 2 driving cycles	*3 2 driving cycles
	*1 38		Voltage at sensor terminal of TCM is low. (sensor circuit shorted to ground)		
P0715	37	Input/Turbine speed sensor (forward clutch cylinder revolution sensor) circuit malfunction	No sensor signal is inputted while output speed sensor (A/T VSS) signal is inputted.	1 driving cycle	1 driving cycle
P0720	31	Output speed sensor (A/T VSS) circuit malfunction	No sensor signal is inputted while input shaft speed sensor (forward clutch cylinder revolution sensor) signal is inputted.	1 driving cycle	1 driving cycle
P0725	*2 35	Engine speed input circuit malfunction	No engine speed signal is inputted while engine running. (engine coolant temp. signal is inputted properly)	2 driving cycles	Not applicable
P0741	*2 29	Torque converter clutch system performance or stuck off	TCC is not locked up while TCC solenoid ON is commanded. TCC is locked up while TCC solenoid OFF is commanded.	2 driving cycles	Not applicable
P0743	25	Torque converter clutch system electrical	Voltage at solenoid terminal of TCM is high while solenoid OFF is commanded. (solenoid circuit open)	1 driving cycle	1 driving cycle
	26		Voltage at solenoid terminal of TCM is low while solenoid ON is commanded. (solenoid circuit shorted to ground)		
P0745	41	Pressure control solenoid malfunction	No electric current flows. (circuit open)	1 driving cycle	1 driving cycle
	42		Excessive electric current flows. (circuit short)		
P0751	*2 17	Shift solenoid-A (No.1) performance or stuck off	Actual gear position (ratio) does not agree with gear position (2nd or 3rd) commanded from TCM to A/T.	2 driving cycles	Not applicable
P0753	21	Shift solenoid-A (No.1) electrical	Voltage at solenoid terminal of TCM is high while solenoid OFF is commanded. (solenoid circuit open)	1 driving cycle	1 driving cycle
	22		Voltage at solenoid terminal of TCM is low while solenoid ON is commanded. (solenoid circuit shorted to ground)		
P0756	*2 28	Shift solenoid-B (No.2) performance or stuck off	Actual gear position (ratio) does not agree with gear position (3rd or 4th) commanded from TCM to A/T.	2 driving cycles	Not applicable

A: Using scan tool for vehicle with WU-TWC
B: Using scan tool for vehicle without WU-TWC and not using scan tool
C: Driving cycles when MIL lighting and "O/D OFF" lamp flashing for vehicle with WU-TWC
D: Driving cycles when "O/D OFF" lamp flashing for vehicle without WU-TWC (MIL lighting is not applicable to vehicle without WU-TWC)

DTC NO.		DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	C	D
A	B				
P0758	23	Shift solenoid-B (No.2) electrical	Voltage at solenoid terminal of TCM is high while solenoid OFF is commanded. (solenoid circuit open)	1 driving cycle	1 driving cycle
	24		Voltage at solenoid terminal of TCM is low while solenoid ON is commanded. (solenoid circuit shorted to ground)		
P1700	32	Throttle position signal circuit	ON (0 V) time of pulse signal from ECM to TCM is shorter than specified time. (signal circuit open)	1 driving cycle	1 driving cycle
	33		ON (0 V) time of pulse signal from ECM to TCM is longer than specified time. (signal circuit shorted to ground)		
P1702	*2 52	Internal control module memory	Incorrect calculations of checking programmed data are indicated.	1 driving cycle	1 driving cycle
P1705	51	Engine coolant temperature signal circuit	High voltage (signal circuit open) or low voltage (signal circuit shorted to ground) while engine is running.	1 driving cycle	1 driving cycle
P1895	*1 27	Torque reduction signal circuit	Voltage at torque reduction signal circuit terminal of TCM is low while torque reduction signal OFF is commanded. (torque reduction signal circuit open or shorted to ground)	*3 1 driving cycle	*3 1 driving cycle

NOTE:
***1: DTC No. can not be read with SUZUKI scan tool.**
***2: Detecting of trouble (and DTC) is not applicable for vehicle without WU-TWC.**
***3: MIL does not light and also "O/D OFF" lamp does not flash although DTC is detected and stored at 1 or 2 driving cycles.**

VISUAL INSPECTION

Visually check the following parts and systems.

INSPECTION ITEM	REFERRING SECTION
○A/T fluid – – – – – level, leakage, color	Section 0B
○A/T fluid hoses – – – – – disconnection, looseness, deterioration	Section 7B1
○Throttle cable – – – – – play (under warm engine), installation	Section 6E1, 6E2, 6E3 or 6E4
○A/T select cable – – – – – installation	Section 7B1
○Engine oil – – – – – level, leakage	Section 0B
○Engine coolant – – – – – level, leakage	Section 0B
○Battery – – – – – indicator condition, corrosion of terminal	
○Connectors of electric wire harness – – – – – disconnection, friction	Section 6E1, 6E3, 6-1 or 6-2
○Fuses – – – – – burning	Section 8
○Parts – – – – – installation, damage	
○Bolt – – – – – looseness	
○Other parts that can be checked visually	
Also check the following items at engine start, if possible.	
○"O/D OFF" lamp	
○Malfunction indicator lamp	Section 6E1, 6E3, 6-1 or 6-2
○Charge warning lamp	Section 6H
○Engine oil pressure warning lamp — Operation	Section 8 (Section 6A1 or 6A3 for pressure check)
○Engine coolant temp. meter	
○Other parts that can be checked visually	

AUTOMATIC TRANSMISSION BASIC CHECK

This check very important for troubleshooting when TCM and ECM has detected no malfunction DTC and no abnormality has been found in visual inspection. Follow the flow table carefully.

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check A/T Fluid. Warm transmission to normal operating temperature and check fluid level and contamination referring to “Fluid Level Check” in this section. Is it in good condition?	Go to Step 3	Add or change fluid.
3	Check Select Cable for Adjustment referring to “SELECT CABLE ADJUSTMENT” in this section. Is it adjusted correctly?	Go to Step 4.	Adjust.
4	Check Transmission Range Sensor Circuit for Operation referring to “TRANSMISSION RANGE SENSOR CIRCUIT CHECK” in this section. Is check result satisfactory?	Go to Step 5.	Go to Step 3 of DTC P0705 Flow Table.
5	Check Engine Idle Speed referring to “IDLE SPEED/IAC DUTY INSPECTION” in Section 6E1, 6E2, 6E3 or 6E4. Is it specified speed?	Go to Step 6.	Inspect idle air control system referring to Section 6E1, 6E3, 6-1 or 6-2.
6	Perform Manual Road Test referring to “MANUAL ROAD TEST” in this section. Is check result satisfactory?	Go to Step 7.	Go to Step 9.
7	Perform Engine Brake Test referring to “ENGINE BRAKE TEST” in this section. Is check result satisfactory?	Go to Step 8.	Go to “TROUBLE DIAGNOSIS TABLE-3” in this section.
8	Perform “P” Range Test referring to ““P” RANGE TEST” in this section. Is check result satisfactory?	Go to “TROUBLE DIAGNOSIS TABLE-1, -2 AND -3” in that order.	Parking lock pawl and/or spring malfunction.
9	Perform “TIME LAG TEST”, “STALL TEST” and “LINE PRESSURE TEST” referring to each applicable item in this section. Are all check results satisfactory?	Go to “TROUBLE DIAGNOSIS TABLE-2” and then “TROUBLE DIAGNOSIS TABLE-3”.	Repair or replace malfunction parts.

TROUBLE DIAGNOSIS TABLE

Perform troubleshooting referring to the following tables, according to “AUTOMATIC TRANSMISSION BASIC FLOW TABLE” when ECM and TCM have detected no malfunction DTC and no abnormality has been found in visual inspection. This section has 3 tables, Table-1 (Electrical circuit diagnosis table), Table-2 (Valve mechanism diagnosis table), Table-3 (Clutches, brake, etc. diagnosis table). If malfunction part is not found in Table-1, proceed to Table-2 and then Table-3.

TROUBLE DIAGNOSIS TABLE-1

Condition		Possible Cause	Correction
No up-shift	1st 2nd 2nd 3rd	○ Throttle position sensor or its circuit faulty ○ Shift solenoid No.1 (2nd 3rd), No.2 (1st 2nd) or its circuit faulty ○ ECM faulty	Refer to throttle position sensor in Section 6E1, 6E3, 6-1 or 6-2. Repair or replace. Refer to “ECM AND ITS CIRCUIT CHECK” in Section 6E1, 6E3, 6-1 or 6-2.
	3rd 4th	○ Engine coolant temperature sensor or its circuit faulty ○ Throttle position sensor or its circuit faulty ○ Shift solenoid No.2 or its circuit faulty ○ “O/D OFF” switch and/or “O/D OFF” indicator light circuit faulty ○ ECM	Refer to “ECT SENSOR” in Section 6E1, 6E2, 6E3 or 6E4. Refer to “THROTTLE POSITION SENSOR” in Section 6E1, 6E2, 6E3 or 6E4. Repair or replace. Refer to “DIAGNOSTIC TROUBLE CODE(S) CHECK” in this section. Refer to “ECM AND ITS CIRCUIT CHECK” in Section 6E1, 6E3, 6-1 or 6-2.
No down-shift	4th 3rd 3rd 2nd 2nd 1st	○ Shift solenoid No.1 (3rd 2nd), No.2 (4th 3rd, 2nd 1st) or its circuit faulty ○ Mode selector switch and/or mode indicator lights circuit faulty ○ Throttle position sensor or its circuit faulty ○ ECM	Repair or replace. Repair or replace. Refer to “THROTTLE POSITION SENSOR” in Section 6E1, 6E2, 6E3 or 6E4. Refer to “ECM AND ITS CIRCUIT CHECK” in Section 6E1, 6E3, 6-1 or 6-2.
No lock-up or No lock-up OFF		○ TCC solenoid valve or its circuit faulty ○ Throttle position sensor or its circuit faulty ○ Engine coolant temperature sensor or its circuit faulty ○ Brake light switch circuit faulty ○ ECM	Repair or replace. Refer to “THROTTLE POSITION SENSOR” in Section 6E1, 6E2, 6E3 or 6E4. Refer to “ECT SENSOR” in Section 6E1, 6E2, 6E3 or 6E4. Repair or replace. Refer to “ECM AND ITS CIRCUIT CHECK” in Section 6E1, 6E3, 6-1 or 6-2.
Shift point too high or too low		○ Throttle position sensor or its circuit faulty	Refer to “THROTTLE POSITION SENSOR” in Section 6E1, 6E2, 6E3 or 6E4.
Vehicle does not move.		○ Throttle pressure control solenoid or its circuit faulty ○ Shift solenoid No.1 or its circuit faulty	Repair or replace. Repair or replace.
Excessive slip		○ Throttle pressure control solenoid or its circuit faulty	Repair or replace.
Excessive shock at N D or N R		○ Throttle position sensor or its circuit faulty ○ Brake light switch or its circuit faulty ○ Throttle pressure control solenoid or its circuit faulty	Refer to “THROTTLE POSITION SENSOR” in Section 6E1, 6E2, 6E3 or 6E4. Repair or replace. Repair or replace.

TROUBLE DIAGNOSIS TABLE-2

Condition		Possible Cause	Correction
Vehicle does not move at any range.		○ Manual valve faulty ○ Primary regulator valve faulty	Clean or replace. Clean or replace.
No gear change	1st ↔ 2nd	○ 1 – 2 shift valve faulty	Clean or replace.
	2nd ↔ 3rd	○ 2 – 3 shift valve faulty	Clean or replace.
	3rd ↔ 4th	○ 3 – 4 shift valve faulty	Clean or replace.
Harsh engagement	P, N R	○ Reverse clutch accumulator faulty	Clean or replace.
	N D	○ Forward clutch accumulator faulty ○ 2nd and 4th brake accumulator faulty ○ 2nd and 4th brake modulator valve faulty ○ 2nd and 4th brake modulator control valve faulty	Clean or replace. Clean or replace. Clean or replace. Clean or replace.
	1st 2nd at D or 2nd range	○ 2nd and 4th brake accumulator faulty ○ 2nd and 4th brake modulator valve faulty ○ 2nd and 4th brake modulator control valve faulty	Clean or replace. Clean or replace. Clean or replace.
	2nd 3rd at D range	○ Overdrive clutch accumulator faulty ○ 2 – 3 timing valve faulty	Clean or replace. Clean or replace.
	3rd 4th at D range	○ 2nd and 4th brake accumulator faulty ○ 2nd and 4th brake modulator valve faulty ○ 2nd and 4th brake modulator control valve faulty	Clean or replace. Clean or replace. Clean or replace.
	All gear changes	○ Throttle pressure control valve faulty ○ Primary regulator valve faulty ○ Accumulator control valve faulty	Clean or replace. Clean or replace. Clean or replace.
No lock-up		○ TCC modulator valve faulty ○ TCC control valve faulty ○ TCC control solenoid faulty ○ Secondary regulator valve faulty	Clean or replace. Clean or replace. Clean or replace. Clean or replace.
No lock-up OFF		○ TCC control solenoid faulty ○ TCC control valve faulty	Clean or replace. Clean or replace.
Excessive slip (low line pressure)		○ Throttle pressure control valve faulty ○ Primary regulator valve faulty	Clean or replace. Clean or replace.

TROUBLE DIAGNOSIS TABLE-3

Condition		Possible Cause	Correction
Vehicle does not move at	1st, 2nd, 3rd, 4th gear	○ Forward clutch faulty	Repair or replace.
	Reverse gear	○ Reverse clutch faulty	Repair or replace.
	3rd, 4th gear	○ Overdrive clutch faulty	Repair or replace.
	2nd, 4th gear	○ 2nd/4th brake faulty	Repair or replace.
	Reverse gear	○ 1st/Reverse brake faulty	Repair or replace.
	1st (D or 2) gear	○ One-way clutch No.1 faulty	Repair or replace.
	any forward and reverse gear	○ Parking lock pawl faulty	Repair or replace.
No lock-up, No lock-up OFF, shock when lock-up or engine stalls when starting off and stopping		○ Torque converter clutch faulty	Inspect and replace as necessary.
No up-shift	1st 2nd	○ 2nd/4th brake faulty	Repair or replace.
	2nd 3rd	○ Overdrive clutch faulty	Repair or replace.
	3rd 4th	○ 2nd/4th brake faulty	Repair or replace.
No engine braking	2nd or 3rd gear	○ Coast clutch faulty	Repair or replace.
	L range 1st gear	○ 1st/Reverse brake faulty	Repair or replace.

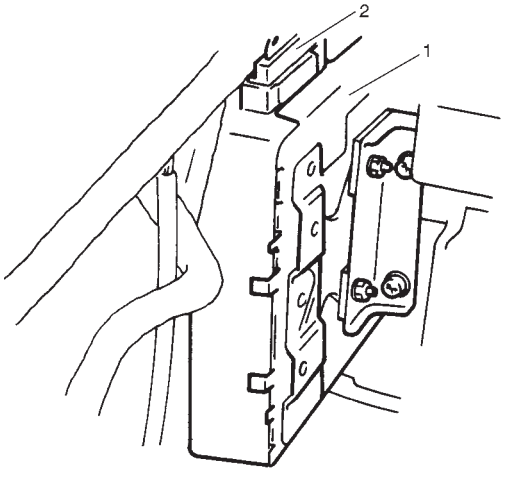
ROAD TEST

This test is to check if upshift and downshift take place at specified speeds while actually driving vehicle on a level road.

WARNING:
- ○ **Carry out test in very little traffic area to prevent an accident.**
- ○ **Test requires 2 persons, a driver and a tester.**

1) Warm up engine.
2) With engine running at idle, shift select “D”.
3) Accelerate vehicle speed by depressing accelerator pedal gradually.
4) While driving in “D” range, check if gear shift occurs properly as shown in Gear Shift Diagram. (Refer to “AUTOMATIC GEAR SHIFT DIAGRAM” in this section.)

Condition	Possible causes
When 1 → 2 upshift fails to occur	1 – 2 shift valve stuck
When 2 → 3 upshift fails to occur	2 – 3 shift valve stuck
When 3 → O/D upshift fails to occur	3 – 4 shift valve stuck
When gear shift point is incorrect	○ Maladjusted throttle cable ○ Defective solenoid valve No.1 – A or No.1 – B ○ 1 – 2, 2 – 3 or 3 – 4 shift valve not operating properly



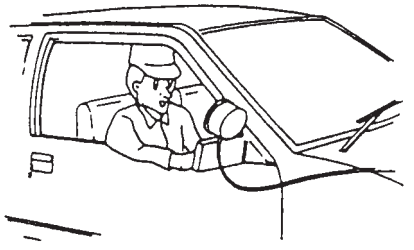
1. TCM
2. Coupler

MANUAL ROAD TEST

This test checks the gears being used in “L”, “2” or “D” range when driven with unoperated gear shift control system. Test drive vehicle on a level road.

NOTE:
Before this test, check diagnosis code.

1) With select lever in “P”, start engine and warm it up.
2) After warming up engine, disconnect couplers of TCM with ignition switch OFF.
3) With select lever in “L” range, start vehicle and accelerate to 20 km/h (12.5 mile/h). Check in this state that 1st gear is being used.
4) At 20 km/h (12.5 mile/h), shift select lever to 2 range and accelerate to 40 km/h (25 mile/h). Check in this state that 3rd gear is being used.
5) At 40 km/h (25 mile/h), shift select lever to D range and check that O/D gear is used when speed is higher than 40 km/h (25 mile/h).
6) After above checks, stop vehicle then engine, and connect TCM coupler with ignition switch OFF.



STALL TEST

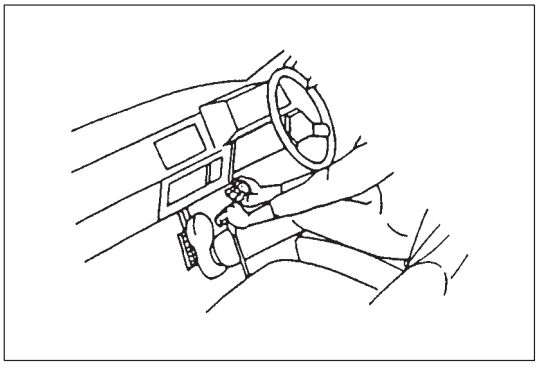
This test is to check overall performance of automatic transmission and engine by measuring stall speed at “D” and “R” ranges. Be sure to perform this test only when transmission fluid is at normal operating temperature and its level is between FULL and LOW marks.

CAUTION:
- **Do not run engine at stall more than 5 seconds continuously, for fluid temperature may rise excessively high.**
- **After performing stall test, be sure to leave engine running at idle for longer than 30 seconds before another stall test.**

1) Apply parking brake and block wheels.
2) Install tachometer.
3) Start engine with select lever shifted to “P”.
4) Depress brake pedal fully.
5) Shift select lever to “D” and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
6) Release accelerator pedal immediately after stall speed is checked.
7) In the same way, check stall speed in “R” range.
8) Stall speed should be within the following specification.

Stall speed: 2,280 – 2,610 rpm

Test result	Possible cause
Lower than standard level	○ Faulty engine output ○ Defective torque converter
Higher than standard level in “D” range	○ Low line pressure ○ Malfunctioning one-way clutch No.0 and/or coast clutch ○ Malfunctioning forward clutch ○ Malfunctioning one-way clutch No.1
Higher than standard level in “R” range	○ Low line pressure ○ Malfunctioning reverse clutch ○ Malfunctioning 1st/reverse brake



TIME LAG TEST

This test is to check conditions of clutch, reverse brake and fluid pressure. “Time lag” means time elapsed since select lever is shifted with engine idling till shock is felt.

1) With chocks placed before and behind front and rear wheels respectively, depress brake pedal.
2) Start engine.
3) With stop watch ready, shift select lever from “N” to “D” range and measure time from that moment till shock is felt.
4) Similarly measure time lag by shifting select lever from “N” to “R” range.

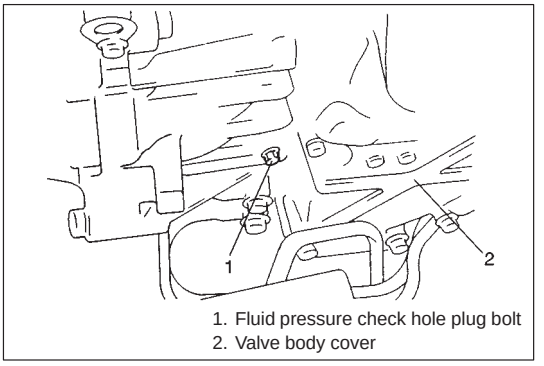
Specification for time lag	“N” → “D”	Less than 0.7 sec.
	“N” → “R”	Less than 1.2 sec.

NOTE:

○ **When repeating this test, be sure to wait at least minute after select lever is shifted back to “N” range.**

○ **Engine should be warmed up fully for this test.**

Test result	Possible cause
When “N” → “D” time lag exceeds specification	○ Low line pressure ○ Worn forward clutch
When “N” → “R” time lag exceeds specification	○ Low line pressure ○ Worn direct clutch ○ Worn 1st/reverse brake



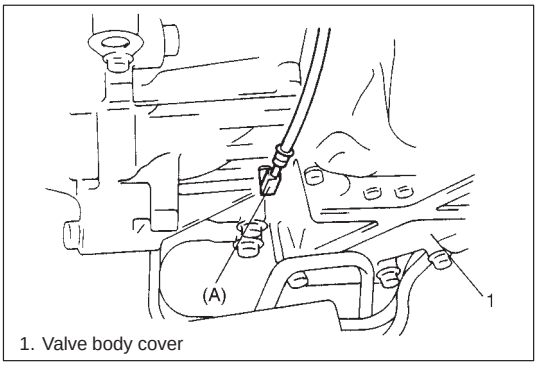
1. Fluid pressure check hole plug bolt
2. Valve body cover

LINE PRESSURE TEST

Purpose of this test is to check operating conditions of each part by measuring fluid pressure in fluid pressure line.

Line pressure test requires the following conditions.

- ○ Automatic fluid is at normal operating temperature (70 to 80°C/158 – 176°F).
- ○ Fluid is filled to proper level (between FULL and LOW on dipstick).



1. Valve body cover

1) Apply parking brake securely and place chocks against wheels.
2) Remove engine under cover at right side.
3) Remove fluid pressure check hole plug bolt.
4) Attach oil pressure gauge to fluid pressure check hole in transmission case.

Special Tool
(A): 09925-37811-001

> **CAUTION:**
> **After attaching oil pressure gauge, check that not fluid leakage exists.**

5) Depress foot brake fully, run engine at idle and stall and then check fluid pressure in “D” or “R” range.

> **CAUTION:**
> **Do not continue running engine at stall speed longer than 5 seconds.**

Engine running mode	Line pressure	
	“D” range	“R” range
At idle speed	3.6 – 4.2 kg/cm^2 52 – 60 psi	5.1 – 6.1 kg/cm^2 73 – 86 psi
At stall speed	11.0 – 12.8 kg/cm^2 156 – 182 psi	14.7 – 16.9 kg/cm^2 209 – 240 psi

Test result	Possible cause
Line pressure higher than standard level in each range	○ Malfunctioning pressure control solenoid valve ○ Malfunctioning primary regulator valve
Line pressure lower than standard level in each range	○ Malfunctioning pressure control solenoid valve ○ Malfunctioning primary regulator valve ○ Defective oil pump
Line pressure lower than standard level only in “D” range	Fluid leakage from “D” range pressure circuit
Line pressure lower than standard level only in “R” range	Fluid leakage from “R” range pressure circuit

ENGINE BRAKE TEST

WARNING:
Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

1) While driving vehicle in 3rd gear of “D” range, shift select lever down to “2” range and check if engine brake operates.
2) In the same way as in Step 1), check engine brake for operation when select lever is shifted down to “L” range.
3) Engine brake should operate in above test.

Test result	Possible cause
Fails to operate when shifted down to “2” range	2nd/4th brake defective
Fails to operate when shifted down to “L” range	1st/Reverse brake defective

“P” RANGE TEST

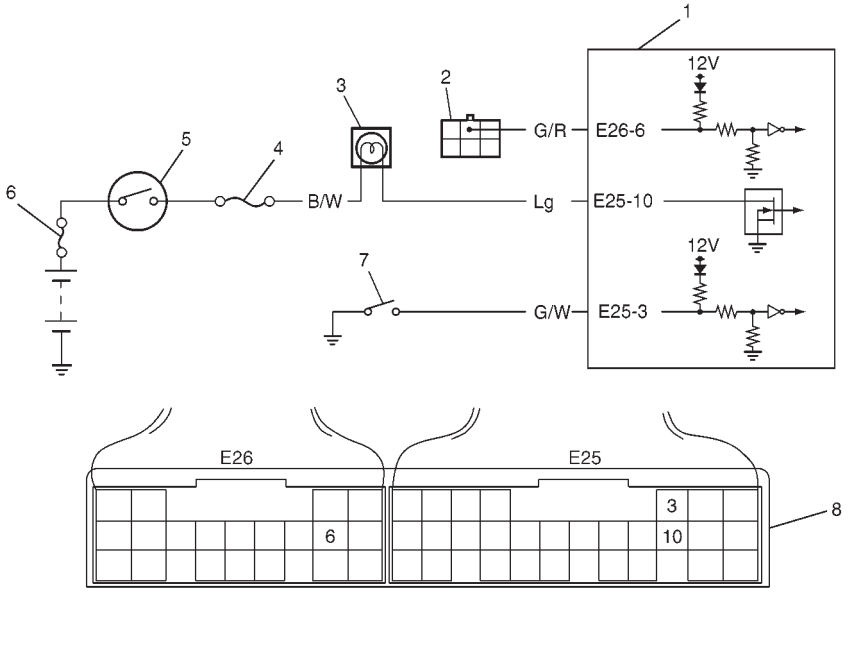
1) Stop vehicle on a slope, shift select lever to “P” range and at the same time apply parking brake.
2) After stopping engine, depress brake pedal and release parking brake.
3) Then, release brake pedal gradually and check that vehicle remains stationary.
4) Depress brake pedal and shift select lever to “N” range.
5) Then, release brake pedal gradually and check that vehicle moves.

WARNING:
Before test, check to make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

Test result	Possible cause
Vehicle moves at “P” range or remains stationary at “N” range	Defective parking lock pawl or spring

TABLE A-1 "O/D OFF" LAMP CIRCUIT CHECK (LAMP DOES NOT COME "ON" AT IGNITION SWITCH ON (BUT ENGINE AT STOP)

WIRING DIAGRAM



1. TCM
2. Monitor connector No.2
3. "O/D OFF" lamp
4. IG fuse
5. Ignition switch
6. Main fuse
7. O/D off switch
8. Terminal arrangement of TCM coupler (Viewed from harness side)

CIRCUIT DESCRIPTION

Operation (ON/OFF) of the "O/D OFF" lamp is controlled by transmission control module (TCM).
When the ignition switch is turned ON with the O/D cut switch OFF (switch button is pushed) and malfunction is not detected, TCM turns the "O/D OFF" lamp ON only for 2 sec. to check the bulb and turns it OFF.
When ignition switch is turned ON regardless of engine running or not and malfunction is detected, the "O/D OFF" lamp is blinked by TCM to warm the driver of such occurrence of trouble.
When diagnosis switch terminal is grounded by using service wire for DTC check, the "O/D OFF" lamp indicates DTC by flashing pattern.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Lamp Power Circuit Check 1) Turn ignition switch ON. Do other indicator/warning lamps in combination meter comes ON?	Go to Step 2	"IG" fuse blown, main fuse blown, ignition switch malfunction or "B/W" circuit open.
2	"O/D OFF" Lamp Circuit Check 1) With ignition switch turned OFF, disconnect couplers from TCM. 2) Check for proper connection to TCM at E25-10 terminal. If OK, body-ground E25-10 terminal in coupler disconnected. Does "O/D OFF" lamp turn ON at ignition switch ON?	Go To Step 3	Bulb burned out, "Lg" or "B/W" circuit open.
3	Check TCM Power and Ground Circuit referring to Table A-4 in this section. Is it in good condition?	Substitute a known-good TCM and recheck.	Repair or replace.

TABLE A-2 "O/D OFF" LAMP CIRCUIT CHECK (LAMP COMES ON STEADILY)

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to Table A-1 in this section.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Check O/D off Switch Position. See Fig.1. Is O/D off switch turned OFF (Is switch button at OFF position)?	Go to Step 2.	Turn O/D off switch OFF.
2	Check Lamp Circuit for Short. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Turn ignition switch ON. Does "O/D OFF" lamp come ON steadily?	"Lg" circuit shorted to ground.	Go to Step 3.
3	Check O/D off Switch Circuit. 1) Check resistance between E25-3 terminal of disconnected TCM connector and body ground with O/D off switch OFF. Is continuity indicated?	Go to Step 4.	Check TCM ground circuit for open. If ground circuit is OK, substitute a known-good TCM and recheck.
4	Check O/D off Switch for Operation. 1) Remove console box. 2) Disconnect O/D off switch connector. 3) Check continuity between switch terminals under each condition below. See Fig. 2. Switch OFF position : No continuity Switch ON position : Continuity Is check result satisfactory?	"G/W" circuit shorted to ground.	Replace O/D off switch.

Fig.1 for Step 1

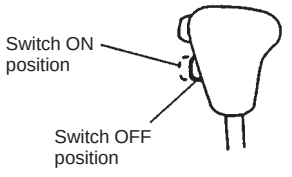


Fig.2 for Step 4

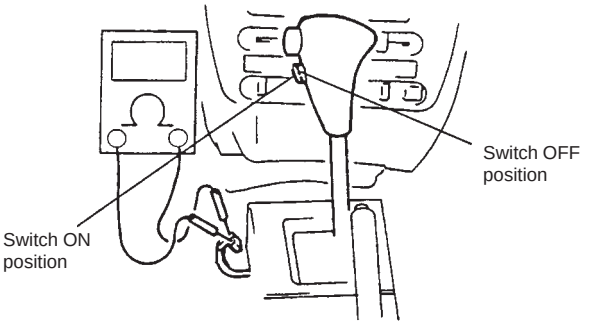


TABLE A-3 "O/D OFF" LAMP CIRCUIT CHECK (LAMP BLINKS OR REPEATS BRIGHT/DIM CONTINUOUSLY AT IGNITION SWITCH ON)

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to Table A-1 in this section.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Check DTC by "O/D OFF" Lamp Blinking Pattern. 1) Using service wire, connect diagnosis switch terminal to ground terminal. See Fig. 1. 2) Turn ignition switch ON. Does blinking of "O/D OFF" lamp indicate malfunction DTC?	Go to Step 2 of "A/T DIAGNOSTIC FLOW TABLE".	Go to Step 2.
2	Check Diagnosis Switch Terminal Circuit. 1) Disconnect service wire from diagnosis switch terminal and ground terminal with ignition switch OFF. 2) Turn ignition switch ON. 3) Check voltage between diagnosis switch terminal and body ground. Is it 10 – 14 V?	Check TCM ground circuit for open. If ground circuit is OK, substitute a known-good TCM and recheck.	"G/R" circuit shorted to ground.

Fig.1 for Step 1

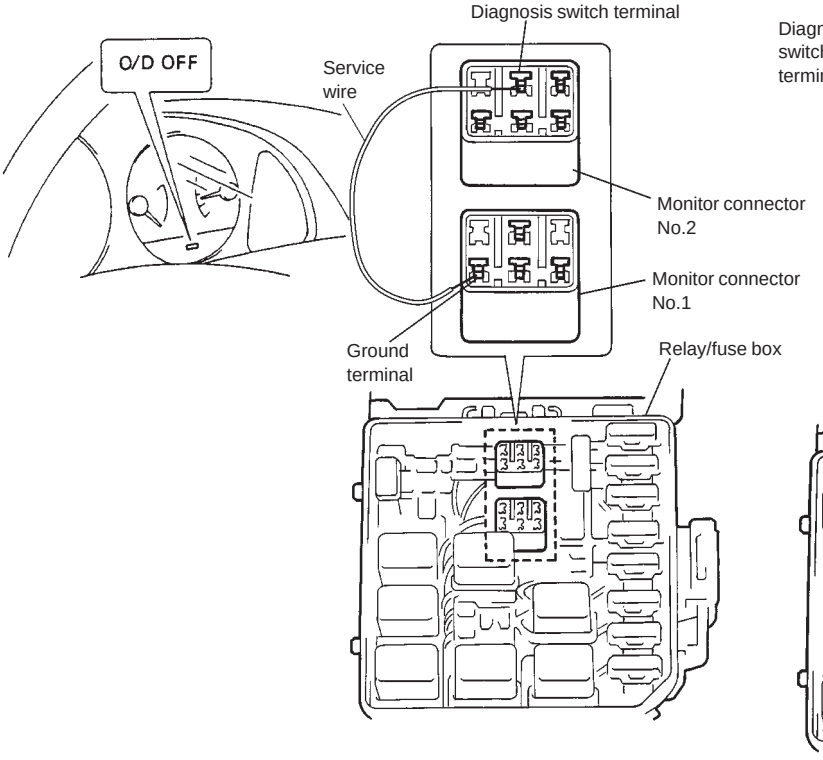


Fig.2 for Step 2

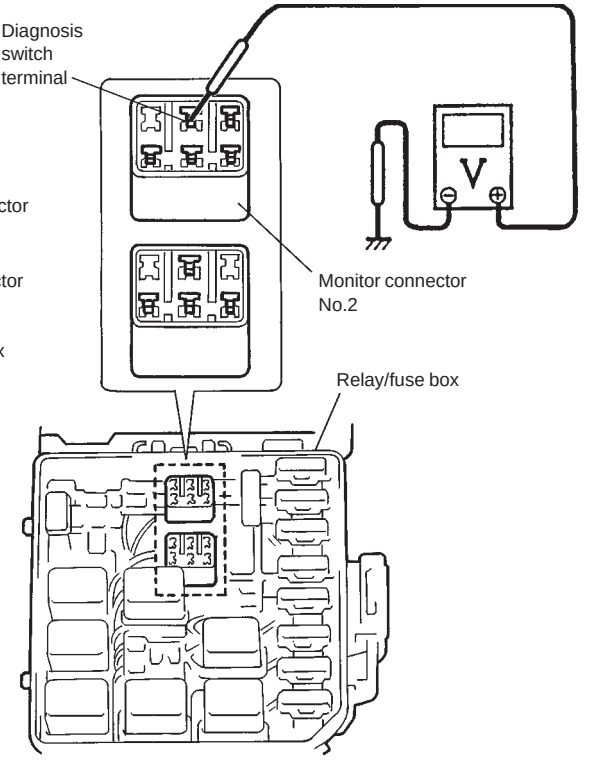
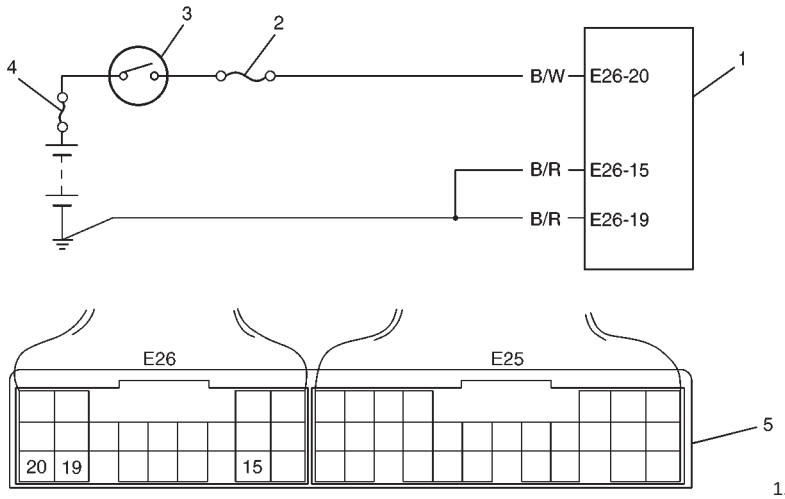


TABLE A-4 TCM POWER AND GROUND CIRCUIT CHECK



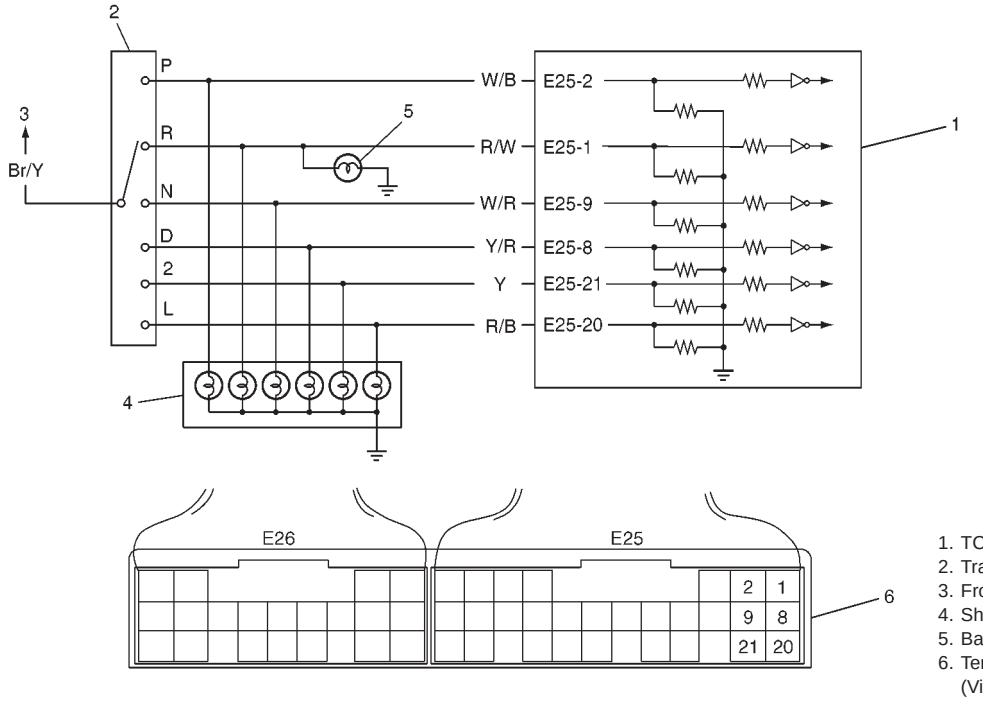
1. TCM
2. IG fuse
3. Ignition switch
4. Main fuse
5. Terminal arrangement of TCM coupler (Viewed from harness side)

INSPECTION

STEP	ACTION	YES	NO
1	Check TCM Power Circuit. 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to TCM at E26-20 terminal. 3) If OK, turn ignition switch ON and check voltage at terminal E26-20 of disconnected TCM connector. Is it 10 – 14 V?	Go to Step 2.	"B/W" circuit open.
2	Check TCM Ground Circuit. 1) Turn ignition switch OFF. 2) With TCM connectors disconnected, check for proper connection to TCM at E26-15 terminal. 3) If OK, check resistance between E26-15/E26-19 terminal of disconnected TCM connector and body ground. Is continuity indicated?	TCM power and ground circuits are in good condition.	"B/R" circuit open.

DTC P0705/DTC NO.34 TRANSMISSION RANGE SENSOR CIRCUIT MALFUNCTION

WIRING DIAGRAM



1. TCM
2. Transmission range sensor
3. From ignition switch
4. Shift indicator
5. Backup lamp
6. Terminal arrangement of TCM coupler (Viewed from harness side)

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check Transmission Rang Sensor Circuit for Operation referring to “TRANSMISSION RANGE SENSOR CIRCUIT CHECK” in this section. Are check result satisfactory?	If voltmeter is used in Step 2, check TCM to connector connection for poor connection. If OK, intermittent trouble. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 3.
3	Check Select Cable for Adjustment referring to “SELECT CABLE ADJUSTMENT” in this section. Is it adjusted correctly?	Go to Step 4.	Adjust.
4	Check Transmission Range Sensor for Installation Position. 1) Shift select lever to “N” range. 2) Check that “N” reference line on switch and center line on shaft are aligned. Are they aligned?	Go to Step 5.	Adjust.
5	Check Transmission Range Sensor referring to “TRANSMISSION RANGE SENSOR INSPECTION” in this section. Are check results satisfactory?	“Br/Y”, “W/B”, “R/W”, “W/R”, “Y/R”, “Y” or “R/B” circuit open or short. If wires and connections are OK, substitute a known-good TCM and recheck.	Replace TR sensor.

TRANSMISSION RANGE SENSOR CIRCUIT CHECK

When using SUZUKI scan tool:

1) Connect SUZUKI scan tool to DLC with ignition switch OFF.
2) Turn ignition switch ON and check transmission range signal (P, R, N, D, 2 or L) on display when shifting select lever to each range.

If select lever position is not displayed on scan tool or displayed range is different from select lever position, check select cable, transmission range sensor or wire harness.

When not using SUZUKI scan tool:

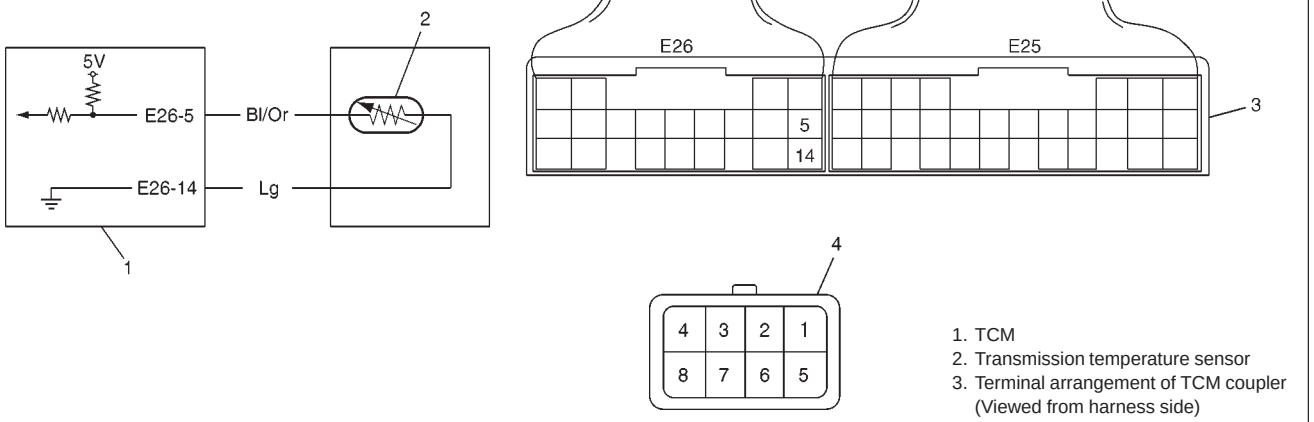
1) Turn ignition switch ON.
2) Check voltage at each of E25-2, E25-1, E25-9, E25-8, E25-21 and E25-20 terminals with select lever shifted to each range.

If each voltage is not as specified, check select cable, transmission range sensor or wire harness.

Terminal / Select lever position	E25-2	E25-1	E25-9	E25-8	E25-21	E25-20
P	B + V	0V	0V	0V	0V	0V
R	0V	B + V	0V	0V	0V	0V
N	0V	0V	B + V	0V	0V	0V
D	0V	0V	0V	B + V	0V	0V
2	0V	0V	0V	0V	B + V	0V
L	0V	0V	0V	0V	0V	B + V

DTC P0710/DTC NO.36 OR 38 TRANSMISSION TEMPERATURE SENSOR CIRCUIT MALFUNCTION

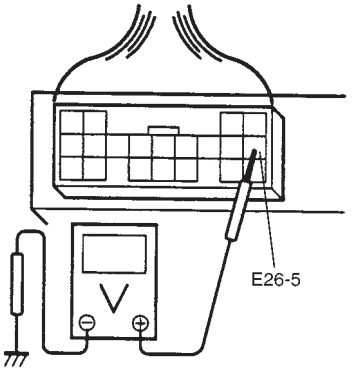
WIRING DIAGRAM



1. TCM
2. Transmission temperature sensor
3. Terminal arrangement of TCM coupler (Viewed from harness side)
4. Solenoid wire harness connector

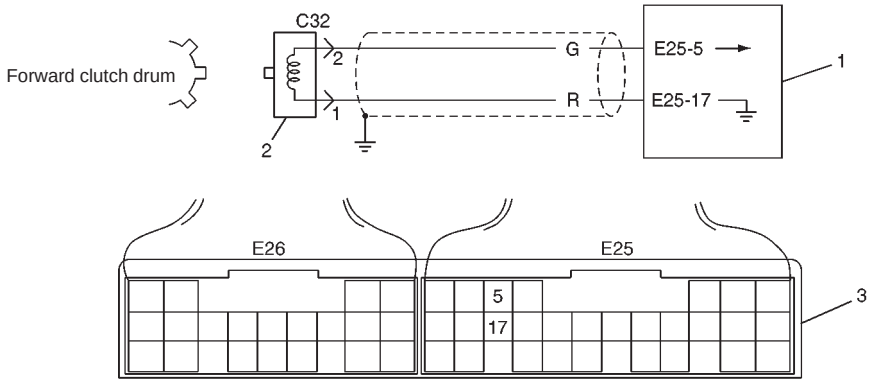
TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” in this section.
2	Inspect transmission temperature sensor refer to “TRANSMISSION TEMPERATURE SENSOR INSPECTION” in this section. Is it OK?	Go to Step 3.	Transmission temperature sensor malfunction.
3	Check transmission temperature sensor circuit. Turn ignition switch ON and check voltage between E26-5 and body ground with coupler connected. Is it 0.2 – 4 V?	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	“Bl/Or” or “Lg” circuit open or “Bl/Or” or “Lg” circuit shorted to ground. If the above are OK, substitute a known-good TCM and recheck.



DTC P0715/DTC NO.37 INPUT/TURBINE SPEED SENSOR CIRCUIT MALFUNCTION

WIRING DIAGRAM



1. TCM
2. Input shaft speed sensor
3. Terminal arrangement of TCM coupler (Viewed from harness side)

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check Input Shaft Speed Sensor Circuit. 1) Disconnect TCM connectors with ignition switch OFF. 2) Check for proper connection to input shaft speed sensor at E25-5 and E25-17 terminals. 3) If OK, check resistance for sensor circuit. Resistance between E25-5 and E25-17 : 387 – 475 Ω at 20°C, 68°F Resistance between E25-5/E25-17 and ground : No continuity Are check result satisfactory?	Go to Step 4.	Go to Step 3.
3	Check Input Shaft Speed Sensor for Resistance. 1) Disconnect sensor connector with ignition switch OFF. 2) Check for proper connection to sensor at terminals C32-1 and C32-2. 3) If OK, then check resistance of sensor. See Fig. 1. Are measured values as specified in Step 2?	“R” or “G” circuit open or short.	Replace input shaft speed sensor.
4	Check Visually Input Shaft Speed Sensor and Forward Clutch Drum Using Mirror for the Followings. See Fig. 2. ○No damage ○No foreign material attached ○Correct installation Are they in good condition?	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Clean, repair or replace.

Fig.1 for Step 3

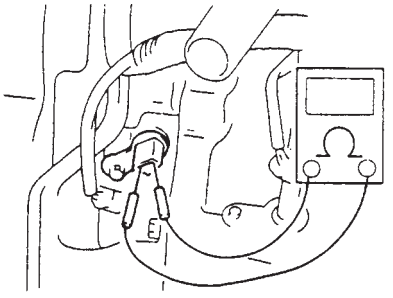
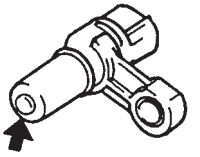
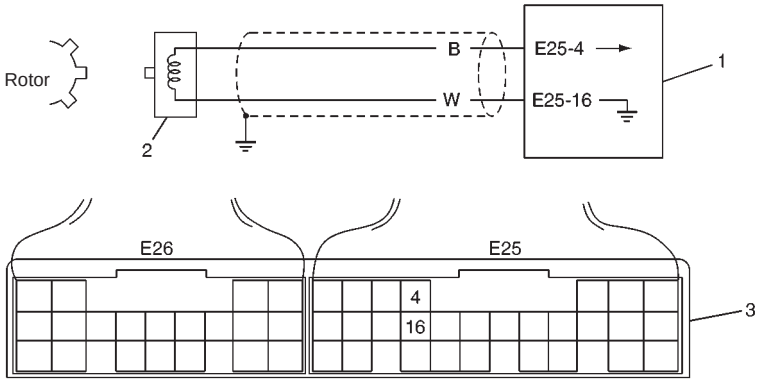


Fig.2 for Step 4



DTC P0720/DTC NO.31 OUTPUT SPEED SENSOR CIRCUIT MALFUNCTION

WIRING DIAGRAM



1. TCM
2. Output shaft speed sensor
3. Terminal arrangement of TCM coupler (Viewed from harness side)

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check Output Shaft Speed Sensor Circuit. 1) Disconnect TCM connectors with ignition switch OFF. 2) Check for proper connection to output shaft speed sensor at E25-4 and E25-16 terminals. 3) If OK, check resistance of sensor circuit. Resistance between E25-4 and E25-16 : 648 – 792 Ω at 20°C, 68°F Resistance between E25-4/E25-16 and ground : No continuity Are check results satisfactory?	Go to Step 4.	Go to Step 3.
3	Check Output Shaft Speed Sensor. 1) With ignition switch OFF, disconnect output shaft speed sensor connector. 2) Check for proper connection to output shaft speed sensor at each terminals. 3) If OK, then check resistance of output shaft speed sensor. See Fig. 1. Are measured values as specified in Step 2?	“B” or “W” wire open or short.	Replace output shaft speed sensor.
4	Check Visually Output Shaft Speed Sensor and Sensor Rotor Using Mirror for the Following. See Fig. 2. ○No damage ○No foreign material attached ○Correct installation Are they in good condition?	Go to Step 5.	Clean, repair or replace.

STEP	ACTION	YES	NO
5	Check Transmission Range Sensor for Operation referring to step 2 of DTC P0705 Flow Table. Is check result satisfactory?	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Adjust or replace transmission range sensor.

Fig.1 for Step 3

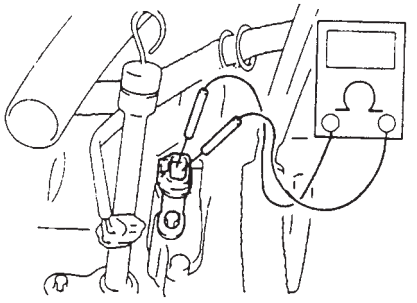
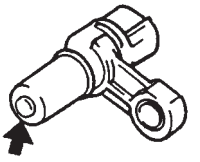
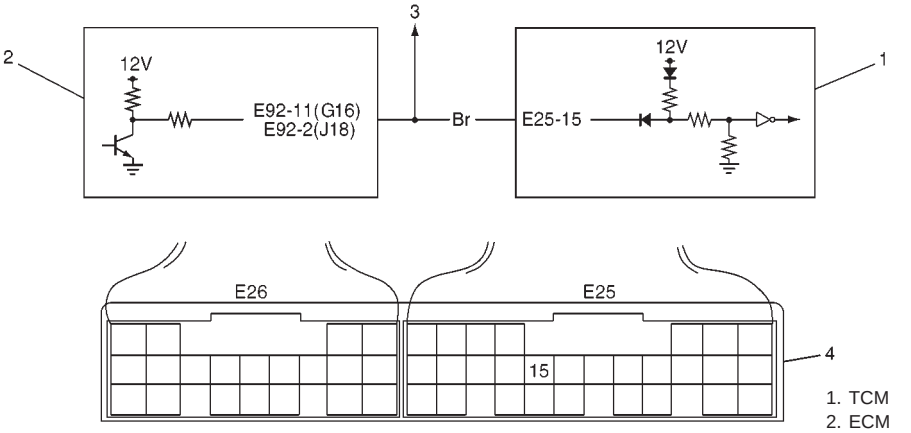


Fig.2 for Step 4



DTC P0725/DTC NO.35 ENGINE SPEED INPUT CIRCUIT MALFUNCTION

WIRING DIAGRAM



1. TCM
2. ECM
3. To tachometer
4. Terminal arrangement of TCM coupler (Viewed from harness side)

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check Engine Speed Signal Circuit for Open and Short. 1) Disconnect connectors from TCM and ECM respectively with ignition switch OFF. 2) Check for proper connection to TCM at terminal E25-15 and to ECM at terminal E92-11 (G16) or E92-2 (J18). 3) If OK, check engine speed signal circuit for resistance and voltage under the following conditions. ○ Resistance between E25-15 and E92-11 (G16) or E92-2 (J18) terminals of disconnected connectors: Continuity ○ Resistance between E25-15 terminal of disconnected connector and ground: Infinity ○ Voltage between E25-15 terminal of disconnected connector and ground with ignition switch ON: About 0 V. Are check results satisfactory?	Substitute a known-good TCM and recheck.	“Br” wire open or short or tachometer malfunction if equipped.

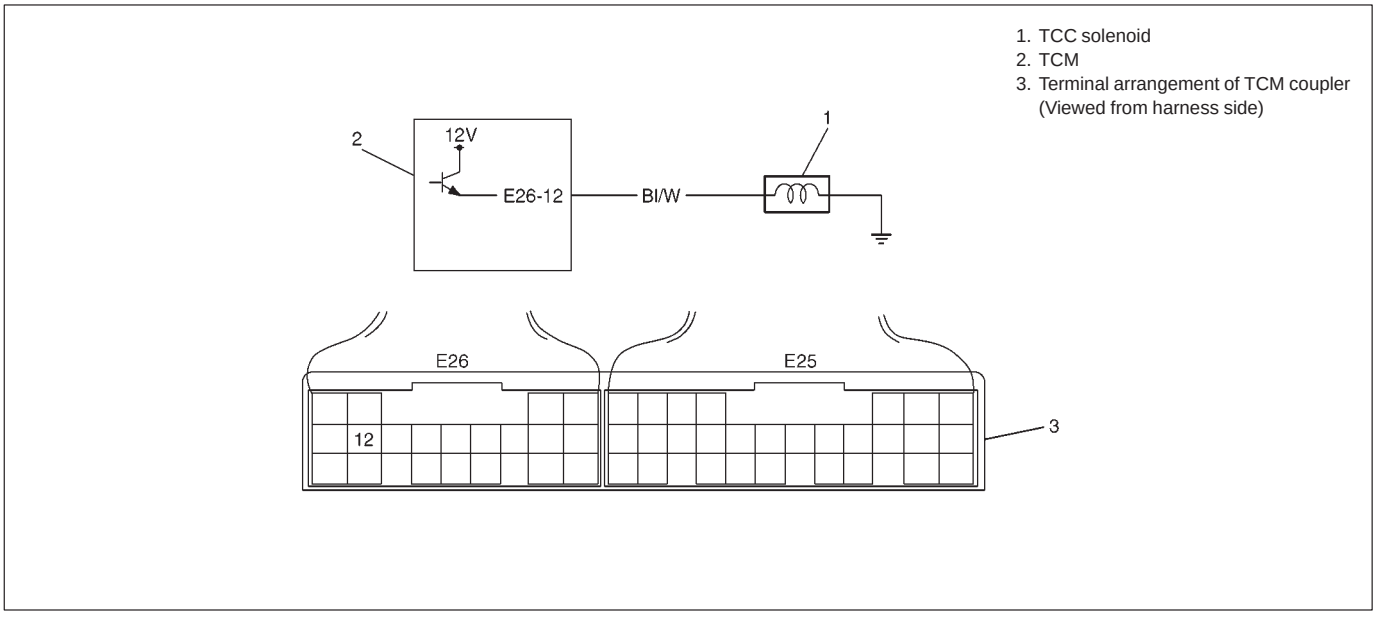
DTC P0741/DTC NO.29 TCC SYSTEM PERFORMANCE OR STUCK OFF

TROUBLESHOOTING (DTC P0741/DTC NO.29)

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check TCC Solenoid Valve for Operation referring to “SOLENOID VALVES OPERATION CHECK” in this section. Is it in good condition?	Go to Step 3.	Replace TCC solenoid valve.
3	Check TCC Control Valve for Operation and Fluid Passage for Clog referring to “VALVE BODY” in this section. Are they in good condition?	Replace torque converter.	Clean passage or replace faulty parts.

DTC P0743/DTC NO.25 OR 26 TCC SYSTEM ELECTRICAL

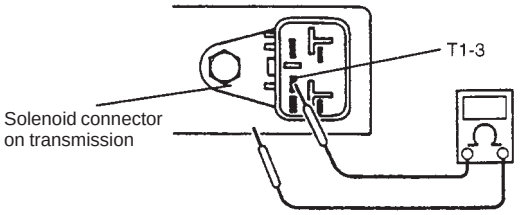
WIRING DIAGRAM



TROUBLESHOOTING

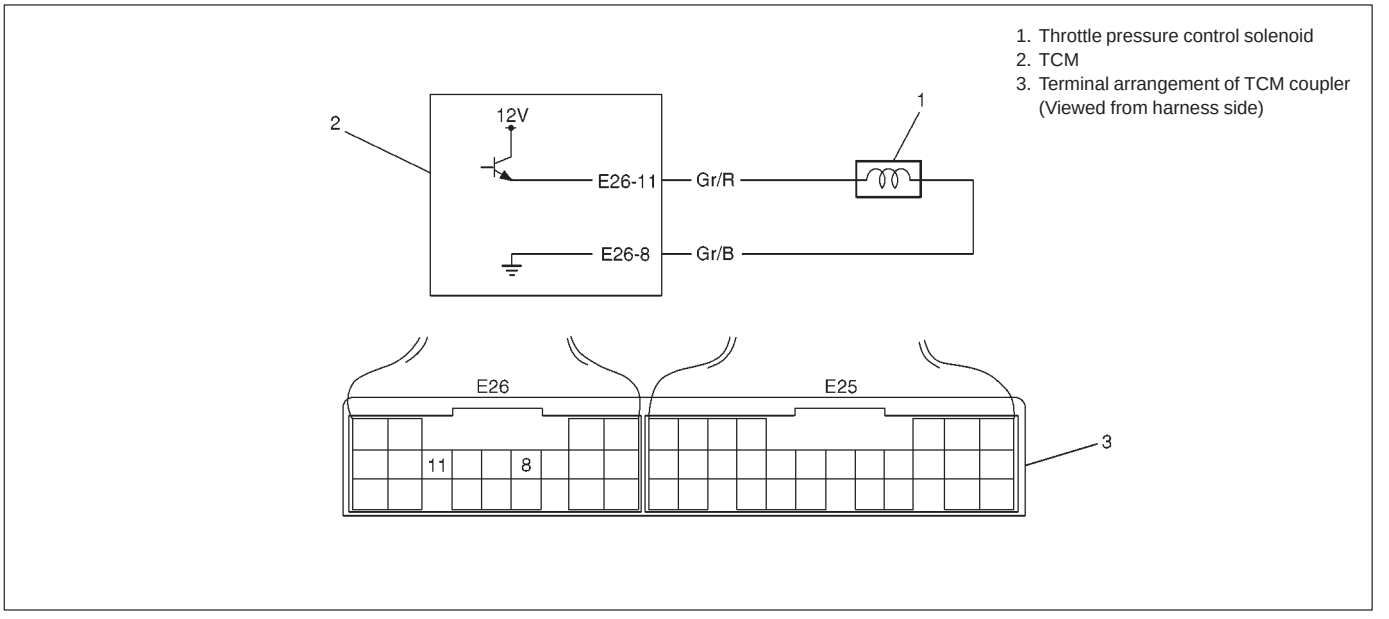
STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Check TCC Solenoid Circuit for Short. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Check for proper connection to TCM at terminal E26-12. 3) If OK, then turn ignition switch ON and measure voltage between terminal E26-12 of disconnected TCM connector and ground. Is it about 0 V?	Go to Step 3.	“Bl/W” circuit shorted to power circuit.
3	Check TCC Solenoid Circuit for Open or Short. 1) Turn ignition switch OFF. 2) Measure resistance between terminal E26-12 of disconnected TCM connector and ground. Is it 11 – 15 Ω at 20°C, 68°F?	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 4.
4	Check TCC Solenoid for Resistance. 1) Disconnect solenoids connector at transmission. 2) Check for proper connection to solenoid at “Bl/W” wire terminal. 3) If OK, then measure resistance between solenoid terminal T1-3 and transmission. See Fig. 1. Is it 11 – 15 Ω at 20°C, 68°F?	“Bl/W” circuit open or shorted to ground.	Check solenoid wire harness for open or short. If wire and connections are OK, replace TCC solenoid.

Fig.1 for Step 4



DTC P0745/DTC NO.41 OR 42 PRESSURE CONTROL SOLENOID MALFUNCTION

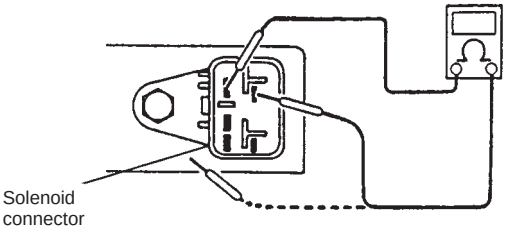
WIRING DIAGRAM



TROUBLESHOOTING (DTC P0745/DTC NO.41 OR 42)

STEP	ACTION	YES	NO
1	Was "A/T DIAGNOSTIC FLOW TABLE" performed?	Go to Step 2.	Go to "A/T DIAGNOSTIC FLOW TABLE".
2	Check Throttle Pressure Control Solenoid for Resistance. 1) Turn ignition switch OFF. 2) Disconnect solenoids connector at transmission. 3) Check resistance of solenoid. See Fig. 1. Resistance between terminals : 3 – 5 Ω at 20°C, 68°F Resistance between terminal and A/T : No continuity Are check result satisfactory?	"Gr/R", or "Gr/B" circuit open or "Gr/R" circuit short or intermittent trouble. If wire and connections are OK, substitute a known-good TCM and recheck.	Replace throttle pressure control solenoid or lead wire.

Fig.1 for Step 2

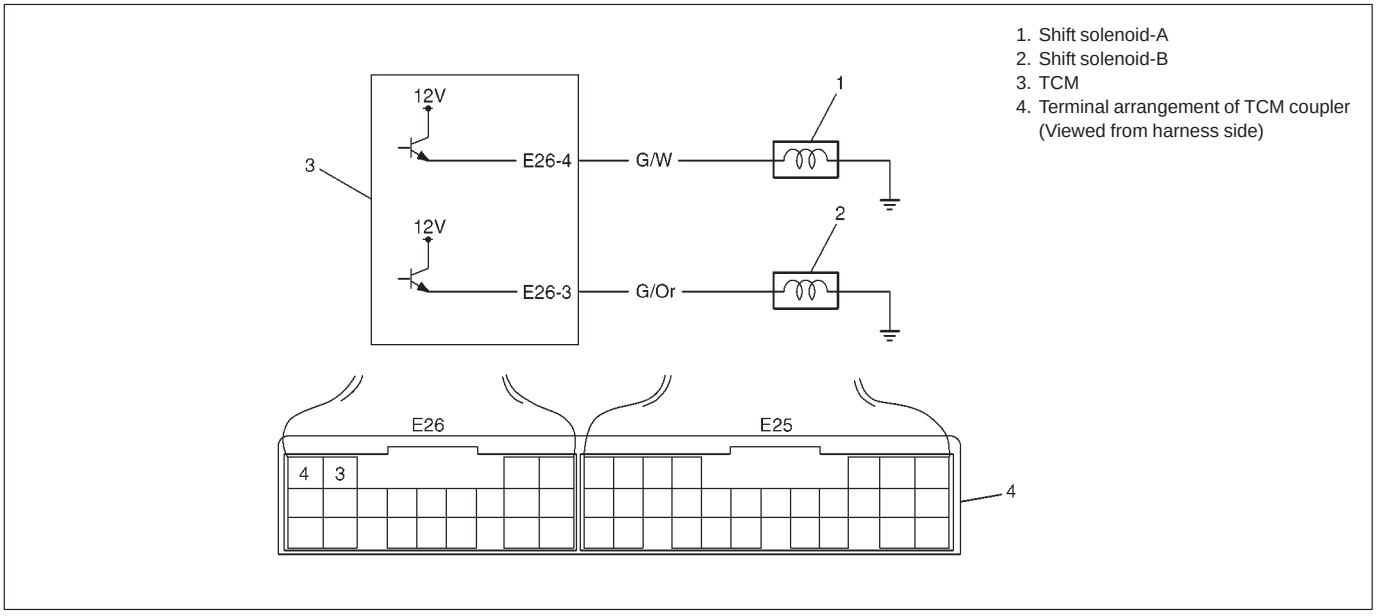


DTC P0751/DTC NO.17 SHIFT SOLENOID-A PERFORMANCE OR STUCK OFF
DTC P0756/DTC NO.28 SHIFT SOLENOID-B PERFORMANCE OR STUCK OFF

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”
2	Perform Manual Shift Road Test referring to “MANUAL ROAD TEST” in this section. Is test result satisfactory?	Go to Step 3.	Go to “A/T Basic Check”.
3	Check Shift Solenoid valve-A or -B for Operation referring to “SOLENOID VALVES OPERATION CHECK” in this section. Are they in good condition?	Go to Step 4.	Replace shift solenoid valve-A or -B.
4	Check Valves and Fluid Passage in Valve Body for Operation and Clog referring to “VALVE BODY” in this section. Are they in good condition?	Substitute a known-good TCM and recheck.	Clean passage or replace faulty parts.

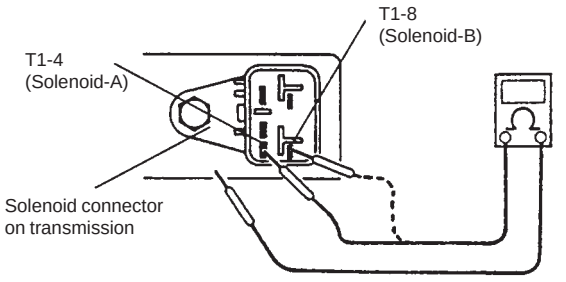
DTC P0753/DTC NO.21 OR 22 SHIFT SOLENOID-A ELECTRICAL
DTC P0758/DTC NO.23 OR 24 SHIFT SOLENOID-B ELECTRICAL
WIRING DIAGRAM



TROUBLESHOOTING

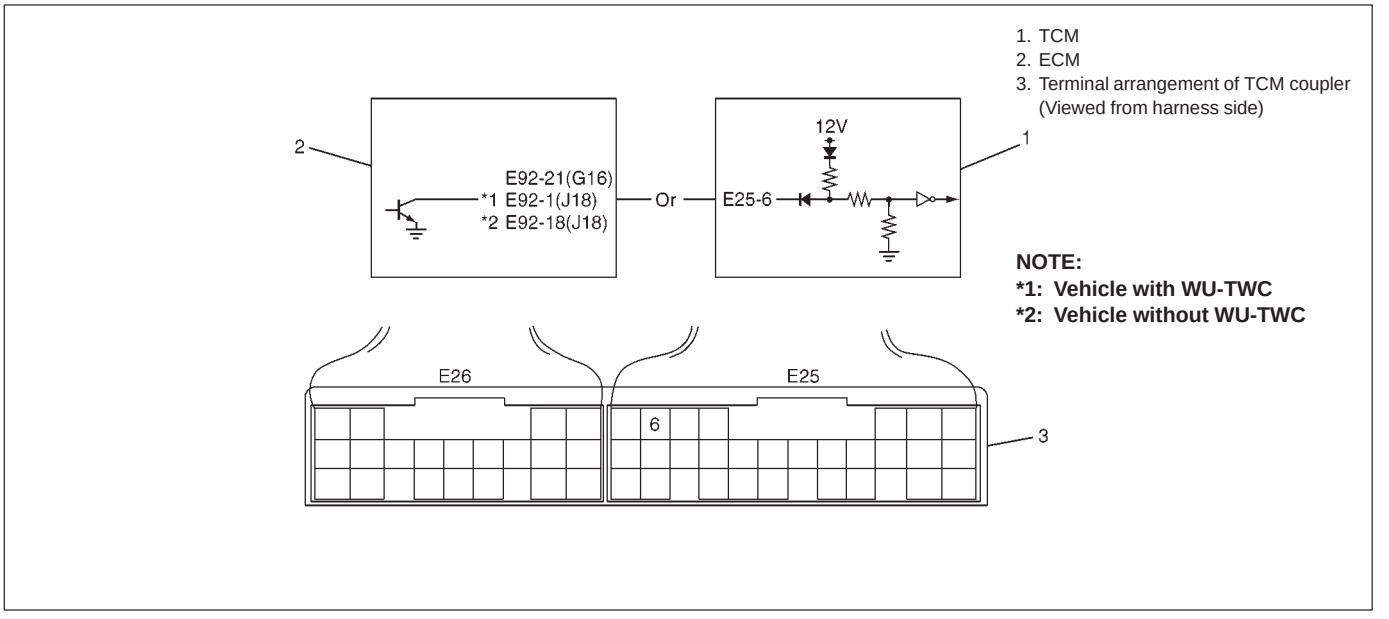
STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSIS FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAGNOSIS FLOW TABLE”.
2	Check Shift Solenoid Circuit for Short. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Check for proper connection to TCM at terminals E26-4 or E26-3. 3) If OK, then turn ignition switch ON and measure voltage between terminal E26-4 or E26-3 of disconnected TCM connector and ground. Is it about 0 V ?	Go to Step 3.	“G/W” or “G/Or” circuit shorted to power circuit.
3	Check Shift Solenoid Circuit for Open or Short. 1) Turn ignition switch OFF. 2) Measure resistance between terminal E26-4 or E26-3 disconnected TCM connector and ground. Is it 11 – 15 Ω at 20°C, 68°F?	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 4.
4	Check Shift Solenoid for Resistance. 1) Disconnect solenoids connector at transmission. 2) Check for proper connection to solenoid at “G/W” or “G/Or” wire terminal. 3) If OK, then measure resistance between solenoid terminal T1-4 or T1-8 and transmission. See Fig.1. Is it 11 – 15 Ω at 20°C, 68°F?	“G/W” or “G/Or” circuit open or shorted to ground.	Check solenoid wire harness for open or short. If wire and connections are OK, replace shift solenoid-A or -B.

Fig.1 for Step 4



DTC P1700/DTC NO.32 OR 33 THROTTLE POSITION SIGNAL CIRCUIT

WIRING DIAGRAM



TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAGNOSTIC FLOW TABLE” preformed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE”.
2	Is there DTC related to throttle position sensor (DTC P0120/DTC No.21 or 22)?	Go to applicable DTC table in Section6E1,6E3, 6-1 or 6-2.	Go to Step 3.
3	Check Throttle Position Signal (Opening signal) of warmed engine. When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check “THROTTLE POSITION” displayed on scan tool. Does throttle position vary according to throttle valve opening as shown in graph? See Fig. 1. When not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check duty, high voltage rate of duty cycle, (voltage) between terminal E25-6 of TCM and ground. Does duty (voltage) vary according to throttle valve opening as shown in graph? See Fig. 2.	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 4.
4	Check Throttle Position Signal Circuit for Open or Short. 1) Turn ignition switch OFF and disconnect ECM connectors. 2) Check for proper connection to ECM at terminal E92-21 (G16), E92-1 (J18) or E92-18 (J18). 3) If OK, then turn ignition switch ON and check voltage between terminal E92-21 (G16), E92-1 (J18) or E92-18 (J18) of disconnected ECM connector and ground. Is it 10 – 14 V?	Check ECM power and ground circuit for open. If OK, substitute a known-good ECM and recheck.	“Or” circuit open or shorted to ground, poor E25-6 connection. If wire and connections are OK, substitute a known-good TCM and recheck.

Fig.1 for Step 3

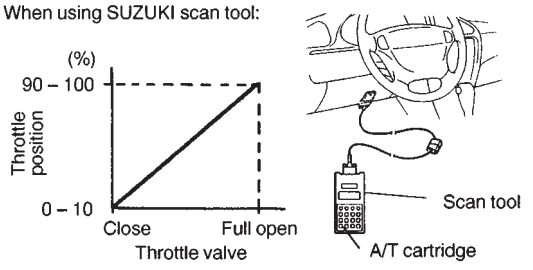
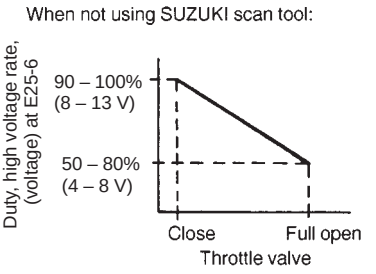


Fig.2 for Step 3



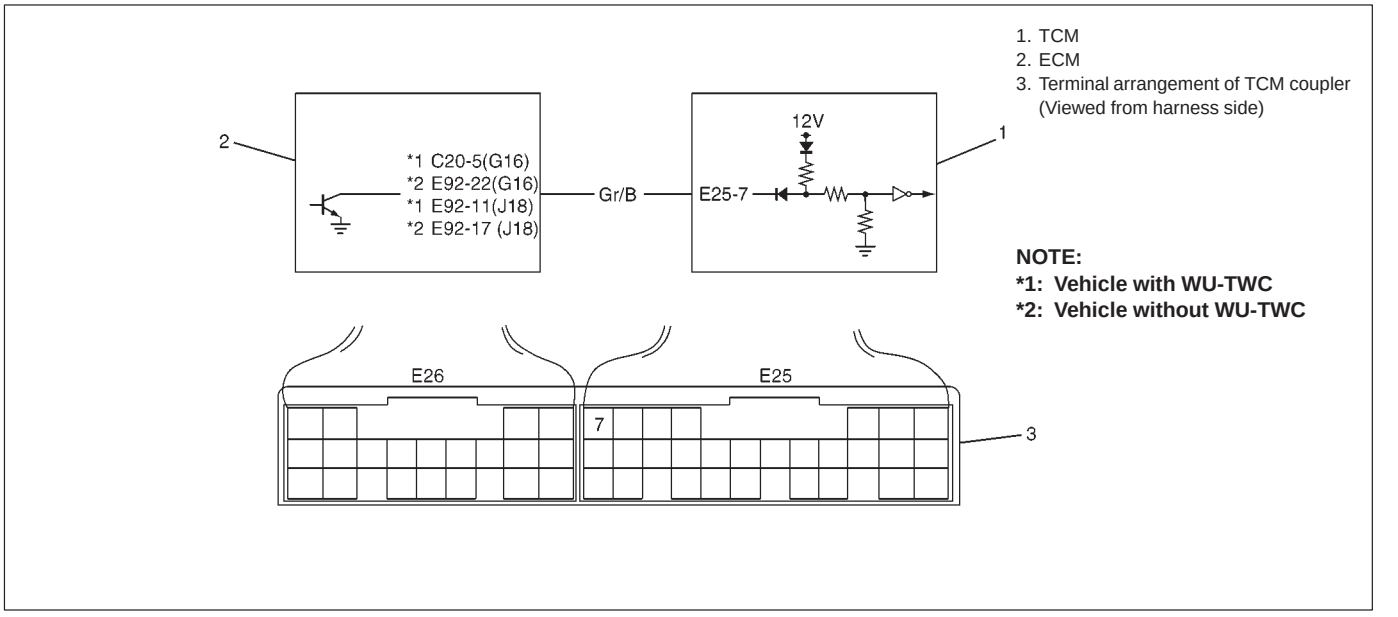
DTC P1702/DTC NO.52 INTERNAL CONTROL MODULE MEMORY

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	1) Turn ignition switch ON. 2) Erase all DTCs referring to “DTC CLEARANCE” in this section. 3) Turn ignition switch OFF. 4) Turn ignition switch ON once again and check for any DTC. Is there DTC P1702/DTC NO.52?	Faulty TCM. Replace TCM.	Could be a temporary malfunction of TCM.

DTC P1705/DTC NO.51 ENGINE COOLANT TEMPERATURE SIGNAL CIRCUIT

WIRING DIAGRAM

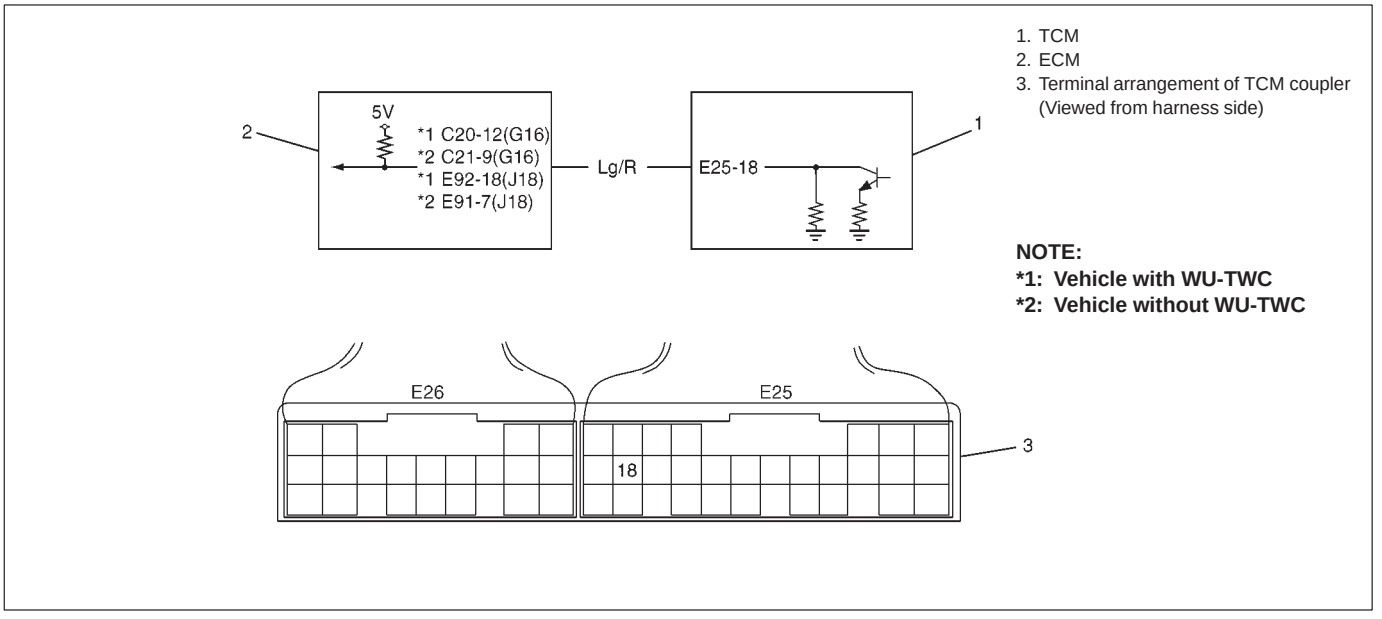


TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was "A/T DIAGNOSTIC FLOW TABLE" performed?	Go to Step 2.	Go to "A/T DIAGNOSTIC FLOW TABLE".
2	Is there DTC related to ECT sensor (DTC P0115/DTC NO.14 or 15)?	Go to applicable DTC table in Section 6E1, 6E3, 6-1 or 6-2.	Go to Step 3.
3	Check Engine Coolant Temp. Signal. When using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Start cold engine. 3) Check "COOLANT TEMP SIGNAL" displayed on scan tool. Coolant temp. Below 50°C, 122°F : LOW Over 50°C, 122°F : HIGH Is check result satisfactory? When not using SUZUKI scan tool: 1) Start cold engine. 2) Check duty, high voltage rate of duty cycle, (voltage) between terminal E25-7 of TCM and ground. Coolant temp. –5 – 50°C, 23 – 122°F : 30 – 40% (2.6 – 4.6 V) Over 50°C, 122°F : 60 – 70% (5.1 – 9.3 V). Is check result satisfactory?	Intermittent trouble or faulty TCM. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to Step 4.
4	Check Engine Coolant Temp. Signal Circuit for Open or Short. 1) Turn ignition switch OFF and disconnect ECM connectors. 2) Check for proper connection to ECM at terminal C20-5 (G16), E92-22 (G16), E92-11(J18) or E92-17 (J18). 3) If OK, then turn ignition switch ON and check voltage between terminal C20-5 (G16), E92-22(G16), E92-11 (J18) or E92-17 (J18) of disconnected ECM connector and ground. Is it 9 – 14 V?	Substitute a know-good ECM and recheck.	"Gr/B" circuit open or shorted to ground, poor E25-7 connection. If wire and connections are OK, substitute a known-good TCM and recheck.

DTC P1895/DTC NO.27 TORQUE REDUCTION SIGNAL CIRCUIT

WIRING DIAGRAM



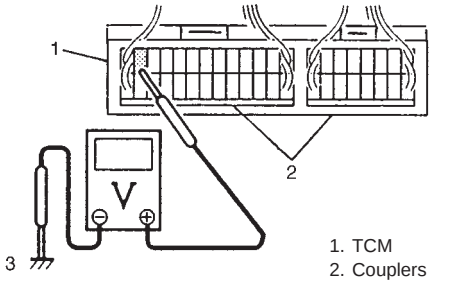
TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” in this section.
2	Check Torque Reduction Signal Circuit. 1) Check voltage between terminal E25-18 and body ground with ignition switch ON. Is it 4 – 6 V?	Intermittent trouble or faulty TCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 3.
3	Check Power Supply from ECM. 1) Disconnect TCM coupler with ignition switch OFF. 2) Check voltage between terminal E25-18 of disconnected TCM connector and body ground with ignition switch ON. Is it 4 – 6 V?	Substitute a known-good TCM and recheck.	“Lg/R” circuit open, “Lg/R” circuit shorted to ground. If the above are OK, substitute a known-good ECM and recheck.

INSPECTION OF TCM AND ITS CIRCUITS

TCM and its circuits can be checked at TCM wiring couplers by measuring voltage and resistance.

CAUTION:
TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with coupler disconnected from it.



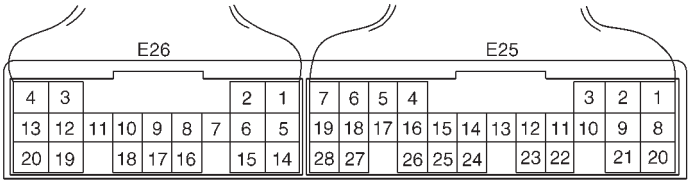
1. TCM
2. Couplers
3. Body ground

Voltage Check

1) Remove TCM from body.
2) Connect TCM couplers to TCM.
3) Check voltage at each terminal of couplers connected.

NOTE:
As each terminal voltage is affected by the battery voltage, confirm that it is 11 V or more when ignition switch is ON.

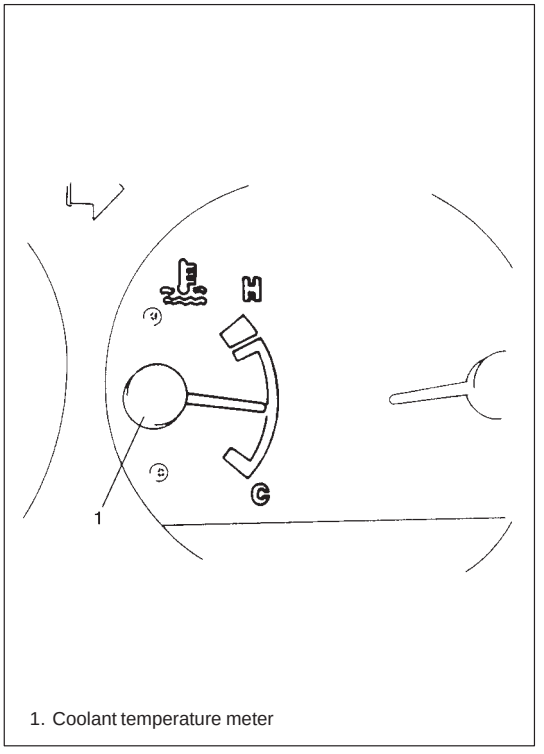
Terminal arrangement of TCM coupler (Viewed from harness side)



TERMINAL		CIRCUIT	NORMAL VOLTAGE	CONDITION
E25	1	Transmission range switch (“R” range)	10 – 14 V	Ignition switch ON, selector lever in “R” range
			about 0 V	Ignition switch ON, selector lever in other than “R” range
	2	Transmission range switch (“P” range)	10 – 14 V	Ignition switch ON, selector lever in “P” range
			about 0 V	Ignition switch ON, selector lever in other than “P” range
	3	O/D off switch	about 0 V	O/D cut switch ON (“O/D OFF” lamp lights)
			10 – 14 V	O/D cut switch OFF (“O/D OFF” lamp doesn’t light)
	4	Output shaft speed sensor (+)	—	
	5	Input shaft speed sensor (+)	—	
	6	Throttle opening signal (from ECM)	Voltage varies as specified in graph in Section 6, 6-1 or 6-2 while throttle valve is opened gradually.	

TERMINAL		CIRCUIT	NORMAL VOLTAGE	CONDITION
E25	7	Engine coolant temperature signal (ECM)	Voltage varies as specified in graph in Section 6, 6-1 or 6-2.	
	8	Transmission range sensor (“D” range)	10 – 14 V	Ignition switch ON, selector lever in “D” range
			about 0 V	Ignition switch ON, selector lever in other than “D” range
	9	Transmission range sensor (“N” range)	10 – 14 V	Ignition switch ON, selector lever in “N” range
			about 0 V	Ignition switch ON, selector lever in other than “N” range
	10	“O/D OFF” lamp	0 – 1 V	Ignition switch ON (lamp turn ON)
			10 – 14 V	Ignition switch ON (lamp turns OFF)
	11	Blank	—	—
	12	Blank	—	—
	13	Blank	—	—
	14	Blank	—	—
	15	Engine speed signal	0 – 1 V	Ignition switch ON
	16	Output shaft speed sensor (–)	—	—
	17	Input shaft speed sensor (–)	—	—
	18	Torque reduction signal	4 – 6 V	Ignition switch ON
	19	Blank	—	—
	20	Transmission range sensor (“L” range)	10 – 14 V	Ignition switch ON, selector lever in “L” range
			about 0 V	Ignition switch ON, selector lever in other than “L” range
	21	Transmission range sensor (“2” range)	10 – 14 V	Ignition switch ON, selector lever in “2” range
			about 0 V	Ignition switch ON, selector lever in other than “2” range
	22	Blank	—	—
	23	Blank	—	—
	24	Blank	—	—
	25	Blank	—	—
	26	Blank	—	—
	27	Serial data line to ECM	0 – 1 V ↔ 10 – 14 V	Ignition switch ON
	28	Park/Neutral position signal (To ECM)	10 – 14 V	Ignition switch ON, selector lever in “P” or “N” range
			about 0 V	Ignition switch ON, selector lever in “R”, “D”, “2” or “L” range

TERMINAL		CIRCUIT	NORMAL VOLTAGE	CONDITION
E26	1	Mode selector switch (“SNOW” mode) if equipped	about 0 V	Ignition switch ON, mode selector switch in “SNOW” mode
			10 – 14 V	Ignition switch ON, mode selector switch in other than “SNOW” mode
	2	Mode selector switch (“POWER” mode) if equipped	about 0 V	Ignition switch ON, mode selector switch in “POWER” mode
			10 – 14 V	Ignition switch ON, mode selector switch in other than “POWER” mode
	3	Shift solenoid-B (No.2)	about 0 V	Ignition switch ON
	4	Shift solenoid-A (No.1)	10 – 14 V	Ignition switch ON
	5	Transmission temperature sensor	0.2 – 4V	Ignition switch ON
	6	Diagnosis switch terminal	10 – 14 V	Ignition switch ON
	7	Data link connector	4 – 6 V	Ignition switch ON
	8	Throttle pressure control solenoid	—	—
	9	Blank	—	—
	10	Blank	—	—
	11	Throttle pressure control solenoid (ground)	—	—
	12	TCC solenoid	about 0 V	Ignition switch ON
	13	Power source for back up	10 – 14 V	Ignition switch ON and OFF
	14	Transmission temperature sensor (ground)	—	—
	15	Ground	—	—
	16	Brake lamp switch	10 – 14 V	Brake pedal depressed
			about 0 V	Brake pedal released
	17	Blank	—	—
	18	Blank	—	—
	19	Ground	—	—
	20	Power source	10 – 14 V	Ignition switch ON



1. Coolant temperature meter

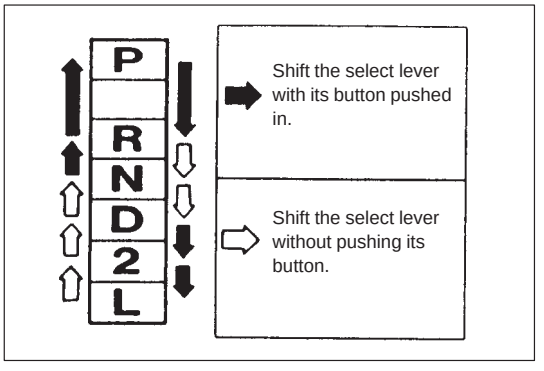
ON-VEHICLE SERVICE

MAINTENANCE SERVICE

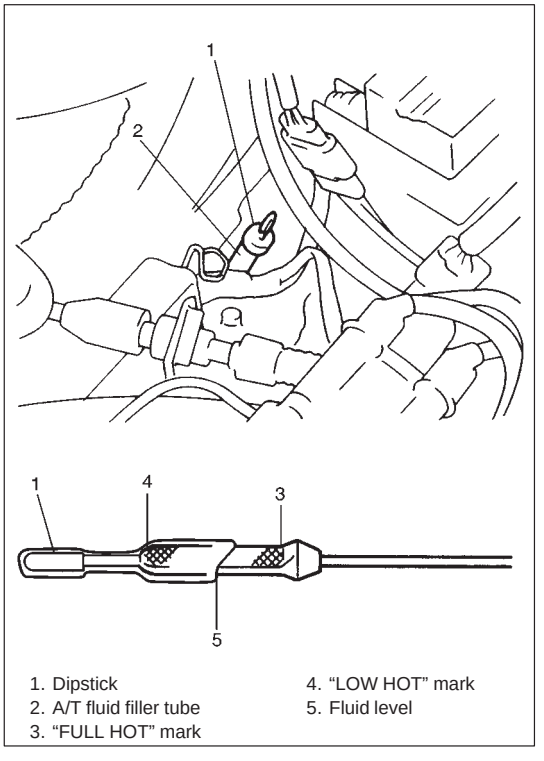
FLUID LEVEL

LEVEL CHECK AT NORMAL OPERATING TEMPERATURE

1) Stop vehicle and place it level.
2) Apply parking brake and place chocks against wheels.
3) With selector at P position, start engine.
4) Warm up engine till fluid temperature reaches normal operating temperature (70 – 80 °C/158 – 176 °F). As a guide to check fluid temperature, warm up engine till engine coolant temperature meter indicates as shown in figure.



5) Keep engine idling and shift selector slowly to L and back to P position.
6) With engine idling, pull out dipstick, wipe it off with a clean cloth and put it back into place.



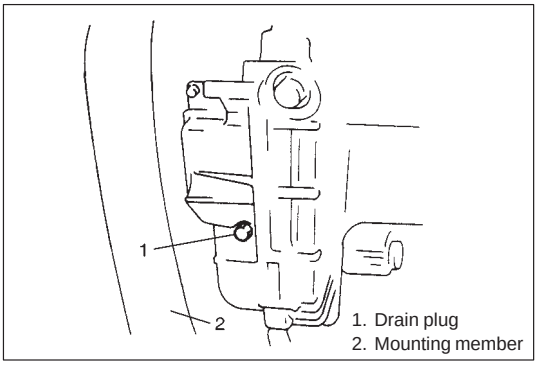
1. Dipstick
2. A/T fluid filler tube
3. "FULL HOT" mark
4. "LOW HOT" mark
5. Fluid level

7) Pull out dipstick again and check fluid level indicated on it. The lowest fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, and an equivalent of DEXRON® -III up to FULL HOT.

Fluid specification
An equivalent of DEXRON® -III or DEXRON®-IIE

NOTE:

- **Do not race engine while checking fluid level, even after the engine start.**
- **Do not overfill. Overfilling can cause foaming and loss of fluid through breather. Then slippage and transmission failure can result.**
- **Bringing the level from LOW HOT to FULL HOT requires 0.4 liters (0.85/0.70 US/Imp. pt).**
- **If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.**

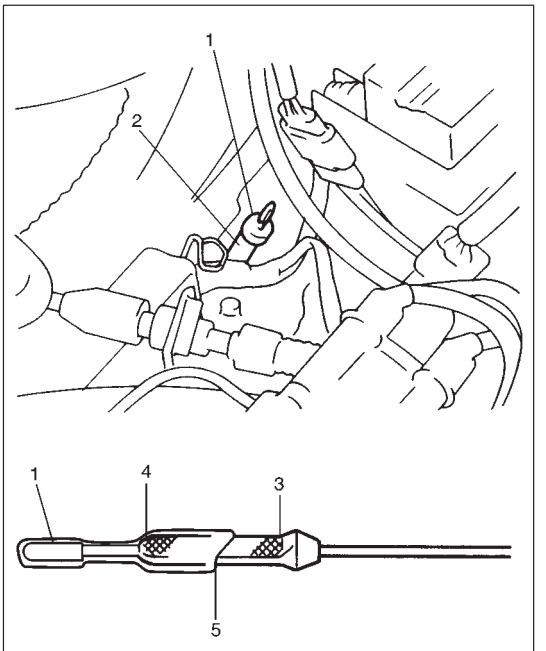


1. Drain plug
2. Mounting member

CHANGING FLUID

1) Lift up vehicle.
2) With engine is cool, remove drain plug from oil pan and drain A/T fluid.
3) Install drain plug.

Tightening Torque
(a): 40 N·m (4.0 kg-m, 29.0 lb-ft)

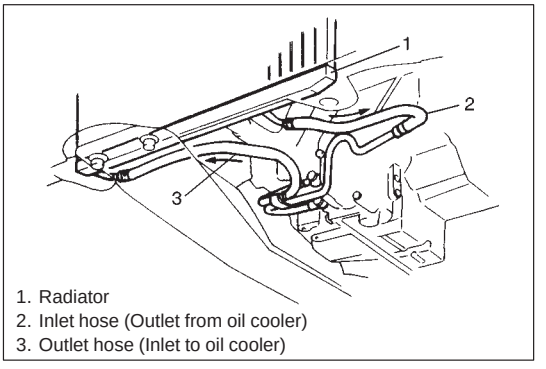


1. Dipstick
2. A/T fluid filler tube
3. "FULL HOT" mark
4. "LOW HOT" mark
5. Fluid level

4) Lower vehicle and fill proper amount of an equivalent of DEXRON® -III.
5) Check fluid level referring to "FLUID LEVEL" in this section.

Fluid specification
An equivalent of DEXRON® -III or DEXRON® -IIE

Fluid capacity		
When draining from drain plug hole	G16	2.4 liters (5.07/4.22 US/Imp.pt.)
	J18	2.6 liters (5.49/4.58 US/Imp.pt.)
When overhauling	G16	5.65 liters (11.94/9.94 US/Imp.pt.)
	J18	5.85 liters (12.36/10.30 US/Imp.pt.)



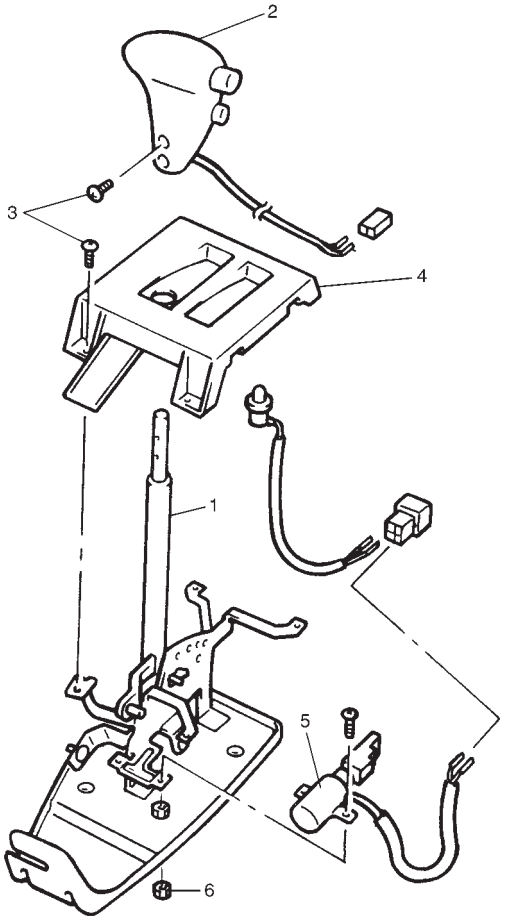
1. Radiator
2. Inlet hose (Outlet from oil cooler)
3. Outlet hose (Inlet to oil cooler)

OIL COOLER HOSES

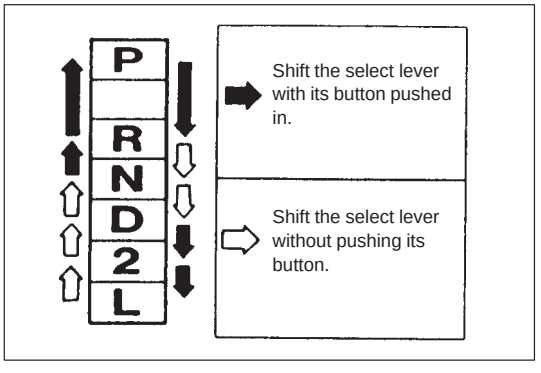
The rubber hoses for the oil cooler should be replaced at specified interval. When replacing them, be sure to note the following.

- to replace clamps at the same time
- to insert hose as far as its limit mark
- to clamp clamps securely

SELECT LEVER



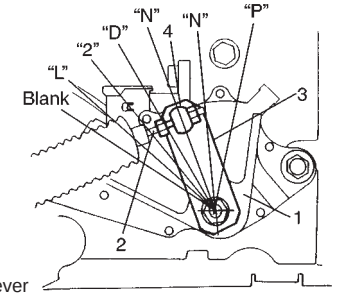
1. Select lever assembly
2. Knob assembly
3. Screw
4. Indicator assembly
5. Solenoid (if equipped)
6. Housing nut



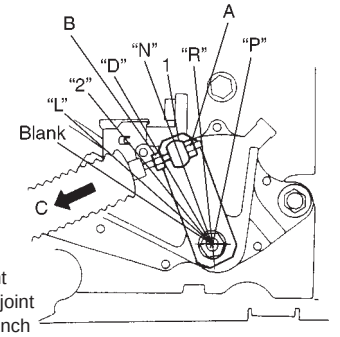
INSPECTION

Check select lever for smooth and clear-cut movement and position indicator for correct indication.

For operation of select lever, refer to the figure.



1. Transmission range sensor
2. Select cable
3. Manual shift lever
4. Select cable joint



1. Select cable joint

A: Align with cable joint

B: Tighten with wrench

SELECT CABLE

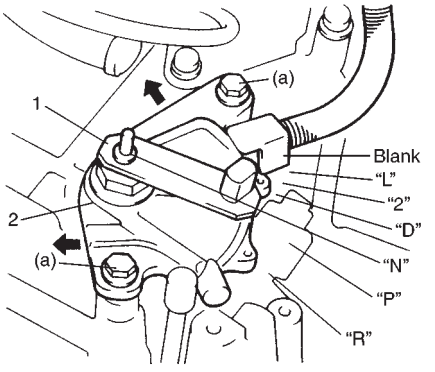
ADJUSTMENT

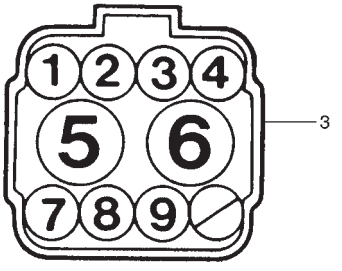
1) Before tightening cable end nut, shift select lever to "N".
2) Also shift manual shift lever to "N".

NOTE:

- **Make sure that nut and cable joint have clearance under above conditions.**
- **If select cable has been moved, push it in arrow C direction as shown in figure till it stops and then confirm that select lever is in "N" position.**

3) Turn nut A by hand till it contacts manual select cable joint. Then tighten nut B with wrench.
4) After select cable was installed, check for the following.
   - Push vehicle with select lever shifted to "P". Vehicle should not move.
   - Vehicle can not be driven in "N".
   - Vehicle can be driven in "D", "2" and "L".
   - Vehicle can be backed in "R".





1. Manual shift lever
2. Transmission range sensor
3. Transmission range sensor coupler

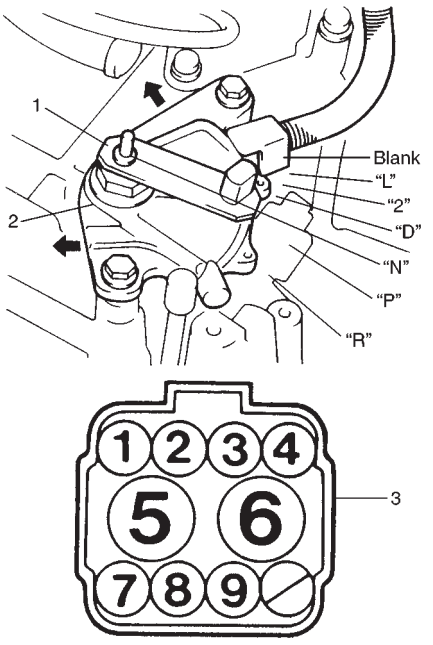
TRANSMISSION RANGE SENSOR (SHIFT SWITCH)

ADJUSTMENT

1) Shift manual shift lever to "N" range.
2) Connect ohmmeter between 7 and 9 terminals of disconnected transmission range sensor coupler.
3) Turn transmission range sensor gradually to find position where ohmmeter reading indicates continuity.
   Then fix transmission range sensor at that position by tightening bolts to specified torque.

   Tightening Torque
   (a): 20 N·m (2.0 kg-m, 14.5 lb-ft)

4) Connect transmission range sensor coupler.
5) Check that engine starts in "N" and "P" ranges but it doesn't start in "D", "2", "L" or "R" range. Also, check that back-up lamp turn ON in "R" range.

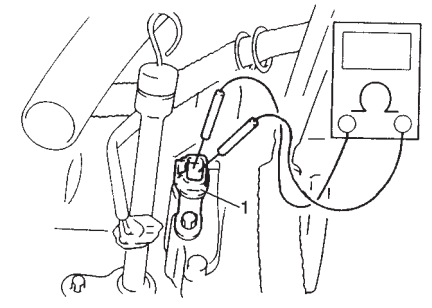


1. Manual shift lever
2. Transmission range sensor
3. Transmission range sensor coupler

INSPECTION

1) Disconnect transmission range sensor coupler.
2) Check that continuity exists as shown in below by moving selector lever.

Switch position \ Terminal No.	1	2	3	4	5	6	7	8	9
P					○	○		○	○
R				○					○
N					○	○	○		○
D			○						○
2		○							○
L	○								○



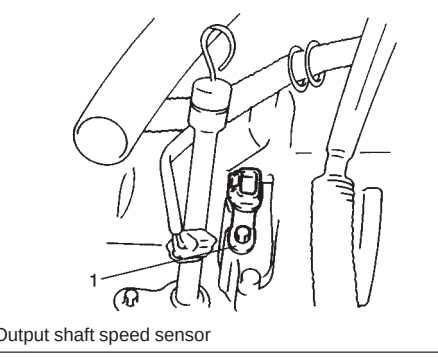
1. Output shaft speed sensor

OUTPUT SHAFT SPEED SENSOR (A/T VSS)

INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect output shaft speed sensor coupler.
3) Check resistance between output shaft speed sensor terminals.

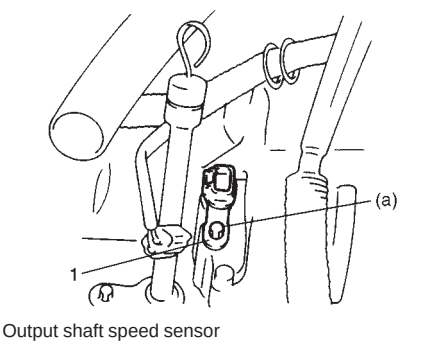
Output shaft speed sensor standard resistance:
648 – 792 Ω at 20 °C (68 °F)



1. Output shaft speed sensor

REMOVAL

1) Disconnect negative cable at battery.
2) Disconnect output shaft speed sensor coupler.
3) Remove output shaft speed sensor by removing its bolt.



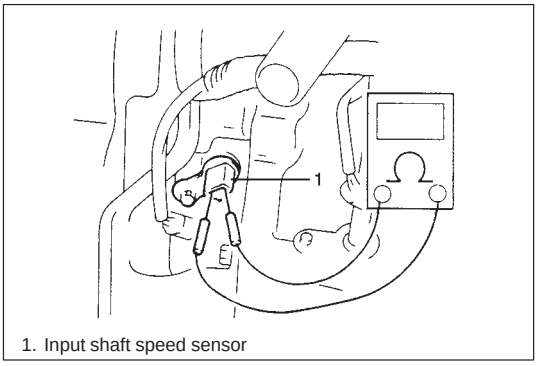
1. Output shaft speed sensor

INSTALLATION

1) Apply A/T fluid to output shaft speed sensor O-ring.
2) Install output shaft speed sensor to A/T case and tighten bolt to specified torque.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

3) Connect output shaft speed sensor coupler to output shaft speed sensor.
4) Connect negative cable to battery.



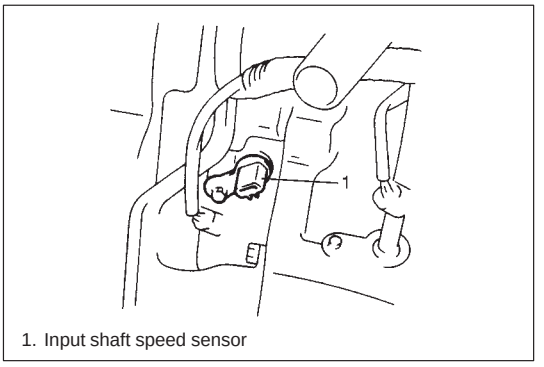
1. Input shaft speed sensor

INPUT SHAFT SPEED SENSOR (FORWARD CLUTCH CYLINDER REVOLUTION SENSOR)

INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect input shaft speed sensor coupler.
3) Check resistance between input shaft speed sensor terminals.

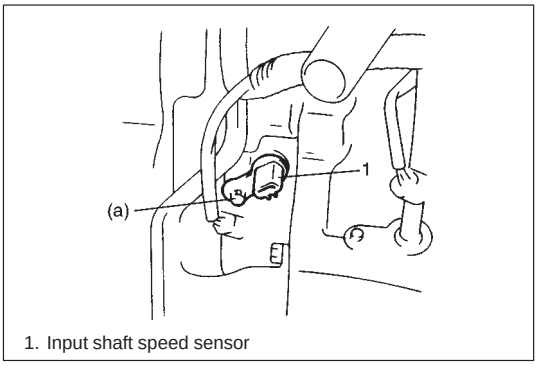
Input shaft speed sensor standard resistance: 387 – 473 Ω at 20 °C (68 °F)



1. Input shaft speed sensor

REMOVAL

1) Disconnect negative cable at battery.
2) Disconnect input shaft speed sensor coupler.
3) Remove input shaft speed sensor by removing its bolt.



1. Input shaft speed sensor

INSTALLATION

1) Apply A/T fluid to input shaft speed sensor O-ring.
2) Install input shaft speed sensor to A/T case and tighten bolt to specified torque.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

3) Connect input shaft speed sensor coupler to input shaft speed sensor.
4) Connect negative cable to battery.

VEHICLE SPEED SENSOR (VSS, SPEEDOMETER DRIVEN GEAR)

Refer to Section 7A for removal, installation and inspection.

THROTTLE POSITION SENSOR

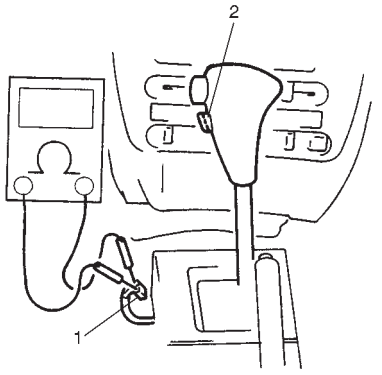
INSPECTION

Check throttle position sensor referring to Section 6E1, 6E2, 6E3 or 6E4.

ENGINE COOLANT TEMPERATURE SENSOR

INSPECTION

Check engine coolant temperature sensor referring to Section 6E1, 6E2, 6E3 or 6E4.



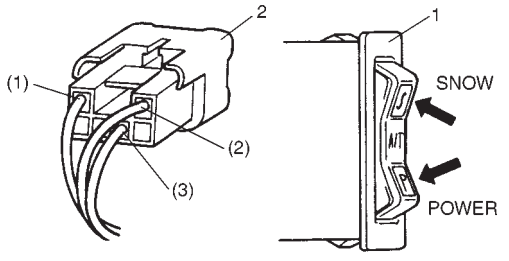
1. O/D off switch coupler
2. O/D off switch

O/D OFF SWITCH

INSPECTION

1) Remove console box.
2) Disconnect O/D off switch coupler.
3) Check continuity between O/D off switch terminals.

O/D off switch	ON	OFF
Continuity	No continuity	Continuity



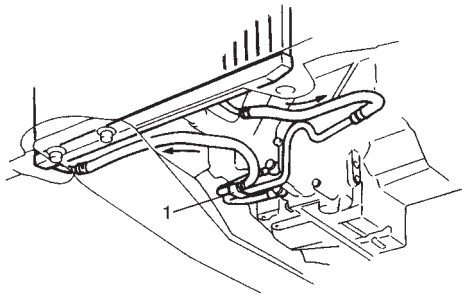
1. Mode select switch
2. Disconnected select switch coupler

MODE SELECT SWITCH

INSPECTION

Check that continuity exists as shown in below by changing mode select switch position.

Terminal No. / Switch position	(1)	(2)	(3)
Normal			
Power		○	○
Snow	○	○	

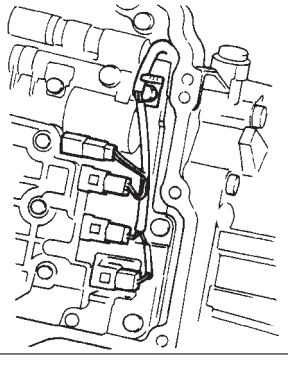


1. A/T fluid cooler pipe

SOLENOID VALVES

REMOVAL

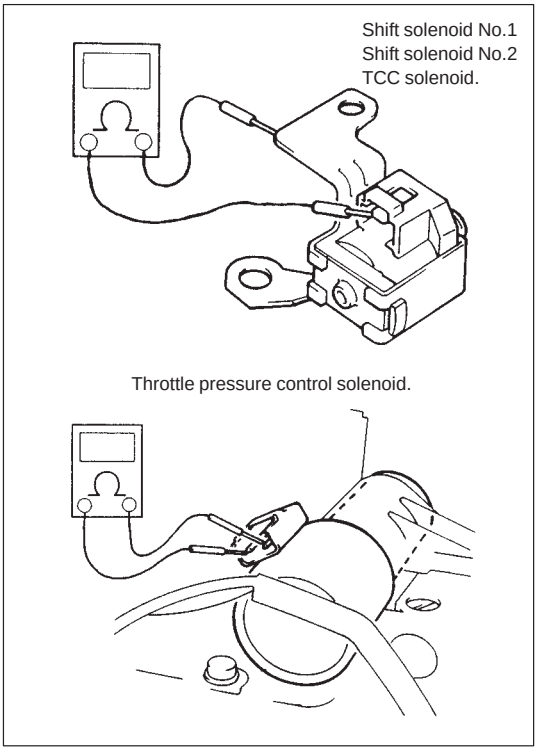
1) Disconnect negative cable from battery.
2) Drain engine coolant and A/T fluid.
3) Remove A/T fluid cooler pipe from A/T with hose connected.
4) Remove radiator with cooling fan, fan shroud, A/T fluid cooler hoses and A/T fluid pipe.



5) Remove A/T side cover.
6) Disconnect solenoid couplers.
7) Remove solenoid valves.

NOTE:

- **Don't remove throttle pressure control solenoid valve.**
- **Remove TCC solenoid valve, shift solenoid valve No.2 and shift solenoid valve No.1 in that order.**



INSPECTION

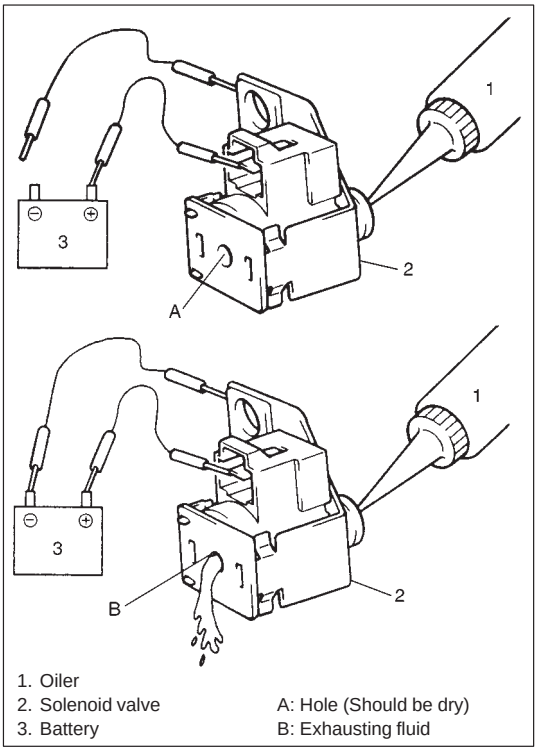
Resistance Check

- Shift solenoid No.1 and No.2 and TCC solenoid
  Check resistance between terminal and solenoid body.

  Standard resistance: 11 – 15 Ω at 20 °C, 68 °F

- Throttle pressure control solenoid
  Check resistance between each terminals.

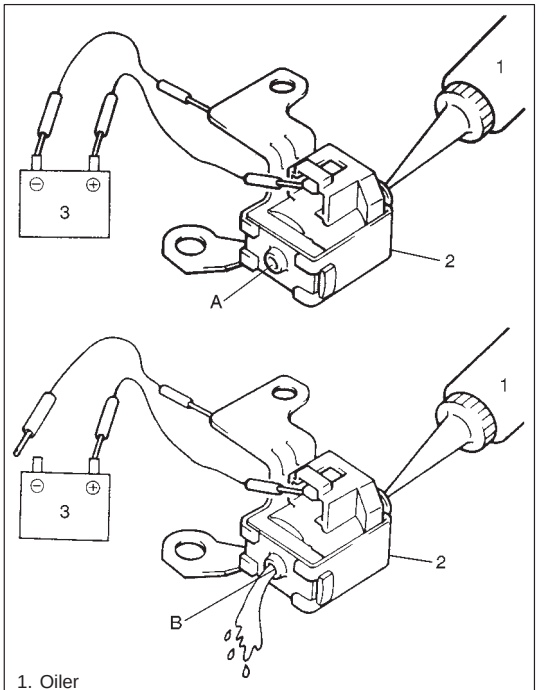
  Standard resistance: 3 – 5 Ω at 20 °C, 68 °F



Operation check

Shift solenoid valves No.1 and No.2.

1) Apply oiler to solenoid valve and give compression by hands and then check to be sure that transmission fluid from oiler does not come out of holes in solenoid valve when battery voltage is not conducted.
2) Under the same conditions as above, conduct battery voltage and then make sure that fluid comes out with vigor.
   If check result is not as described, replace shift solenoid valve.

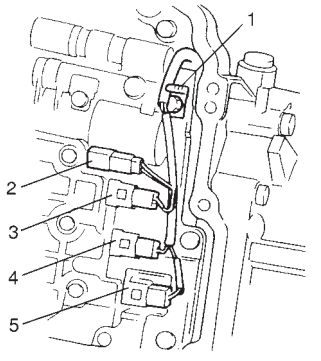


1. Oiler
2. TCC solenoid valve
3. Battery

A: Hole (should be dry)
B: Exhausting fluid

TCC solenoid valve

1) Apply oiler to solenoid valve and give compression by hands and then check to be sure that transmission fluid from oiler does not come out of holes in solenoid valve when battery voltage is conducted.
2) Under the same conditions as above, release battery voltage and then make sure that fluid comes out with vigor.
   If check result is not as described, replace shift solenoid valve.



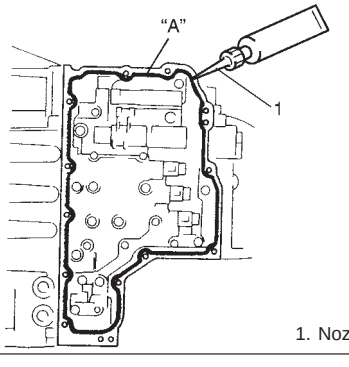
1. Clamp
2. Throttle pressure control solenoid
3. Shift solenoid No.1
4. Shift solenoid No.2
5. TCC control solenoid

INSTALLATION

1) Install shift solenoid No.1, shift solenoid No.2 and TCC solenoid in that order.

   Tightening Torque
   6.8 N·m (0.68 kg-m, 4.9 lb-ft)

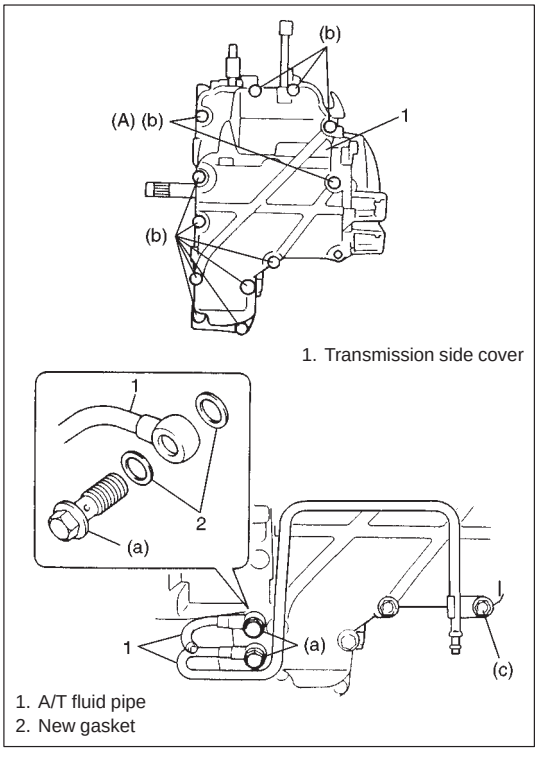
2) Connect solenoid couplers.



1. Nozzle

3) Clean mating surface of A/T side cover and A/T case.
4) Apply sealant to mating surface of A/T side cover and A/T case by using a nozzle as shown in figure by such amount that its section is 1.5 mm (0.059 in) in diameter.

   "A": 99000-31230 (SUZUKI BOND NO.1216B)



1. Transmission side cover
1. A/T fluid pipe
2. New gasket

5) Install A/T side cover.

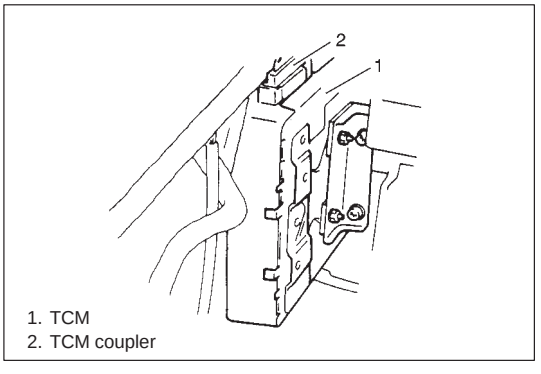
NOTE:
Don't reuse bolts (A).

6) Install radiator with cooling fan, fan shroud, A/T fluid cooler hoses and pipe.
7) Install A/T fluid cooling pipe, using under bolts to specified torque.

Tightening Torque
(a): 27 N·m (2.7 kg-m, 19.5 lb-ft)
(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)
(c): 18 N·m (1.8 kg-m, 13.0 lb-ft)

NOTE:
Make sure to use new A/T fluid pipe union bolt gaskets to prevent fluid from leaking.

8) Refill A/T fluid referring to "CHANGING FLUID" in this section.
9) Refill engine coolant referring to Section 6B.
10) Verify that there is no engine coolant leakage or A/T fluid leakage.



1. TCM
2. TCM coupler

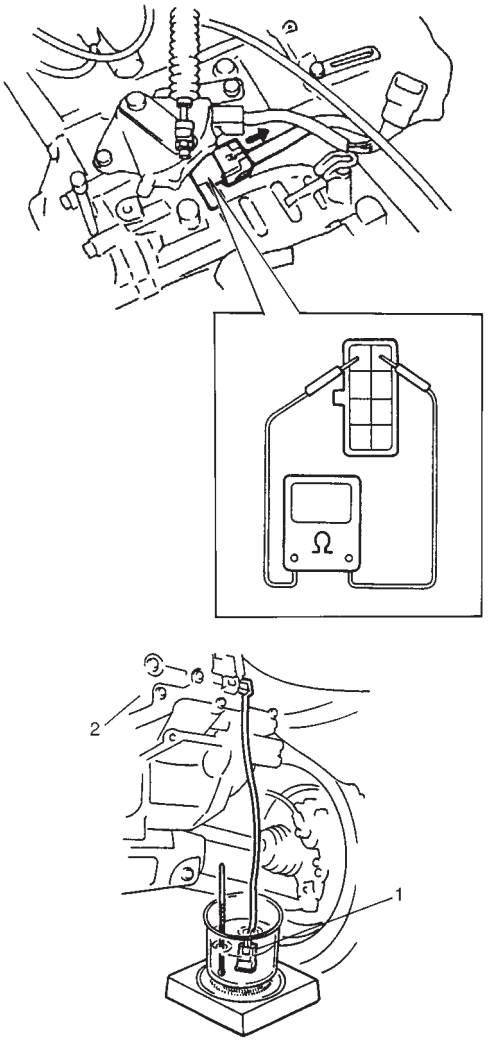
TRANSMISSION CONTROL MODULE (TCM)

REMOVAL

1) Disconnect negative cable at battery.
2) Disconnect TCM couplers from TCM.
3) Remove TCM by removing its bolts.

INSTALLATION

1) Install TCM to its bracket.
2) Connect TCM couplers to TCM.
3) Connect negative cable to battery.



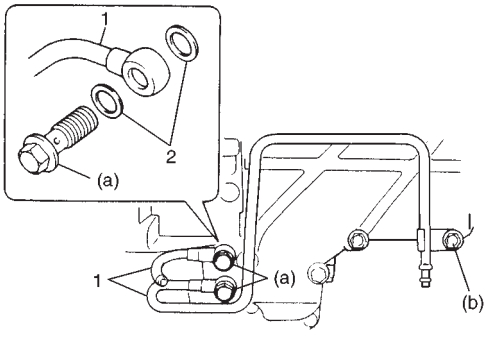
1. Transmission temperature sensor
2. A/T valve body

TRANSMISSION TEMPERATURE SENSOR

INSPECTION

1) Lift up vehicle.
2) With engine is cool, remove drain plug and drain A/T fluid.
3) Install drain plug. (Refer to “CHANGING FLUID” in this section.)
4) Disconnect oil cooler inlet hose (outlet from oil cooler) from pipe, and remove A/T fluid pipe (lower side).
5) Remove A/T side cover.
6) Disconnect wire harness at coupler of valve body.
7) Warm up transmission temperature sensor. Check resistance between terminals of coupler at valve body. Thus make sure its resistance decrease with the increase of temperature. After inspection, connect coupler.

Temperature	Resistance
10 ◯C (50 ◯F)	6.4 kI
110 ◯C (230 ◯F)	247 I
145 ◯C (293 ◯F)	110 I



1. A/T fluid pipe
2. New gasket

8) Perform steps 71) to 73) of “UNIT ASSEMBLY” in this section.
9) Install A/T fluid cooler hose and pipe, and tighten union bolt to specified torque.

Tightening Torque
(a): 27 N·m (2.7 kg-m, 19.5 lb-ft)
(b): 18 N·m (1.8 kg-m, 13.0 lb-ft)

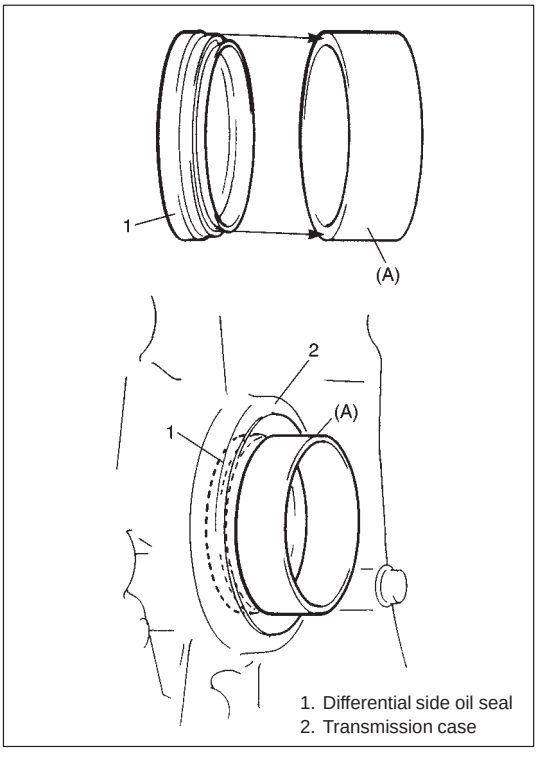
NOTE:
Make sure to use new gaskets for A/T fluid pipe union bolts.

10) Refill A/T fluid.
11) Verify that there is no A/T fluid leakage.

DIFFERENTIAL SIDE OIL SEAL

REPLACEMENT

1) Lift up vehicle and drain transmission oil.
2) Remove drive shaft joints from differential gear of transmission.
   Refer to Section 4 (DRIVE SHAFT) for procedure to disconnect drive shaft joints.
   For differential side oil seal removal, it is not necessary to remove drive shafts from steering knuckle.



1. Differential side oil seal
2. Transmission case

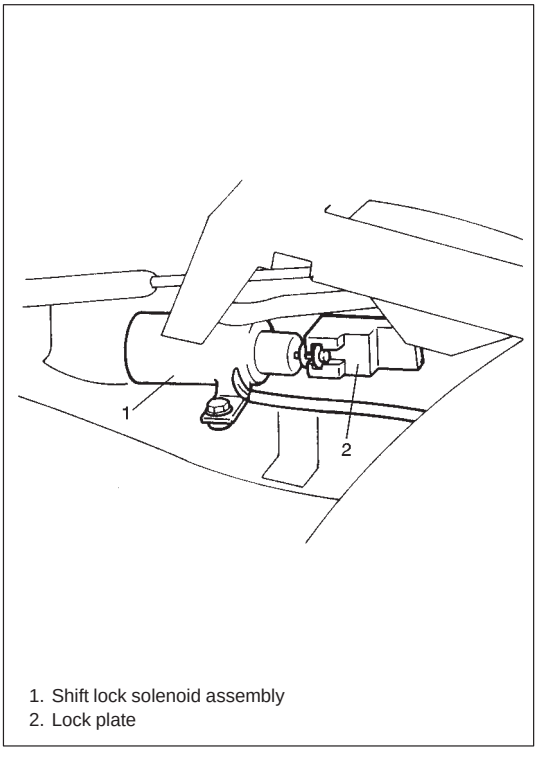
3) Remove differential side oil seal by using screw driver or like.
4) Install new differential side oil seal by using special tool.

   NOTE:
   For oil seal installation, press-fit oil seal so that transmission case end face is flush with oil seal end face.

   Special Tool
   (A): 09944-66020

5) Install drive shaft referring to Section 4.
6) Refill A/T fluid referring to “CHANGING FLUID” in this section.

SHIFT LOCK SOLENOID (if equipped)

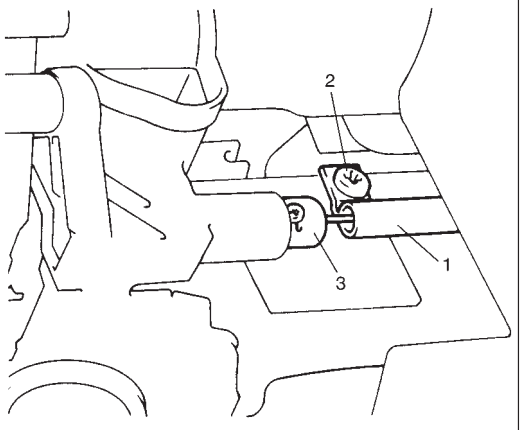


1. Shift lock solenoid assembly
2. Lock plate

1) Remove parking brake cover and console box.
2) Replace shift lock solenoid.
3) Install covers as they were.

   NOTE:
   - **Shift selector lever to “L” to facilitate work.**
   - **Check that detent pin is locked at “P” position by lock plate.**
   - **Check to confirm that lock plate is pulled in when ignition key is turned to “ON” and brake pedal is depressed, so allowing detent pin to be pushed down.**

INTERLOCK CABLE (if equipped)



1. Interlock cable
2. Screw
3. Release shaft

NOTE:
Don't bend interlock cable excessively when removing and installing it, or system will not operate correctly.

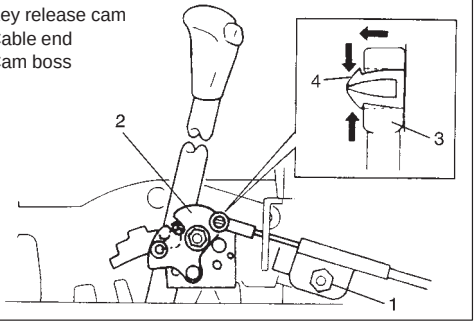
REMOVAL

1) Disconnect negative cable at battery and disable air bag system, referring to "DISABLING AIR BAG SYSTEM" in Section 9J.
2) Remove steering column hole cover and steering joint cover.
3) Disconnect steering shaft upper joint bolt and steering column mounting bolts and nuts.

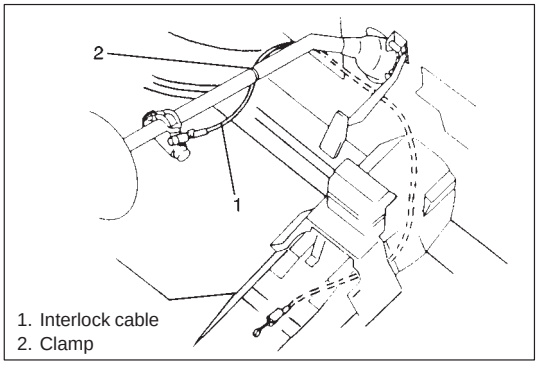
> **CAUTION:**
> **Steering column mounting bolts and/or nuts should not be loosened with steering shaft joint upper side tightened as this could cause damage to shaft joint bearing.**

4) Remove steering upper cover.
5) Remove interlock cable clamp screw located at ignition switch and disconnect interlock cable from release shaft with ignition switch turned at "ACC" position. And then turn ignition switch to "LOCK" position.

1. Cable bracket nut
2. Key release cam
3. Cable end
4. Cam boss



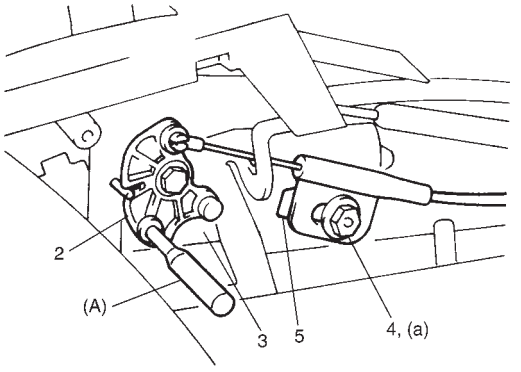
6) Remove parking brake cover and console box.
7) Remove cable bracket nut and detach cable end from key release cam while pressing claws of release cam boss.
   At this time, be careful not to cause damage to its claws.
8) Remove interlock cable.



1. Interlock cable
2. Clamp

INSTALLATION

1) Install interlock cable as shown in figure.
2) Connect cable end to steering lock and tighten cable clamp screw securely.



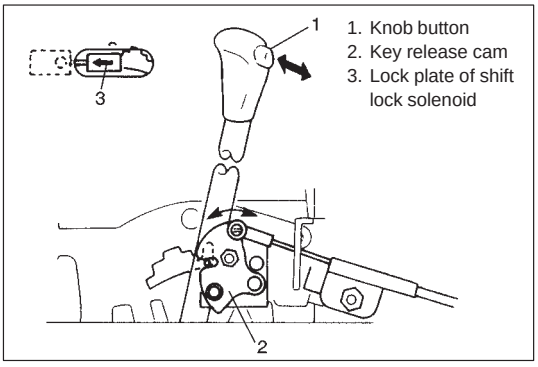
1. Selector lever ("P" position and pushing knob button)
2. Key release cam
3. Selector bracket
4. Cable bracket nut
5. Leaf spring

3) Shift selector lever to "P" position and with lock plate manually moved toward front side of vehicle, push knob button of selector lever.
4) Under above condition, fix key release cam inserting special tool into holes on cam and selector bracket.

Special Tool
(A): 09925-78210 (6 mm)

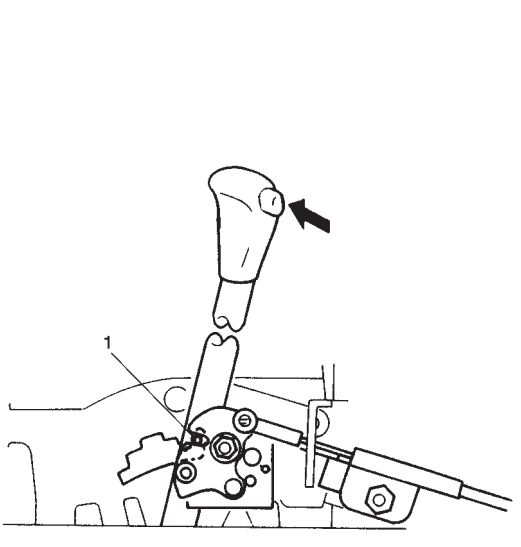
5) Connect cable end to key release cam.
6) With cable bracket pushed in arrow direction by spring force, tighten cable bracket nut.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Knob button
2. Key release cam
3. Lock plate of shift lock solenoid

7) Remove special tool. Then with lock plate of shift lock solenoid manually moved toward front side of vehicle, check that key release cam moves smoothly by operating knob button of selector lever.

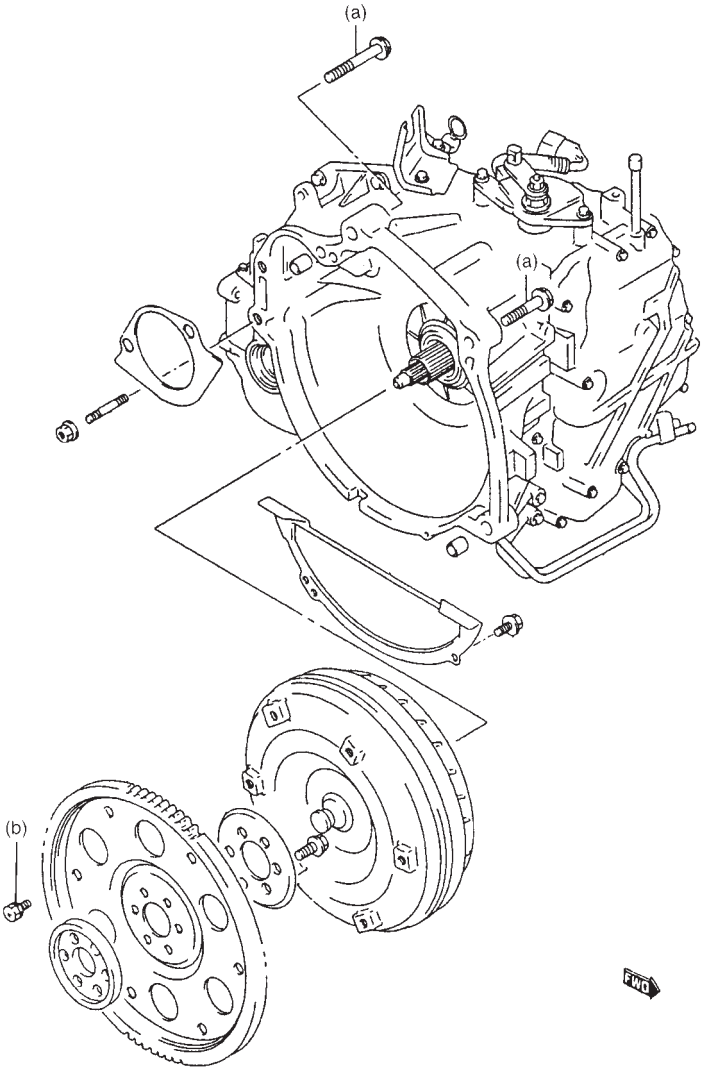


1. Detent pin position when knob button is pressed at "P" position.

8) With selector lever set at "P" position, turn ignition key to "ACC" position and then check for the following conditions.
   - With knob button released, ignition key can be turned from "ACC" position to "LOCK" position.
   - With knob button pressed, ignition key cannot be turned from "ACC" position to "LOCK" position.
9) Install steering column referring to Section 3C1.
10) Install steering column hole cover and steering joint cover.
11) Connect negative cable at battery and enable air bag system, referring to "ENABLING AIR BAG SYSTEM" in Section 9J.

AUTOMATIC TRANSMISSION ASSEMBLY

COMPONENTS

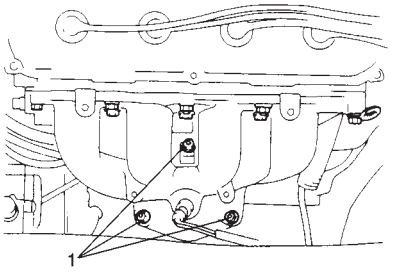


Tightening Torque		N·m	(kg-m,	lb-ft)
(a): Transmission to engine	bolt / nut	90	(9.0,	65.0)
(b): Drive plate	bolt	19	(1.9,	14.0)

DISMOUNTING

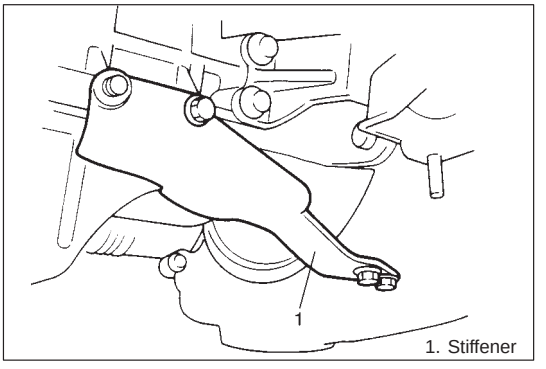
<G16 engine model>

1) Disconnect negative cable at battery and transmission.
2) Disconnect coupler for solenoids, vehicle speed sensor (for speedometer), shift lever switch, forward clutch cylinder revolution sensor and output shaft speed sensor.
3) Undo wiring harness clamps.
4) Disconnect select cable from transmission.
5) Drain cooling system.
6) Remove water intake pipe.
7) Remove transmission-to-engine bolts.
8) Remove starting motor.
   Starting motor plate should also come down.



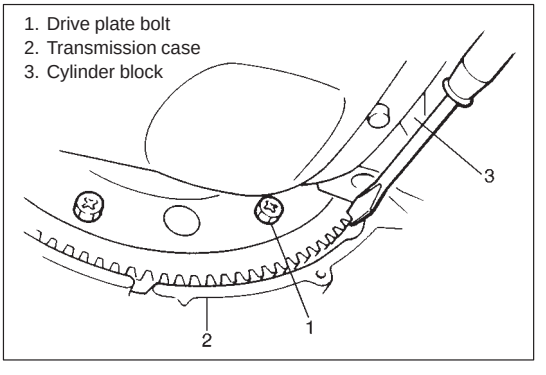
1. Exhaust No.1 pipe mounting nuts

9) Remove exhaust manifold cover.
10) Remove exhaust manifold to No.1 pipe nuts.
11) Support engine to prevent one from being declined excessively at removal of mounting supports.
12) Check around transmission for any other parts required to be removed or disconnected for dismounting of transmission and remove or disconnect whatever necessary.

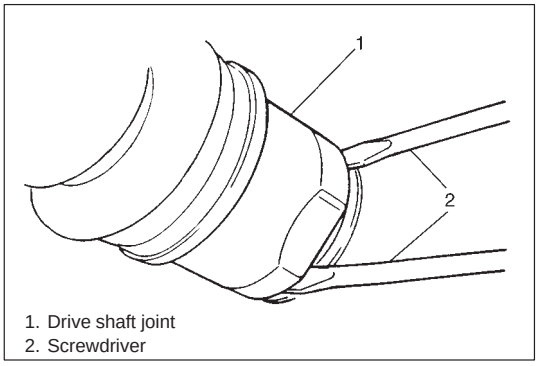


1. Stiffener

13) Drain transmission fluid.
14) Remove engine under covers.
15) Disconnect oil cooler hoses.
16) Remove mounting member.
17) Remove exhaust pipe.
18) Remove stiffener.

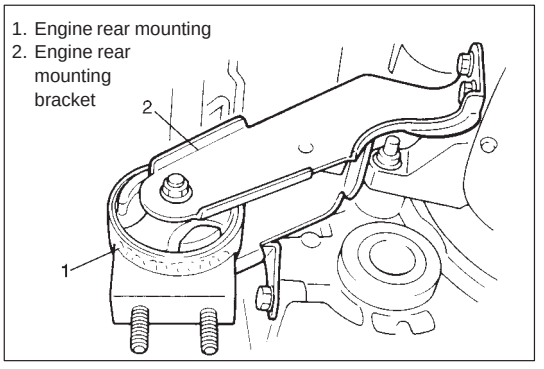


19) Remove transmission housing lower plate.
20) Holding drive plate with a large size screwdriver against rotation, remove drive plate bolts.

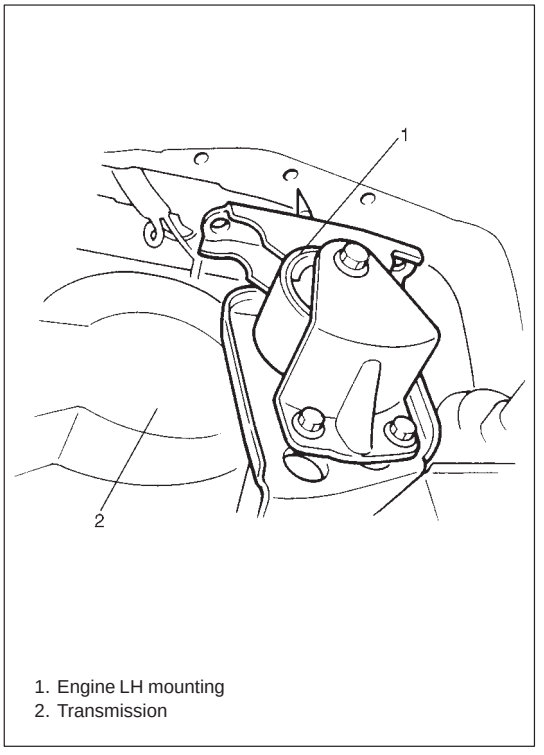


1. Drive shaft joint
2. Screwdriver

21) By using large size screwdriver, pull out drive shaft joints at differential side so as to release snap ring fitting.
22) Disconnect stabilizer joints from suspension arms on both sides.
23) Remove ball stud bolts and nuts from both knuckles and detach suspension arms and then pull out both drive shaft joints from differential.



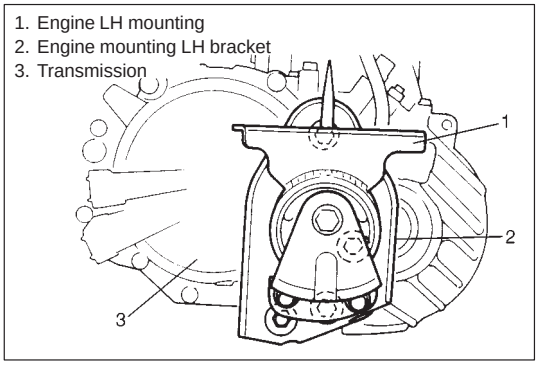
24) Remove engine rear mounting and its bracket.
25) Remove engine-to-transmission bolt and nut.



1. Engine LH mounting
2. Transmission

26) Support transmission with transmission jack.
27) Remove bolts from engine LH mounting.
28) Remove transmission with torque converter from engine compartment.

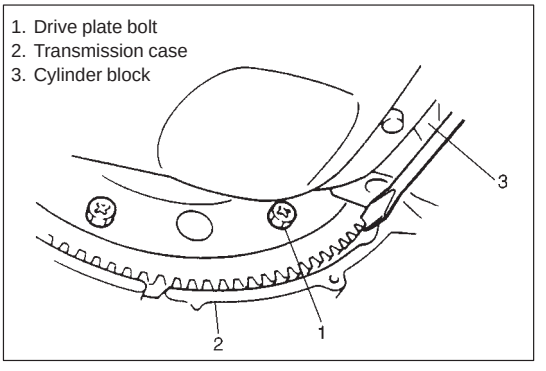
WARNING:
Be sure to keep transmission with torque converter horizontal or facing up through out the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.



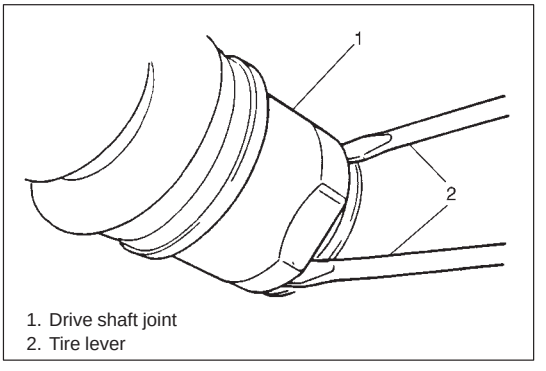
29) Remove engine LH mounting and its bracket from transmission case.

<J18 engine model>

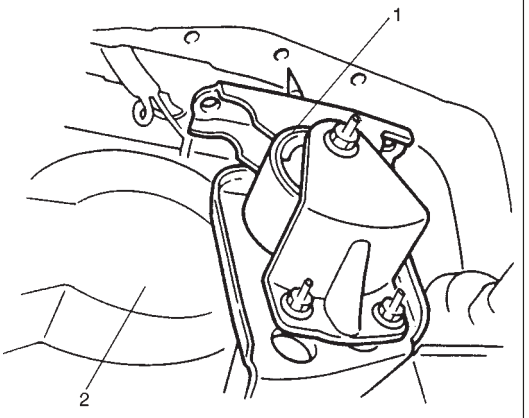
1) Disconnect negative cable at battery and transmission.
2) Disconnect coupler for solenoids, vehicle speed sensor (for speedometer), transmission range sensor, forward clutch cylinder revolution sensor and output shaft speed sensor.
3) Undo wiring harness clamps.
4) Disconnect select cable from transmission.
5) Remove transmission-to-engine bolts.
6) Remove starting motor.
   Starting motor plate should also come down.
7) Support engine to prevent one from being declined excessively at removal of mounting supports.
8) Check around transmission for any other parts required to be removed or disconnected for dismounting of transmission and remove or disconnect whatever necessary.



9) Drain transmission fluid.
10) Remove engine under covers.
11) Disconnect fluid (oil) cooler hoses.
12) Remove mounting member.
13) Remove transmission housing lower plate.
14) Holding drive plate with a proper size rod against rotation, remove drive plate bolts.



15) Pull out left drive shaft joint at differential and right drive shaft joint at center shaft so as to release snap ring fitting.
16) Disconnect stabilizer joints from suspension arms on both sides.
17) Remove ball stud bolts and nuts from both knuckles and detach suspension arms and then pull out left drive shaft joint from differential and right drive shaft joint from center shaft.
18) Remove center shaft from differential.
19) Remove engine rear mounting and its bracket bolts at transmission case.
20) Remove engine-to-transmission bolt and nut.

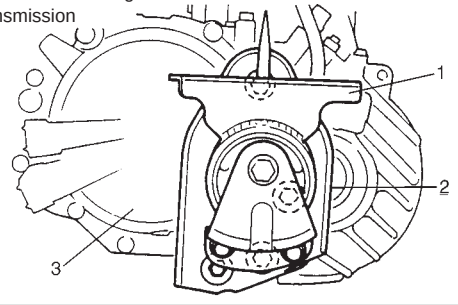


1. Engine left mounting
2. Transmission

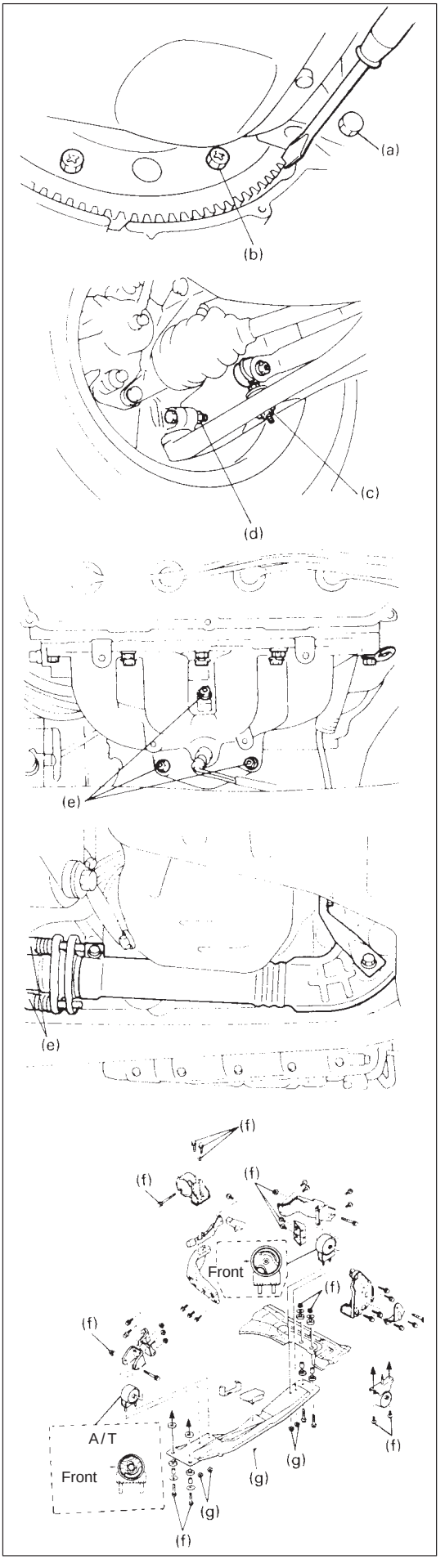
21) Support transmission with transmission jack.
22) Remove bolts from engine left mounting.
23) Remove transmission with torque converter from engine compartment.

WARNING:
Be sure to keep transmission with torque converter horizontal or facing up through out the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.

1. Engine left mounting
2. Engine left mounting bracket
3. Transmission



24) Remove engine left mounting and its bracket from transmission case.



REMOUNTING

<G16 engine model>

For remounting, reverse dismounting procedure. Use following specified torques and note points listed below.

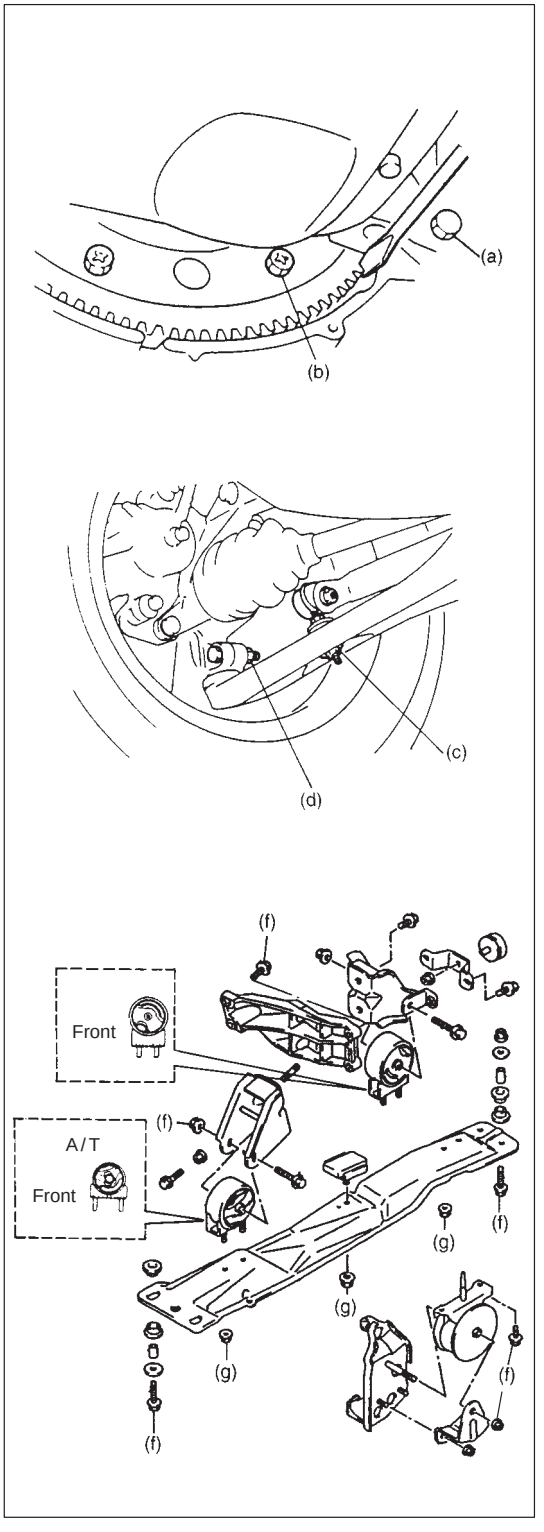
Tightening Torque

(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)
(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)
(c): 28 N·m (2.8 kg-m, 20.5 lb-ft)
(d): 60 N·m (6.0 kg-m, 43.5 lb-ft)
(e): 50 N·m (5.0 kg-m, 36.5 lb-ft)
(f): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(g): 45 N·m (4.5 kg-m, 32.5 lb-ft)

- Push in each drive shaft joint fully so that snap ring engages with differential gear.

> **CAUTION:**
> - **Care should be taken not to scratch oil seal lip with drive shaft while inserting drive shaft joint into transmission.**
> - **Do not hit drive shaft joint with hammer when installing it.**

- Set each clamp for wiring securely.
- Adjust select cable.
- Refill fluid and adjust its level at normal operating temperature.
- Check to make sure that engine and transmission function properly.
- Make sure that these is no evidence of fluid leakage.



<J18 engine model>

For remounting, reverse dismounting procedure. Use the following specified torques and note points listed below.

Tightening Torque

(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)
(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)
(c): 28 N·m (2.8 kg-m, 20.5 lb-ft)
(d): 60 N·m (6.0 kg-m, 43.5 lb-ft)
(f): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(g): 45 N·m (4.5 kg-m, 32.5 lb-ft)

- Push in each drive shaft joint fully so that snap ring engages with differential gear and center shaft respectively.

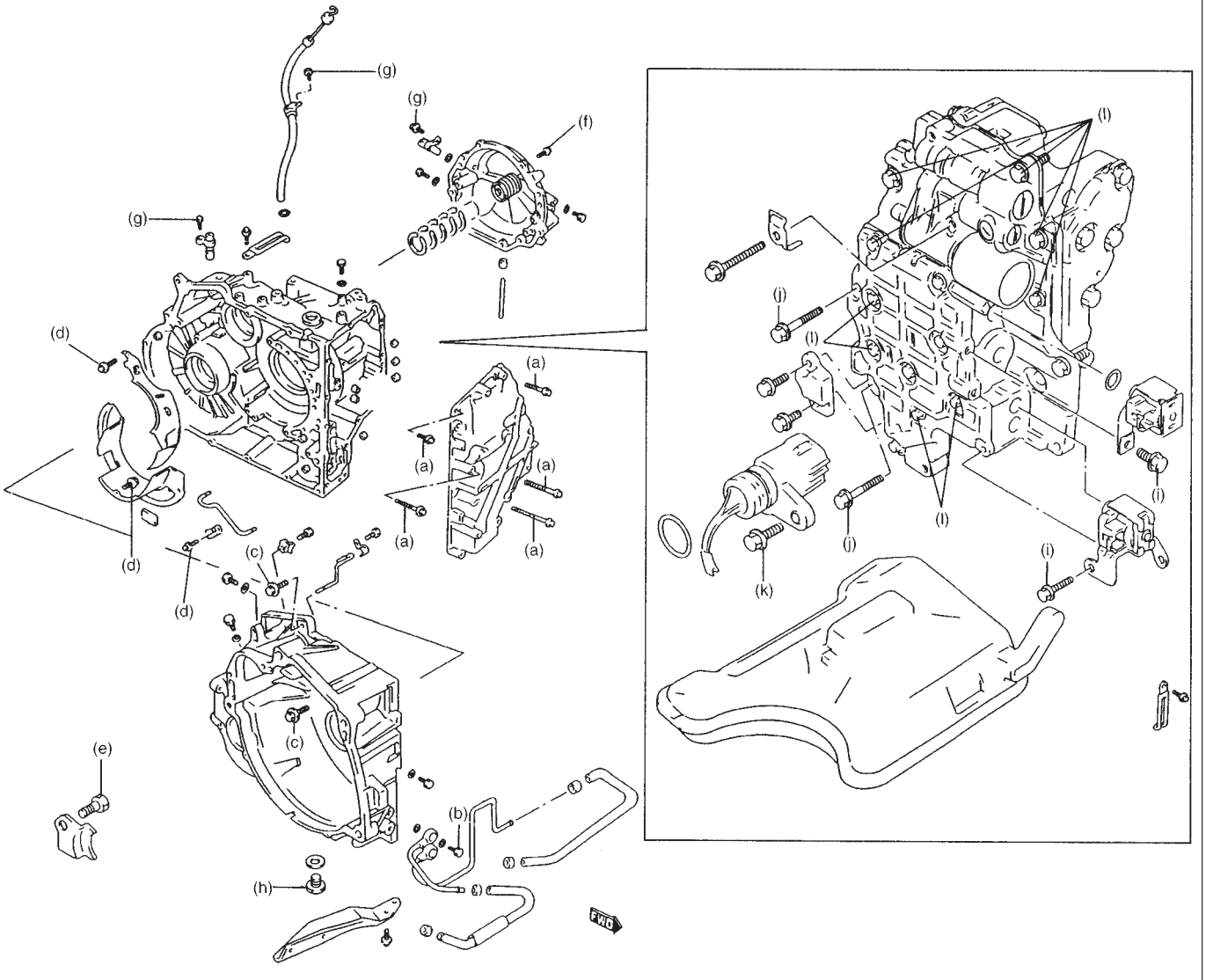
> **CAUTION:**
> - **Care should be taken not to scratch oil seal lip with drive shaft while inserting drive shaft joint into transmission.**
> - **Do not hit drive shaft joint with hammer when installing it.**

- Set each clamp for wiring securely.
- Adjust select cable.
- Refill fluid and adjust its level at normal operating temperature.
- Check to make sure that engine and transmission function properly.
- Make sure that these is no evidence of fluid leakage.

UNIT REPAIR

AUTOMATIC TRANSMISSION ASSEMBLY

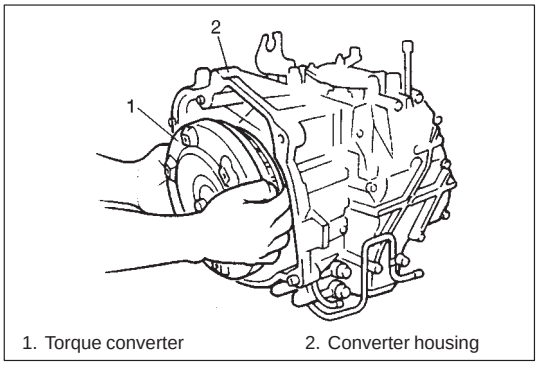
COMPONENTS



Tightening Torque	N·m	(kg-m,	lb-ft)
(a): A/T side cover bolt	18	(1.8,	13.0)
(b): A/T fluid pipe union bolt	27	(2.7,	19.5)
(c): Transmission case bolt	30	(3.0,	22.0)
(d): Oil reservoir plate bolt/tube clamp bolt	5.5	(0.55,	4.0)
(e): Roller bearing retainer	13	(1.3,	9.5)
(f): Rear cover bolt	25	(2.5,	18.0)
(g): Oil filler tube bolt/Sensor bolt	5.5	(0.55,	4.0)
(h): Drain plug	40	(4.0,	29.0)
(i): Solenoid valve bolt	6.8	(0.68,	4.9)
(j): Valve body mount bolt	10	(1.0,	7.5)
(k): Solenoid coupler bolt	5.5	(0.55,	4.0)
(l): Valve body bolt	6.8	(0.68,	4.9)

UNIT DISASSEMBLY

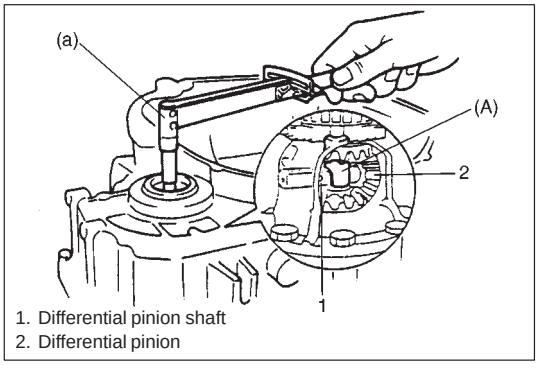
CAUTION:
- **Thoroughly clean transmission exterior before overhauling it.**
- **Keep working table, tools and hands clean while overhauling.**
- **Use special care to handle aluminum parts so as not to damage them.**
- **Do not expose removed parts to dust. Keep them clean always.**



1. Torque converter 2. Converter housing

1) Extract torque converter.

CAUTION:
Remove torque converter as much straight as possible. Leaning it may cause to damage oil seal lip.



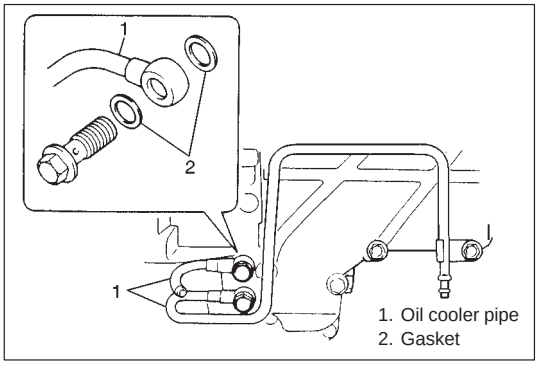
1. Differential pinion shaft
2. Differential pinion

2) Measure starting torque of differential gear assembly using special tool.

Special Tool
(A): 09928-06050

Specified value
(a): 1.0 – 1.4 N·m (0.1 – 0.14 kg-m, 0.74 – 1.0 lb-ft)

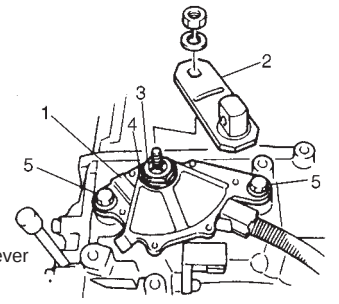
NOTE:
Record actual starting torque of differential assembly for installation reference.



1. Oil cooler pipe
2. Gasket

3) Remove oil cooler pipes.

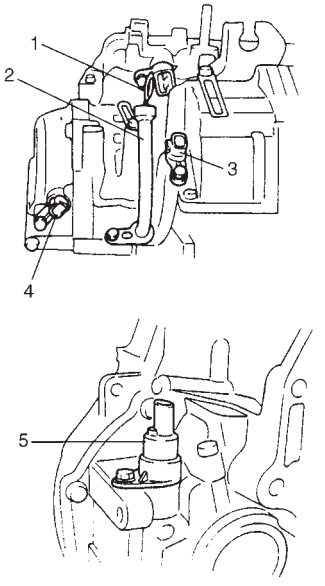
NOTE:
Never reuse gaskets after removal.



1. Transmission range sensor
2. Manual shift lever
3. Lock nut
4. Lock washer
5. Bolt

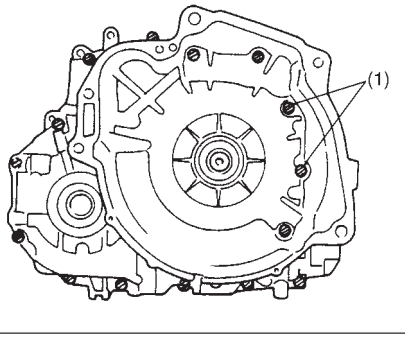
4) Pull out transmission range sensor assembly.
   a) Remove manual shift lever.
   b) Pry off lock washer.
   c) Remove lock nut.
   d) Remove lock washer and rubber plate.
   e) Remove 2 bolts.

NOTE:
Never reuse lock washer after removal.



1. Oil level gauge
2. Oil filler tube
3. Output shaft speed sensor
4. Input shaft speed sensor
5. Vehicle speed sensor (for speedometer)

5) Remove oil level gauge, oil filler tube, output shaft speed sensor, input shaft speed sensor and vehicle speed sensor (for speedometer).



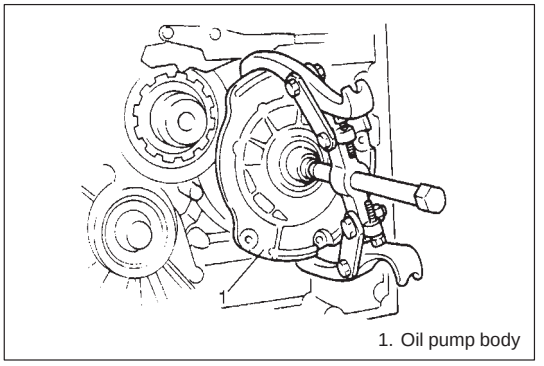
6) Remove transmission housing by removing 15 bolts as shown.

NOTE:
Never reuse removed 2 bolts (1).

7) Pull out differential gear assembly.
8) Clean and wipe off gasket sealer on mating surface between transmission housing and transmission case.

9) Remove three gaskets at transmission case side.

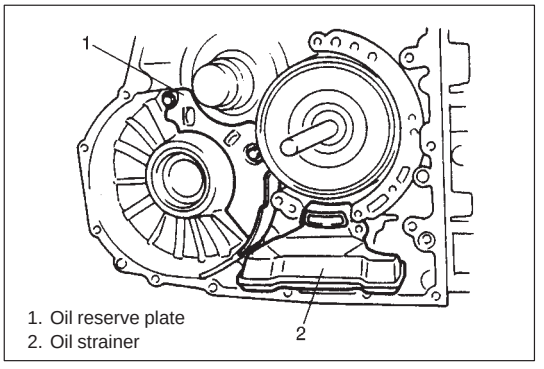
NOTE:
Never reuse removed gaskets.



1. Oil pump body

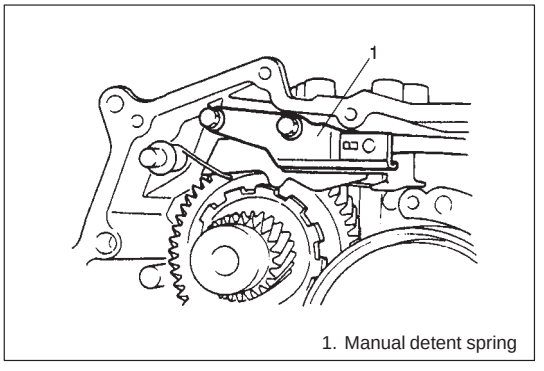
10) Remove 6 bolts of oil pump body, then remove oil pump body by hand.

NOTE:
- **Use care not to cause damage to shaft bushing surface.**
- **If oil pump body can't be removed by hand, remove it by using gear puller as shown in figure.**



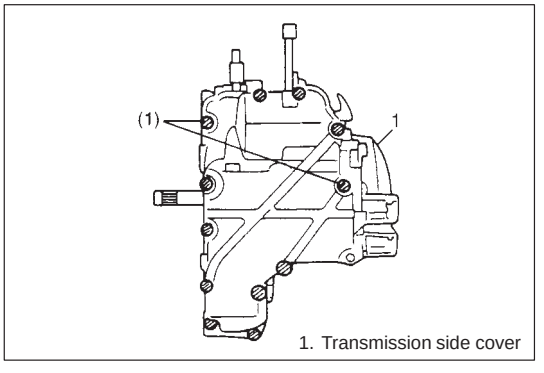
1. Oil reserve plate
2. Oil strainer

11) Remove oil reserve plate by removing 2 bolts.
12) Remove oil strainer.



1. Manual detent spring

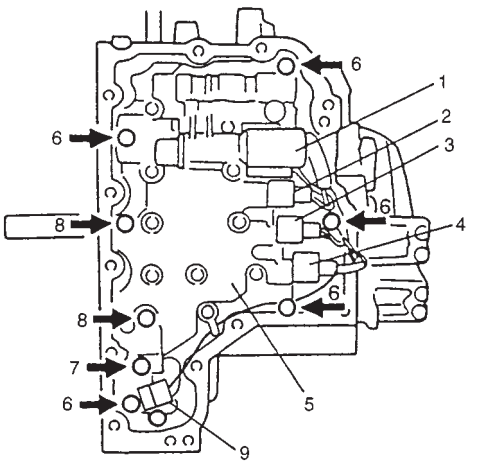
13) Remove manual detent spring by removing 2 bolts.



1. Transmission side cover

14) Remove transmission side cover by removing bolts.

NOTE:
Never reuse removed two bolts (1).



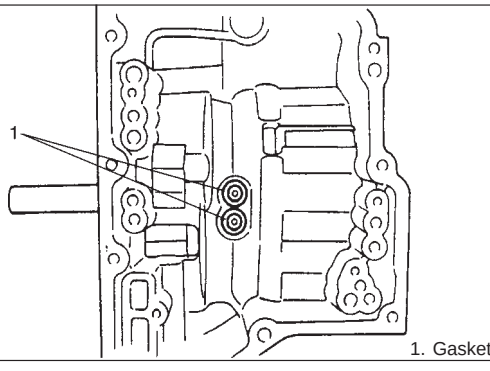
1. Throttle pressure control solenoid
2. No.1 shift solenoid
3. No.2 shift solenoid
4. TCC control solenoid
5. Valve body assembly
6. 20 mm (0.78 in.)
7. 50 mm (1.97 in.)
8. 55 mm (2.17 in.)
9. Transmission temperature sensor

15) Release solenoid wiring harness from clamp.
16) Disconnect pressure control, No.1 shift, No.2 shift and lock up control solenoid couplers.
17) Remove valve body assembly by removing eight bolts.

NOTE:
Each bolt length is indicated in figure.

CAUTION:
Be careful not to let manual valve fall off when removing valve body assembly.

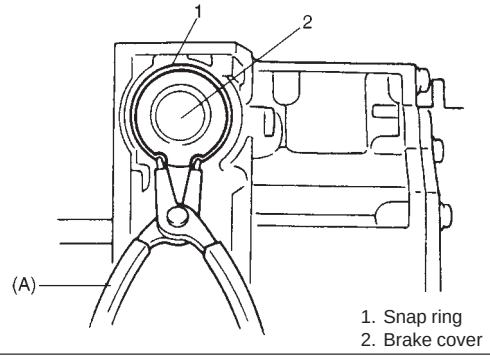
18) Remove solenoid coupler mounting bolt and remove solenoid coupler and its harness.
Then remove transmission temperature sensor and its harness from clamps.



1. Gasket

19) Remove 2 gaskets.

NOTE:
Never reuse removed gaskets.

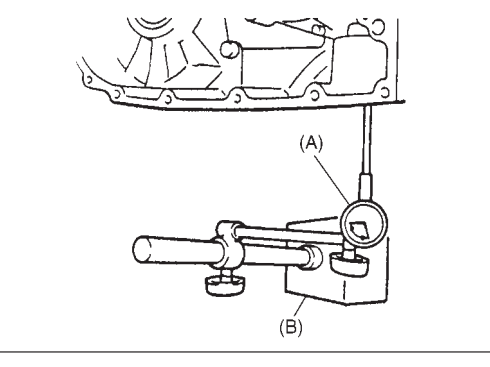


1. Snap ring
2. Brake cover

20) Remove snap ring using special tool.

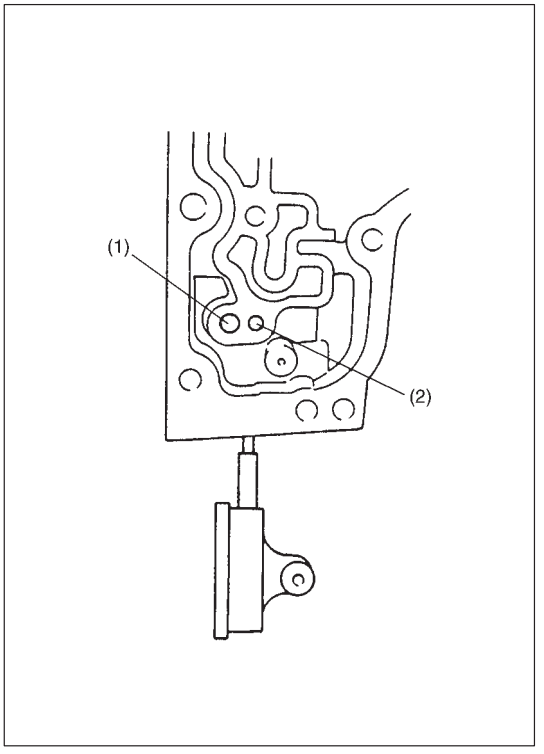
Special Tool
(A): 09900-06108

21) Pull out 2nd and 4th brake cover with O-ring by using plier or the like.



22) Inspect 2nd and 4th brake piston rod stroke.
a) Set dial gauge and magnetic stand (special tools).

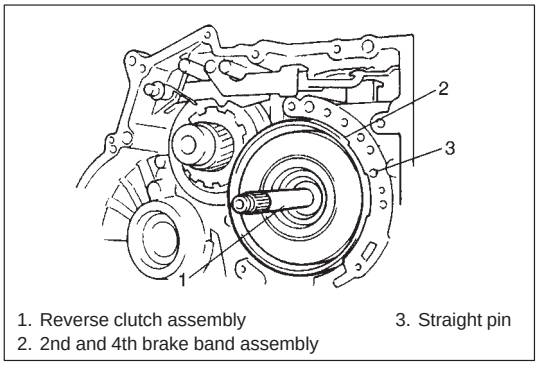
Special Tool
(A): 09900-20606
(B): 09900-20701



b) Plug oil hole (1).
c) Measure piston rod stroke while applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) from oil hole (2).

Specified piston rod stroke: 1.98 – 2.42 mm (0.078 – 0.095 in.)

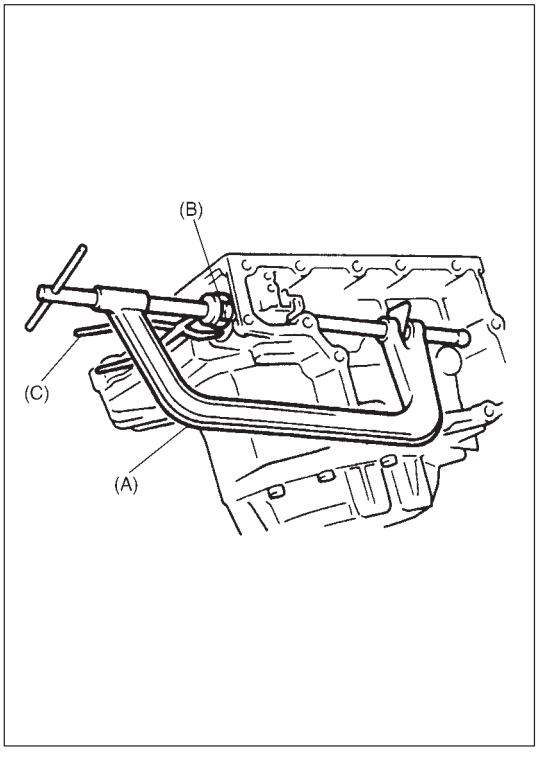
NOTE:
If piston rod stroke exceeds above specification, adjust piston rod (For detail, refer to step 23 on "INSTALLATION" procedure.) or inspect band assembly of 2nd and 4th brake for damage, wear or discoloration.



1. Reverse clutch assembly
2. 2nd and 4th brake band assembly
3. Straight pin

23) Pull out reverse clutch assembly.
24) Remove 2nd and 4th brake band assembly.
25) Remove straight pin.

Reference value of straight pin
Length: 45 mm (1.77 in.)
Outside diameter: 8 mm (0.31 in)

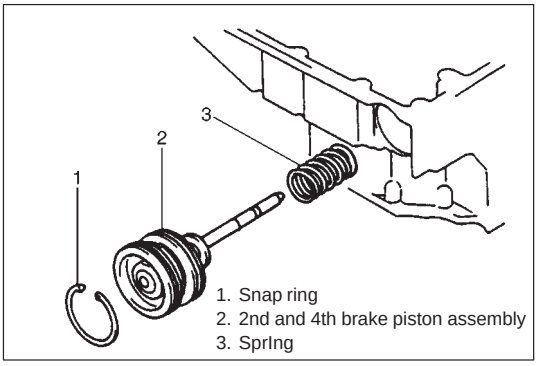


26) Apply valve lifter as illustrated and push in brake inner cover.

Special Tool
(A): 09916-14510
(B): 09916-48210

27) Remove snap ring by using snap ring plier (special tool).

Special Tool
(C): 09900-06108

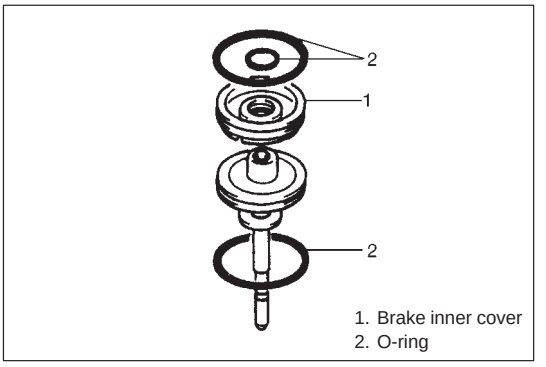


1. Snap ring
2. 2nd and 4th brake piston assembly
3. SprIng

28) Remove tools and take out 2nd and 4th brake piston assembly and brake inner cover.

NOTE:
If 2nd and 4th brake piston assembly doesn't come out, apply compressed air through oil hole (1) in figure of step 22)-b).

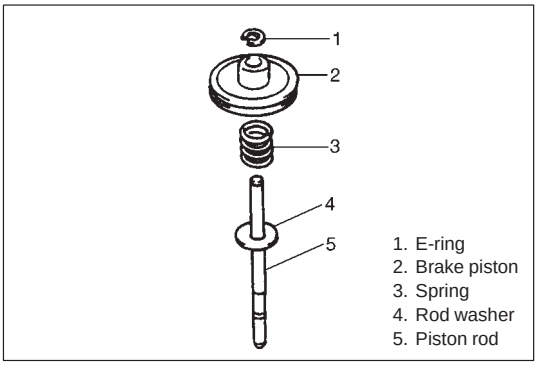
29) Remove spring.



1. Brake inner cover
2. O-ring

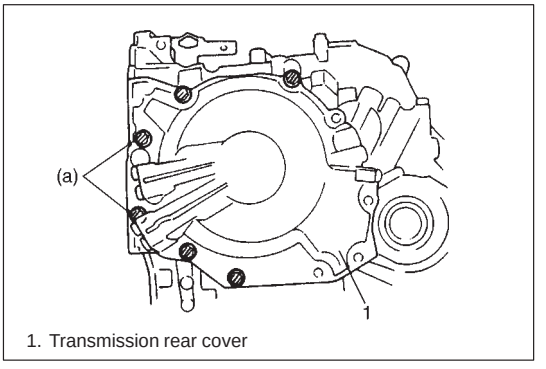
30) Disassemble 2nd and 4th brake piston assembly.
a) Remove brake inner cover and O-rings.

NOTE:
Never reuse removed O-ring.



1. E-ring
2. Brake piston
3. Spring
4. Rod washer
5. Piston rod

b) Remove E-ring, brake piston, spring and rod washer.

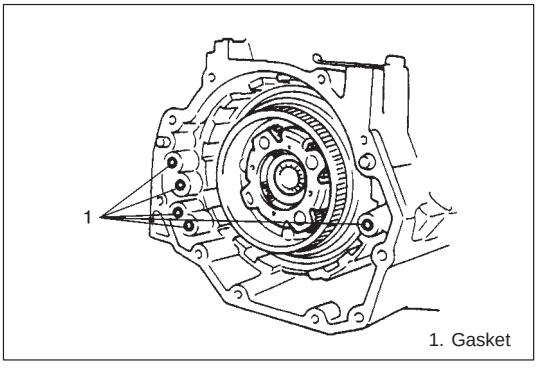


1. Transmission rear cover

31) Loosen six bolts of transmission rear cover.
32) Lightly and uniformly tap two rib sections of transmission rear cover, using plastic hammer.
33) Remove ten bolts and engine mounting LH bracket.

NOTE:
Never reuse 2 bolts (a) after removal.

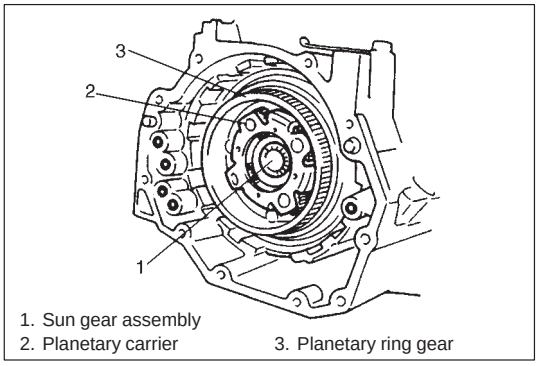
34) Pull out transmission rear cover with forward clutch subassembly installed.



1. Gasket

35) Remove 5 gaskets.

NOTE:
Never reuse removed gaskets.

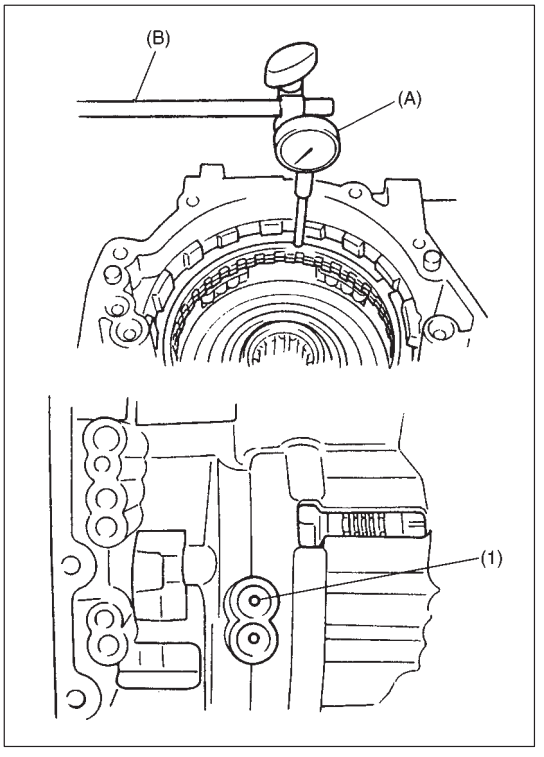


1. Sun gear assembly
2. Planetary carrier
3. Planetary ring gear

36) Remove carrier for front/rear planetary ring gear and sun gear assembly with the following integral bearing installed.

Integral bearing with race dimension
Outside diameter : 32.3 mm (1.27 in.)
Inside diameter : 19.0 mm (0.75 in.)
Race thickness : 2.7 mm (0.11 in.)

37) Pull out sun gear assembly.



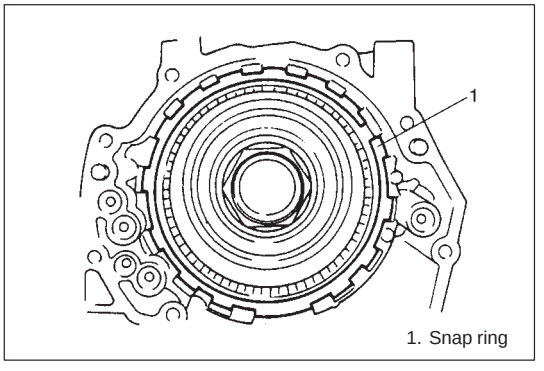
38) Inspect 1st and reverse brake piston stroke.
a) Set special tools (dial gauge and magnetic stand).

Special Tool
(A): 09900-20606
(B): 09900-20701

b) Measure piston stroke while applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) from oil hole (1).

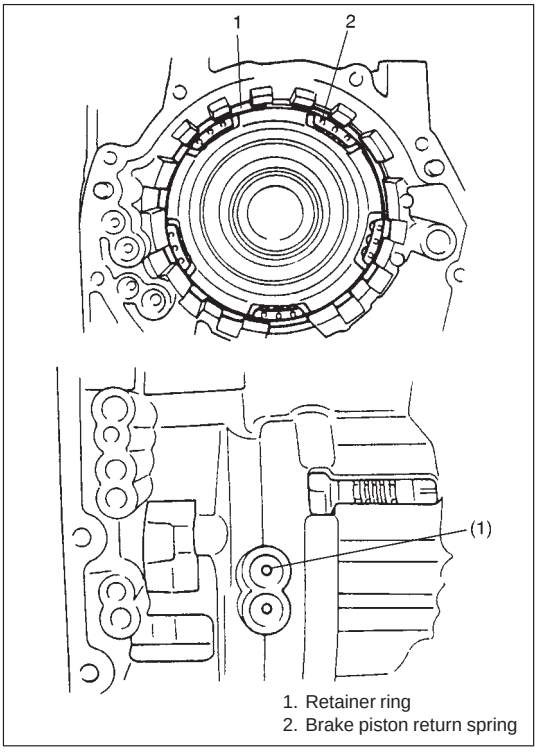
Specified value: 1.4 – 2.2 mm (0.055 – 0.087 in.)

NOTE:
If piston stroke exceeds specification above, inspect or replace flanges and discs.



1. Snap ring

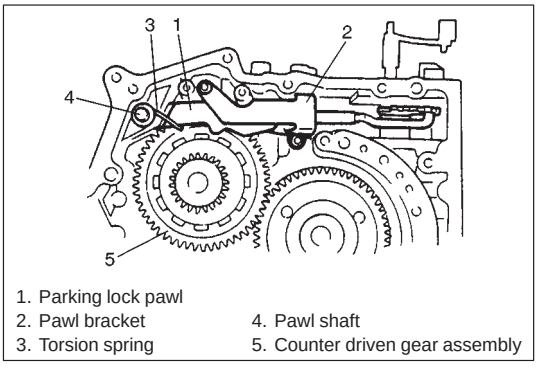
39) Remove snap ring using flat end rod or the like.
40) Remove flange brakes “F”, disc, clutch and flanges “D” and plate brakes “P” in the following order.
F → D → P → D → P → D → P → D → F



1. Retainer ring
2. Brake piston return spring

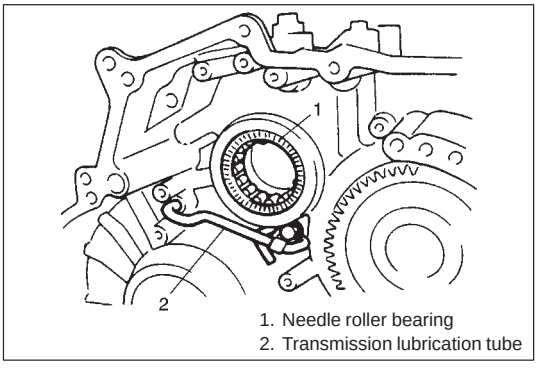
41) Remove retainer ring and brake piston return spring.
42) Remove 1st and reverse brake piston with O-ring installed while applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole section (1).

NOTE:
- **Never reuse removed O-rings.**
- **If piston will not pop out, it is recommended to use needle nose pliers for removal.**



1. Parking lock pawl
2. Pawl bracket
3. Torsion spring
4. Pawl shaft
5. Counter driven gear assembly

43) Remove parking lock pawl, pawl bracket and spring by removing two bolts.
44) Pry off torsion spring of parking lock pawl.
45) Remove parking lock pawl by pulling out pawl shaft with torsion spring installed.
46) Pullout counter driven gear assembly towards you.

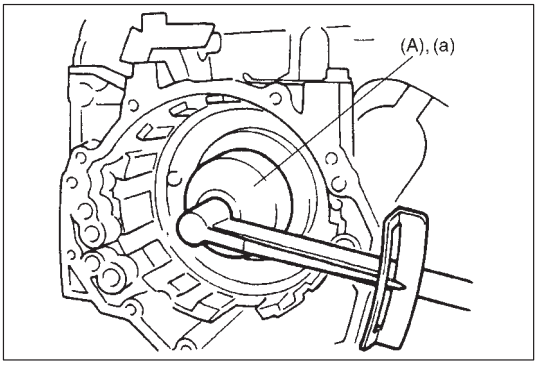


1. Needle roller bearing
2. Transmission lubrication tube

47) Remove integrated needle roller bearing with race.

Race dimension
Outside diameter : 65.7 mm (2.59 in.)
Inside diameter : 51.0 mm (2.01 in.)
Thickness : 2.8 mm (0.11 in.)

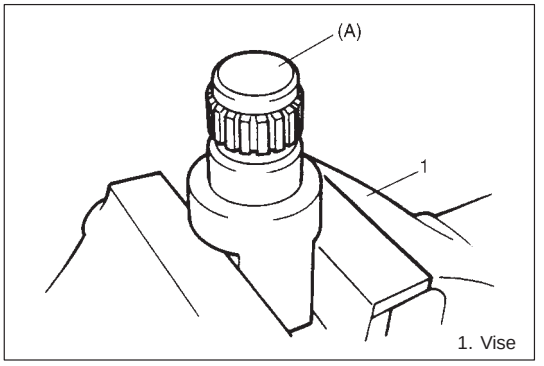
48) Remove transmission lubrication tube.



49) Measure starting torque of counter drive gear subassembly using torque wrench and special tool.

Special Tool
(A): 09927-26010

Specified value
(a): 0.05 – 0.25 N·m (0.005 – 0.025 kg-m, 0.037 – 0.180 lb-ft)



1. Vise

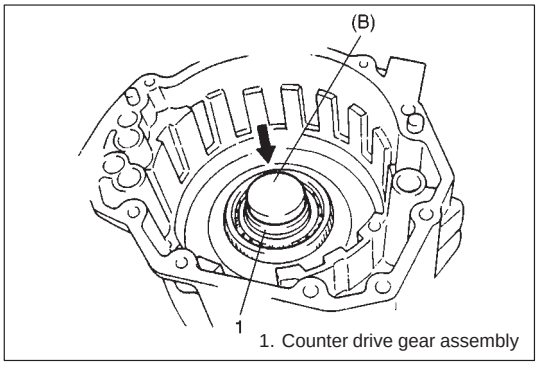
50) Clamp special tool in a vise and place transmission housing onto special tool above.

Special Tool
(A): 09927-76040

51) Measure transmission housing rotational torque using push-pull gauge or the like.

Specified value:
0.05 – 0.15 N·m (0.005 – 0.015 kg-m, 0.037 – 0.108 lb-ft)

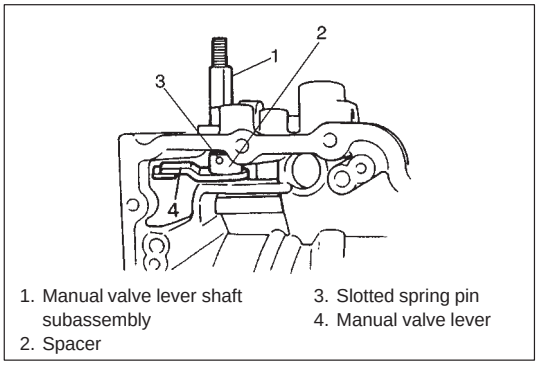
52) Remove snap ring.



1. Counter drive gear assembly

53) Press counter drive gear subassembly using special tool.

Special Tool
(B): 09925-86010



1. Manual valve lever shaft subassembly
2. Spacer
3. Slotted spring pin
4. Manual valve lever

54) Remove slotted spring pin using pin punch or the like.

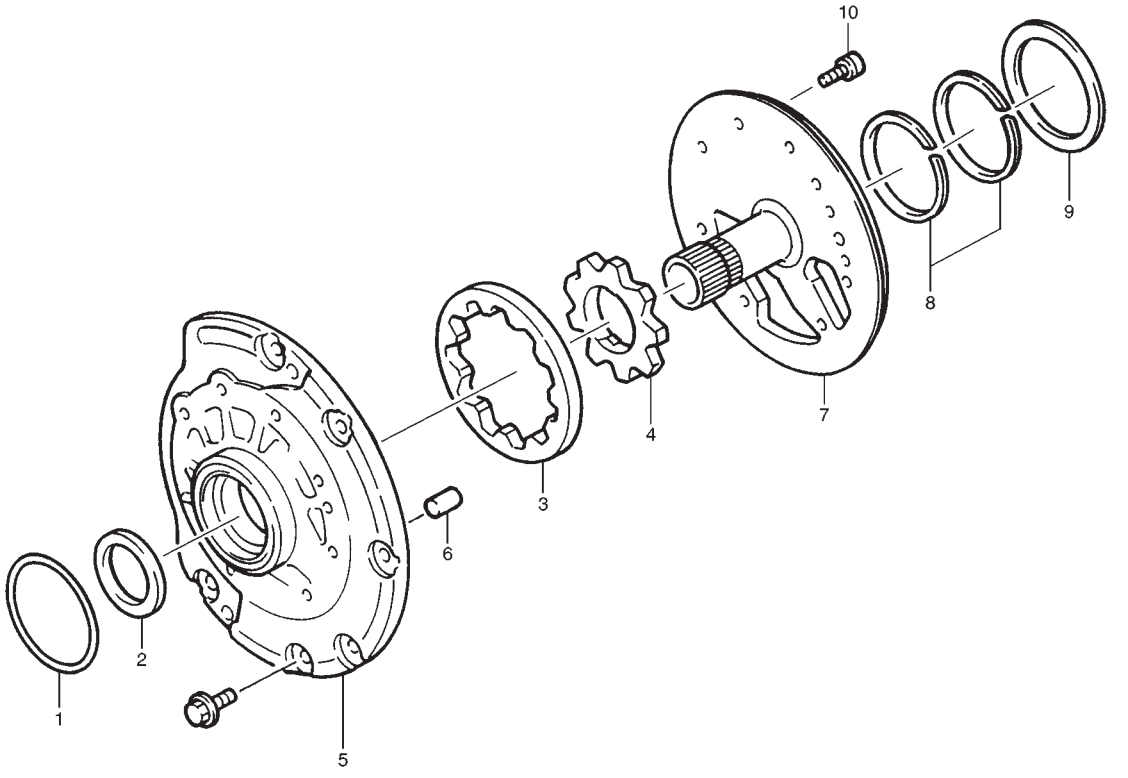
NOTE:
Never reuse removed spacer and slotted spring pin.

55) Remove manual valve lever shaft subassembly, lever manual valve and oil seal.

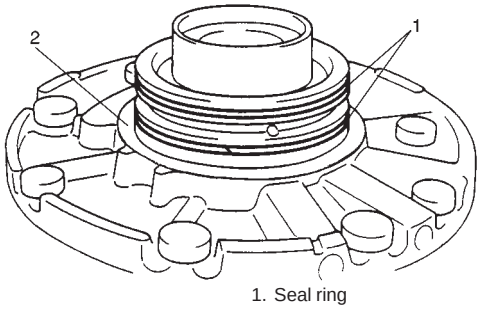
NOTE:
Never reuse removed oil seal.

SUBASSEMBLY

OIL PUMP



1. O-ring
2. Oil pump body oil seal
3. Driven gear
4. Drive gear
5. Oil pump body
6. Knock pin
7. Stator shaft subassembly
8. Seal ring
9. Clutch drum thrust washer
10. Torx bolt

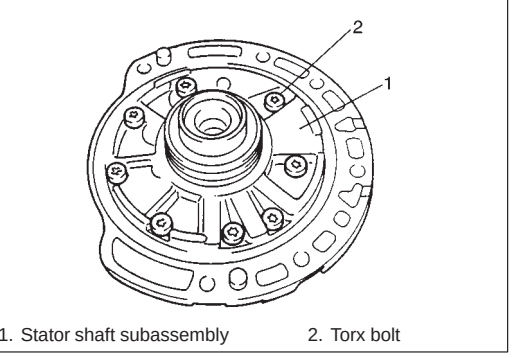


1. Seal ring
2. Clutch drum thrust washer

DISASSEMBLY

1) Remove two seal rings and clutch drum thrust washer from stator shaft subassembly back side.

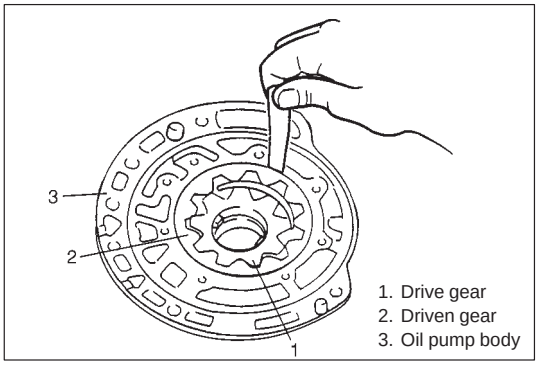
NOTE:
Never reuse seal rings after removal.



1. Stator shaft subassembly
2. Torx bolt

2) Remove stator shaft subassembly by removing eight torx bolts using torx wrench.
3) Remove oil pump body oil seal.

NOTE:
Never reuse oil seal after removal.

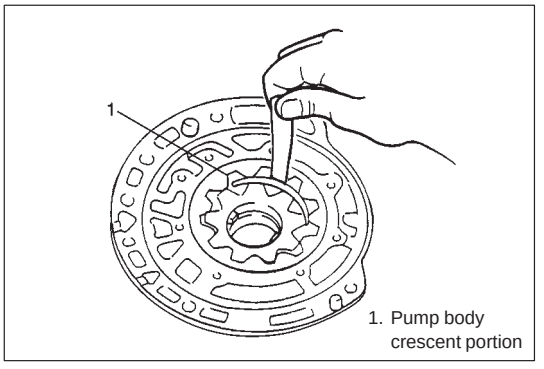


1. Drive gear
2. Driven gear
3. Oil pump body

INSPECTION

1) Check body clearance of driven gear.
   Push driven gear to one side of body. Using a feeler gauge, measure clearance between driven gear and body.
   If clearance exceeds its limit, replace gear.

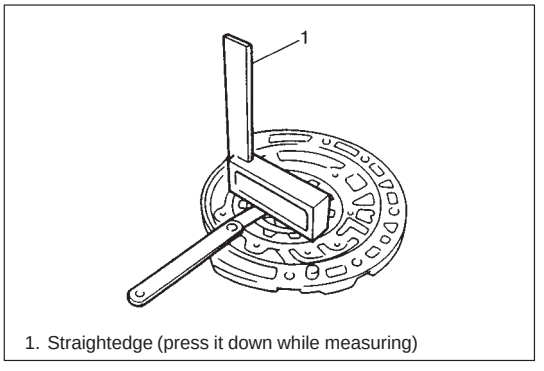
   Body clearance
   Standard : 0.075 – 0.15 mm (0.00295 – 0.0059 in.)
   Limit : 0.3 mm (0.011 in.)



1. Pump body crescent portion

2) Check tip clearance of both drive and driven gears.
   Measure radial clearance between gear tooth and crescent.
   If clearance exceeds its limit, replace gear.

   Tip clearance
   Standard : 0.01 – 0.248 mm (0.00040 – 0.00976 in.)
   Limit : 0.3 mm (0.011 in.)



1. Straightedge (press it down while measuring)

3) Check side clearance of both gears.
   Using a straightedge and a feeler gauge, measure side clearance between gear and pump body.

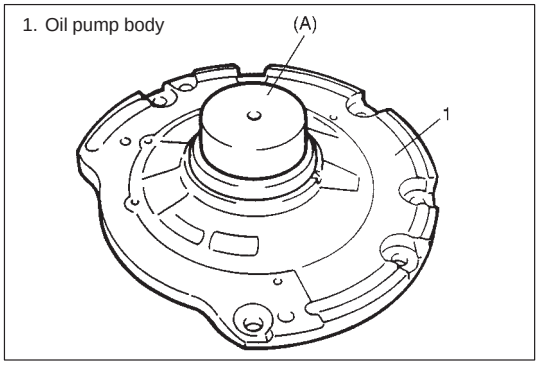
   Side clearance
   Standard : 0.02 – 0.05 mm (0.0008 – 0.0019 in.)
   Limit : 0.1 mm (0.0039 in.)

   Drive gears and driven gears are different in thickness as listed below.

Drive Gear and Driven Gear Thickness

Drive gear	9.440 – 9.449 mm (0.3717 – 0.3720 in.)
	9.450 – 9.459 mm (0.3721 – 0.3724 in.)
	9.460 – 9.470 mm (0.3725 – 0.3728 in.)
	9.471 – 9.480 mm (0.3729 – 0.3732 in.)
	9.481 – 9.490 mm (0.3733 – 0.3736 in.)
Driven gear	9.440 – 9.449 mm (0.3717 – 0.3720 in.)
	9.450 – 9.459 mm (0.3721 – 0.3724 in.)
	9.460 – 9.470 mm (0.3725 – 0.3728 in.)
	9.471 – 9.480 mm (0.3729 – 0.3732 in.)
	9.481 – 9.490 mm (0.3733 – 0.3736 in.)

If side clearance of the thickest gear is out of specification, replace oil pump body or assembly and stator shaft subassembly.

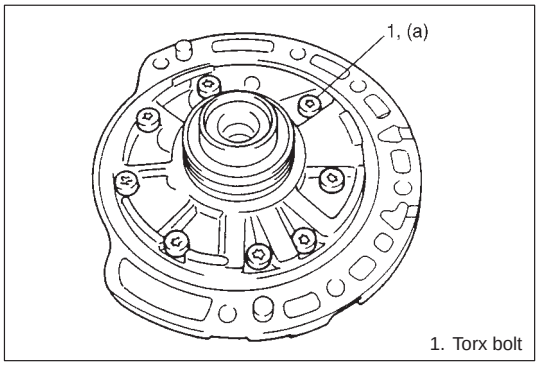


REASSEMBLY

1) Install pump body oil seal.
   Use special tool and hammer to install it, and then apply grease to its lip portion.

   Special Tool
   (A): 09944-66020

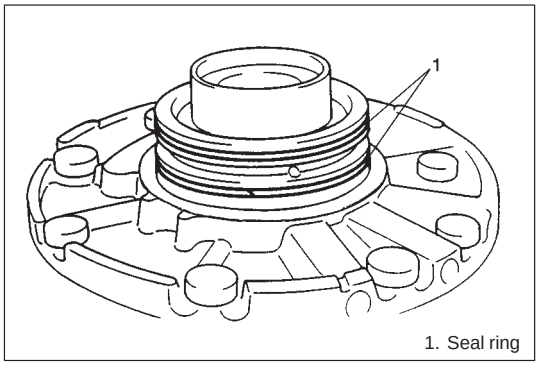
2) Install driven gear and drive gear to pump body after applying fluid to gears.



3) Install stator shaft subassembly to pump body and tighten eight torx bolts to specification.

   Tightening Torque
   (a): 12 N·m (1.2 kg-m, 9.0 lb-ft)

   NOTE:
   Be sure to tighten bolts alternately and uniformly. (The figure indicates a typical example of the tightening sequence.)



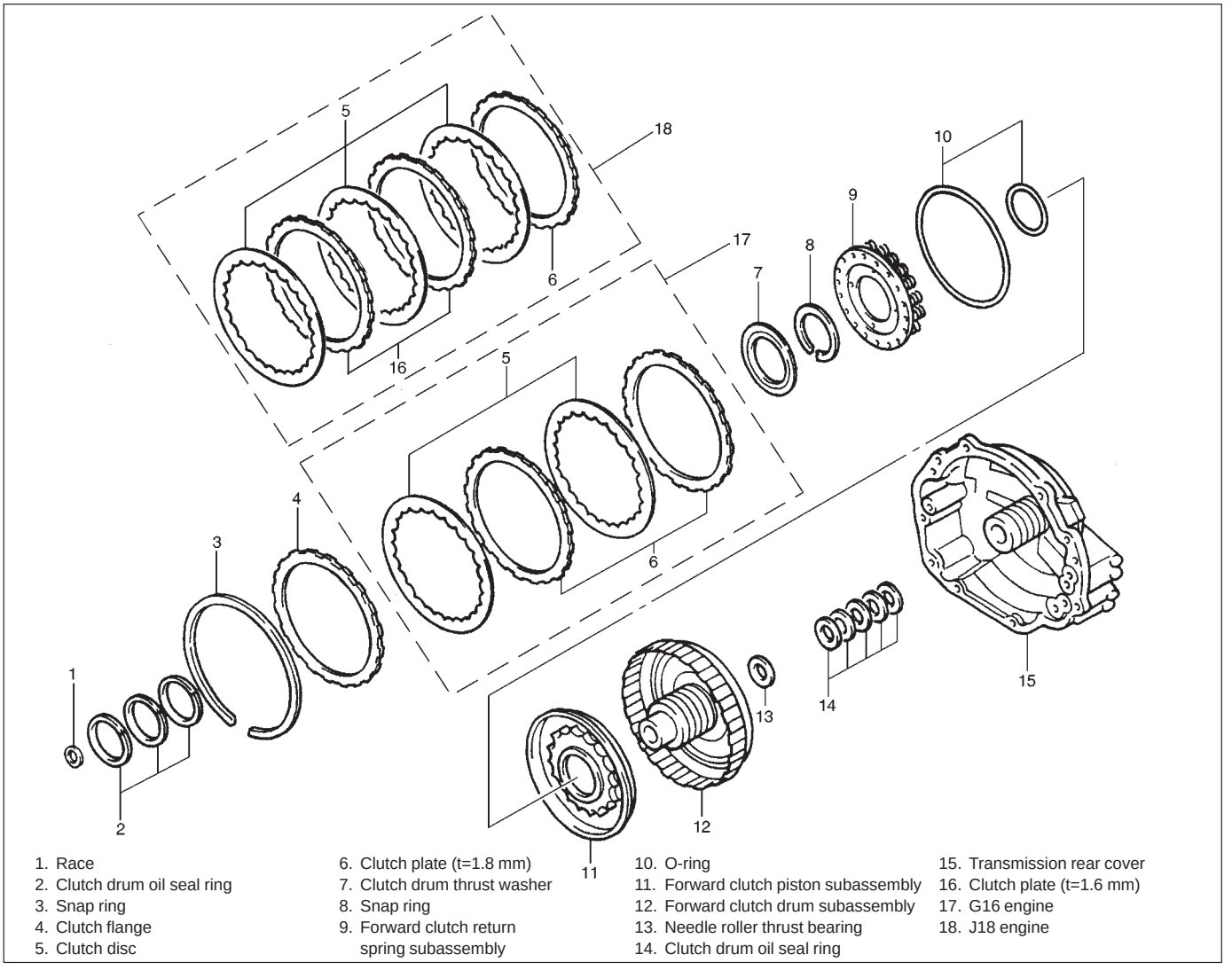
4) Install two new seal rings.

   NOTE:
   Do not spread ring end excessively.

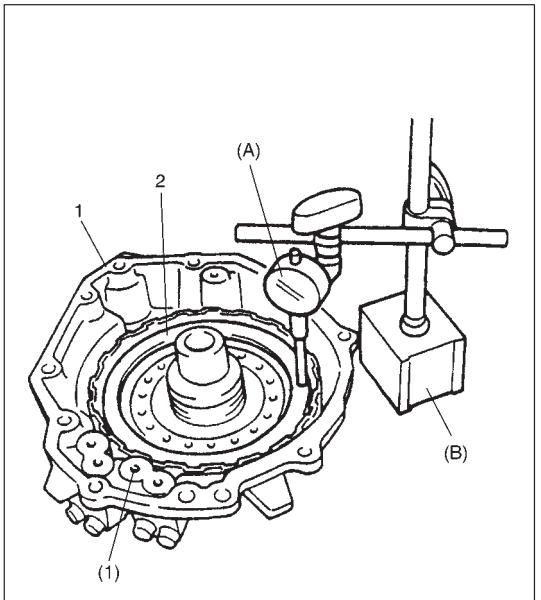
5) Apply A/T fluid to clutch drum thrust washer and install them.
6) Check drive gear and driven gear rotation.
   Turn drive gear with two flat end rods or the like and make sure it rotates smoothly.

   NOTE:
   Be very careful not to damage oil seal lip.

FORWARD CLUTCH



1. Race
2. Clutch drum oil seal ring
3. Snap ring
4. Clutch flange
5. Clutch disc
6. Clutch plate (t=1.8 mm)
7. Clutch drum thrust washer
8. Snap ring
9. Forward clutch return spring subassembly
10. O-ring
11. Forward clutch piston subassembly
12. Forward clutch drum subassembly
13. Needle roller thrust bearing
14. Clutch drum oil seal ring
15. Transmission rear cover
16. Clutch plate (t=1.6 mm)
17. G16 engine
18. J18 engine



1. Transmission rear cover
2. Forward clutch assembly

PRELIMINARY CHECK

1) Measure piston stroke before disassembly.
   a) Install forward clutch assembly to transmission rear cover.
   b) Measure piston stroke while applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole (1) using special tools.

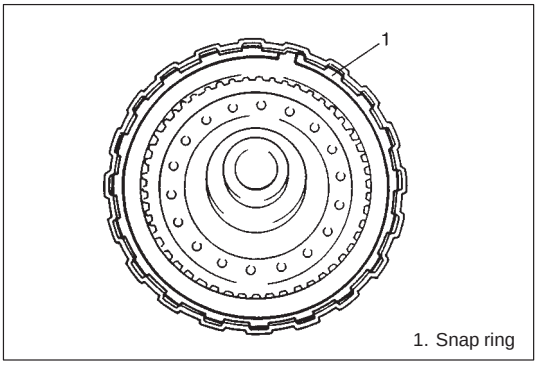
      Special Tool
      (A): 09900-20606
      (B): 09900-20701

      Specified piston stroke: 0.76 – 1.04 mm (0.03 – 0.040 in.) (G16 engine model)
      0.85 – 1.05 mm (0.034 – 0.041 in.) (J18 engine model)

      For J18 engine model, measure pack clearance while applying and releasing compressed air (170 – 230 kPa, 1.7 – 2.3 kg/cm^2, 25 – 32 psi) through oil hole (1) using the some special tools as the above Step b).

      Specified pack clearance: 0.34 – 0.72 mm (0.014 – 0.028 in.)

      If measured piston stroke exceeds specified value, disassemble and inspect inner parts.



1. Snap ring

DISASSEMBLY

1) Remove flange, discs and plates by removing snap ring in the following order.

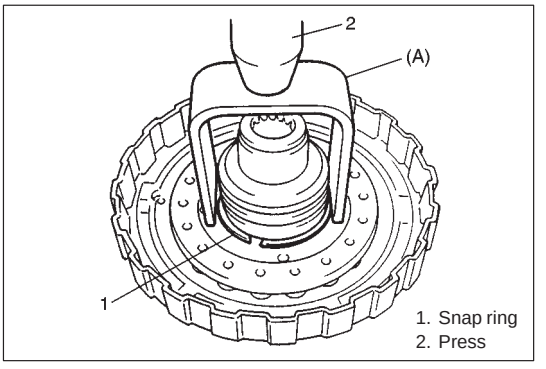
<G16 engine model>

(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Plate

<J18 engine model>

(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Plate · (6) Disc · (7) Plate

2) Remove clutch drum thrust washer.



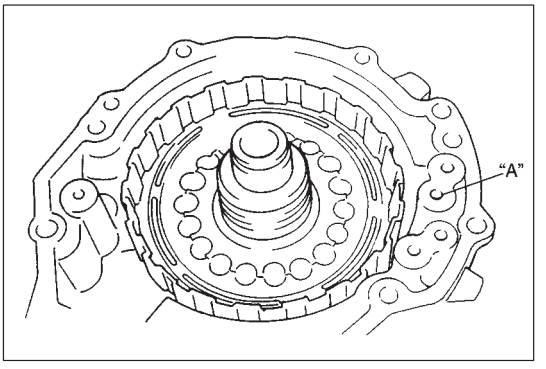
1. Snap ring
2. Press

3) Using special tool and hydraulic press, compress forward clutch return spring subassembly and remove snap ring.

Special Tool
(A): 09926-98330

> **CAUTION:**
> **Be careful when applying pressure, for overpressure will cause plate section of forward clutch return spring subassembly to deform.**

4) Remove forward clutch return spring subassembly.

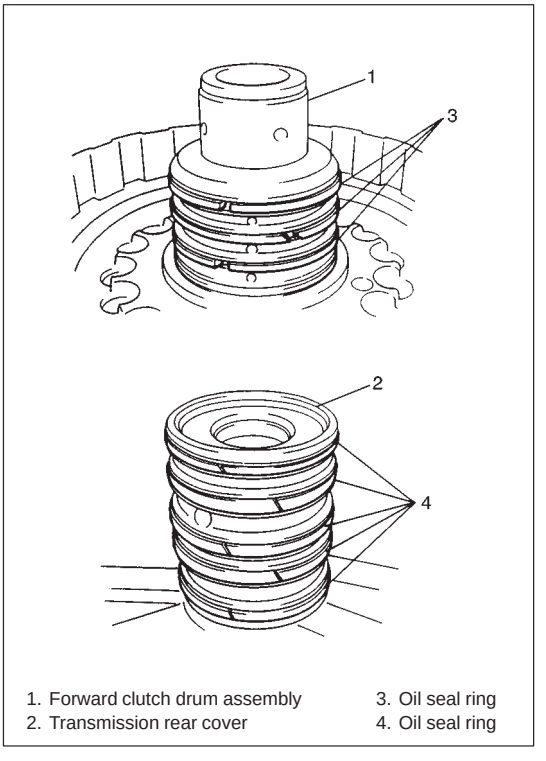


5) Install forward clutch piston subassembly to transmission rear cover.

6) Remove forward clutch piston subassembly with O-rings installed through oil hole "A" compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi).

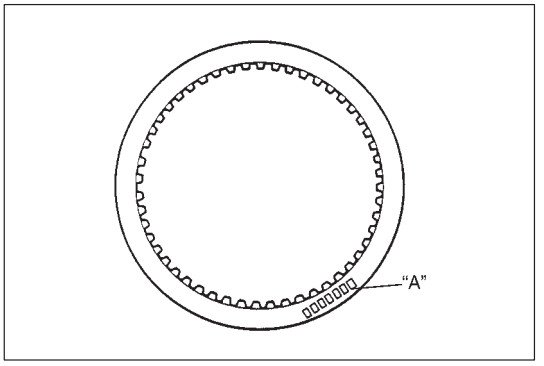
NOTE:

- **If piston does not pop out, it is recommended to use needle-nose pliers for removal.**
- **Never reuse removed O-rings.**



1. Forward clutch drum assembly
2. Transmission rear cover
3. Oil seal ring
4. Oil seal ring

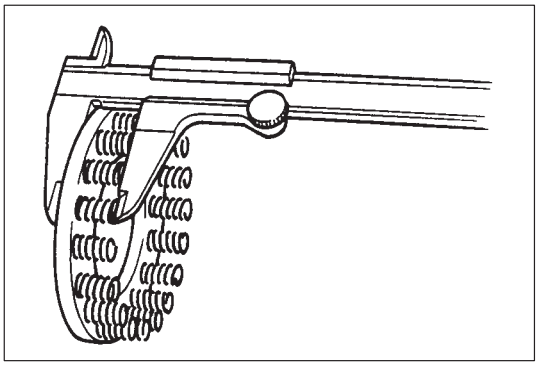
7) Remove clutch drum oil seal rings of forward clutch drum sub-assembly and transmission rear cover.



INSPECTION

1) Check that sliding surfaces of discs, plates and flanges are not worn or burnt. If necessary, replace.

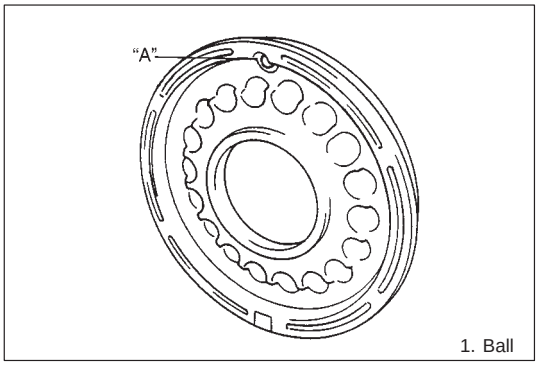
NOTE:
- **If disc lining is exfoliated or discolored, or part of printed numbers ("A" section) is defaced, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least two hours.**



2) Measure height of forward clutch return spring.

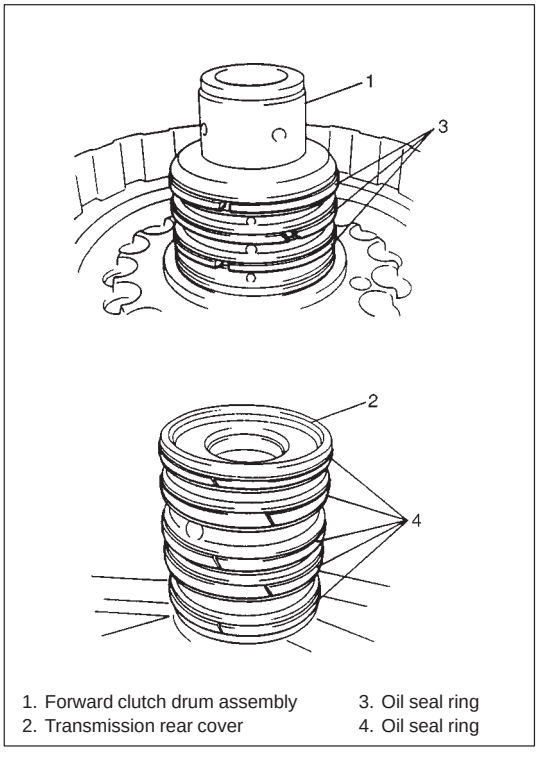
Specified value: 22 mm (0.87 in.)

NOTE:
Do not apply excessive force when measuring spring height. Perform measurement at several points.



1. Ball

3) Check to make sure that ball makes creaking noise when shaking forward clutch piston. (i.e., check that ball is free.)
4) Check that there is no leakage from backside of oil hole "A" by applying low pressure air.

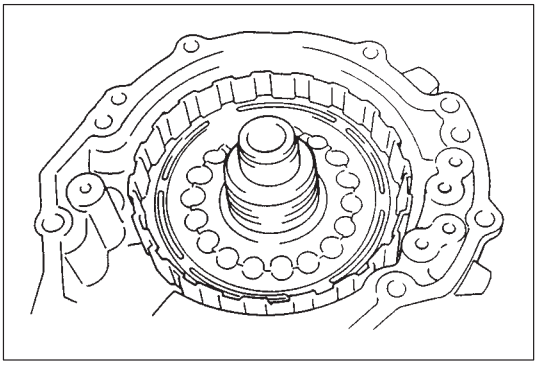


1. Forward clutch drum assembly
2. Transmission rear cover
3. Oil seal ring
4. Oil seal ring

REASSEMBLY

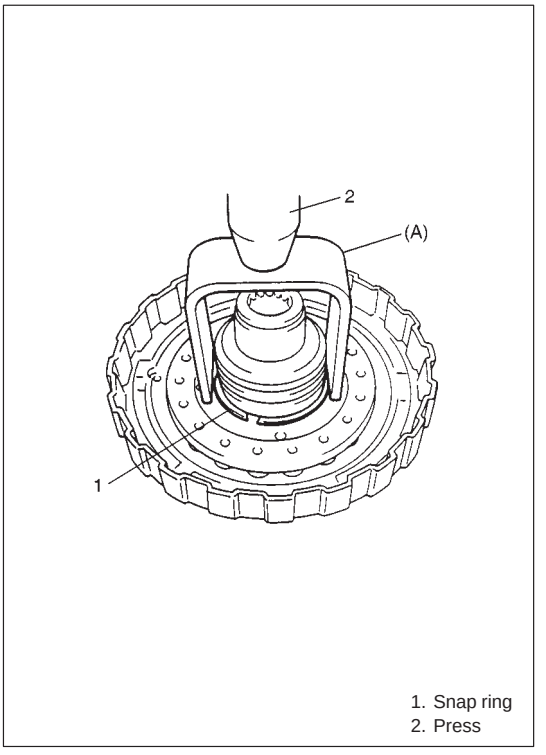
1) Coat new clutch drum oil seal rings with A/T fluid.
2) Install them to transmission rear case and forward clutch drum subassembly.

NOTE:
- **Do not spread ring ends excessively.**
- **Make sure that opening ends of oil seal rings are not lined up so as to prevent fluid leakage.**



3) Coat new O-rings with A/T fluid.
4) Install new O-rings to forward clutch piston subassembly.
5) Press forward clutch piston subassembly to forward clutch drum subassembly with fingers.

NOTE:
Make sure that O-ring is not twisted or deviated from position during insertion of piston.



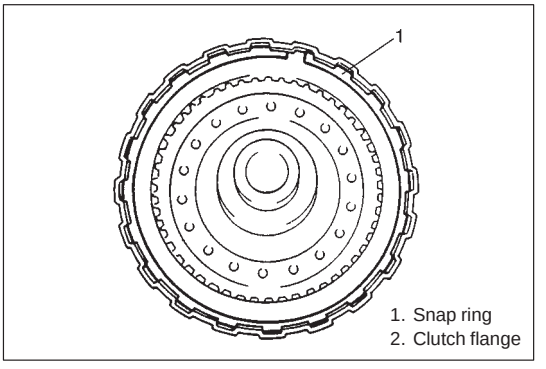
1. Snap ring
2. Press

6) Place forward clutch return spring subassembly.
7) Install snap ring using special tool and hydraulic press.

Special Tool
(A): 09926-98330

NOTE:
- **When installing return spring, be careful so that return spring will not fall or tilt.**
- **Do not align opening in snap ring with lug of forward clutch return spring subassembly at its retainer section.**

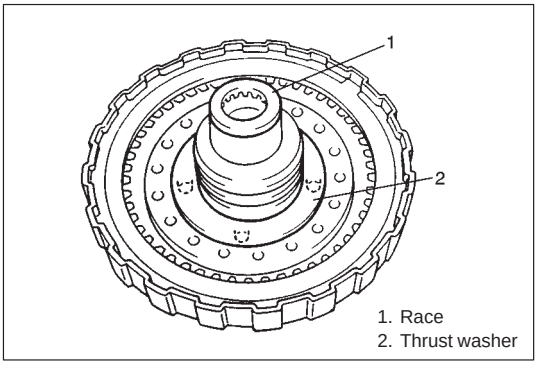
CAUTION:
Be careful when applying pressure, for overpressure will cause plate section of forward clutch return spring subassembly to deform.



1. Snap ring
2. Clutch flange

8) Install snap ring by installing plates, discs and flange in the following order.
<G16 engine model>
(1) Plate · (2) Disc · (3) Plate · (4) Disc · (5) Flange
<J18 engine model>
(1) Plate · (2) Disc · (3) Plate · (4) Disc · (5) Plate · (6) Disc · (7) Flange

NOTE:
Check to make sure that flat end of flange faces toward upper side. Also, make sure that opening end of ring is not aligned with groove section.



1. Race
2. Thrust washer

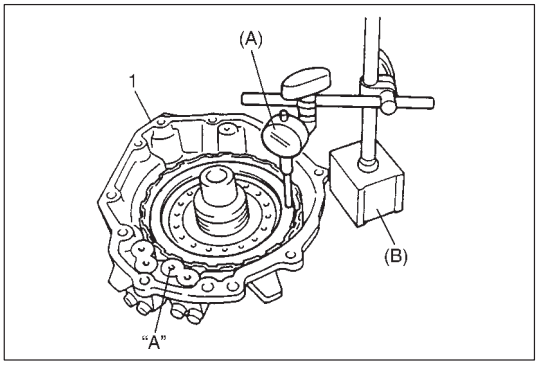
9) Coat race and clutch drum thrust washer with grease.

Grease: 09900-25030 (SUZUKI SUPER GREASE C)

Race Dimension:

Outer diameter	30.3 mm (1.193 in.)
Inner diameter	19.1 mm (0.752 in.)
Thickness	2.7 mm (0.106 in.)

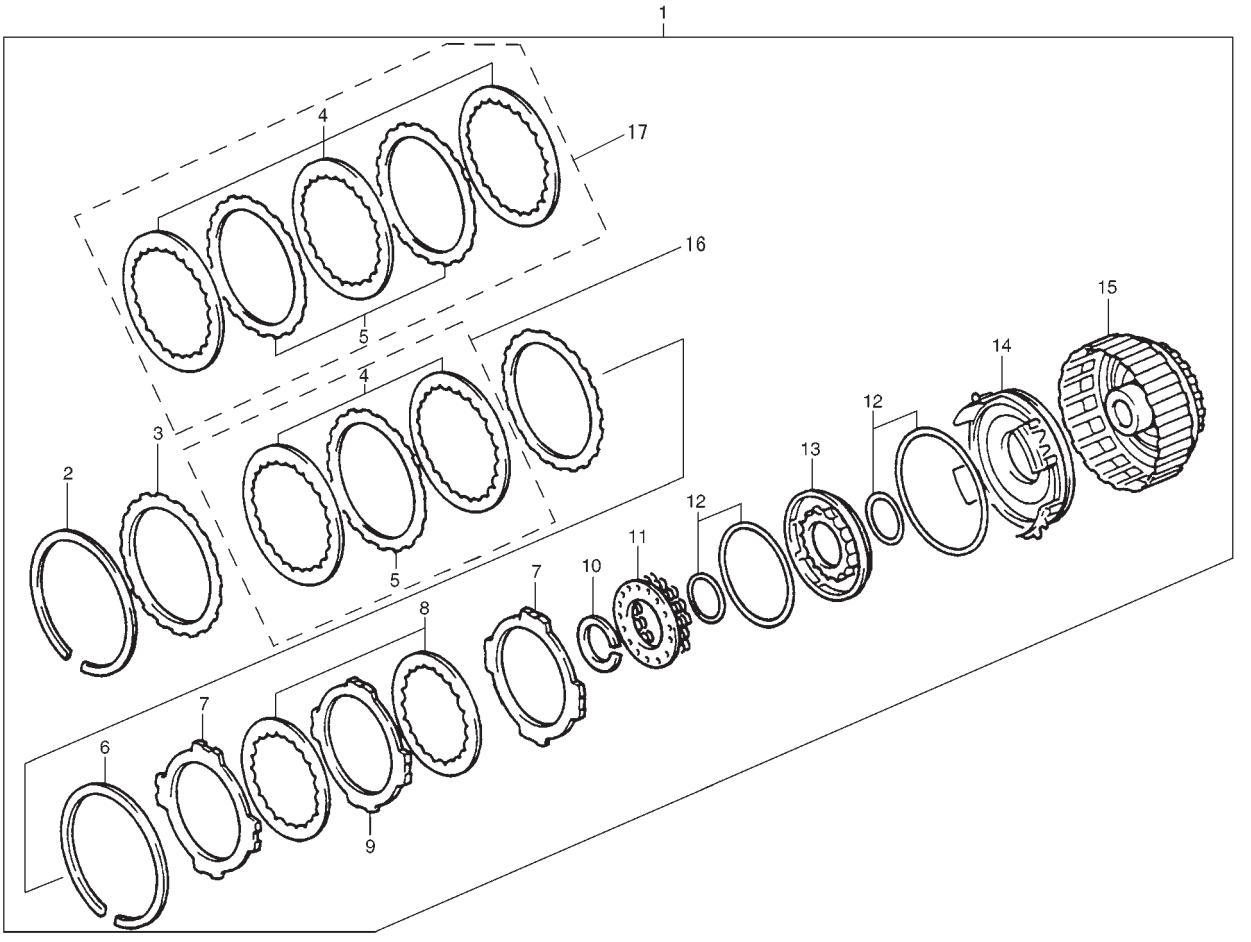
10) Install them onto clutch drum subassembly.



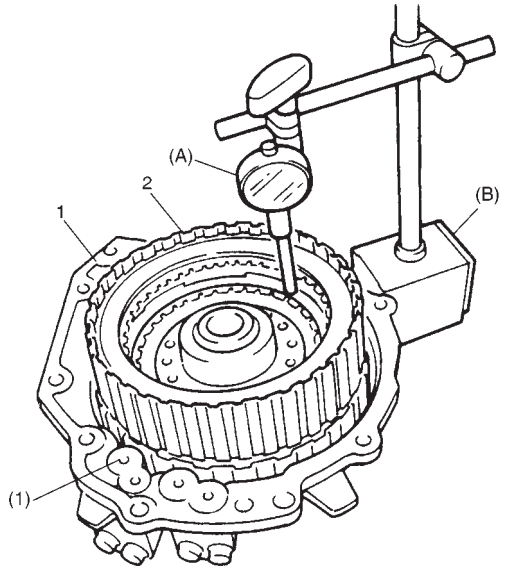
11) Measure piston stroke of forward clutch piston subassembly again.

Special Tool
(A): 09900-20606
(B): 09900-20701

OVERDRIVE CLUTCH COAST CLUTCH



1. Overdrive direct multiple D clutch assembly
2. Snap ring
3. Clutch flange
4. Clutch disc
5. Clutch plate
6. Snap ring
7. Clutch flange
8. Clutch disc
9. Clutch plate
10. Snap ring
11. Overdrive clutch return spring
12. O-ring
13. Coast clutch piston
14. Overdrive clutch piston
15. Overdrive clutch drum
16. G16 engine
17. J18 engine



1. Transmission rear cover
2. Overdrive/coast clutch assembly

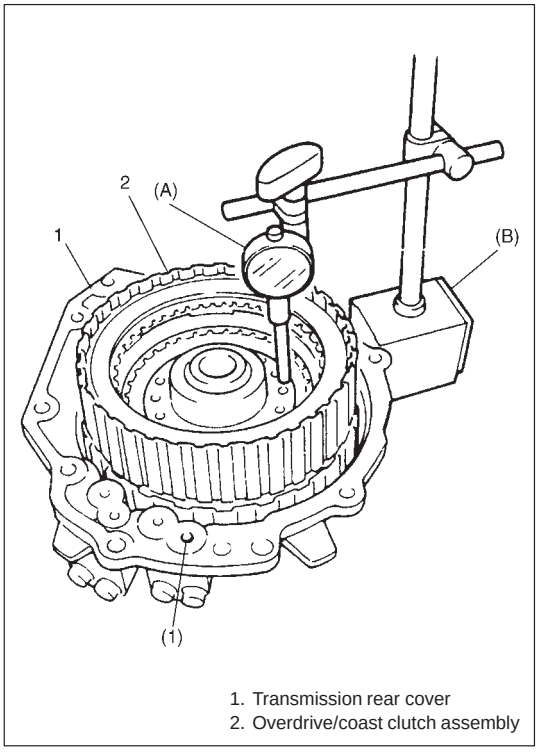
PRELIMINARY CHECK

1) Measure piston stroke.
   Install forward clutch assembly and overdrive/coast clutch assembly to transmission rear cover.
2) Measure overdrive clutch piston stroke while applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg-cm^2, 57 – 113 psi) through oil hole (1) by using special tools.

   Special Tool
   (A): 09900-20606
   (B): 09900-20701

   Specified piston stroke: 0.76 – 1.04 mm (0.03 – 0.040 in.)
   (G16 engine model)
   1.043 – 1.357 mm (0.041 – 0.053 in.)
   (J18 engine model)

   If piston stroke exceeds specified value, disassemble and inspect inner parts.



1. Transmission rear cover
2. Overdrive/coast clutch assembly

3) Measure coast clutch piston stroke while applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg-cm^2, 57 – 113 psi) through oil hole (1) by using special tools.

Special Tool
(A): 09900-20606
(B): 09900-20701

Specified piston stroke: 2.68 – 3.02 mm (0.106 – 0.119 in.)

If piston stroke exceeds specified value, disassemble and inspect inner parts.

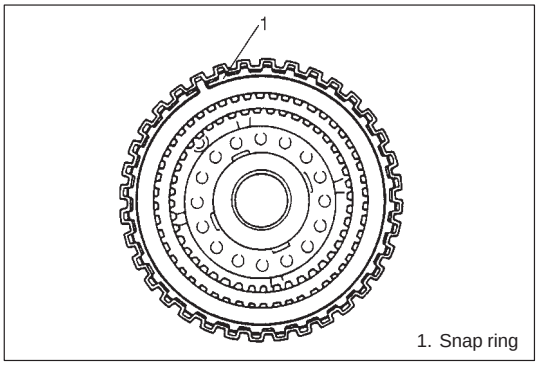
DISASSEMBLY

1) Remove flanges, discs and plate of overdrive clutch by removing snap ring in the following order.

<G16 engine model>
(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Flange

<J18 engine model>
(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Plate · (6) Disc · (7) Flange

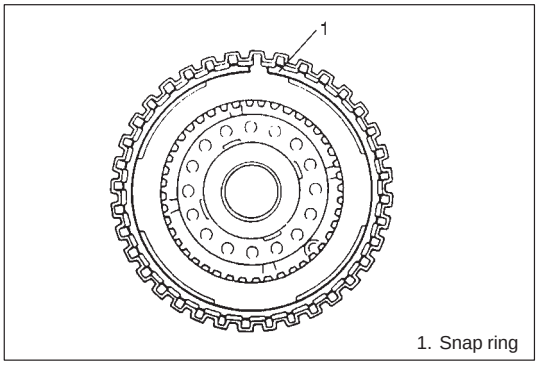
NOTE:
Measure thickness of removed flange (1) and record for reference of piston stroke confirmation.



1. Snap ring

2) Remove flanges, discs and plate of coast clutch by removing snap ring in the following order.
(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Flange

NOTE:
Measure thickness of removed flange (1) and record for reference of piston stroke confirmation.

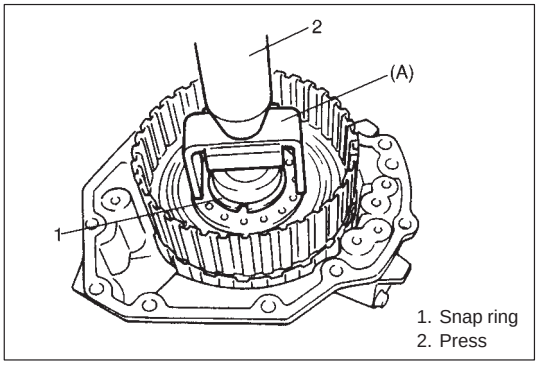


1. Snap ring

3) Using special tool and hydraulic press, compress overdrive clutch return spring and remove snap ring.

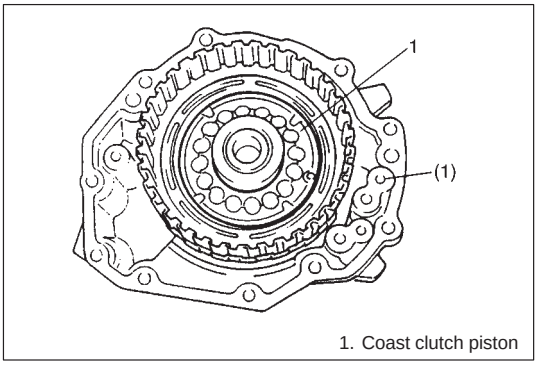
Special Tool
(A): 09926-98310

CAUTION:
Be careful when applying pressure, for overpressure will cause plate section of overdrive clutch return spring to deform.



1. Snap ring
2. Press

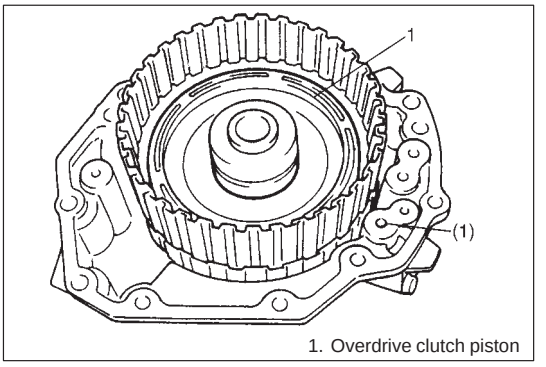
4) Remove overdrive clutch return spring.



1. Coast clutch piston

5) For removing coast clutch piston, install forward clutch assembly.
6) Remove coast clutch piston with O-rings using compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole (1).
7) Remove O-rings from coast clutch piston.

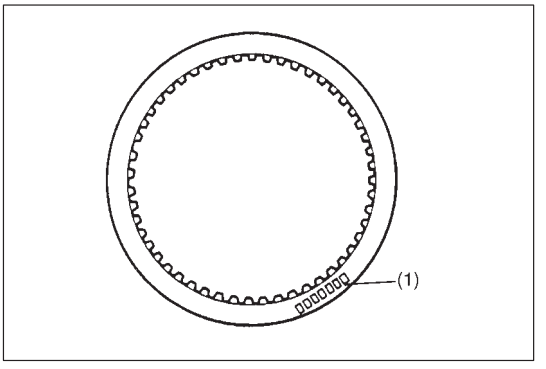
NOTE:
Never reuse O-rings after removal.



1. Overdrive clutch piston

8) Remove overdrive clutch piston with O-rings using compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole (1).
9) Remove O-rings from overdrive clutch piston.

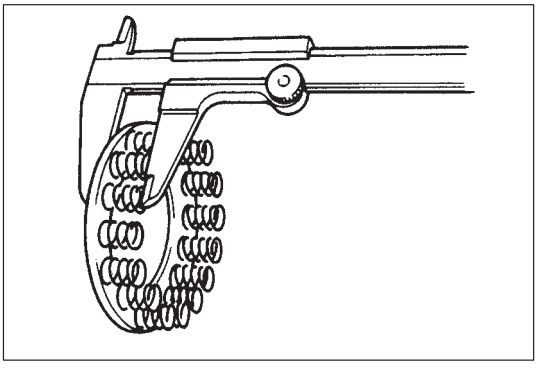
NOTE:
Never reuse O-rings after removal.



INSPECTION

1) Check that sliding surfaces of discs, plates and flanges are not worn or burnt. If necessary, replace.

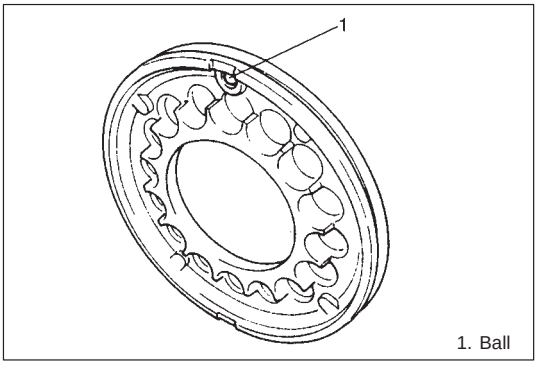
NOTE:
- **If disc lining is exfoliated or discolored, or part of printed numbers ((1) section) is defaced, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least two hours.**



2) Measure height of overdrive clutch return spring.

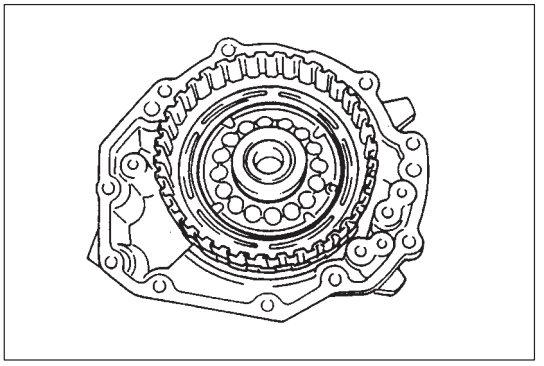
Specified value: 18.9 mm (0.74 in.)

NOTE:
Do not apply excessive force when measuring spring height. Perform measurement at several points.



1. Ball

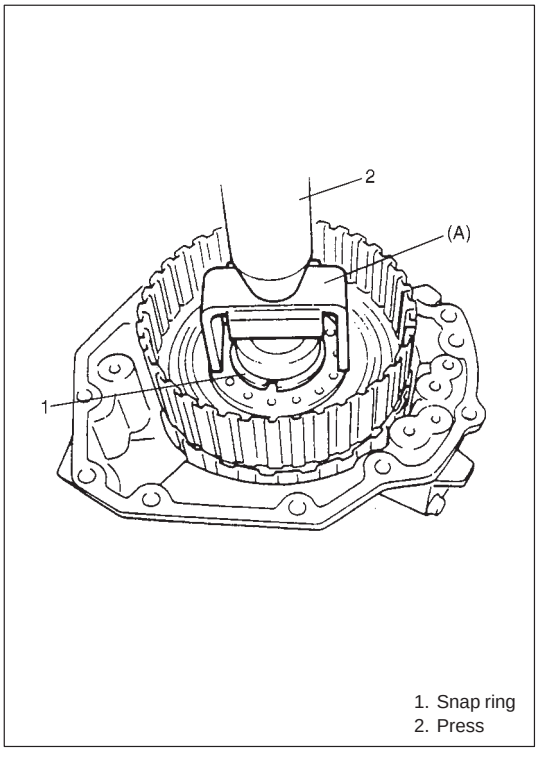
3) Check to make sure that ball makes creaking noise when shaking piston clockwise and counterclockwise. (i.e., check that ball is free.)



REASSEMBLY

1) Apply A/T fluid to new O-rings.
2) Install new O-rings to pistons.
3) Set coast clutch piston to overdrive clutch piston by pushing with fingers.
4) Press overdrive clutch and coast clutch piston to overdrive clutch drum.

   NOTE:
   Make sure that O-rings are not twisted or deviated from position during insertion of piston.



1. Snap ring
2. Press

5) Using special tool and hydraulic press, compress overdrive clutch return spring and install snap ring.

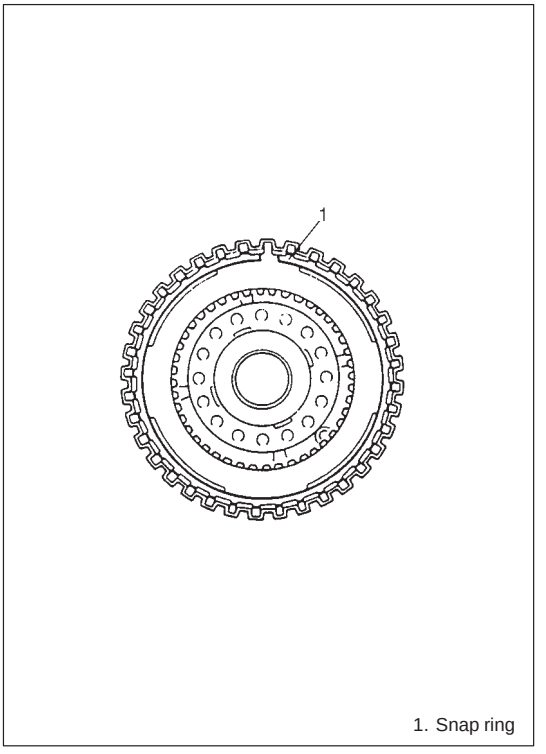
   Special Tool
   (A): 09926-98310

   NOTE:
   - **When installing return spring, be careful so that return spring will not fall or tilt.**
   - **Do not align opening in snap ring with lug of overdrive clutch return spring at its retainer section.**

> **CAUTION:**
> **Be careful when applying pressure, for overpressure will cause plate section of spring to deform.**

6) Select and measure correct thickness of coast clutch flange (flange (5) in Step 7)).

Available clutch flange size (thickness)	3.6 mm (0.142 in.)
	3.8 mm (0.150 in.)
	4.0 mm (0.157 in.)



1. Snap ring

7) Install flanges, discs and plate of coast clutch in the following order.
(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Flange

NOTE:
Be sure to confirm that flat section of flange (5) selected in Step 6) faces toward piston side and also that flange (1) faces toward upper side.

8) Install snap ring.

NOTE:
Check to make sure that opening end of ring is not aligned with groove section of drum.

9) Select and measure correct thickness of overdrive clutch flange (flange (5) (for G16 engine model), (7) (for J18 engine model) in Step 10)).

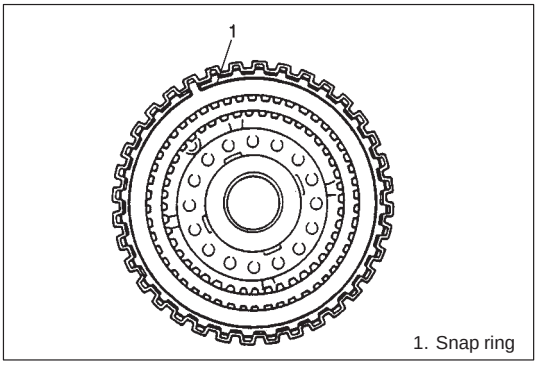
Available clutch flange size (thickness)	3.6 mm (0.142 in.)
	3.8 mm (0.150 in.)
	4.0 mm (0.157 in.)

10) Install flanges, discs and plate of overdrive clutch in the following order.

<G16 engine model>
(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Flange

<J18 engine model>
(1) Flange · (2) Disc · (3) Plate · (4) Disc · (5) Plate · (6) Disc · (7) Flange

NOTE:
Be sure to confirm that flat section of flange (5) (for G16 engine model) or (7) (for J18 engine model) selected in Step 9) faces toward piston side and also that flange (1) faces toward upper side.

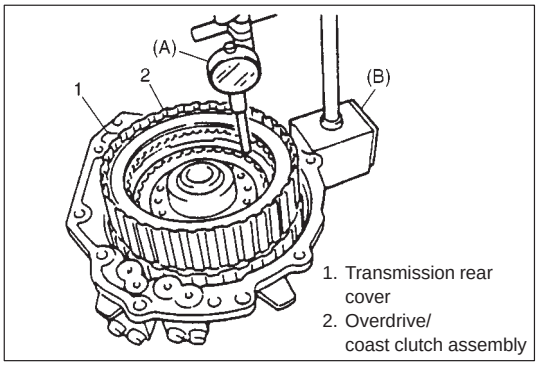


1. Snap ring

11) Install snap ring.

NOTE:
Check to make sure that opening end of ring is not aligned with groove section of drum.

12) Install forward clutch assembly and overdrive direct multiple D clutch assembly to transmission rear cover.

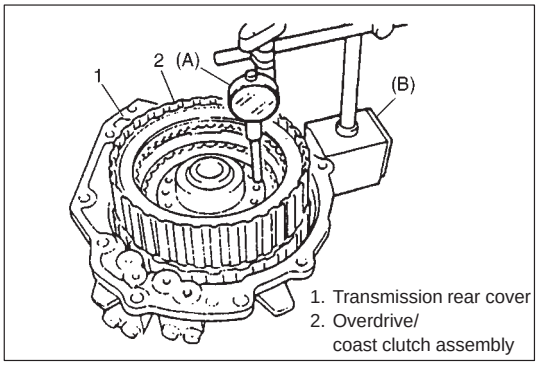


1. Transmission rear cover
2. Overdrive/ coast clutch assembly

13) Measure overdrive clutch piston stroke again, using special tools.

Special Tool
(A): 09900-20606
(B): 09900-20701

Specified piston stroke: 0.76 – 1.04 mm (0.03 – 0.040 in.) (G16 engine model)
1.043 – 1.357 mm (0.041 – 0.053 in.) (J18 engine model)



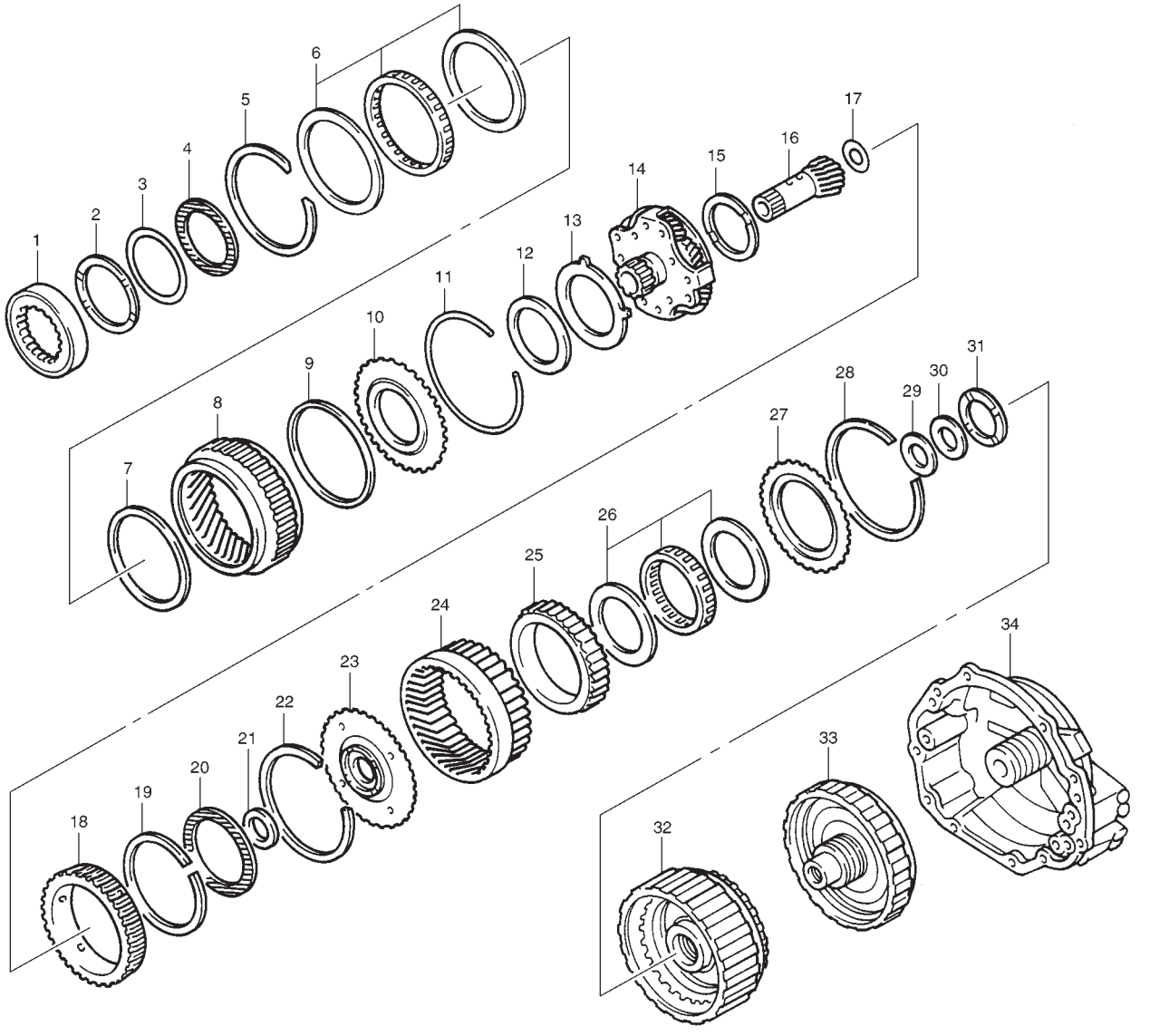
1. Transmission rear cover
2. Overdrive/ coast clutch assembly

14) Measure coast clutch piston stroke again, using special tools.

Special Tool
(A): 09900-20606
(B): 09900-20701

Specified piston stroke: 2.68 – 3.02 mm (0.106 – 0.119 in.)

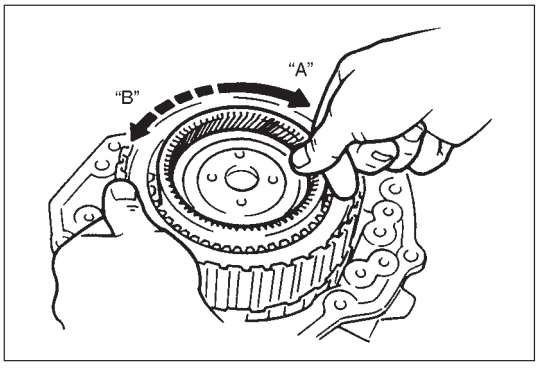
FRONT PLANETARY RING GEAR (F1), REAR PLANETARY RING GEAR (F0)



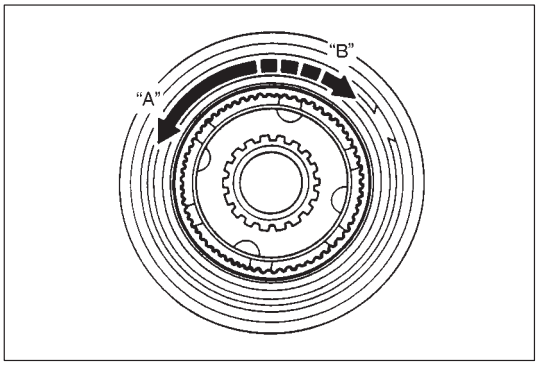
1. One-way clutch inner race
2. Thrust washer
3. Thrust bearing race
4. Thrust needle roller bearing
5. Snap ring
6. One-way clutch
7. O-ring
8. Front planetary ring gear subassembly
9. O-ring
10. Front planetary ring gear flange
11. Snap ring
12. Thrust needle roller bearing
13. Thrust bearing race
14. Planetary gear assembly
15. Thrust bearing race
16. Planetary sun gear subassembly
17. Thrust needle roller bearing
18. Overdrive clutch hub
19. Snap ring
20. Thrust needle roller bearing
21. Thrust bearing race
22. Snap ring
23. Rear planetary ring gear flange
24. Rear planetary ring gear subassembly
25. One-way clutch race
26. One-way clutch
27. One-way clutch retainer
28. Snap ring
29. Thrust needle roller bearing
30. Thrust bearing race
31. Thrust washer
32. Overdrive/coast clutch assembly
33. Forward clutch assembly
34. Transmission rear cover

OPERATION CHECK OF ONE-WAY CLUTCHES

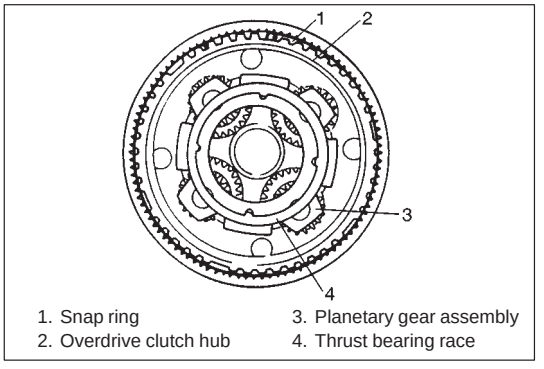
1) Install forward clutch assembly and overdrive/coast clutch assembly to transmission rear cover.



2) Install planetary ring gear assembly to forward clutch and install No.0 (F0) one-way clutch to planetary ring gear facing toward front side.
3) Check to make sure that No.0 (F0) one-way clutch turns freely when turned clockwise "A" and locks when turned counterclockwise "B".



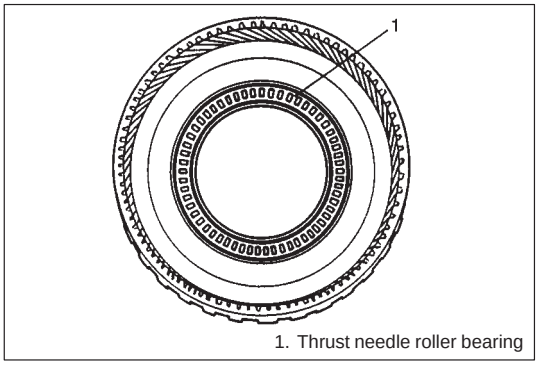
4) Remove planetary ring gear assembly from forward clutch assembly.
5) Turn over planetary ring gear assembly.
6) Check to make sure that No.1 (F1) one-way clutch turns freely when turned counterclockwise "A" and locks when turned clockwise "B".



1. Snap ring
2. Overdrive clutch hub
3. Planetary gear assembly
4. Thrust bearing race

DISASSEMBLY – No.1 (F1)

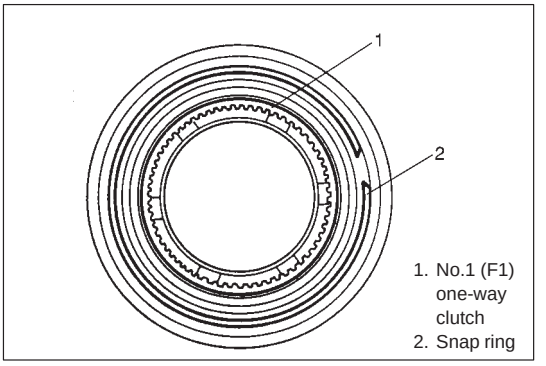
1) Remove the following parts by removing snap ring.
   - ○ Overdrive clutch hub
   - ○ Planetary gear assembly
   - ○ Two thrust bearing races



1. Thrust needle roller bearing

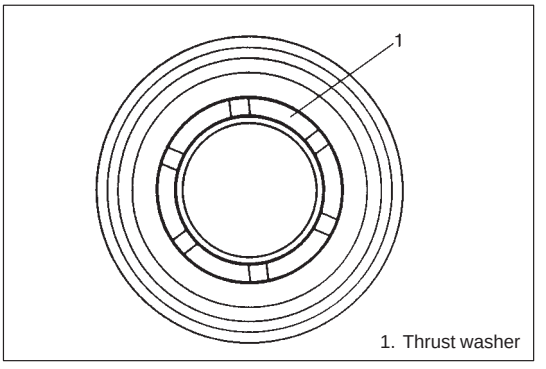
2) Pull out thrust needle roller bearing.

Reference value for bearing
Outside diameter : Approximately 83.2 mm (3.28 in.)
Inside diameter : Approximately 68.3 mm (2.69 in.)
Thickness : Approximately 2.6 mm (0.10 in.)



1. No.1 (F1) one-way clutch
2. Snap ring

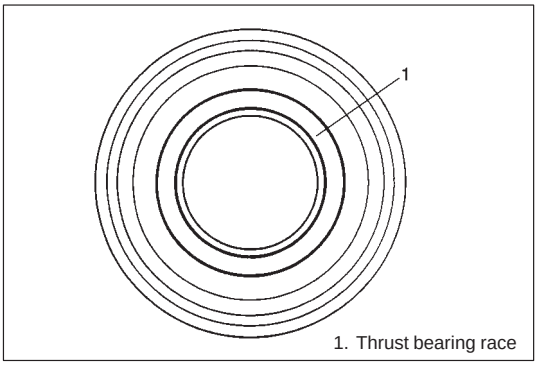
3) Remove No.1 (F1) one-way clutch by removing snap ring.



1. Thrust washer

4) Remove thrust washer.

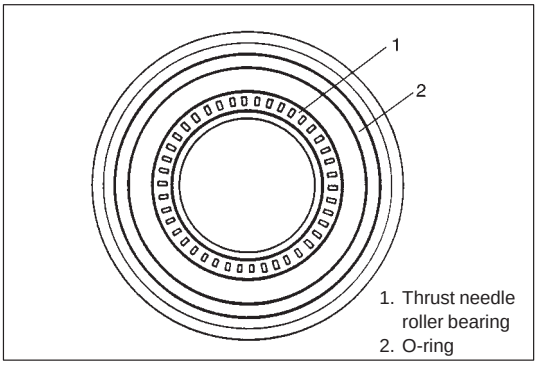
Reference value for washer
Outside diameter : Approximately 85.3 mm (3.36 in.)
Inside diameter : Approximately 70.0 mm (2.76 in.)
Thickness : Approximately 2.6 mm (0.10 in.)



1. Thrust bearing race

5) Remove thrust bearing race.

Reference value for race
Outside diameter : Approximately 80.2 mm (3.16 in.)
Inside diameter : Approximately 68.3 mm (2.69 in.)
Thickness : Approximately 0.8 mm (0.03 in.)



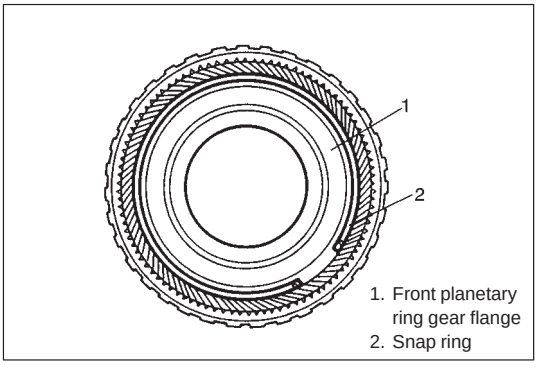
1. Thrust needle roller bearing
2. O-ring

6) Remove thrust needle roller bearing.

Reference value for bearing
Outside diameter : Approximately 83.2 mm (3.28 in.)
Inside diameter : Approximately 64.9 mm (2.56 in.)
Thickness : Approximately 2.7 mm (0.11 in.)

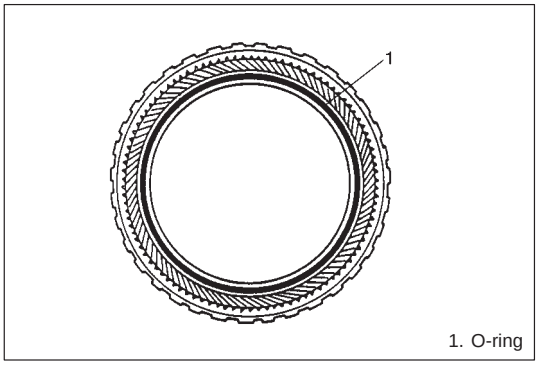
7) Remove O-ring.

NOTE:
Never reuse O-ring after removal.



1. Front planetary ring gear flange
2. Snap ring

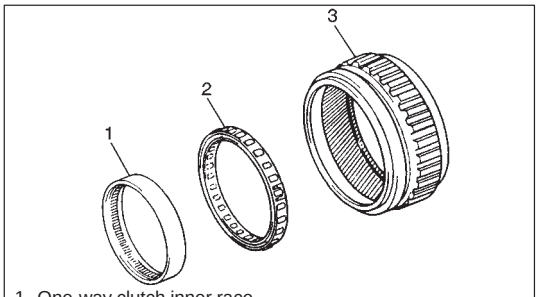
8) Remove front planetary ring gear flange by removing snap ring.



1. O-ring

9) Remove O-ring.

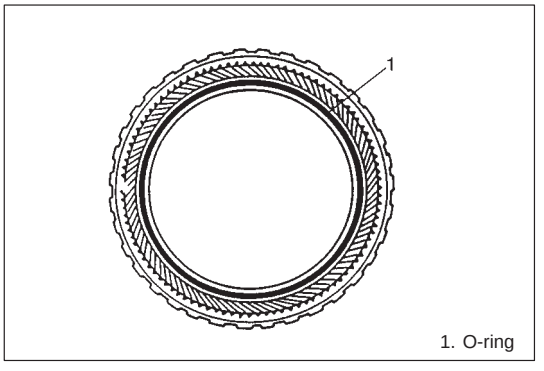
NOTE:
Never reuse O-ring after removal.



1. One-way clutch inner race
2. One-way clutch roller
3. Front planetary ring gear subassembly

INSPECTION

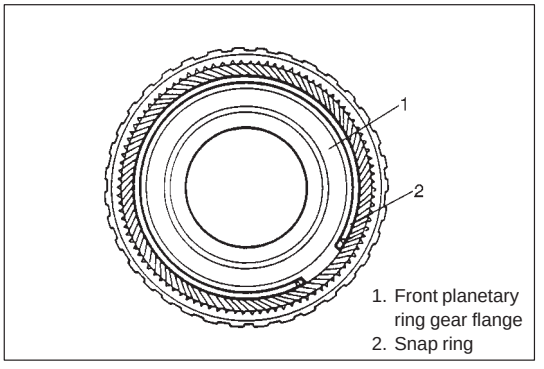
Visually check the following parts for scratches or discoloration.
- ○ Outer surface of one-way clutch inner race.
- ○ Outer surface of one-way clutch roller.
- ○ Inner surface of front planetary ring gear subassembly.



1. O-ring

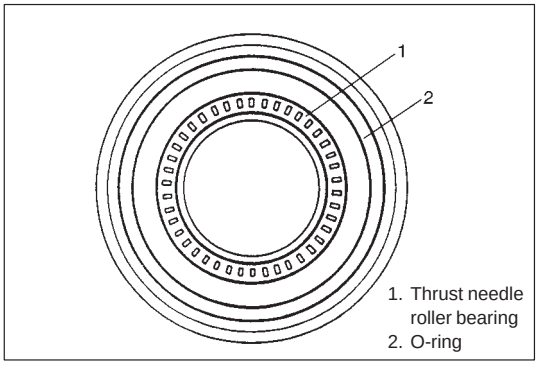
REASSEMBLY

1) Apply A/T fluid to new O-ring.
2) Install O-ring.



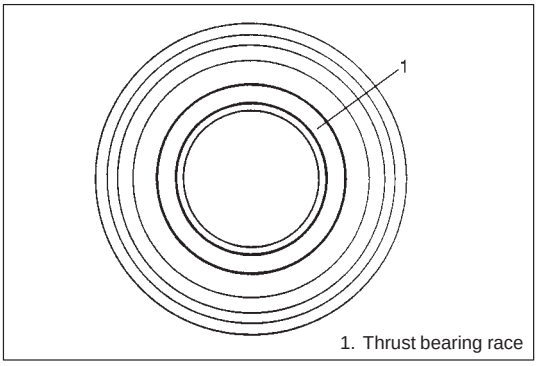
1. Front planetary ring gear flange
2. Snap ring

3) Install front planetary ring gear flange with snap ring.



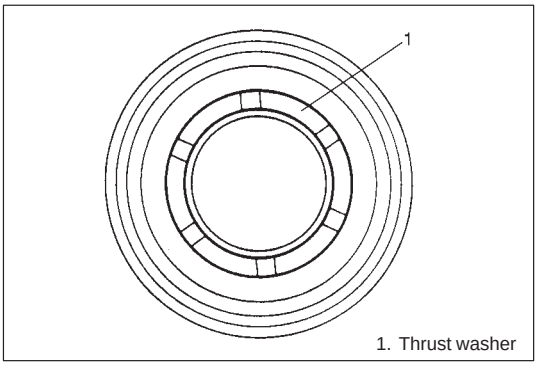
1. Thrust needle roller bearing
2. O-ring

4) Coat new O-ring with A/T fluid.
5) Install new O-ring.
6) Install thrust needle roller bearing.



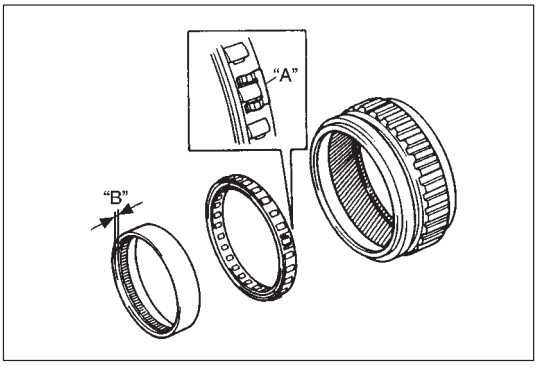
1. Thrust bearing race

7) Apply A/T fluid to thrust bearing race and install it.



1. Thrust washer

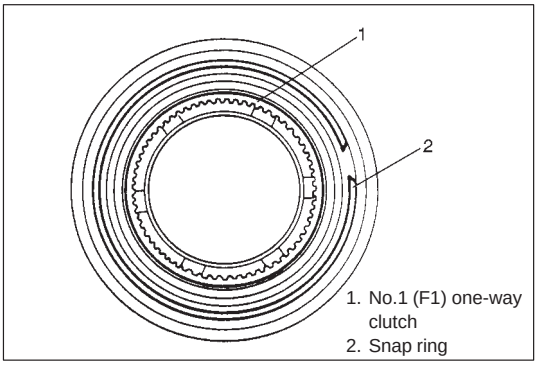
8) Apply A/T fluid to thrust washer and install it.



9) Set one-way clutch and one-way clutch inner race.

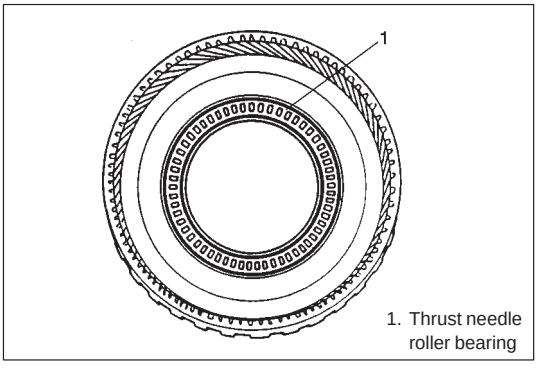
NOTE:

- ○ **Check to make sure that "A" section (shorter than rear) of inner race faces toward front side.**
- ○ **Check to make sure that thinner section "B" of one-way clutch faces toward rear side.**



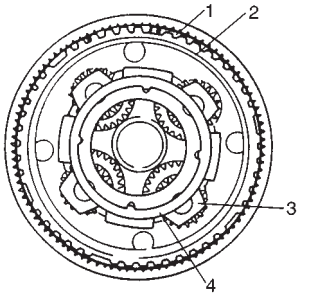
1. No.1 (F1) one-way clutch
2. Snap ring

10) Install No.1 (F1) one-way clutch with snap ring.



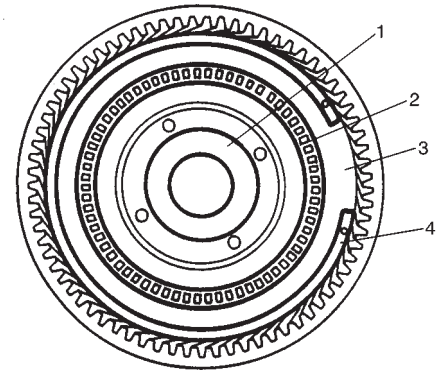
1. Thrust needle roller bearing

11) Install thrust needle roller bearing.



1. Snap ring
2. Overdrive clutch hub
3. Planetary gear assembly
4. Thrust bearing race

12) Coat two thrust bearing races with A/T fluid.
13) Install planetary gear assembly and overdrive clutch hub with snap ring.
14) Install two thrust bearing races.
15) Check operation of one-way clutch.



1. Thrust bearing race
2. Thrust needle roller bearing
3. Rear planetary ring gear flange
4. Snap ring

DISASSEMBLY – No.0 (F0)

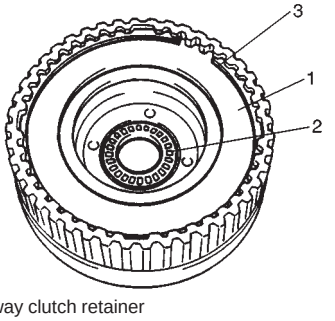
1) Remove thrust bearing race.

Reference value for race
Outside diameter : 29.4 mm (1.16 in.)
Inside diameter : 19.6 mm (0.77 in.)
Thickness : 0.8 mm (0.03 in.)

2) Remove thrust needle roller bearing

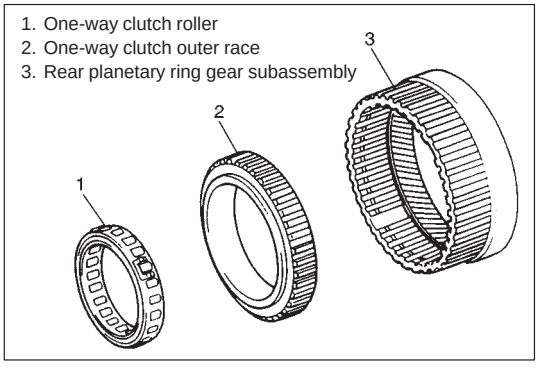
Reference value for bearing
Outside diameter : 70.8 mm (2.79 in.)
Inside diameter : 57.2 mm (2.25 in.)
Thickness : 2.7 mm (0.11 in.)

3) Remove rear planetary ring gear flange by removing snap ring.



1. One-way clutch retainer
2. Thrust needle roller bearing
3. Snap ring

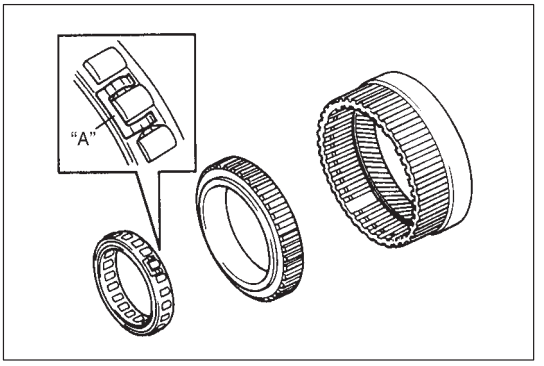
4) Remove one-way clutch retainer with thrust needle roller bearing by removing snap ring.



1. One-way clutch roller
2. One-way clutch outer race
3. Rear planetary ring gear subassembly

INSPECTION

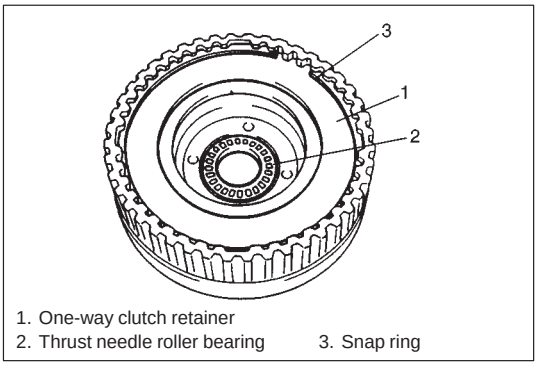
Visually check the following parts for scratches or discoloration.
○ Outer surface of one-way clutch roller.
○ Inner surface of one-way clutch outer race.
○ Inner surface of rear planetary ring gear subassembly.



REASSEMBLY

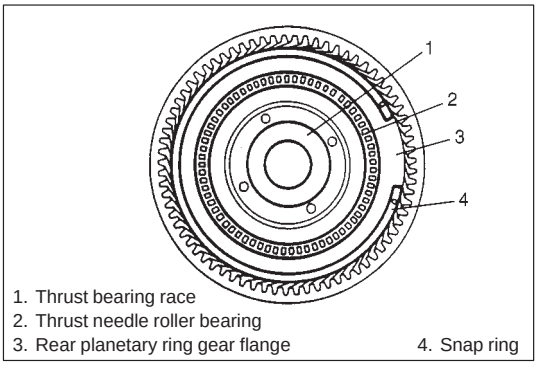
1) Set one-way clutch to one-way clutch outer race and rear planetary ring gear.

   NOTE:
   Check to make sure that thinner section "A" of one-way clutch faces toward front side.



1. One-way clutch retainer
2. Thrust needle roller bearing
3. Snap ring

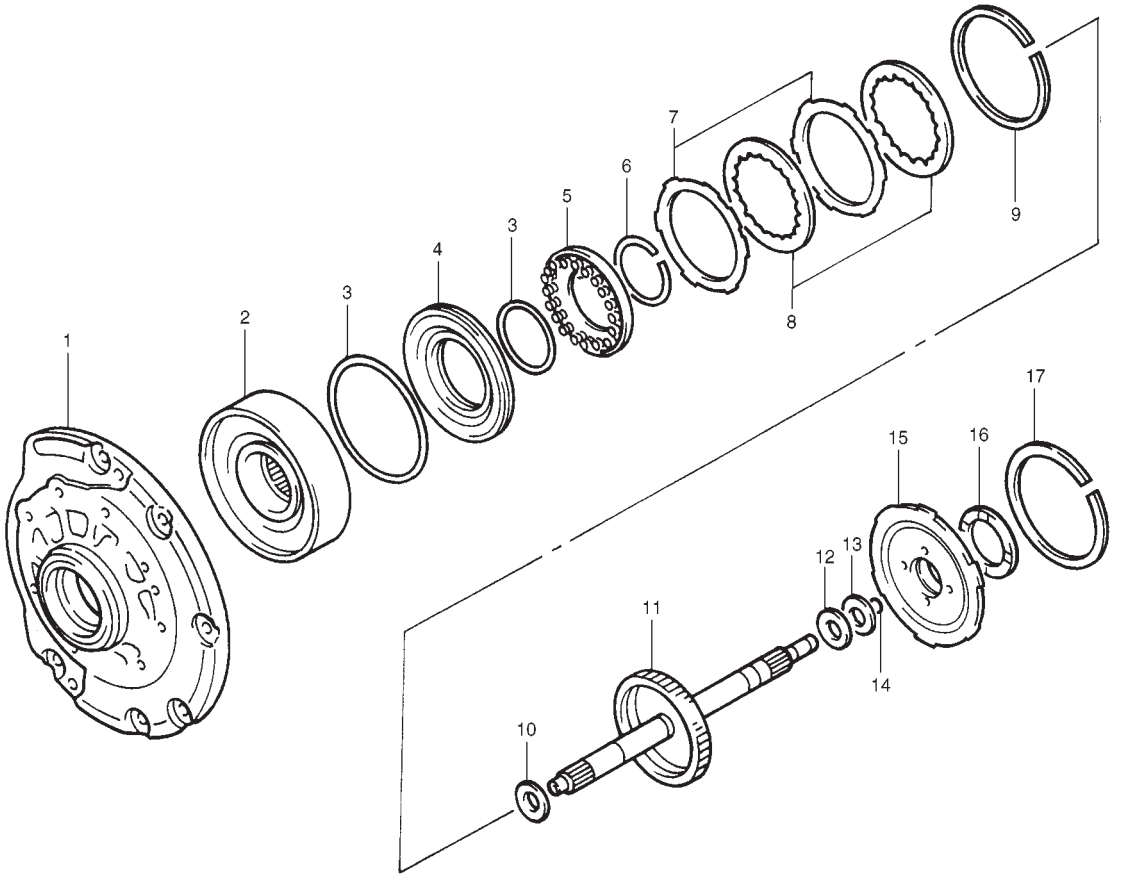
2) Install the following parts, previously mentioned parts, one-way clutch retainer and thrust needle roller bearing.
3) Install snap ring.



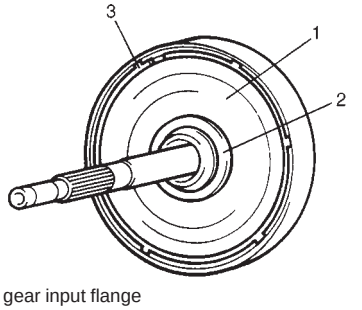
1. Thrust bearing race
2. Thrust needle roller bearing
3. Rear planetary ring gear flange
4. Snap ring

4) Install rear planetary ring gear flange with snap ring.
5) Coat thrust bearing race and thrust needle roller bearing with A/T fluid.
6) Install them.

REVERSE CLUTCH



1. Oil pump body
2. Reverse clutch drum with bearing
3. O-ring
4. Reverse clutch piston
5. Reverse clutch return spring
6. Snap ring
7. Clutch plate
8. Clutch No.3 disc
9. Snap ring
10. Thrust needle roller bearing
11. Input shaft
12. Thrust needle roller hearing
13. Thrust bearing race
14. Seal ring
15. Sun gear input flange
16. Thrust washer
17. Retainer ring

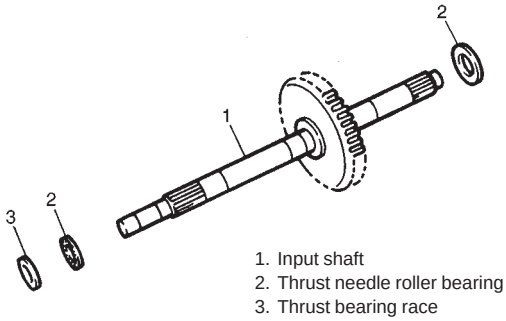


1. Sun gear input flange
2. Thrust washer
3. Retainer ring

PRELIMINARY INSPECTION

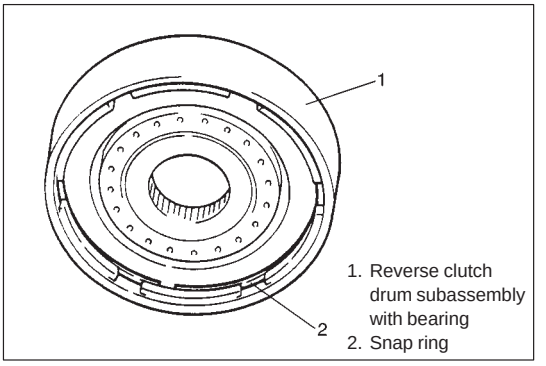
Measure pack clearance.

1) Remove sun gear input flange with thrust washer installed by removing retainer ring.



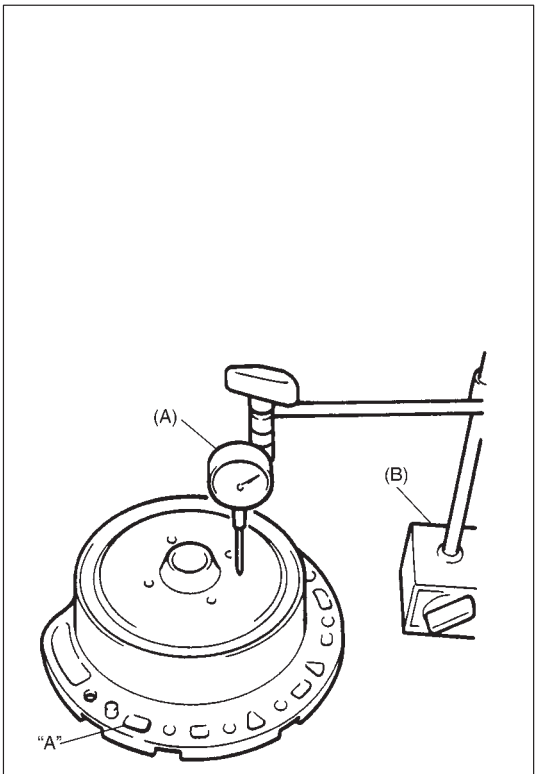
1. Input shaft
2. Thrust needle roller bearing
3. Thrust bearing race

2) Remove input shaft with thrust bearing race and thrust needle roller bearing installed.



1. Reverse clutch drum subassembly with bearing
2. Snap ring

3) Remove snap ring of reverse clutch drum with bearing.



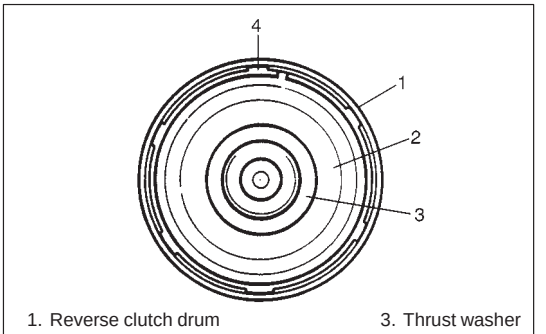
1. Align plate

4) Install sun gear input flange (thrust washer installed) with retainer ring.
5) Mount reverse clutch drum with bearing to oil pump body.
6) Measure piston stroke with compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole section "A", using special tools.

Special Tool
(A): 09900-20606
(B): 09900-20701

Specified piston stroke: 0.932 – 1.608 mm (0.037 – 0.633 in.)

NOTE:
- **To prevent air leakage from oil hole section "A" during pack clearance measurement with air nozzle gun, it is recommended to plug oil hole section around air nozzle gun with a clean cloth or the like because pack clearance cannot be measured otherwise.**
- **If it is difficult to obtain correct specified value above, it is recommended to align plate (Thickness: approximately 3 mm) with shape around oil hole section.**

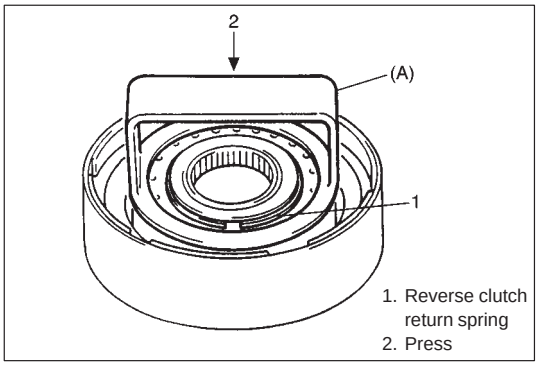


1. Reverse clutch drum
2. Sun gear input flange
3. Thrust washer
4. Retainer ring

DISASSEMBLY

1) Remove reverse clutch drum with bearing from oil pump body.
2) Remove sun gear input flange with thrust washer installed by removing retainer ring.

3) Remove No.3 clutch discs and clutch plates in the following order.
(1) Disc · (2) Plate · (3) Disc · (4) Plate

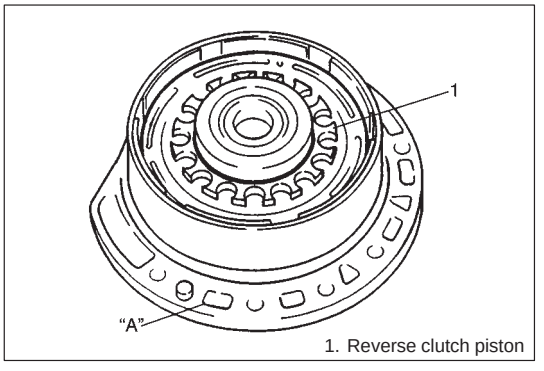


1. Reverse clutch return spring
2. Press

4) Remove reverse clutch return spring by removing snap ring, using special tool and hydraulic press.

Special Tool
(A): 09926-96010

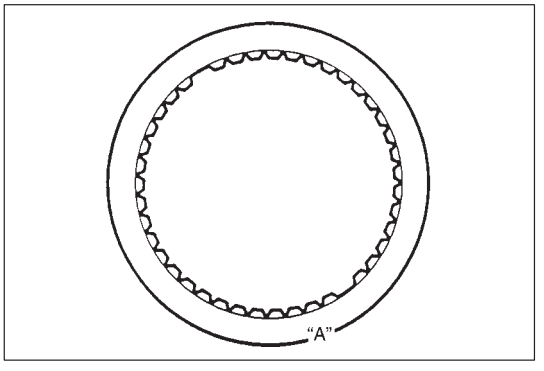
NOTE:
To prevent deformation of spring seat, it is recommended to compress spring seat until claw section of snap ring is free.



1. Reverse clutch piston

5) Mount reverse clutch drum with bearing to oil pump body.
6) Remove reverse clutch piston by blowing compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole section "A".
7) Remove two O-rings from piston.

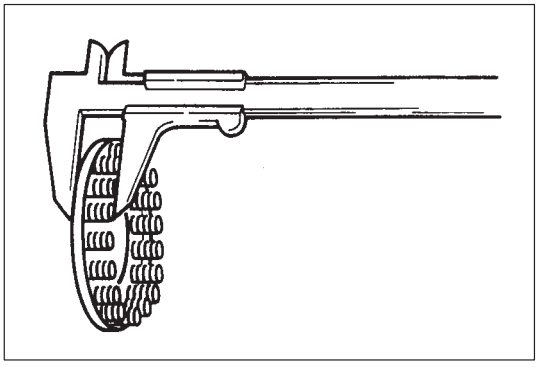
NOTE:
Never reuse removed O-rings.



INSPECTION

1) Check that sliding surfaces of disc and plate are not worn or burnt. If necessary, replace.

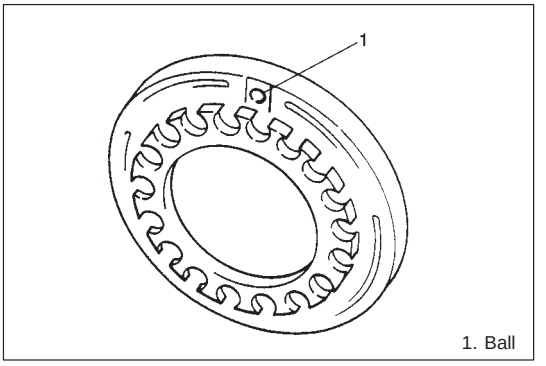
NOTE:
- **If disc lining is exfoliated or discolored, or part of printed numbers ("A" section) is defaced, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least two hours.**



2) Measure height of reverse clutch return spring.

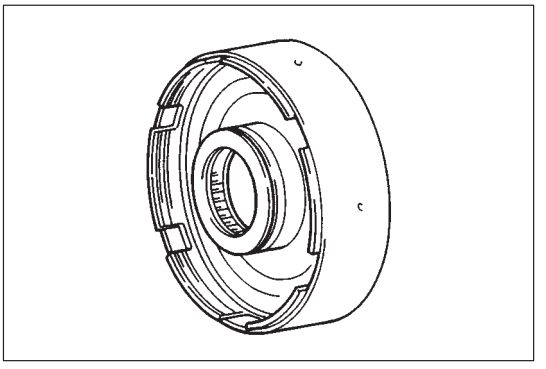
Specified value: 18.7 mm (0.74 in.)

NOTE:
Do not apply excessive force when measuring spring height. Perform measurement at several points.

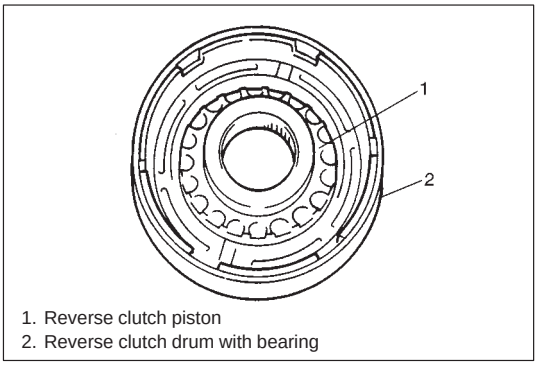


1. Ball

3) Check to make sure that ball makes creaking noise when shaking the reverse clutch piston. (i.e., check that ball is free.)
4) Check that there is no leakage by applying low-pressure air onto ball.



5) Check that outer surface of reverse clutch with bearing is not worn or burnt. If necessary, replace.

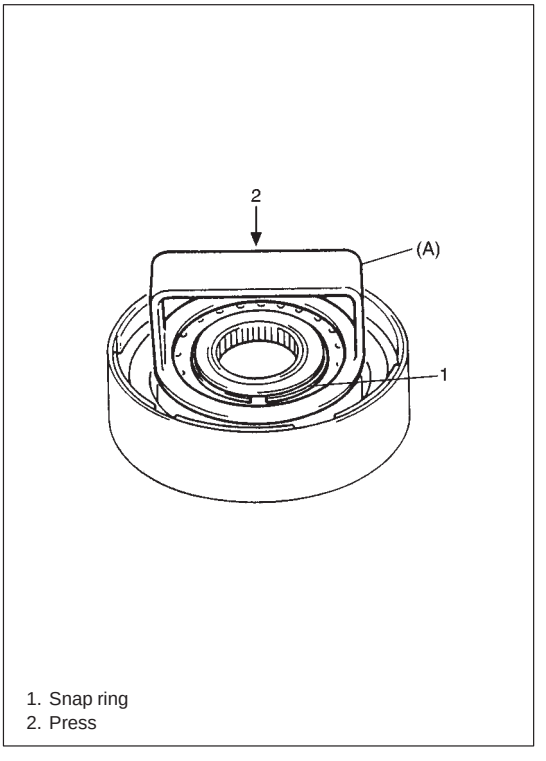


1. Reverse clutch piston
2. Reverse clutch drum with bearing

REASSEMBLY

1) Apply A/T fluid to new O-rings.
2) Install them to reverse clutch piston.
3) Press reverse clutch piston into reverse clutch drum with bearing with cup side up.

NOTE:
Do not twist or deviate O-rings during installation.

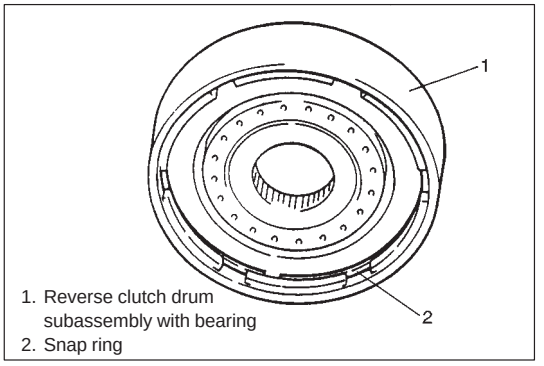


1. Snap ring
2. Press

4) Place reverse clutch return spring onto reverse clutch piston.
5) Install snap ring, using special tool and hydraulic press.

Special Tool
(A): 09926-96010

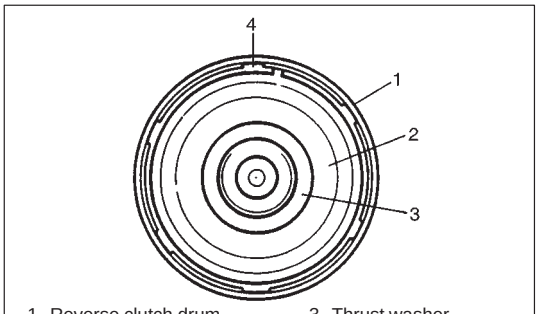
NOTE:
To prevent spring seat deformation, be sure to keep clearance of 1 – 2 mm between return spring seat and snap ring.



1. Reverse clutch drum subassembly with bearing
2. Snap ring

6) Install clutch plates and No.3 clutch discs in the following order.
(1) Plate → (2) Disc → (3) Plate → (4) Disc

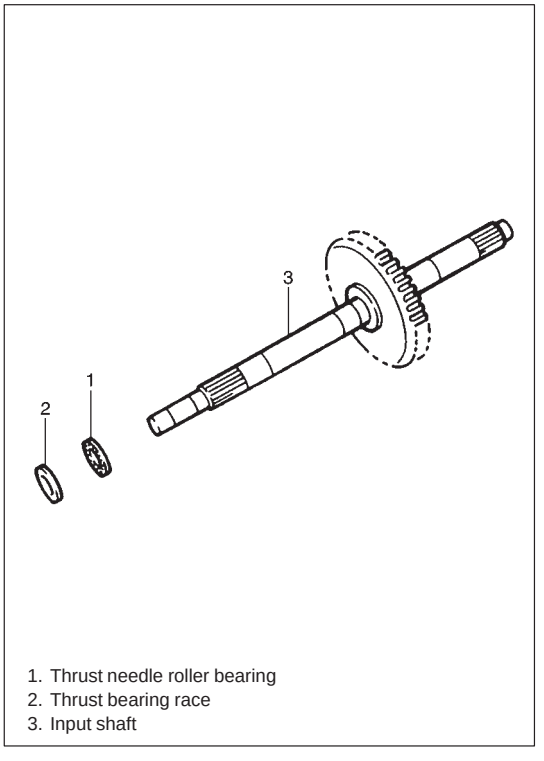
NOTE:
Check to make sure that flat end section of plate faces toward piston side.



1. Reverse clutch drum
2. Sun gear input flange
3. Thrust washer
4. Retainer ring

7) Install sun gear input flange with retainer ring.

8) Measure pack clearance, referring to preliminary check in "REVERSE CLUTCH"
9) Remove reverse clutch from oil pump body.
10) Remove sun gear input flange by removing retainer ring.



1. Thrust needle roller bearing
2. Thrust bearing race
3. Input shaft

11) Coat race with thrust needle roller bearing with grease.

Grease:99000-25030 (SUZUKI SUPER GREASE C)

12) Install thrust needle roller bearing to input shaft.

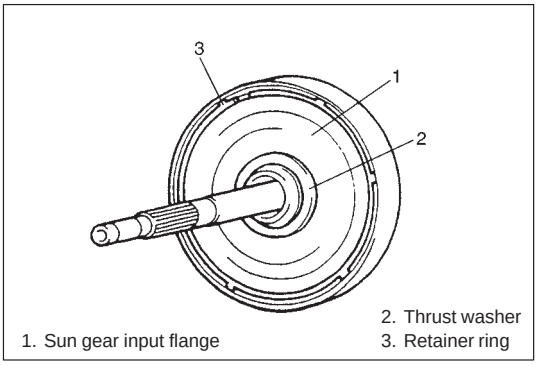
Race with bearing dimension
Outside diameter : 31.1 mm (1.22 in.)
Inside diameter : 18.7 mm (0.74 in.)
Thickness : 2.6 mm (0.10 in.)

13) Coat thrust bearing race with grease.

Grease: 99000-25030 (SUZUKI SUPER GREASE C)

14) Install thrust bearing race to input shaft.

Race dimension
Outside diameter : 33.3 mm (1.31 in.)
Inside diameter : 21.7 mm (0.85 in.)
Thickness : 2.0 mm (0.08 in.)

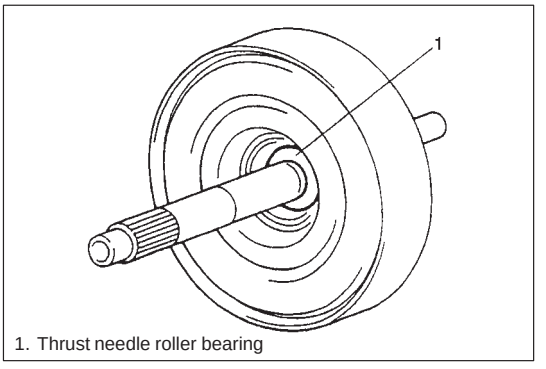


1. Sun gear input flange
2. Thrust washer
3. Retainer ring

15) Install input shaft to reverse clutch drum.
16) Install sun gear input flange with retainer ring.
17) Coat thrust washer with grease.

Grease: 99000-25030 (SUZUKI SUPER GREASE C)

18) Install thrust washer to reverse clutch assembly.



1. Thrust needle roller bearing

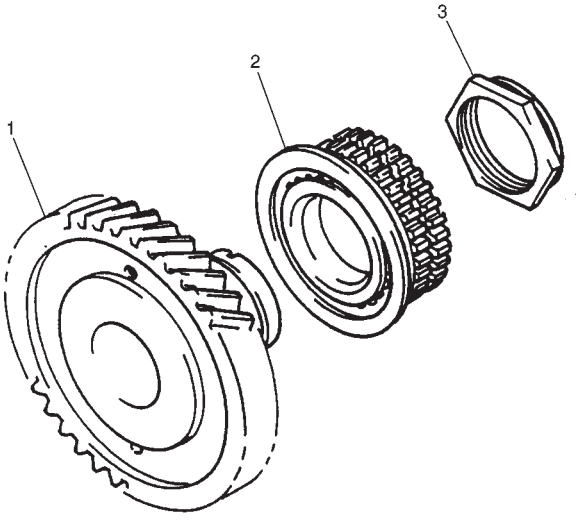
19) Coat race with thrust needle roller bearing with grease.

Grease: 99000-25030 (SUZUKI SUPER GREASE C)

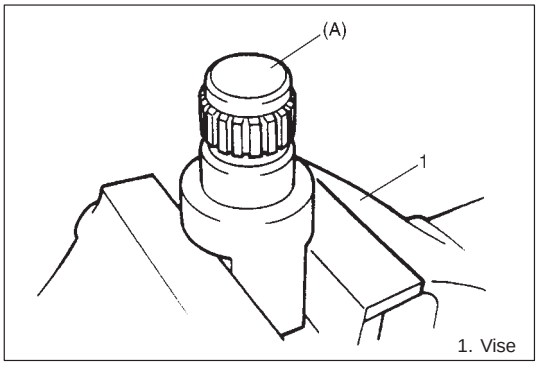
20) Install thrust needle roller bearing to reverse clutch assembly.

Race with bearing dimension
Outside diameter : 32.9 mm (1.30 in.)
Inside diameter : 18.8 mm (0.74 in.)
Thickness : 3.6 mm (0.14 in.)

COUNTER DRIVE GEAR



1. Counter drive gear
2. Angular ball bearing
3. Locknut

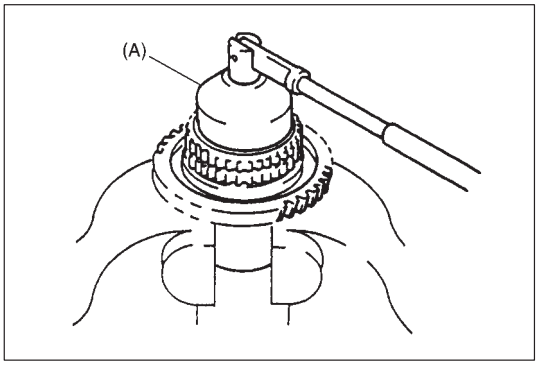


1. Vise

DISASSEMBLY

1) Clamp special tool in vise and place counter drive gear onto the special tool.

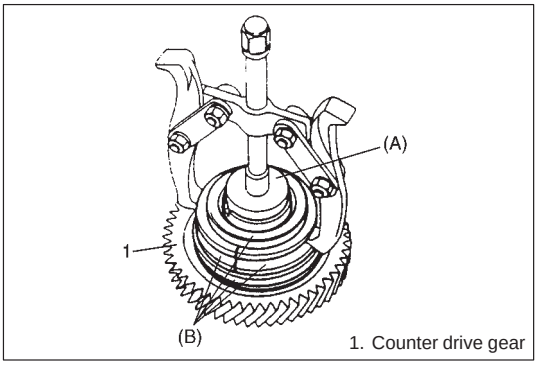
Special Tool
(A): 09927-76040



2) Unstake lock section of lock nut and remove lock nut using special tool.

Special Tool
(A): 09927-26010

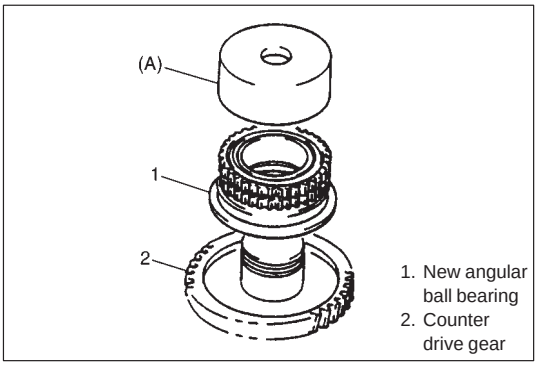
3) Remove angular ball bearing from counter drive gear.



1. Counter drive gear

NOTE:
If inner race of angular ball bearing remains on counter drive gear, remove it using gear puller and special tools.

Special Tool
(A): 09925-86010
(B): 09925-06010



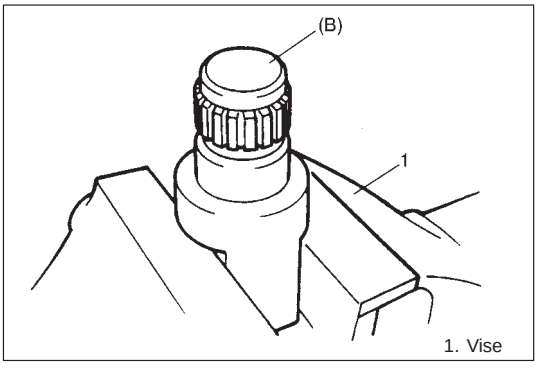
1. New angular ball bearing
2. Counter drive gear

REASSEMBLY

1) Press new angular ball bearing into counter drive gear using special tool.

   Special Tool
   (A): 09951-46010

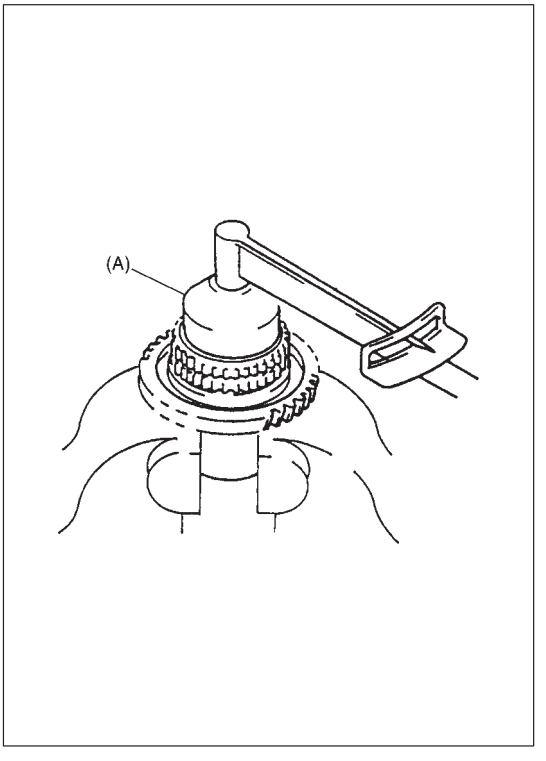
2) Temporally tighten new lock nut.



1. Vise

3) Clamp special tool in vise and place counter drive gear onto the special tool.

   Special Tool
   (B): 09927-76040

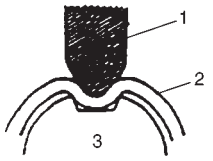


4) Tighten new lock nut using special tool until starting/rotation torques will be specifications below with push-pull gauge or the like.

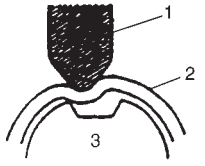
   Special Tool
   (A): 09927-26010

   Specified value
   Starting torque: 0.05 – 0.25 N·m
   (0.005 – 0.025 kg-m, 0.037 – 0.180 lb-ft)
   Rotation torque: 0.05 – 0.15 N·m
   (0.005 – 0.015 kg-m, 0.037 – 0.108 lb-ft)

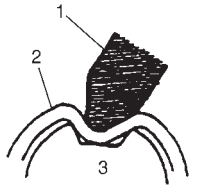
Correct



Wrong



Wrong

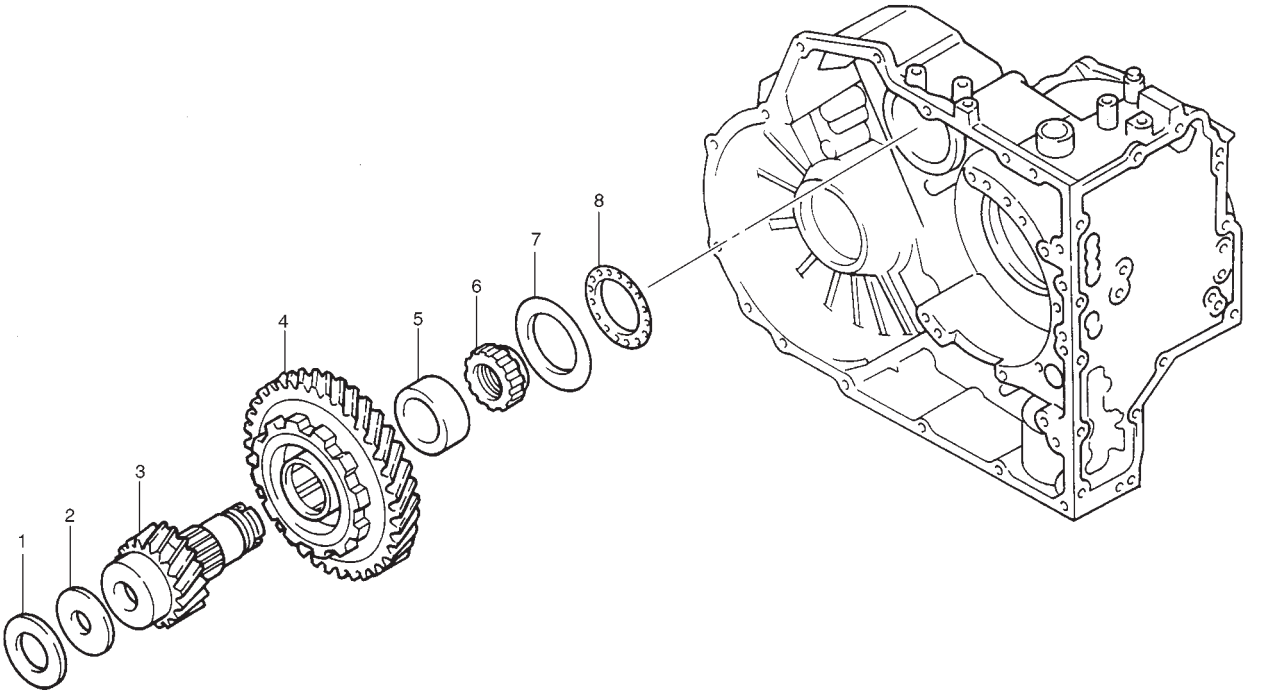


1. Suitable staking tool
2. New lock nut
3. Shaft

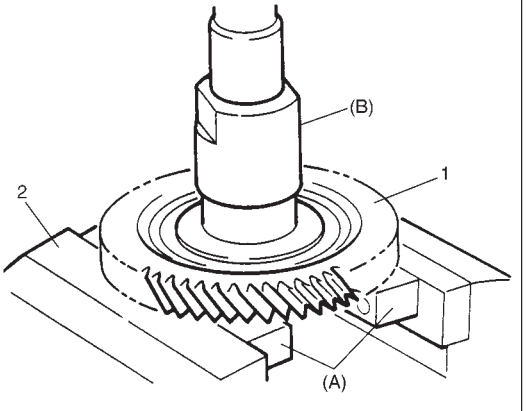
5) Stake new lock nut, using standard punch in combination with hammer.

NOTE:
When staking lock nut, point a suitable staking tool toward axis center shaft and stake lock nut securely as shown in figure. (Poor staking may cause abnormal noise.)

COUNTER DRIVEN GEAR



1. Thrust needle roller bearing
2. Thrust bearing race
3. Differential drive pinion
4. Counter driven gear
5. Cylindrical roller bearing
6. Lock nut (for output shaft speed sensor)
7. Thrust bearing race
8. Thrust needle roller bearing



1. Counter driven gear
2. Vice

DISASSEMBLY

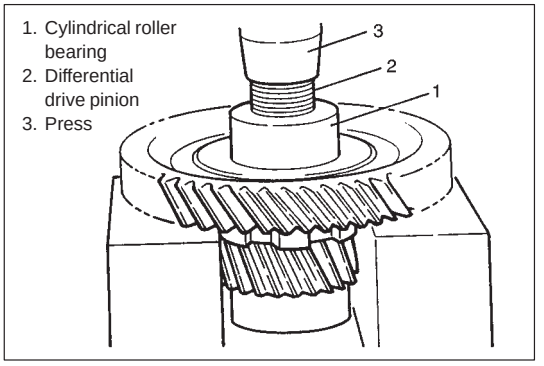
1) Remove transmission housing.
2) Clamp counter driven gear with special tool and a vice.

Special Tool
(A): 0992I-57810

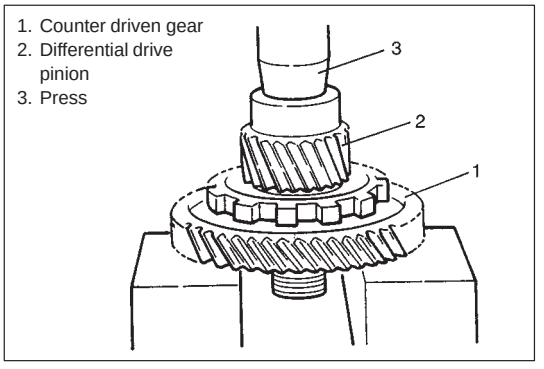
3) Unstake lock section of lock nut for output shaft speed sensor.
4) Remove lock nut for output shaft speed sensor, using special tool.

Special Tool
(B): 09927-76050

NOTE:
Do not reuse lock nut for output shaft speed sensor once removed.



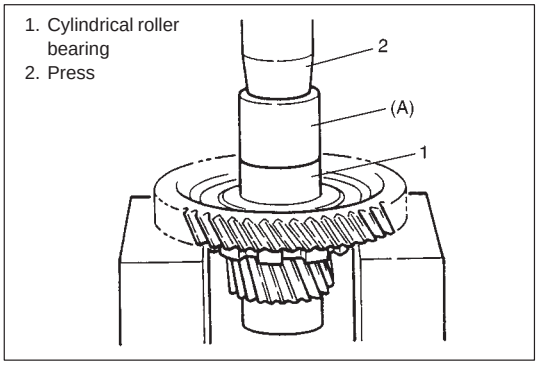
5) Remove cylindrical roller bearing by pressing differential drive pinion, using hydraulic press.



REASSEMBLY

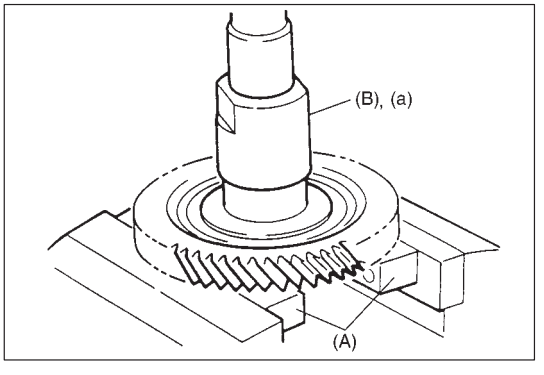
1) Press differential drive pinion to counter driven gear, using hydraulic press.

2) Coat inner surface of cylindrical roller bearing with A/T fluid.



3) Press cylindrical roller bearing, using special tools and hydraulic press.

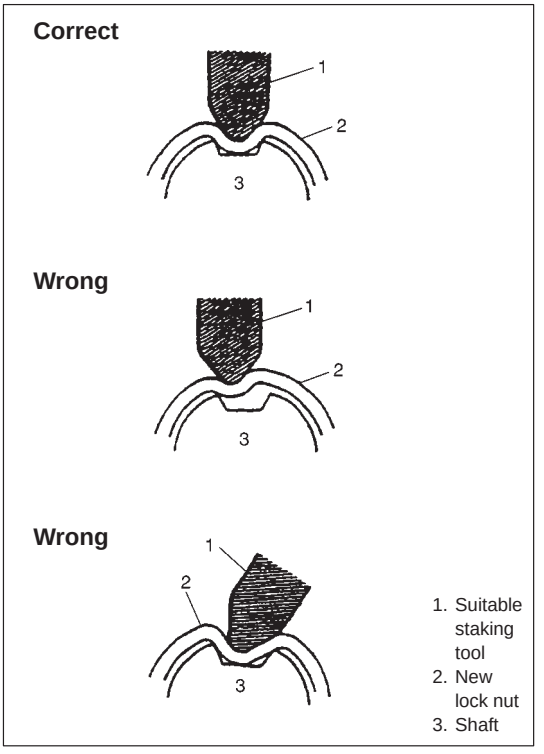
Special Tool
(A): 09951-16060



4) Tighten new lock nut for output shaft speed sensor, using special tools.

Special Tool
(A): 09921-57810
(B): 09927-76050

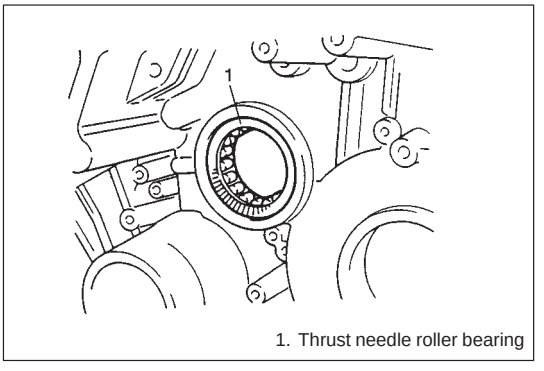
Tightening Torque
(a): 125 N·m (12.5 kg-m, 90.5 lb-ft)



1. Suitable staking tool
2. New lock nut
3. Shaft

5) Stake new lock nut for output shaft speed sensor, using standard punch in combination with hammer.

NOTE:
When staking lock nut for vehicle speed sensor, point a suitable staking tool toward differential drive pinion shaft axis center and stake lock nut securely, as shown in the figure. (Poor staking may cause abnormal noise.)

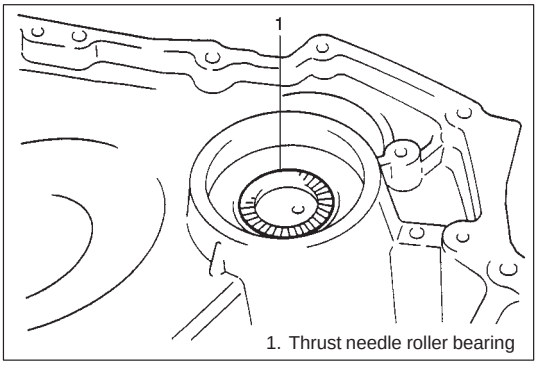


1. Thrust needle roller bearing

6) Apply A/T fluid to thrust needle roller bearing and race.

Race with bearing dimension
Outside diameter : Approximately 65.8 mm (2.59 in.)
Inside diameter : Approximately 51.0 mm (2.01 in.)
Thickness : Approximately 2.7 mm (0.11 in.)

7) Place thrust needle roller bearing and race to transmission case.



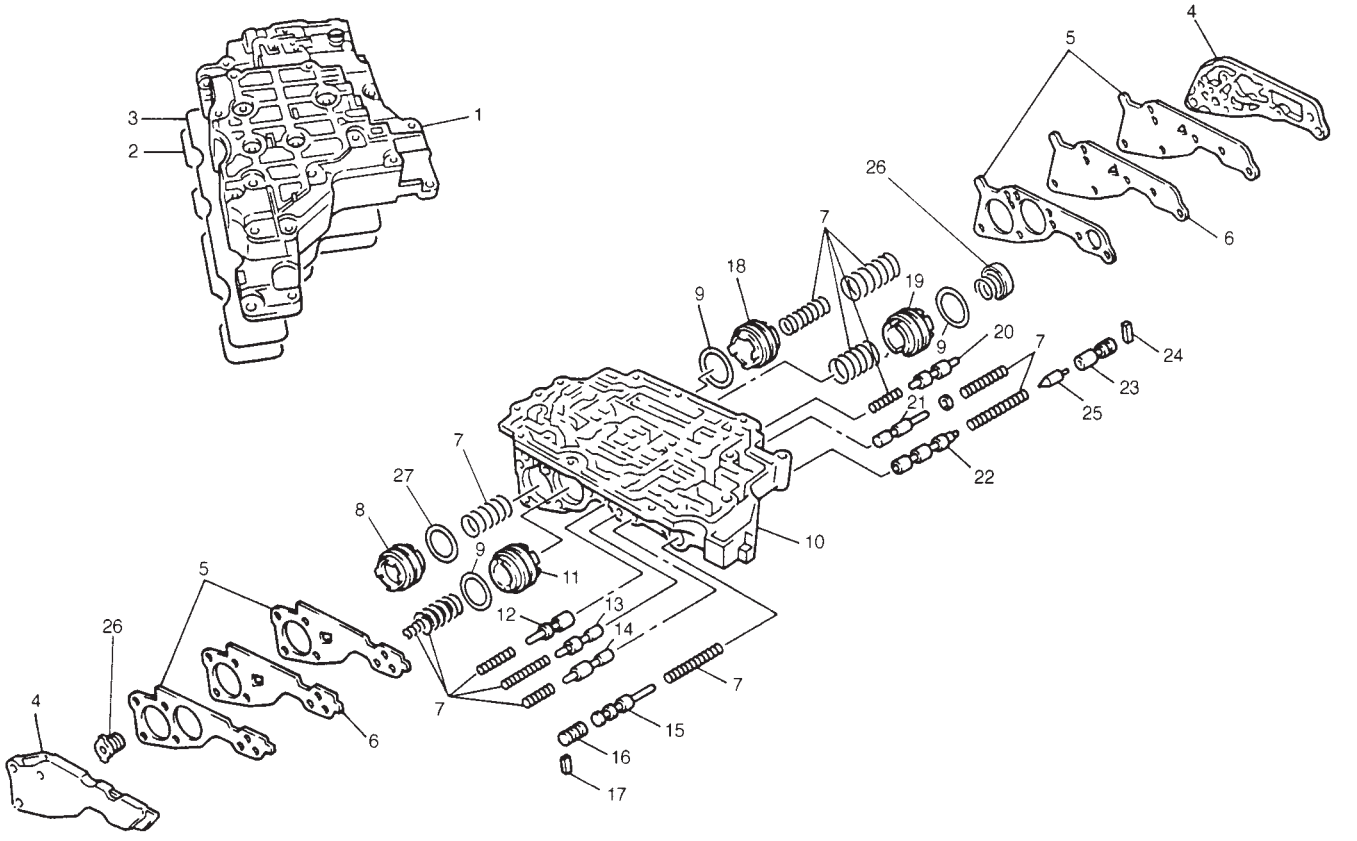
1. Thrust needle roller bearing

8) Apply A/T fluid to thrust needle roller bearing and race.

Race with bearing dimension
Outside diameter : Approximately 45.7 mm (1.80 in.)
Inside diameter : Approximately 30.0 mm (1.18 in.)
Thickness : Approximately 3.0 mm (0.12 in.)

9) Place thrust needle roller bearing and race to transmission case.
10) Install counter driven gear to transmission case.

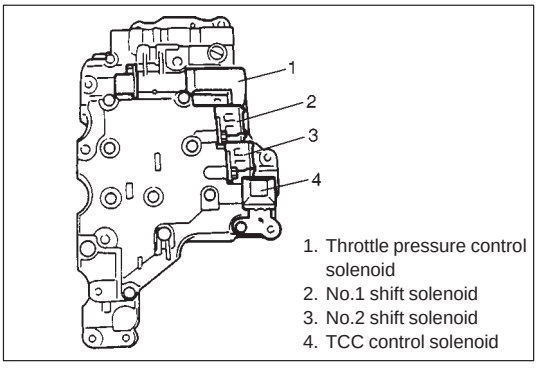
VALVE BODY



1. Front valve body assembly
2. Rear valve body gasket
3. Separator plate
4. Rear valve body cover
5. Rear valve cover gasket
6. Rear valve body cover plate
7. Compression spring
8. 2nd and 4th brake accumulator piston
9. O-ring
10. Rear valve body assembly
11. Reverse clutch accumulator piston
12. Solenoid modulator valve
13. Low coast modulator valve
14. Clutch modulator valve
15. Secondary regulator valve
16. Plug
17. Key
18. Forward clutch accumulator piston
19. Overdrive clutch accumulator piston
20. 2 – 3 shift timing valve
21. Coast modulator valve
22. Lock up control valve
23. Lock up control plunger sleeve
24. Retainer
25. Lock up control plunger
26. Accumulator piston spring subassembly
27. D-ring

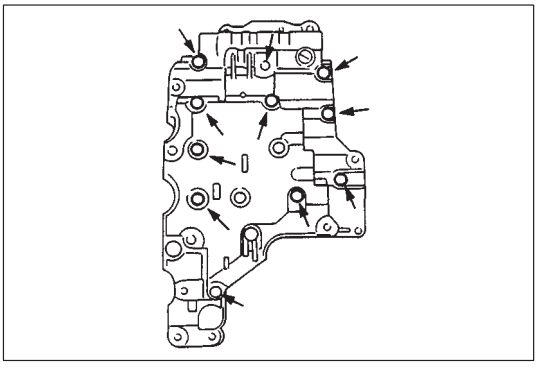
DISASSEMBLY

1) Remove valve body assembly from transmission case.
2) Pull out manual valve.

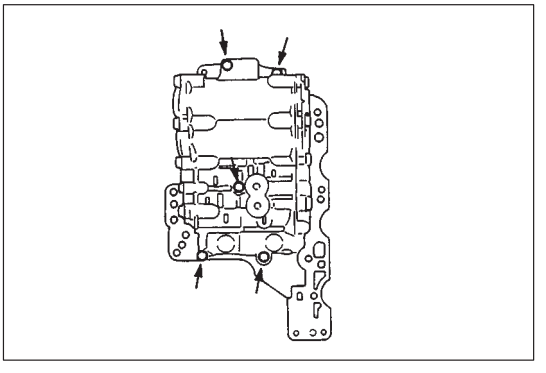


1. Throttle pressure control solenoid
2. No.1 shift solenoid
3. No.2 shift solenoid
4. TCC control solenoid

3) Remove solenoids by removing bolts.



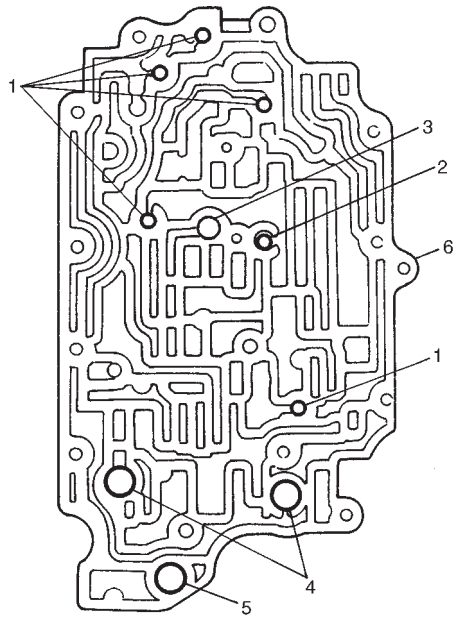
4) Remove 11 bolts from valve body front side.



5) Remove 5 bolts from valve body rear side.

6) Remove rear valve body gaskets and separator plate together with rear valve body.

NOTE:
Never reuse gasket after removal.

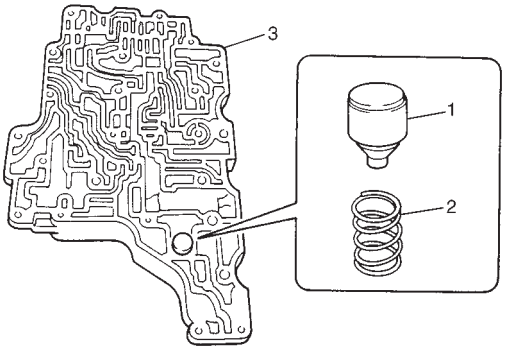


1. Ball
2. Ball (large)
3. Oil solenoid strainer
4. Check valve (spring 1)
5. Check valve (spring 2)
6. Rear valve body

7) Remove six balls, oil solenoid strainer and check valves and compression springs.

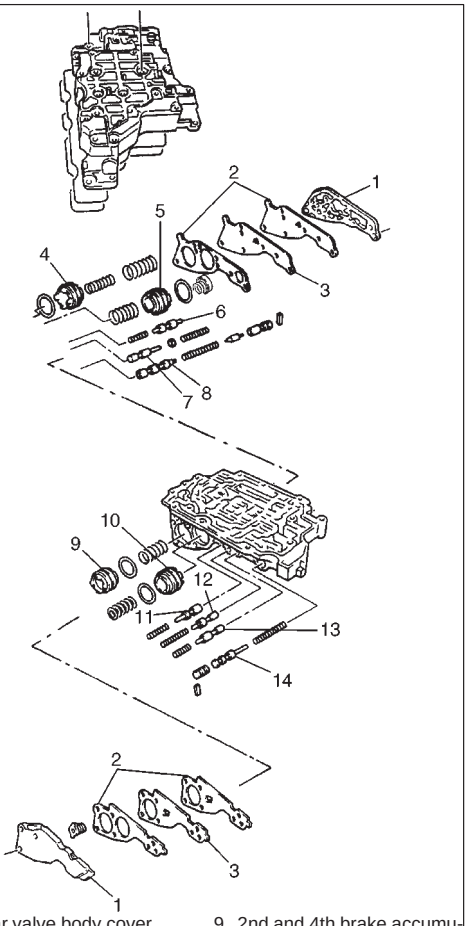
Spring Identifications

	Length	Outside diameter		Color	
		G16	J18	G16	J18
Spring 1	12.6 mm (0.496 in.)	5.2 mm (0.205 in.)	5.3 mm (0.209 in.)	Blue	Light blue
Spring 2	18.1 mm (0.713 in.)	6.2 mm (0.244 in.)	7.0 mm (0.276 in.)	Yellow	Yellow



1. Check valve
2. Compression spring
3. Front valve body

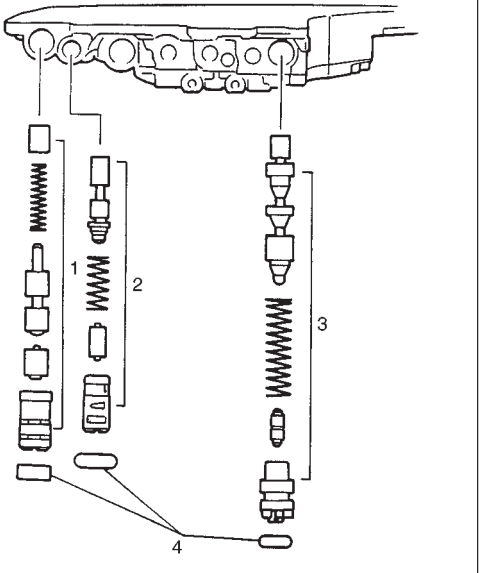
8) Remove check valve and compression spring from front valve body.



1. Rear valve body cover
2. Gasket
3. Plate
4. Forward clutch accumulator
5. Overdrive clutch accumulator
6. 2 – 3 timing valve
7. Coast clutch modulator
8. TCC control valve
9. 2nd and 4th brake accumulator
10. Reverse clutch accumulator
11. Solenoid modulator valve
12. Low coast modulator valve
13. 2nd and 4th brake modulator control valve
14. Secondary regulator valve

9) Remove the following parts and springs by removing rear valve body cover bolts and key.

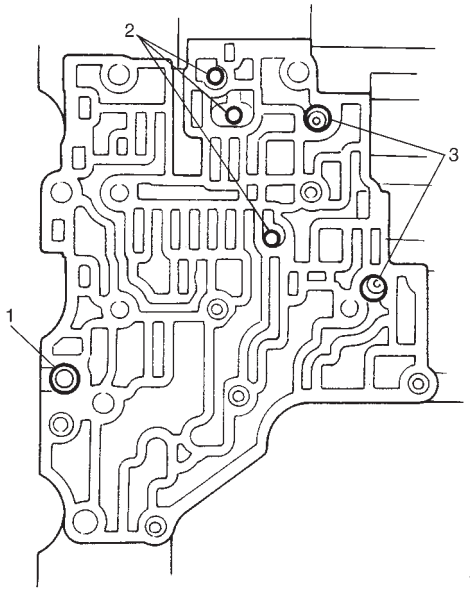
- Rear valve body cover
- Gasket
- Plate
- Forward clutch accumulator
- Overdrive clutch accumulator
- 2 – 3 timing valve
- Coast clutch modulator
- TCC control valve
- 2nd and 4th brake accumulator
- Reverse clutch accumulator
- Solenoid modulator valve
- Low coast modulator valve
- 2nd and 4th brake modulator control valve
- Secondary regulator valve



1. 2nd and 4th brake modulator
2. Accumulator control valve
3. Primary regulator valve
4. Key

10) Remove the following parts from front valve body by removing keys.

- 2nd and 4th brake modulator
- Accumulator control valve
- Primary regulator valve
- Key

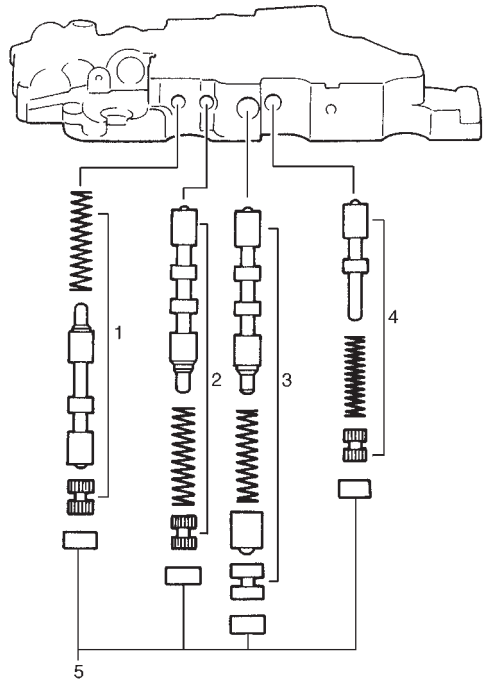


1. Check valve and compression spring
2. Ball
3. Oil solenoid strainer

11) Remove front valve body cover, cover gaskets and plate by removing 4 bolts.

NOTE:
Never reuse used gasket.

12) Remove check valve, compression spring, three balls and oil solenoid strainers.



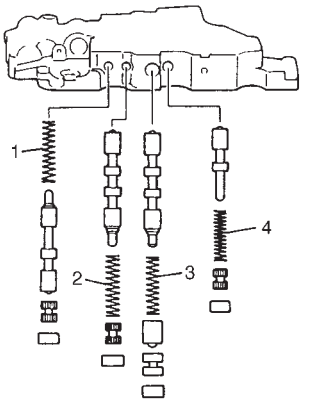
1. 1 – 2 shift valve
2. 2 – 3 shift valve
3. 3 – 4 shift valve
4. TCC modulator valve
5. Key

13) Remove the following parts from front valve body by removing keys.

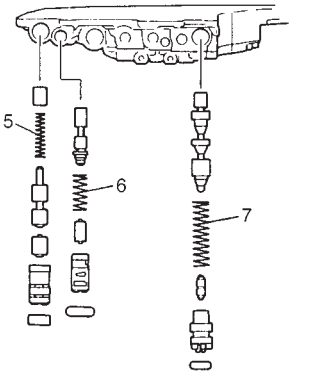
- 1 – 2 shift valve
- 2 – 3 shift valve
- 3 – 4 shift valve
- TCC modulator valve
- Key

COMPRESSION SPRING IDENTIFICATIONS

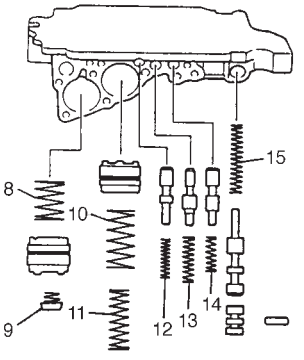
Torque convertor side of front valve body



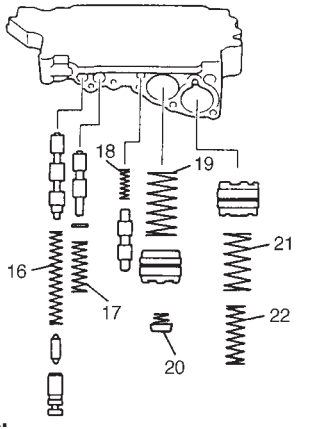
Rear cover side of front valve body



Torque convertor side of rear valve body

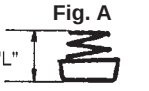


Rear cover side of rear valve body

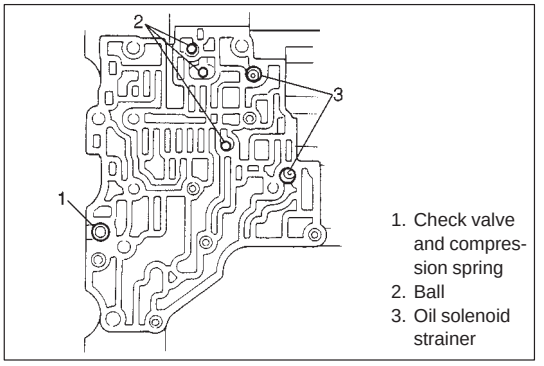


NOTE:
The free lengths of No. 9 and No. 20 indicate length "L" as Fig. A.

Fig. A



Spring	Free length mm (in.)	Outside diameter mm (in.)	Identification color
1. 1 – 2 shift valve spring	34 (1.34)	8 (0.31)	Dark blue
2. 2 – 3 shift valve spring	34 (1.34)	8 (0.31)	Dark blue
3. 3 – 4 shift valve spring	34 (1.34)	8 (0.31)	Dark blue
4. TCC modulator valve spring	28 (1.10)	8 (0.31)	Light green
5. 2nd and 4th brake modulator valve spring	30 (1.18)	8.26 (0.33)	Light green
6. Accumulator control valve spring	25 (0.98)	11.5 (0.45)	White
7. Primary regulator valve spring	48 (1.89)	13.2 (0.52)	Purple
8. 2nd and 4th brake accumulator piston spring	28.5 (1.12)	21 (0.83)	Blue
9. 2nd and 4th brake accumulator piston spring subassemlby	30.8 (1.21)	16 (0.63)	Blue
10. Reverse clutch accumulator piston spring (OUTER)	42.0 (1.65)	21 (0.83)	Red
11. Reverse clutch accumulator piston spring (INNER)	42.0 (1.65)	15.4 (0.61)	Red
12. Solenoid modulator valve spring	28.5 (1.12)	8.0 (0.31)	Purple
13. Low coast modulator valve spring	32.8 (1.29)	9.0 (0.35)	Red
14. 2nd and 4th brake modulator control valve spring	28.7 (1.13)	7.2 (0.28)	Light blue
15. Secondary regulator valve spring	47.44 (1.87)	9.5 (0.37)	None
16. TCC control valve spring	64.9 (2.56)	9.6 (0.38)	None
17. Coast clutch modulator valve spring	35.6 (1.40)	7.7 (0.30)	Light green
18. 2 – 3 timing valve spring	21.1 (0.83) (G16) 27.44 (1.08) (J18)	7.7 (0.30)	White (G16) Blue (J18)
19. Overdrive clutch accumulator piston spring	45.1 (1.78)	21.1 (0.83)	Light green
20. Overdrive clutch accumulator piston spring subassembly	14.3 (0.56)	15.5 (0.61)	Red
21. Forward clutch accumulator piston spring (OUTER)	42.0 (1.65)	21.0 (0.83)	Red
22. Forward clutch accumulator piston spring (INNER)	42.0 (1.65)	15.5 (0.61)	Red

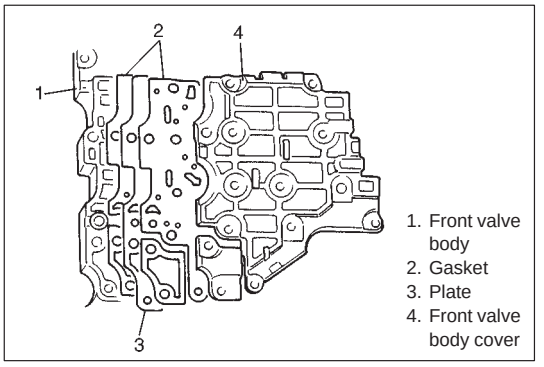


REASSEMBLY

1) Install valves and compression springs to torque convertor side of front valve body.

NOTE:
To identify correct spring or valve, refer to compression spring identification.

2) Place check balls, check valve, compression spring and oil solenoid strainers.

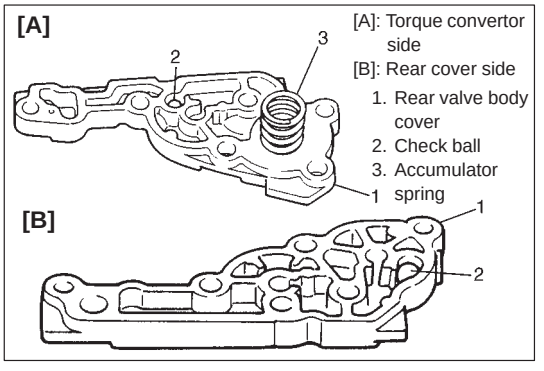


3) Install gaskets, plate, and front valve body cover and tighten bolts to specified torque.

Tightening Torque
Front valve body cover: 6.8 N·m (0.68 kg-m, 4.9 lb-ft)

4) Install valves and compression springs to rear cover side of front valve body.

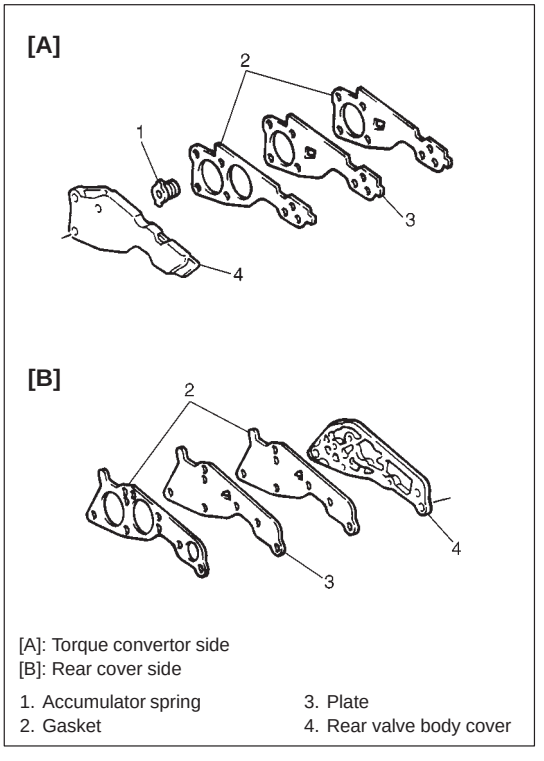
NOTE:
To identify correct spring or valve, refer to compression spring identification.



5) Install accumulator pistons, valves and compression springs to rear valve body.

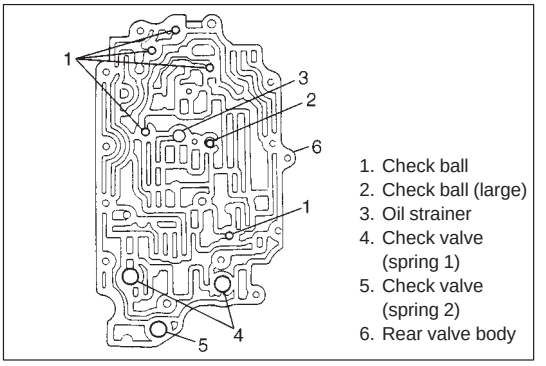
NOTE:
- **Don't reuse accumulator O-ring.**
- **To identify correct piston, valve or spring, refer to compression spring identification.**

6) Place check balls and accumulator spring to rear valve body covers.



7) Install gaskets, plates and rear valve body covers with check balls and accumulator spring, and then tighten bolts to specified torque.

Tightening Torque
Rear valve body cover: 10 N·m (1.0 kg-m, 7.5 lb-ft)

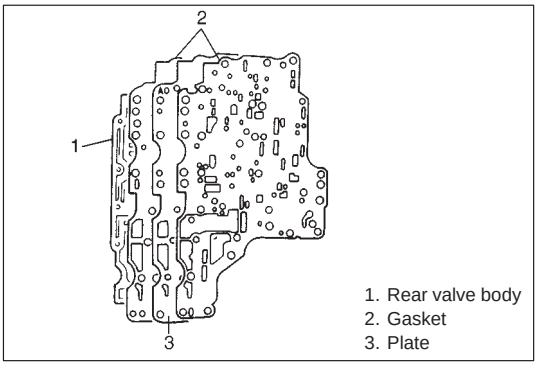


1. Check ball
2. Check ball (large)
3. Oil strainer
4. Check valve (spring 1)
5. Check valve (spring 2)
6. Rear valve body

8) Place check balls, oil solenoid strainer, check valves and compression springs to rear valve body.

Check Valve Spring Identification

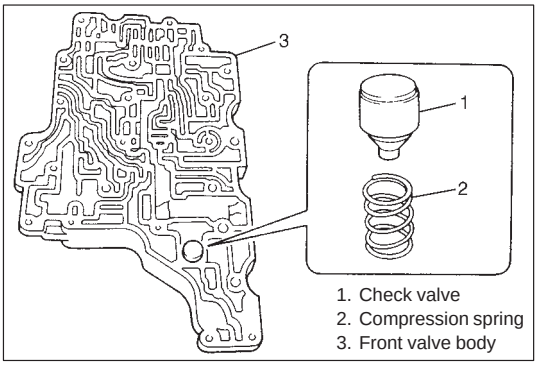
Spring	Free length mm (in.)	Outside diameter mm (in.)		Identification color	
		G16	J18	G16	J18
1	12.6 (0.496)	5.2 (0.205)	5.3 (0.209)	Blue	Light blue
2	18.1 (0.713)	6.2 (0.244)	7.0 (0.276)	Yellow	Yellow



1. Rear valve body
2. Gasket
3. Plate

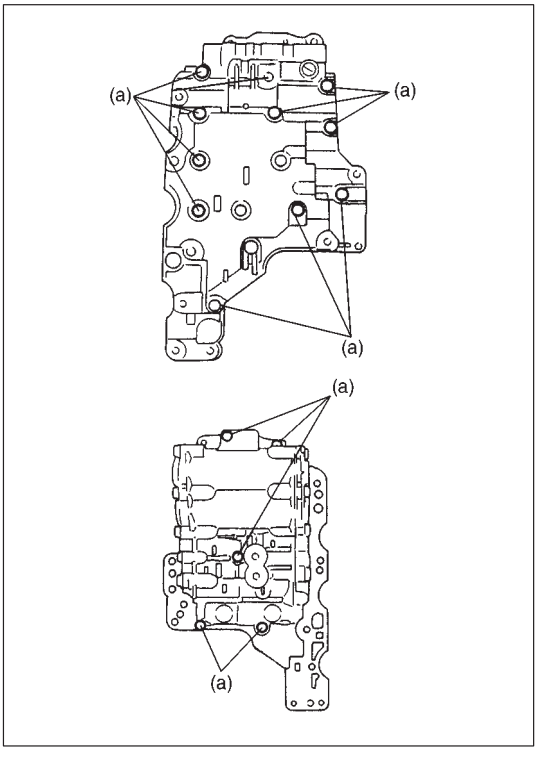
9) Place gaskets and plate on rear valve body.

NOTE:
Place new gaskets and plate as shown in figure, that is, "A0" mark provided on plate faces to front valve body side.



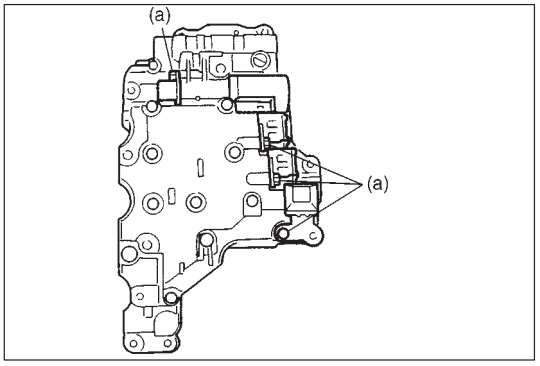
1. Check valve
2. Compression spring
3. Front valve body

10) Place check valve and compression spring to front valve body.



11) Install rear valve body with gaskets, plate and inner parts to front valve body and tighten bolts to specified torque.

Tightening Torque
(a): 6.8 N·m (0.68 kg-m, 4.9 lb-ft)



12) Install solenoid valves to valve body and tighten bolts to specified torque.

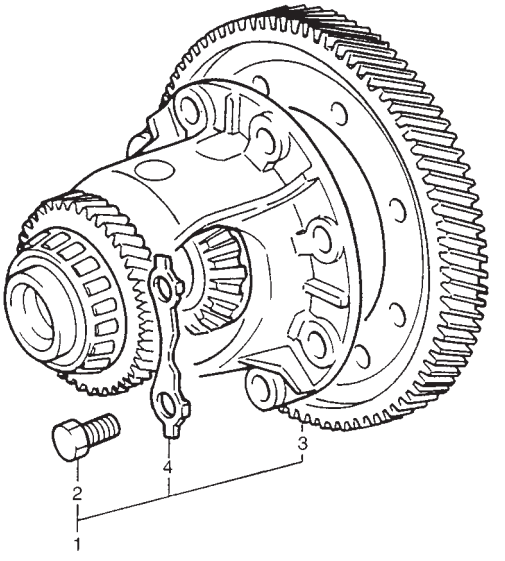
Tightening Torque
(a): 6.8 N·m (0.68 kg-m, 4.9 lb-ft)

NOTE:
- **Don’t reuse solenoid valve O-rings.**
- **No.1 shift solenoid valve and No.2 shift solenoid valve are interchangeable with each other.**

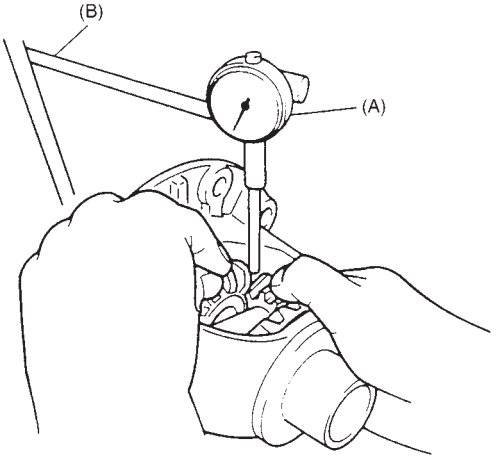
13) Install manual shift valve to valve body.
14) Install valve body assembly to transmission case.

NOTE:
Don’t reuse gaskets.

DIFFERENTIAL



1. Differential gear assembly
2. Bolt
3. Differential ring gear
4. Ring gear set bolt lock plate



INSPECTION

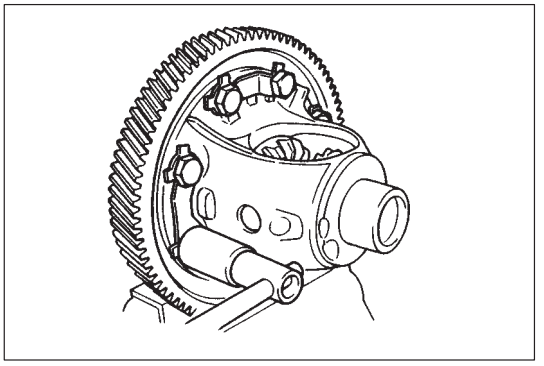
1) Hold differential assembly with soft jawed vice and set special tools as shown.

   Special Tool
   (A): 09900-20606
   (B): 09900-20701

2) Measure differential gear thrust play.

   Differential gear thrust play:
   0.06 – 0.18 mm (0.0024 – 0.0071 in.)

3) If thrust play is out of specification, replace differential case.

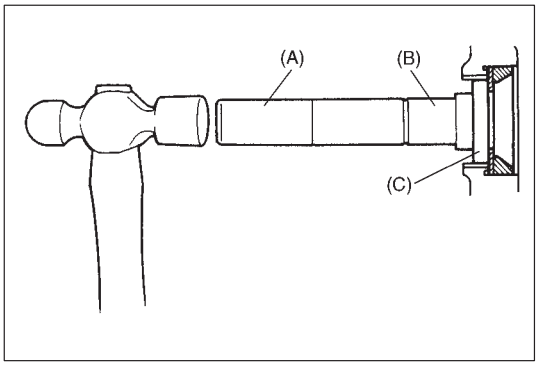


DIFFERENTIAL RING GEAR REMOVAL

1) Unclamp 4 ring gear set bolt lock plates.
2) Remove 8 bolts and 4 ring gear set bolt lock plates.

NOTE:
Don't reuse lock plates.

3) Remove differential ring gear.



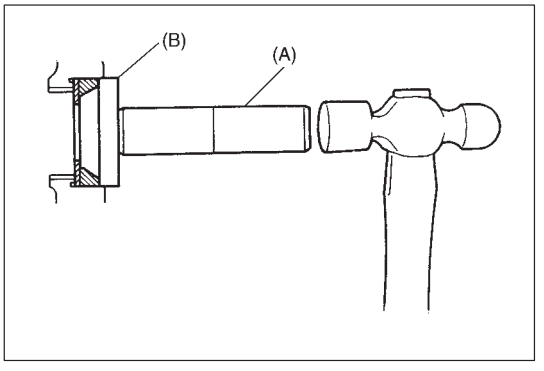
BEARING OUTER RACE REMOVAL

1) Remove differential side oil seal.

NOTE:
Don't reuse removed oil seal.

2) Drive out taper roller bearing outer race and washer from transmission case by using special tools or like.

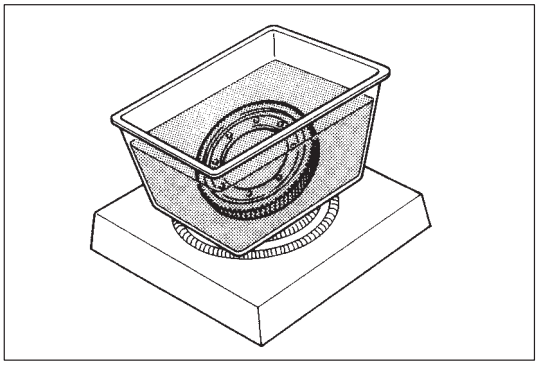
Special Tool
(A): 09924-74510
(B): 09924-74590
(C): 09924-84510-005



BEARING OUTER RACE INSTALLATION

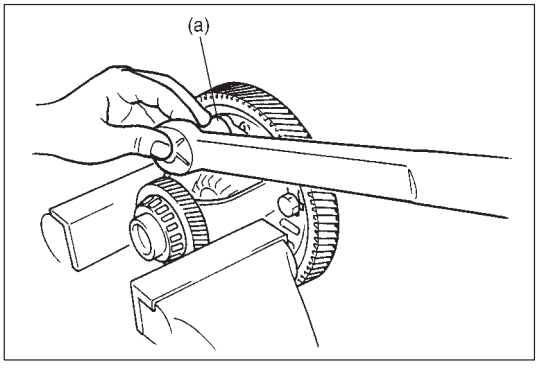
1) Install bearing outer race and washer by using special tool and hummer.

Special Tool
(A): 09924-74510
(B): 09944-68210



DIFFERENTIAL RING GEAR INSTALLATION

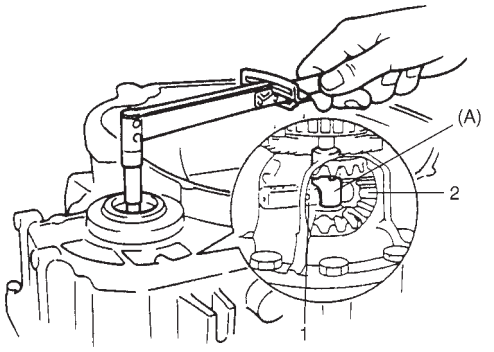
1) Heat differential ring gear to about 100°C (212°F) in oil bath.
2) Clean mating surfaces of differential ring gear and differential case.



3) Install differential ring gear to differential case.
4) Install new 4 ring gear set bolt lock plates and 8 bolts and tighten bolts to specified torque.

Tightening Torque
(a): 99 N·m (9.9 kg-m, 72.0 lb-ft)

5) Clamp bolts with lock plate securely.



1. Differential pinion shaft
2. Differential pinion

6) Install differential assembly to transmission case and tighten case bolts to specified torque.

Tightening Torque for transmission case
30 N·m (3.0 kg-m, 22.0 lb-ft)

7) Check preload of differential by using special tool.

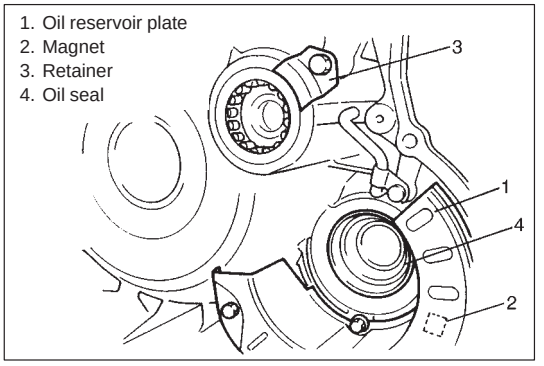
Special Tool
(A): 09928-06050

Differential preload (starting torque)
1.0 – 1.4 N·m (0.1 – 0.14 kg-m, 0.74 – 1.01 lb-ft)

NOTE:

- **If preload exceeds specified value, reselect washer on both transmission case and housing.**
- **Preload changes about 0.3 – 0.4 N·m (0.03 – 0.04 kg-m, 0.22 – 0.29 lb-ft) with each washer thickness.**
- **Washer thickness: mm**
  2.35, 2.40, 2.45, 2.50, 2.55, 2.60, 2.65, 2.70, 2.75, 2.80, 2.85, 2.90, 2.10, 2.15, 2.20, 2.25, 2.30

8) Install differential side oil seal.



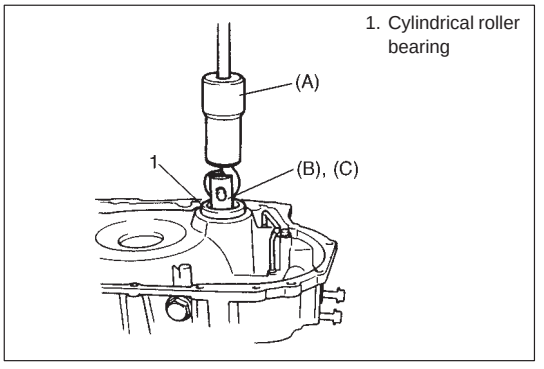
TRANSMISSION HOUSING

REMOVAL

1) Remove oil seal.

NOTE:
Never reuse removed oil seal.

2) Remove oil reservoir plate with three magnets by removing bolts.
3) Remove roller bearing retainer by removing bolt.

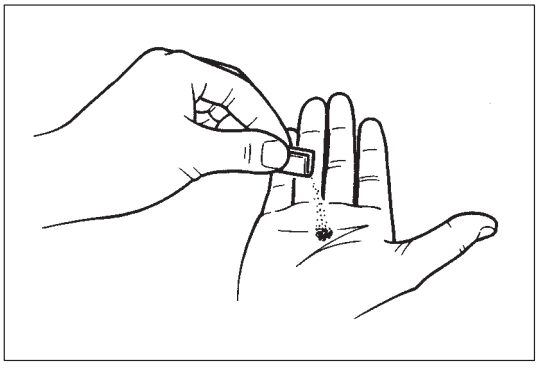


4) Remove cylindrical roller bearing, using special tools.

Special Tool
(A): 09942-15511
(B): 09941-54911 (remover)
(C): 09921-26010 (coller)

NOTE:
Never reuse removed bearing.

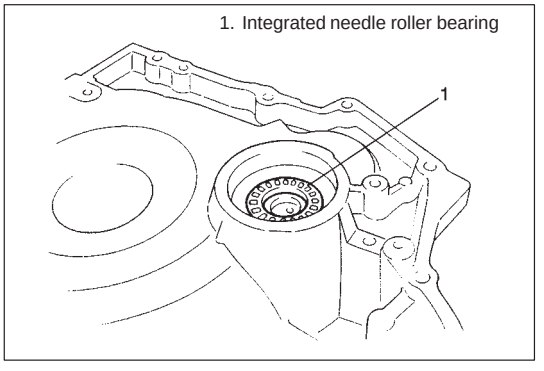
5) Remove integrated needle roller bearing with race.



INSPECTION

Check pan for particles.
Remove magnets and use them to collect any chips.
Inspect oil reservoir plate for any chips and particle collected on magnet.
Inspect them carefully to find out the type of wear on transmission.

- Steel (magnetic) . . . . . Wear of bearing, gear and plate
- Brass (nonmagnetic) . . . . . Wear of bush

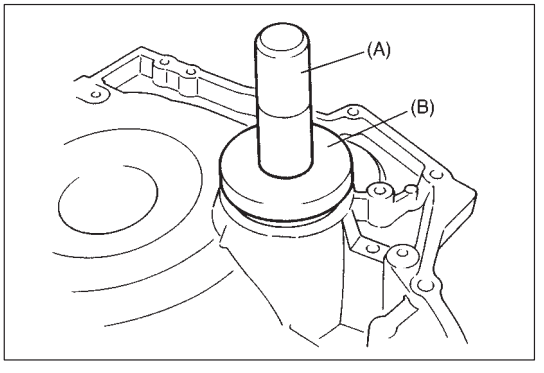


INSTALLATION

1) Apply A/T fluid to integrated needle roller bearing with race.

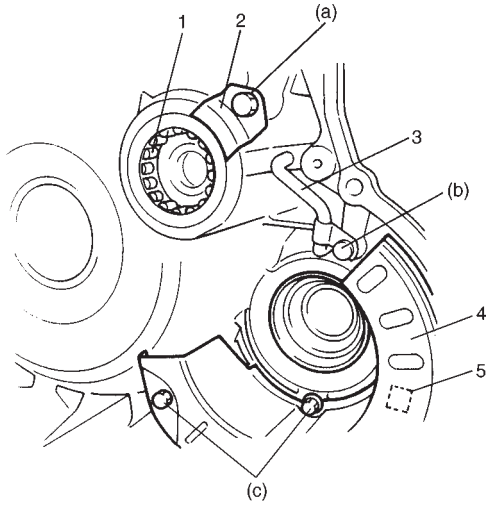
Race dimension
Outside diameter : 45.7 mm (1.80 in.)
Inside diameter : 30.0 mm (1.18 in.)
Thickness : 3.0 mm (0.12 in.)

2) Install integrated needle roller bearing to transmission case.



3) Apply A/T fluid to outer surface of cylindrical roller bearing.
4) Tap cylindrical roller bearing, using special tools.

Special Tool
(A): 09924-74510
(B): 09944-88210



1. Cylindrical roller bearing
2. Retainer
3. Lubrication tube
4. Oil reservoir plate
5. Magnet

5) Tighten roller bearing retainer with bolt.

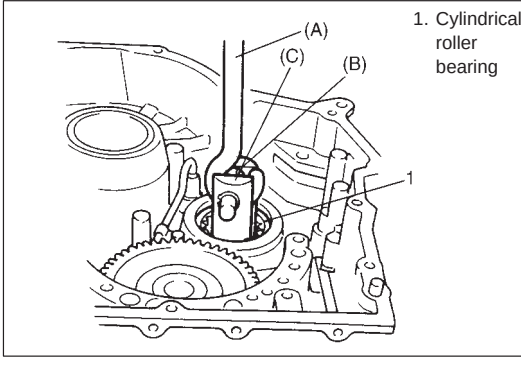
Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

6) Install transmission lubrication tube and clamp.
7) Tighten them with bolt.

Tightening Torque
(b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

8) Tighten oil reservoir plate (with three magnets installed) with bolts.

Tightening Torque
(c): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Cylindrical roller bearing

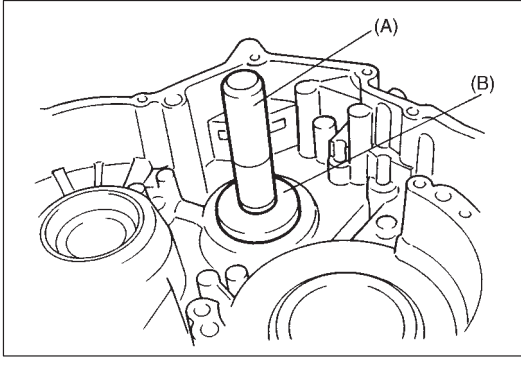
TRANSMISSION CASE

REMOVAL

1) Remove cylindrical roller bearing, using special tools.

Special Tool
(A): 09942-15511
(B): 09941-54911 (remover)
(C): 09921-26010 (coller)

NOTE:
Never reuse removed bearing.



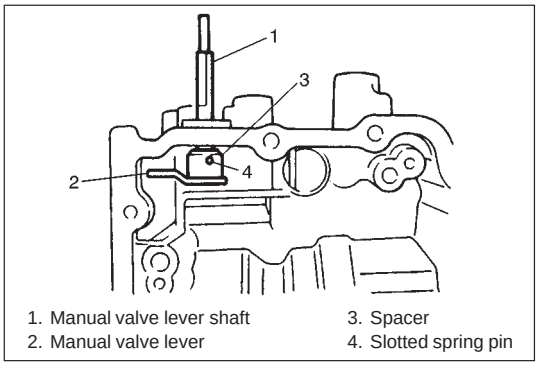
INSTALLATION

1) Apply A/T fluid to outer surface of cylindrical roller bearing.
2) Tap cylindrical roller bearing, using special tools.

Special Tool
(A): 09924-74510
(B): 09944-88210

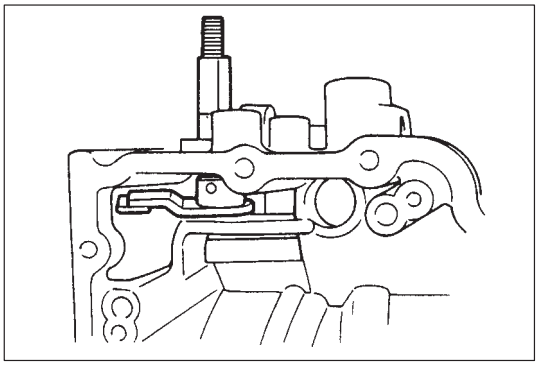
UNIT ASSEMBLY

1) Apply lithium grease to new oil seal lip section.
2) Install new oil seal to transmission case.

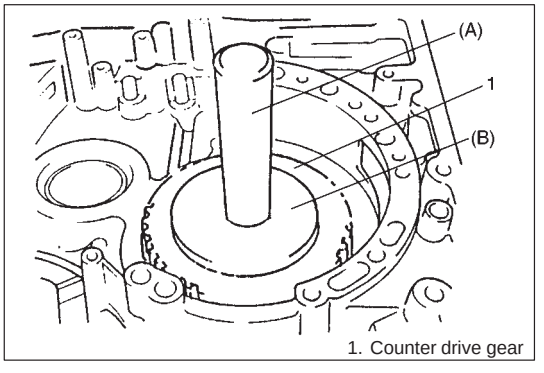


1. Manual valve lever shaft
2. Manual valve lever
3. Spacer
4. Slotted spring pin

3) Insert manual valve lever shaft to transmission case.
4) Install new spacer and manual valve lever to manual valve lever shaft.
5) Install new slotted spring pin.



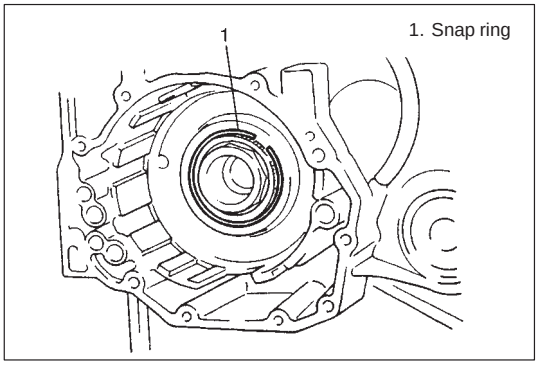
6) Rotate new spacer approximately 180 degrees.
7) Stake small hole of new spacer.



1. Counter drive gear

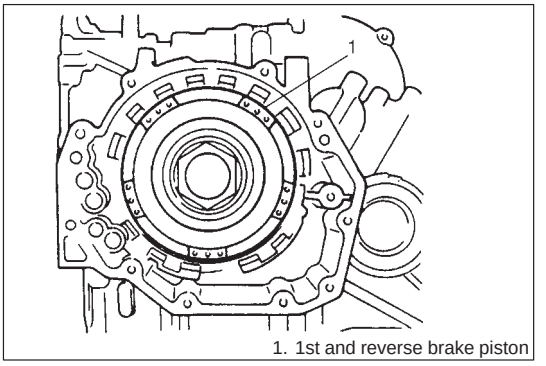
8) Press counter drive gear, using special tools.

Special Tool
(A): 09924-74510
(B): 09926-68310



1. Snap ring

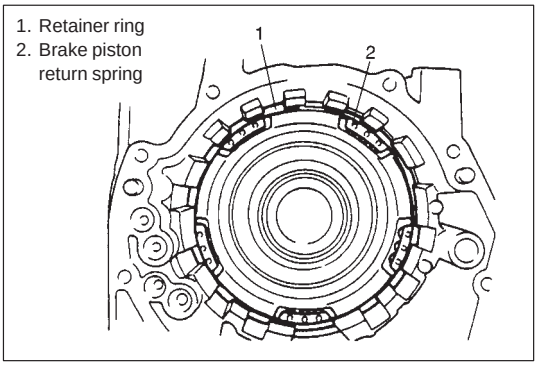
9) Install snap ring to angular ball bearing.



1. 1st and reverse brake piston

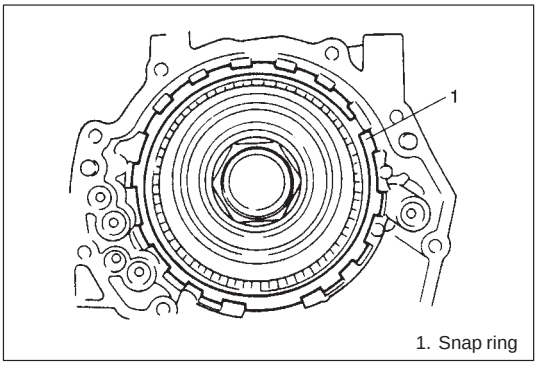
10) Coat new O-rings with A/T fluid.
11) Place 1st and reverse brake piston with O-rings installed.

NOTE:
Be careful not to damage O-rings during piston installation.



1. Retainer ring
2. Brake piston return spring

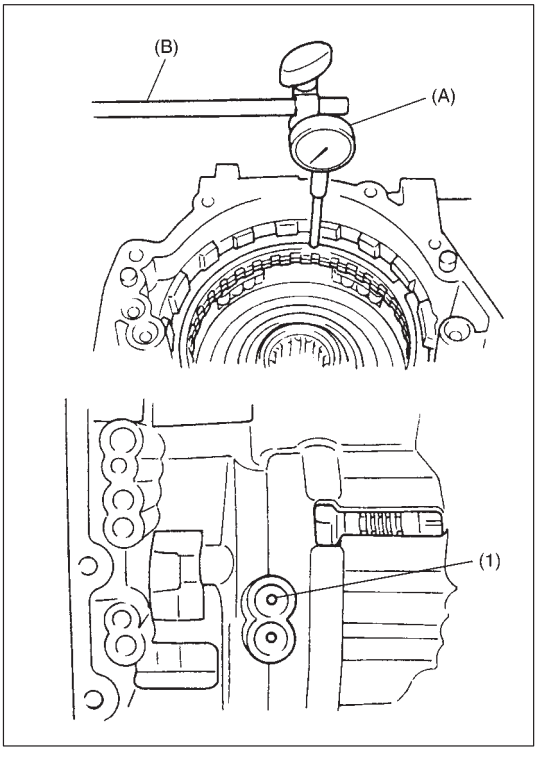
12) Mount brake piston return spring.
13) Install retainer ring by compressing brake piston return spring with flat end rod or the like.



1. Snap ring

14) Install brake flanges “F” disc/clutch and flanges “D” and brake plates in the following order.
F → D → P → D → P → D → P → D → F
15) Install snap ring.

NOTE:
Make sure that opening end of snap ring should be aligned with protrusion of transmission case.



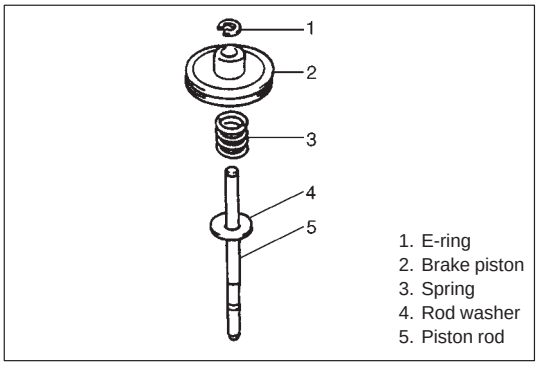
16) Install special tools on transmission.

Special Tool
(A): 09900-20606
(B): 09900-20701

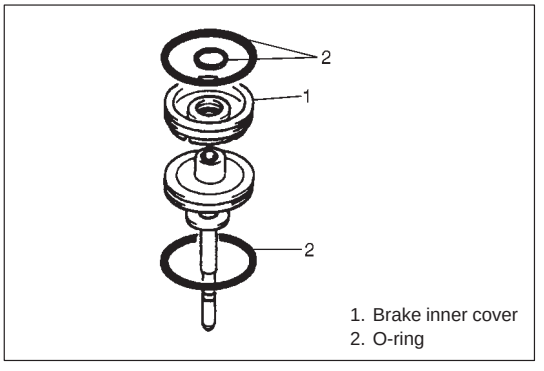
Measure 1st and reverse brake piston stroke by applying and releasing compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) through oil hole section (1).

Specified value: 1.40 – 2.20 mm (0.055 – 0.087 in.)

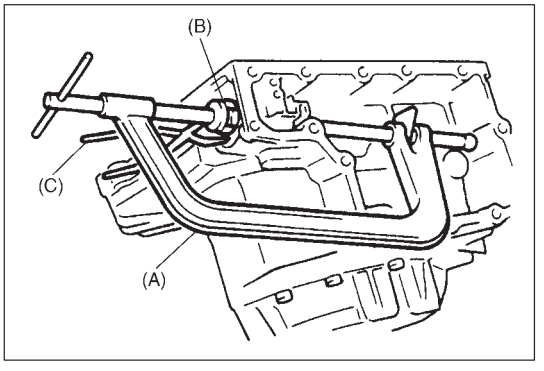
17) Place compression spring for 2nd and 4th brake into transmission case.
18) Apply A/T fluid to new O-rings.



19) Assemble 2nd and 4th brake piston assembly.
    a) Install rod washer, spring, brake piston and new E-ring to brake piston rod.



    b) Install brake inner cover and new O-rings.

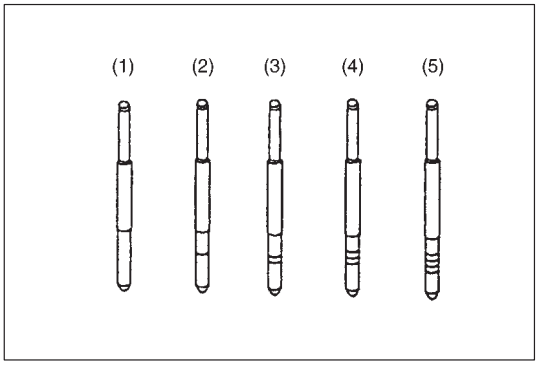


20) Put 2nd and 4th brake piston spring in transmission case and insert piston assembly and brake inner cover into case.
21) Apply valve lifter as shown figure and push piston cover.

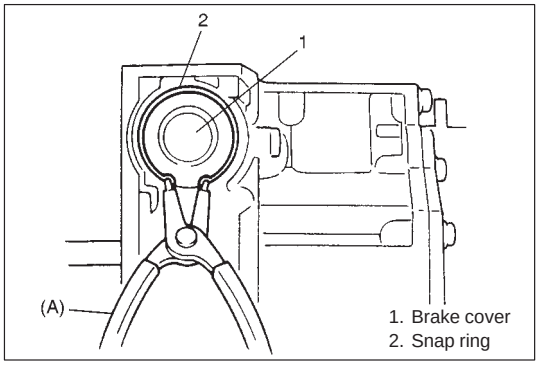
    Special Tool
    (A): 09916-14510
    (B): 09916-48210

22) Install snap ring by using snap ring plier (special tool) and remove special tools (A) and (B).

    Special Tool
    (C): 09900-06108

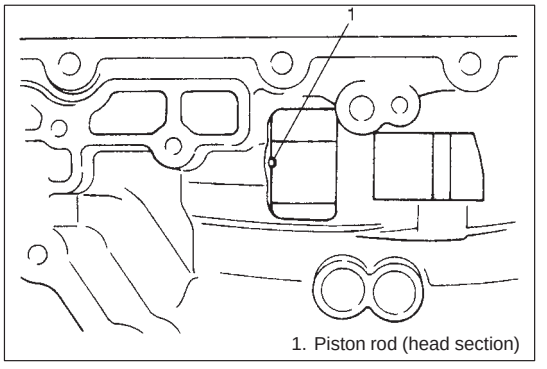


23) Check 2nd and 4th brake piston stroke.
    For detail, refer to step 22) on “UNIT DISASSEMBLY” procedure.
    If its stroke is out of specification, select proper piston rod of 5 type (1) – (5) instead of original one and reinstall 2nd and 4th brake piston assembly so as to be within specification.

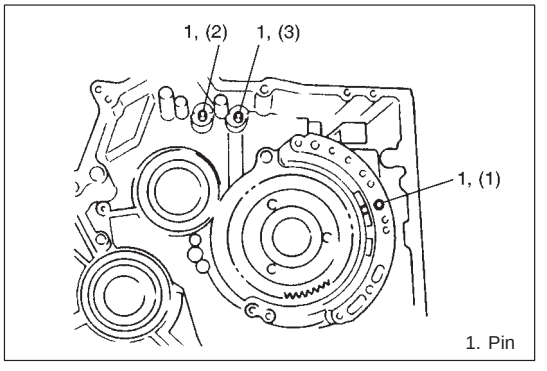


24) Install brake cover to transmission case with snap ring, using snap ring plier.

Special Tool
(A): 09900-06108 (Snap ring plier)



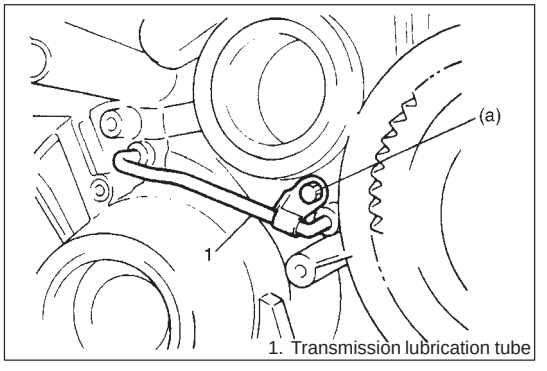
NOTE:
It is best for the head section of piston rod to protrude from the inner side of transmission case approx. 2 – 3 mm (0.079 – 0.118 in.)



25) Apply A/T fluid to outer surface of three pins.
26) Insert three pins to transmission case.

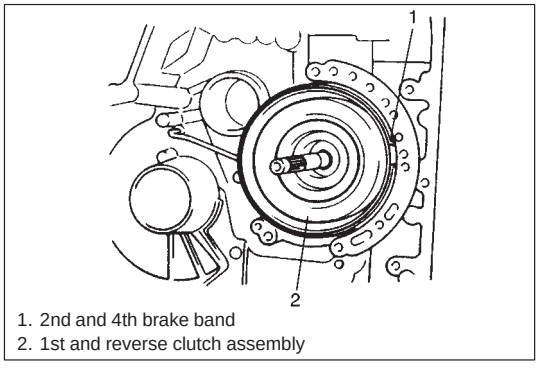
Pin Dimension

	(1)	(2)	(3)
Outer diameter	8.0 mm (0.31 in.)	10.0 mm (0.39 in.)	12.0 mm (0.47 in.)
Length	45.0 mm (1.77 in.)	33.7 mm (1.33 in.)	45.9 mm (1.81 in.)

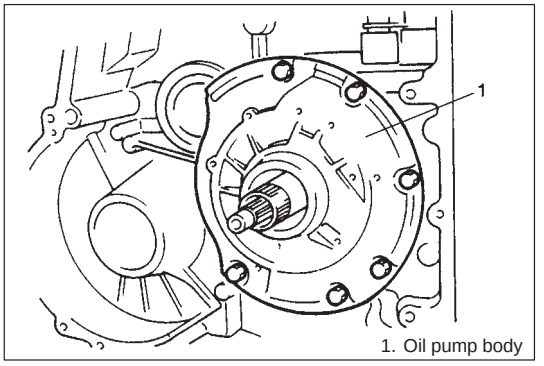


27) Apply A/T fluid to transmission lubrication tube.
28) Install transmission lubrication tube.
29) Tighten clamp with bolt.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

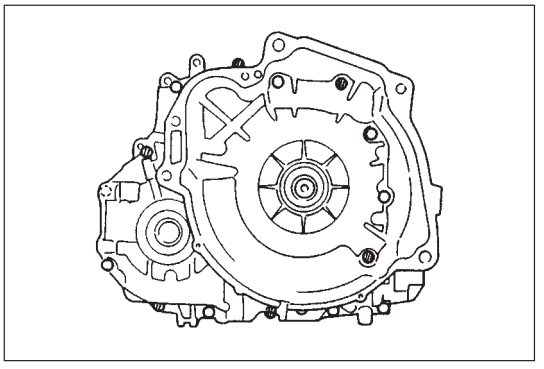


30) Install 2nd and 4th brake band.
31) Install 1st and reverse clutch assembly.

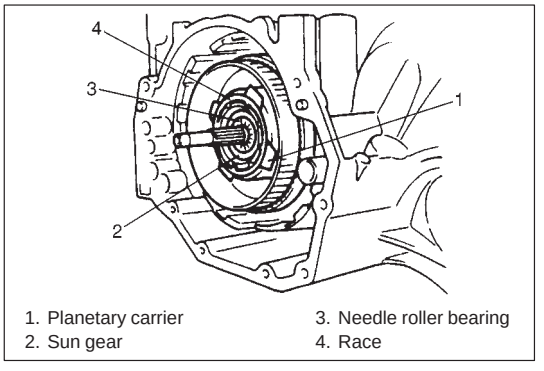


1. Oil pump body

32) Temporarily tighten bolts of oil pump body.



33) Temporarily tighten transmission housing to transmission case with 5 – 6 bolts.
34) Stand transmission up (ie: transmission housing facing downward).



1. Planetary carrier
2. Sun gear
3. Needle roller bearing
4. Race

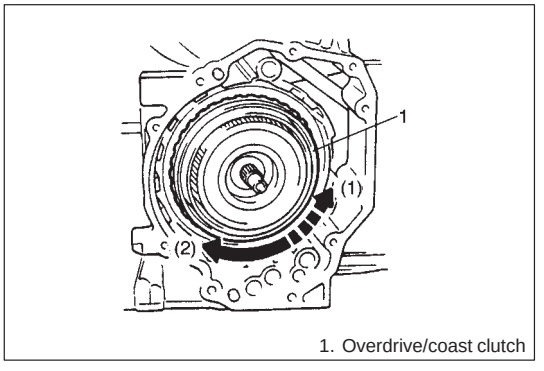
35) Install front and rear planetary carrier while rotating counterclockwise and clockwise.
36) Install sun gear with needle roller bearing.

Bearing race dimension
Outside diameter : Approximately 32.2 mm (1.27 in.)
Inside diameter : Approximately 18.9 mm (0.74 in.)
Thickness : Approximately 2.6 mm (0.10 in.)

37) Coat race with grease.

Grease: 99000-25030 (SUZUKI SUPER GREASE C)

38) Install race to planetary carrier.

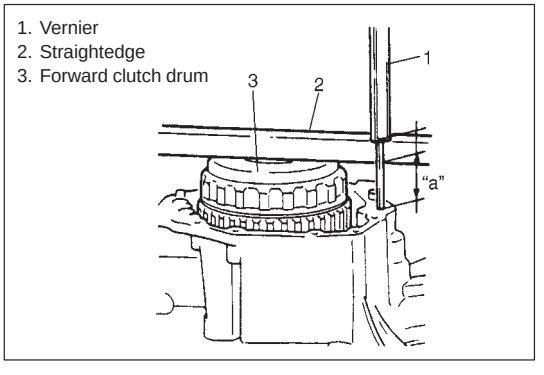


1. Overdrive/coast clutch

39) Install overdrive/coast clutch while rotating counterclockwise and clockwise.

NOTE:
Check to make sure that overdrive/coast clutch locks when turned counterclockwise (1) and moves freely when turned clockwise (2).

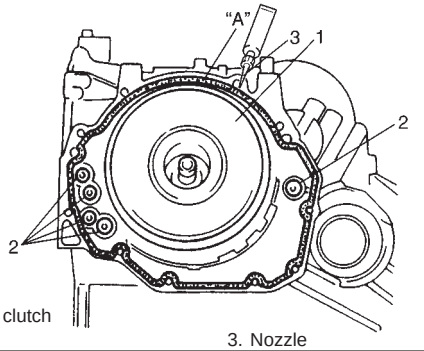
40) Install forward clutch while rotating.



1. Vernier
2. Straightedge
3. Forward clutch drum

41) Check for correct installation of each component parts as follows.
Measure the distance "a" by using vernier and straightedge. If out of specification, remove forward clutch, overdrive/coast clutch, front and rear planetary carrier and reinstall them properly.

Distance "a": 46.94 – 47.81 mm (1.848 – 1.882 in.)



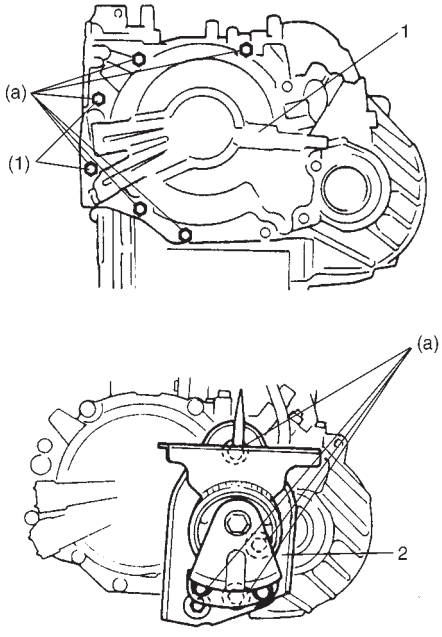
1. Forward clutch
2. Gasket
3. Nozzle

42) Apply sealant to contacting surface of transmission case by using a nozzle as shown in figure by such amount that its section is 1.5 mm (0.059 in) in diameter.

"A": Sealant 99000-31230 (SUZUKI BOND NO.1216B)

43) Install five gaskets.

NOTE:
There is no installation direction for new gaskets.

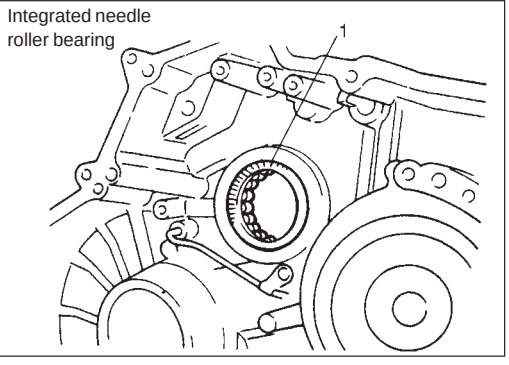


1. Transmission rear cover
2. Engine mounting LH bracket

44) Tighten transmission rear cover and engine mounting LH bracket with ten (two new bolts (1)) bolts.

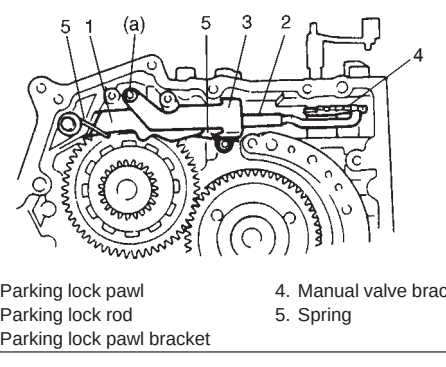
Tightening Torque
(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

45) Turn over transmission.
46) Remove transmission housing.
47) Remove oil pump body, 1st and reverse clutch and 2nd and 4th brake band from transmission case.



48) Apply A/T fluid to race with integrated needle roller bearing.

Race dimension
Outside diameter : Approximately 65.8 mm (2.59 in.)
Inside diameter : Approximately 51.0 mm (2.01 in.)
Thickness : Approximately 2.7 mm (0.11 in.)

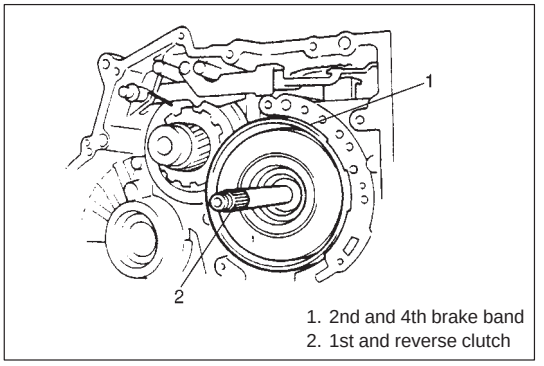


1. Parking lock pawl
2. Parking lock rod
3. Parking lock pawl bracket
4. Manual valve bracket
5. Spring

49) Install counter driven gear.
50) Install parking lock rod with parking lock pawl, parking lock pawl bracket and torsion spring.
51) With spacer and torsion spring placed, install bolt and tighten parking lock pawl bracket.

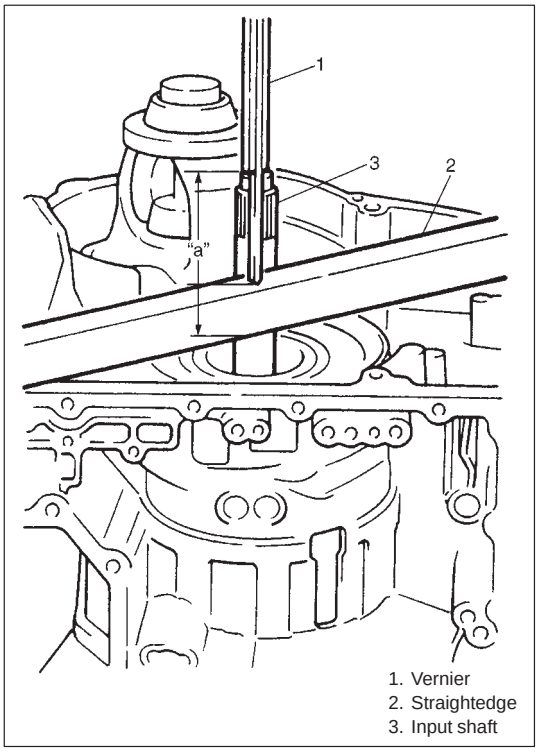
Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

52) Insert parking lock rod to parking lock pawl bracket and connect parking lock rod with manual valve lever.



1. 2nd and 4th brake band
2. 1st and reverse clutch

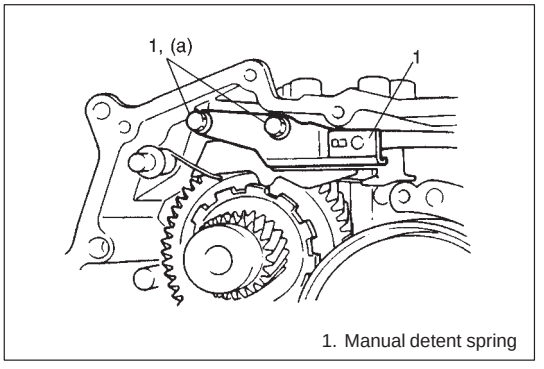
53) Install 2nd and 4th brake band.
54) Install 1st and reverse clutch while rotating counterclockwise and clockwise.



1. Vernier
2. Straightedge
3. Input shaft

55) Check for correct installation of input shaft as follows.
Measure the distance "a" by using vernier and straightedge. If out of specification, remove input shaft with 1st and reverse clutch and reinstall them properly.

Distance "a": 85.65 – 86.39 mm (3.372 – 3.401 in.)

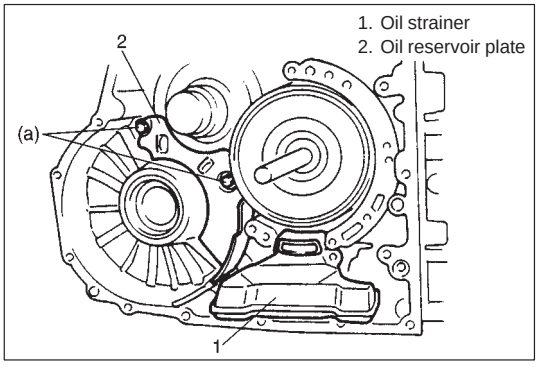


1. Manual detent spring

56) Tighten manual detent spring with bolts.

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

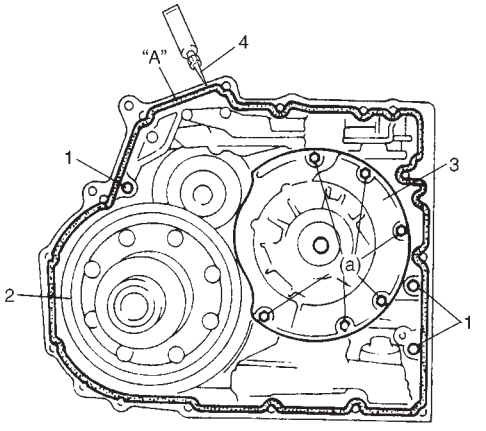
NOTE:
It is recommended to set to neutral position between spring detent and lever manual valve and then tighten bolts (1).



1. Oil strainer
2. Oil reservoir plate

57) Install oil strainer.
58) Tighten oil reservoir plate with bolts.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



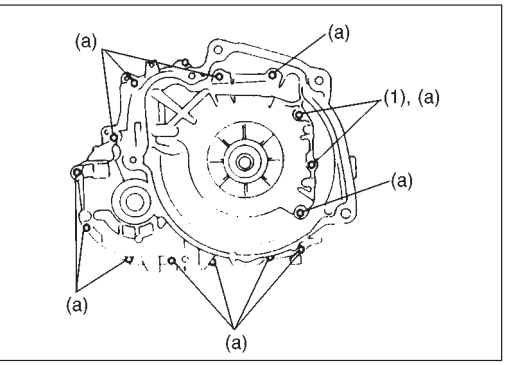
1. Gasket
2. Differential gear assembly
3. Oil pump body
4. Nozzle

59) Install three new gaskets.
60) Install differential gear assembly.
61) Tighten oil pump body with six bolts.

Tightening Torque
(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

62) Wipe off and clean contacting surface between case and housing.
63) Apply sealant to transmission case by using a nozzle as shown in figure by such amount that its section is 1.5 mm (0.059 in) in diameter.

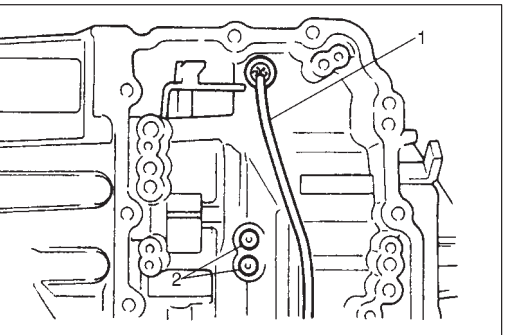
"A": Sealant 99000-31230 (SUZUKI BOND NO.1216B)



64) Tighten transmission housing to transmission case with bolts.

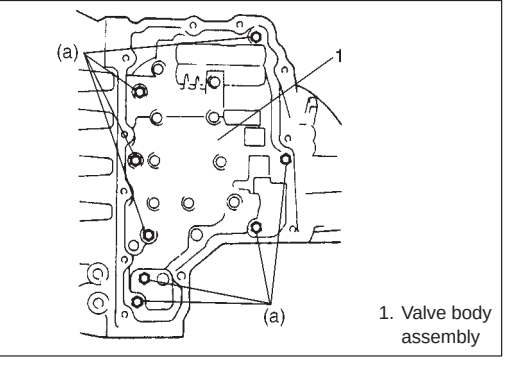
Tightening Torque
(a): 30 N·m (3.0 kg-m, 22.0 lb-ft)

NOTE:
Check to make sure that new bolts are used for bolts indicated as (1) in figure.



1. Wiring harness
2. Gasket

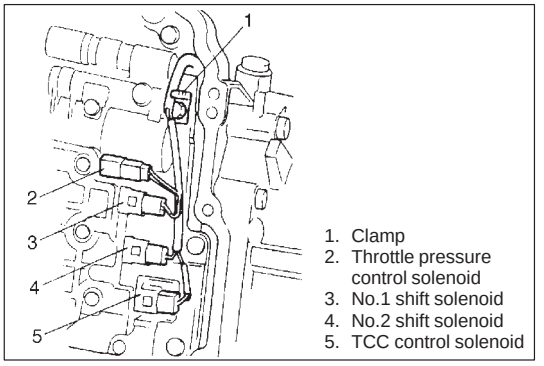
65) Insert wiring harness of solenoid connectors.
66) Coat two new gaskets with A/T fluid and place them as shown in figure.



1. Valve body assembly

67) While holding valve body assembly, connect manual valve to parking lock rod.
68) Tighten valve body assembly with bolts.

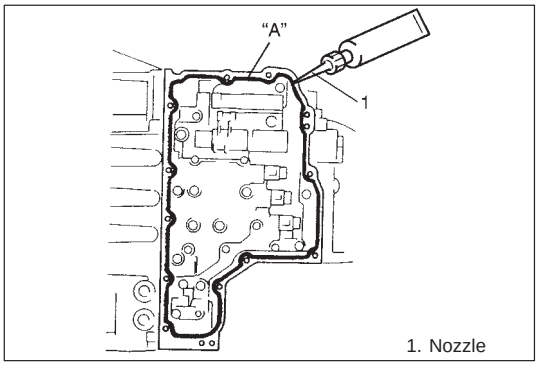
Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



1. Clamp
2. Throttle pressure control solenoid
3. No.1 shift solenoid
4. No.2 shift solenoid
5. TCC control solenoid

69) Clamp wiring harness of solenoid and transmission temperature sensor.
70) Connect couplers of solenoid and install transmission temperature sensor to its clamp.

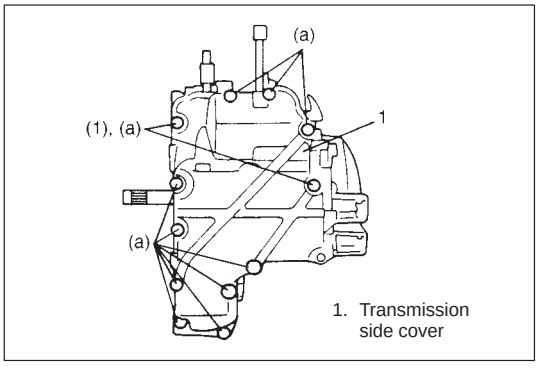
NOTE:
- **Check to make sure that couplers are connected properly. (No.1 shift solenoid-white, No.2 shift solenoid-blue and lock-up control solenoid-yellow).**
- **There is an interchangeability between No.1 and No.2 shift solenoids for installation.**



1. Nozzle

71) Wipe off and clean contacting surface between case and side cover.
72) Apply sealant to transmission case by using a nozzle as shown in figure by such amount that its section is 1.5 mm (0.059 in) in diameter.

"A": Sealant 99000-31230 (SUZUKI BOND NO.1216B)

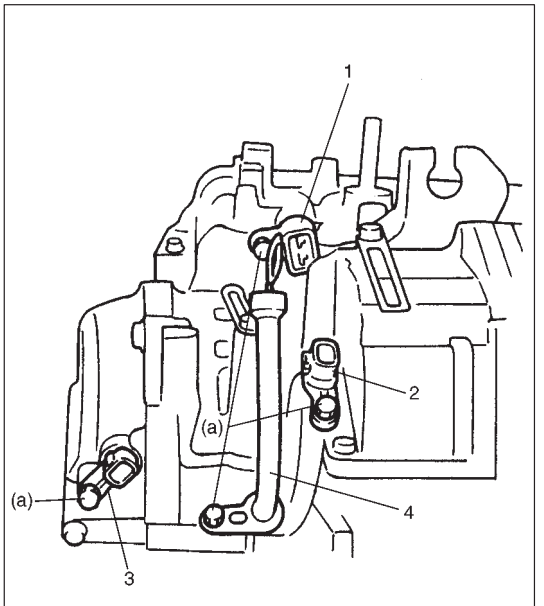


1. Transmission side cover

73) Tighten transmission side cover with bolts.

Tightening Torque
(a): 18 N·m (1.8 kg-m, 13.0 lb-ft)

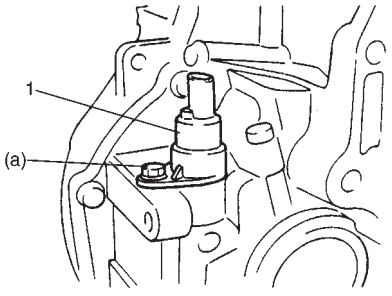
NOTE:
Check to make sure that new bolts are used for bolts indicated as (1) in figure.



1. Solenoid coupler
2. Output shaft speed sensor
3. Input shaft speed sensor
4. Oil filler tube

74) Coat new O-rings with A/T fluid.
75) Tighten the following parts (with new O-rings installed) with bolts.
- Solenoid coupler
- Output shaft speed sensor
- Input shaft speed sensor
- Oil filler tube

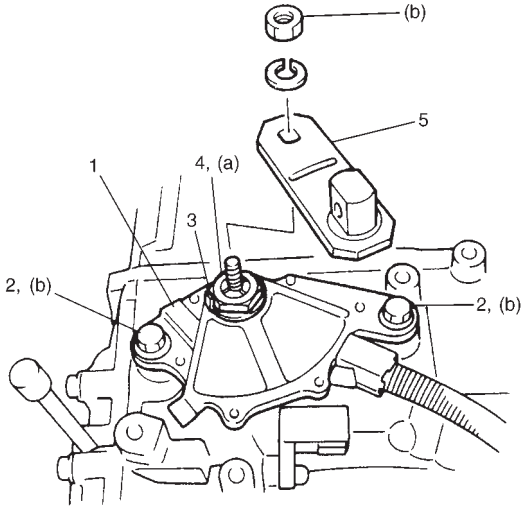
Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Speedometer driven gear (Vehicle speed sensor for speedometer) shaft sleeve subassembly.

76) Coat new O-ring with A/T fluid.
77) Tighten speedometer driven gear (vehicle speed sensor for speedometer) (with new O-ring installed) with bolt.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



1. Transmission range sensor
2. Bolt
5. Manual shift lever
4. Lock nut
3. Lock washer

78) Install transmission range sensor assembly.
a) Place new rubber plate and new lock washer or transmission range sensor.
b) Tighten lock nut.

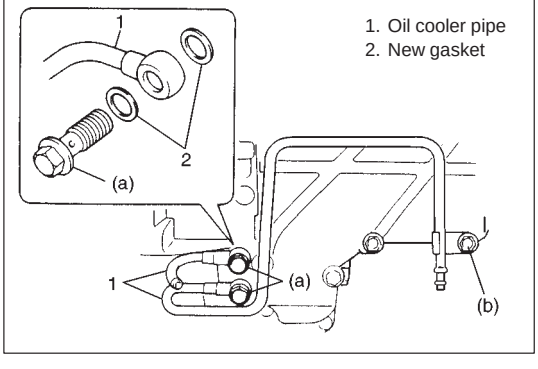
Tightening Torque
(a): 7.0 N·m (0.7 kg-m, 5.0 lb-ft)

c) Adjust transmission range sensor.
d) Tighten transmission range sensor bolts.

Tightening Torque
(b): 20 N·m (2.0 kg-m, 14.5 lb-ft)

e) Tighten manual shift lever with spring washer and nut.

Tightening Torque
(b): 20 N·m (2.0 kg-m, 14.5 lb-ft)



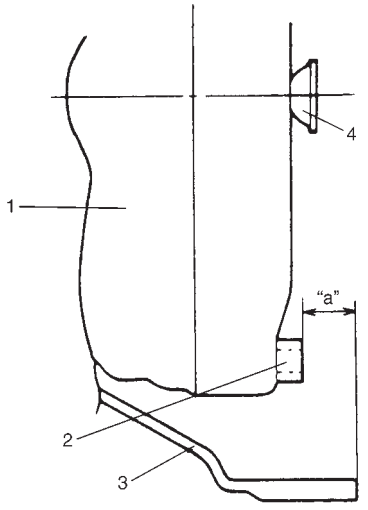
1. Oil cooler pipe
2. New gasket

79) Install oil cooler pipes.

Tightening Torque
(a): 27 N·m (2.7 kg-m, 19.5 lb-ft)
(b): 18 N·m (1.8 kg-m, 13.0 lb-ft)

NOTE:
Make sure to use new A/T fluid pipe union bolt gaskets to prevent fluid from leaking.

80) Measure starting torque of differential gear assembly.
For detail, refer to step 2) on “UNIT DISASSEMBLY” procedure.



1. Torque converter
2. Flange nut
3. Transmission housing
4. Cup

81) Install torque converter to input shaft.
   a) Install torque converter, using care not to damage oil seal of oil pump.
   b) After installing torque converter, check to make sure that distance "a" is within specification.

      Distance "a": More than 21.4 mm (0.843 in.)

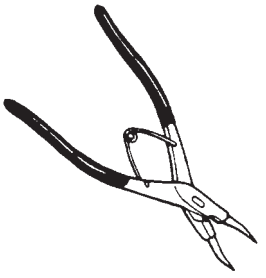
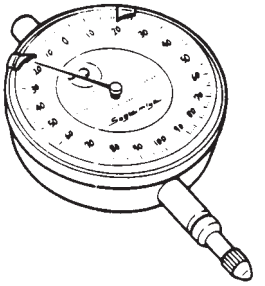
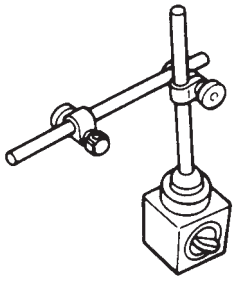
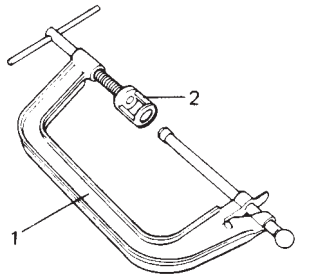
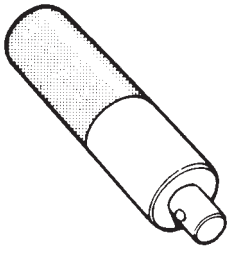
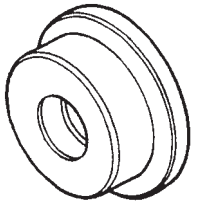
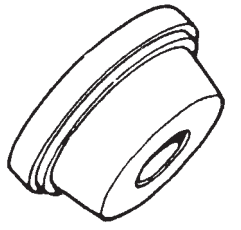
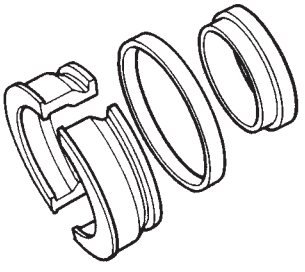
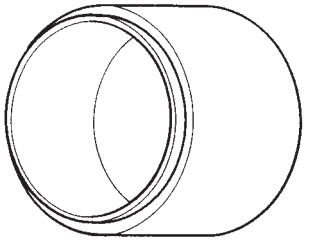
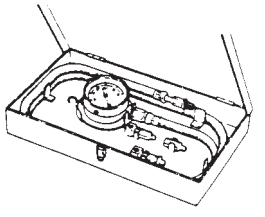
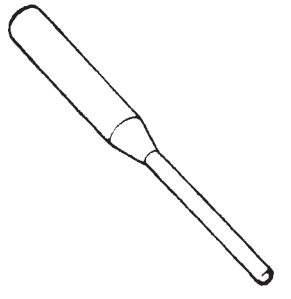
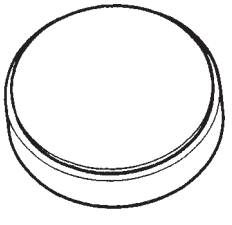
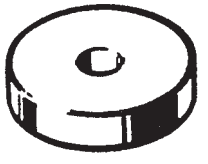
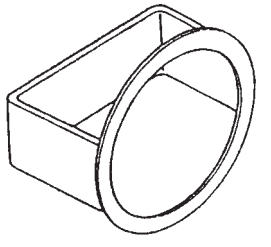
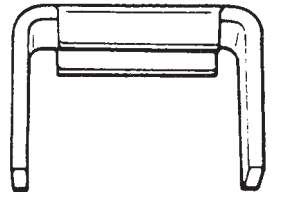
   c) Check torque converter for smooth rotation.

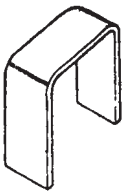
CAUTION:
- **Before installing converter, make sure that its pump hub portion is free from nicks, burrs or damage which may cause oil seal to leak.**
- **Be very careful not to drop converter on oil pump gear. Damage in gear, should it occur, may cause a critical trouble.**

TIGHTENING TORQUE SPECIFICATION

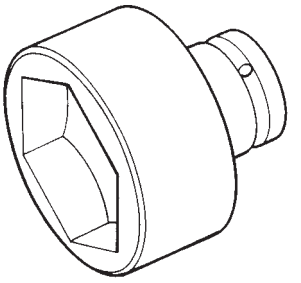
Fastening Portion			Tightening Torque		
			N·m	kg-m	lb-ft
ON-VEHICLE SERVICE	Drain plug		40	4.0	29.0
	Transmission range sensor bolts		20	2.0	14.5
	Output shaft speed sensor bolt		5.5	0.55	4.0
	Input shaft speed sensor bore				
	Solenoid valve bolts		6.8	0.68	4.9
	A/T side over bolts		25	2.5	18.9
	A/T fluid pipe union bolts		27	2.7	19.5
	Interlock cable bracket nut		13	1.3	9.5
MOUNTING	Transmission to engine bolts and nuts		90	9.0	65.0
	Drive plate to converter bolts		19	1.9	14.0
	Engine mounting and bracket bolts and nuts		Refer to “REMOUNTING” under “TRANSMISSION UNIT REPAIR OVERHAUL” in this section.		
	Exhaust manifold to No.1 pipe nuts		50	5.0	36.5
	Exhaust No.1 pipe and No.2 pipe bolts				
	Stabilizer link nuts		28	2.8	20.5
	Steering knuckle ball stud nuts		60	6.0	43.5
TRANSMISSION OVERHAUL	Oil pump torx bolts		12	1.2	9.0
	Connector driven gear output shaft speed sensor rotor nut		125	12.5	90.5
	Valve body bolts	10 mm bolts	10	1.0	7.5
		8 mm bolts	6.8	0.68	4.9
	Differential ring gear bolts		99	9.9	72.0
	Transmission case bolts		30	3.0	22.0
	Roller bearing retainer bolt		13	1.3	9.5
	Transmission lubrication tube clamp bolt		5.5	0.55	4.0
	Oil reservoir plate bolts				
	Transmission rear cover bolts		25	2.5	18.0
	Parking lock paul bracket bolts		10	1.0	7.5
	Manual detent spring bolts				
	2nd and 4th brake piston rod lock nut		20	2.0	14.5
	Oil pump body bolts		25	2.5	18.0
	Transmission range sensor lever lock nut		7.0	0.7	5.1
	Counter drive gear lock nut		500	50.0	362

SPECIAL TOOL

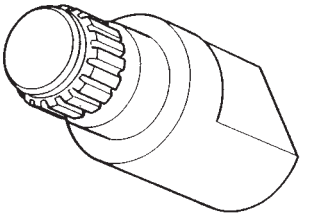
 09900-06108 Snap ring plier (Closing type)	 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 1. 09916-14510 Valve lifter 2. 09916-48210 Attachment
 09921-57810 Bearing remover	 09924-74510 Installer handle	 09924-74590 Input shaft oil seal installer attachment	 09924-84510-005 Bearing installer adapter (C)
 09925-06010 Bearing puller	 09925-16010 Counter drive gear bearing installer	 09925-37811-001 Oil pressure gauge	 09925-78210 Spring pin remover (6 mm)
 09925-86010 Bearing puller attachment	 09926-68310 Bearing installer	 09926-96010 Clutch spring compressor	 09926-98310 Clutch spring compressor



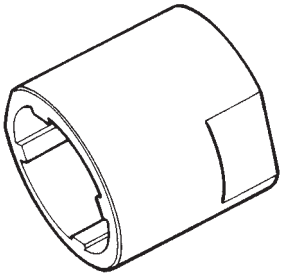
09926-98330
Clutch spring compressor



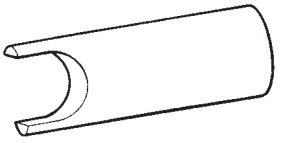
09927-26010
Counter drive gear socket



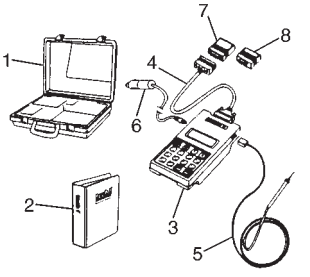
09927-76040
Counter drive gear holder



09927-76050
Counter driven gear socket

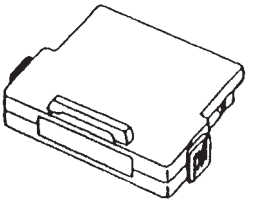


09928-06050
Differential preload adaptor

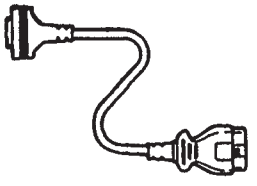


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adapter

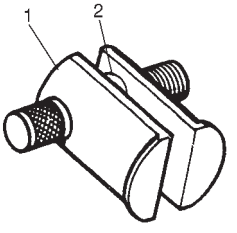
09931-76011
SUZUKI scan tool (Tech 1A) kit



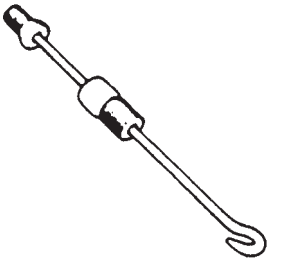
Mass storage cartridge



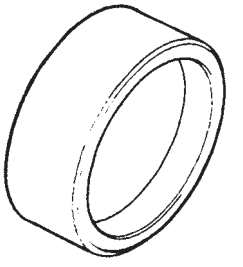
09931-76030
16/14 pin DLC cable



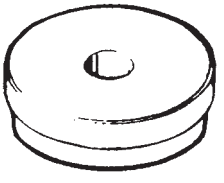
1. 09941-54911
   Bearing outer race remover
2. 09921-26010
   Bearing outer race
   remover coller



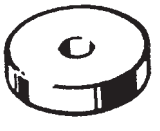
09942-15511
Sliding hammer



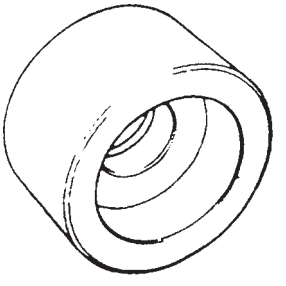
09944-66020
Bearing installer



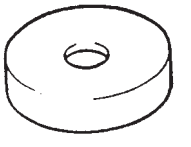
09944-68210
Bearing and oil seal installer



09944-88210
Bearing installer



09951-16060
Bush remover



09951-46010
Drive shaft oil seal installer

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Automatic transmission fluid	An equivalent of DEXRON® -III or DEXRON® -IIE	• Automatic transmission • Parts lubrication when installing
Sealant	SUZUKI BOND NO.1216B (99000-31230)	• Mating surface of case and housing • Mating surface of case and rear cover • Mating surface of case and side cover
Lithium grease	SUZUKI SUPER GREASE C (99000-25030)	• Retaining parts in place when assembling • Oil seal lips • Oil pump O-ring
	SUZUKI SUPER GREASE A (99000-25010)	Cable ends
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	Select cable fastening portion with dash panel

SECTION 7C

CLUTCH (CABLE TYPE)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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GENERAL DESCRIPTION 7C- 1
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Clutch Release System 7C- 9
TIGHTENING TORQUE SPECIFICATIONS . . 7C-12
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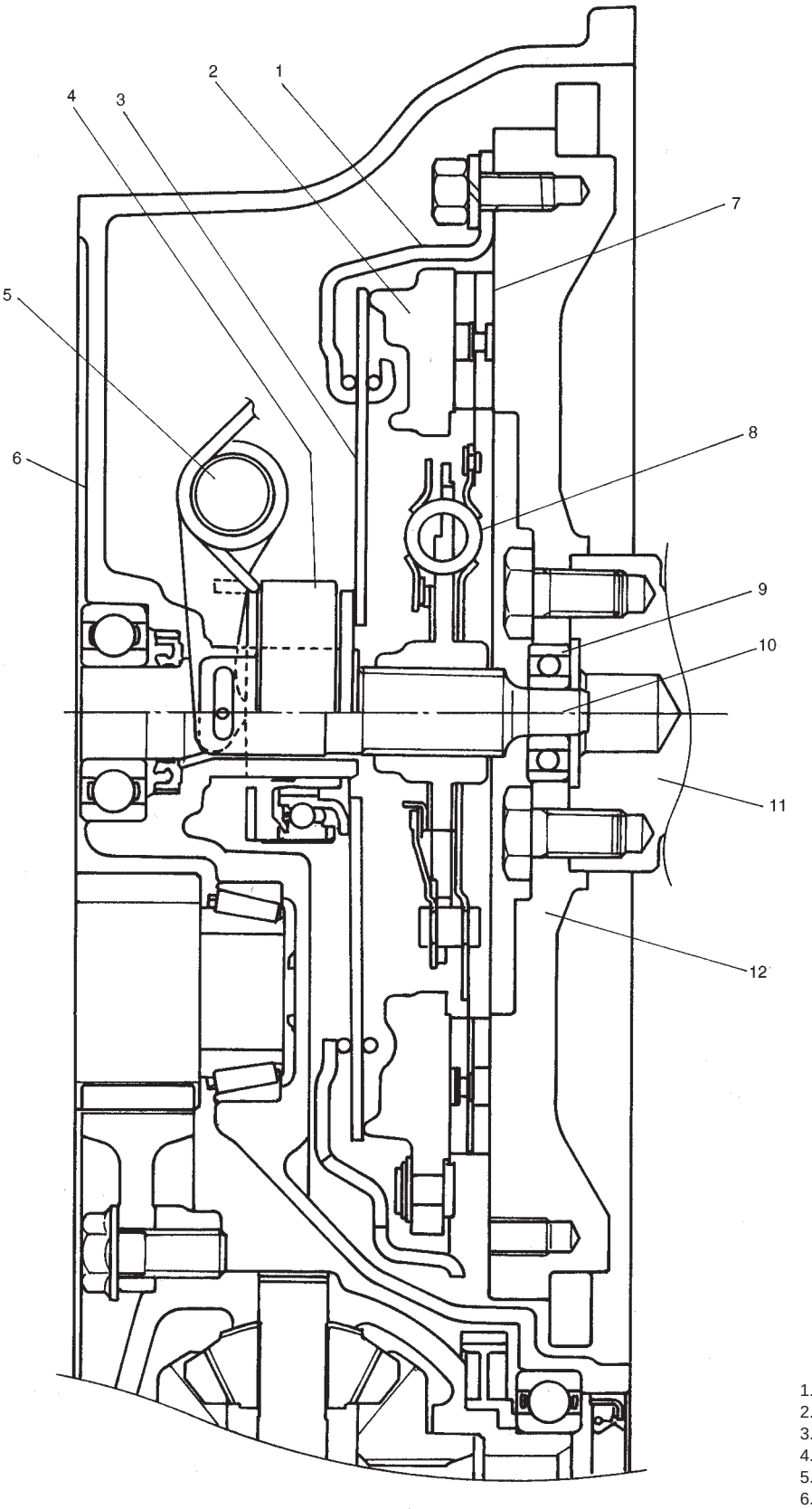
GENERAL DESCRIPTION

The clutch is a diaphragm-spring clutch of a dry signal disc type. The diaphragm spring is of a tapering-finger type, which is a solid ring in the outer diameter part, with a series of tapered fingers pointing inward.

The disc, carrying four (1.6 liter engine) or six (1.3 liter engine) torsional coil springs, is positioned on the transmission input shaft with an involute spline fit.

The clutch cover is secured to the flywheel, and carries the diaphragm spring in such a way that the peripheral edge of the spring pushes on the pressure plate against the flywheel (with the disc in between), when the clutch release bearing is held back. This is the engaged condition of the clutch.

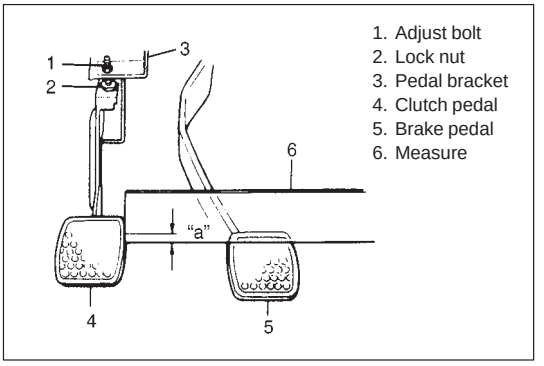
Depressing the clutch pedal causes the release bearing to advance and pushes on the tips of the tapered fingers of the diaphragm spring. When this happens, the diaphragm spring pulls the pressure plate away from the flywheel, thereby interrupting the flow of drive from flywheel through clutch disc to transmission input shaft.



1. Clutch cover
2. Pressure plate
3. Diaphragm spring
4. Release bearing
5. Release shaft
6. Transmission right case
7. Clutch disc
8. Torsional spring
9. Input shaft bearing
10. Input shaft
11. Crankshaft
12. Flywheel

DIAGNOSIS

Condition	Possible cause	Correction
Slipping	○ Improper clutch pedal free travel. ○ Worn or oily clutch disc facing. ○ Warped disc, pressure plate or flywheel surface. ○ Weakened diaphragm spring. ○ Rusted clutch cable.	Adjust free travel. Replace disc. Replace disc, clutch cover or flywheel. Replace clutch cover. Replace cable.
Dragging clutch	○ Improper clutch pedal free travel. ○ Weakened diaphragm spring, or worn spring tip. ○ Rusted input shaft splines. ○ Damaged or worn splines of transmission input shaft. ○ Excessively wobbly clutch disc. ○ Clutch facings broken or dirty with oil.	Adjust free travel. Replace clutch cover. Lubricate. Replace input shaft. Replace disc. Replace disc.
Clutch vibration	○ Glazed (glass-like) clutch facings. ○ Clutch facings dirty with oil. ○ Release bearing slides unsmoothly on input shaft bearing retainer. ○ Wobbly clutch disc, or poor facing contact. ○ Weakened torsion springs in clutch disc. ○ Clutch disc rivets loose. ○ Distorted pressure plate or flywheel surface. ○ Weakened engine mounting or loose mounting bolt or nut.	Repair or replace disc. Replace disc. Lubricate or replace input shaft bearing retainer. Replace disc. Replace disc. Replace disc. Replace clutch cover or flywheel. Retighten or replace mounting.
Noisy clutch	○ Worn or broken release bearing. ○ Input shaft front bearing worn down. ○ Excessive rattle of clutch disc hub. ○ Cracked clutch disc. ○ Pressure plate and diaphragm spring are rattling.	Replace release bearing. Replace input shaft bearing. Replace disc. Replace disc. Replace clutch cover.
Grabbing clutch	○ Clutch disc facings soaked with oil. ○ Excessively worn clutch disc facings. ○ Rivet heads showing out of facing. ○ Weakened torsion springs.	Replace disc. Replace disc. Replace disc. Replace disc.



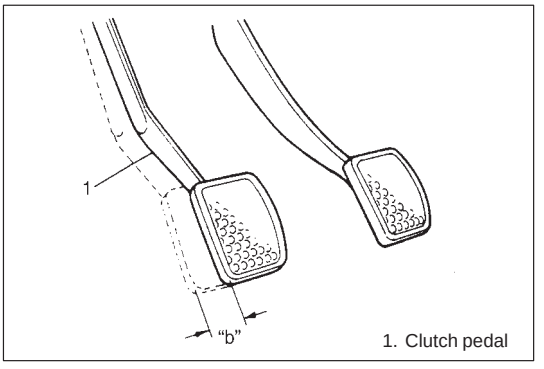
ON-VEHICLE SERVICE

MAINTENANCE SERVICE

CLUTCH PEDAL HEIGHT

Adjust clutch pedal height with adjust bolt located on pedal bracket so that clutch pedal height exceeds brake pedal height by 15 mm (0.6 in.) and tighten lock nut.

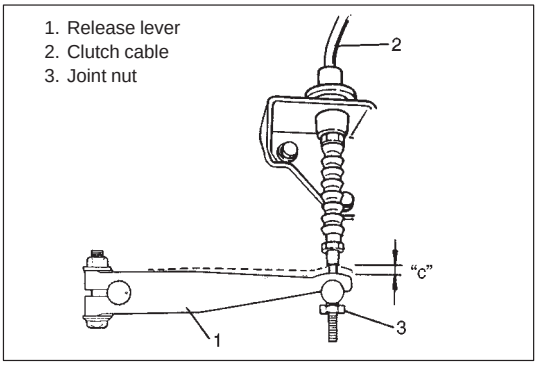
Height difference "a": 15 mm (0.6 in.)



CLUTCH PEDAL FREE TRAVEL

1) Depress clutch pedal, stop the moment clutch resistance is felt, and measure distance (clutch pedal free travel). Free travel should be within following specification.

   Pedal free travel "b": 15 – 20 mm (0.6 – 0.8 in.)



2) If free travel is out of specification, adjust it with cable joint nut.

   Release lever free travel "C" (Reference):
   0 – 2 mm (0 – 0.08 in.)

3) After checking clutch pedal free travel, also check clutch for propre function with engine running.

CLUTCH CABLE

REMOVAL

1) Remove clutch cable joint nut and disconnect joint pin from inner cable.
2) Remove 2 bolts at dash panel, unhook cable end from pedal top, and then take out cable.

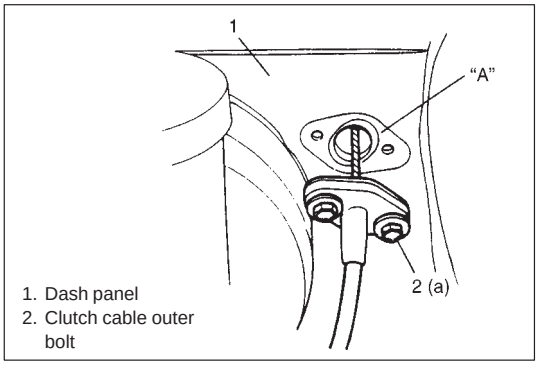
INSPECTION

Inspect clutch cable and replace it if any of following conditions exists.

○ Excessive cable friction.
○ Frayed cable.
○ Bent or kinked cable.
○ Broken boots.
○ Worn end.

INSTALLATION

1) Apply grease to cable end hook and also joint pin before installing cable.
2) Hook cable end with pedal, then join inner cable with joint pin in release arm.



1. Dash panel
2. Clutch cable outer bolt

3) Fasten cable with 2 bolts to dash panel.

"A": Sealant 99000-31090

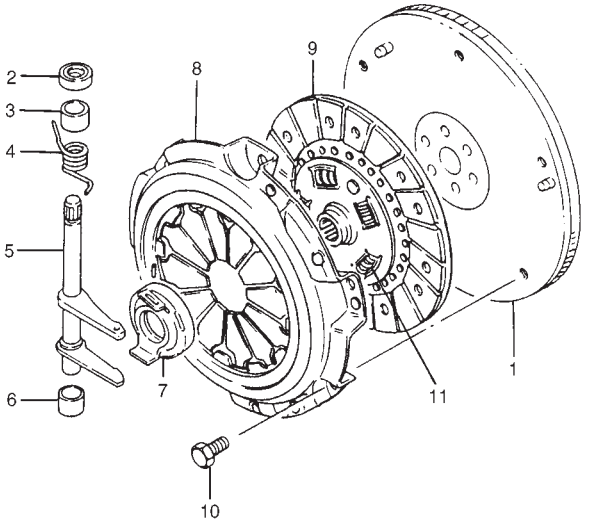
Tightening Torque
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

4) Screw in joint nut and adjust free travel of pedal to specification by turning nut.
5) Check clutch for proper function with engine running.

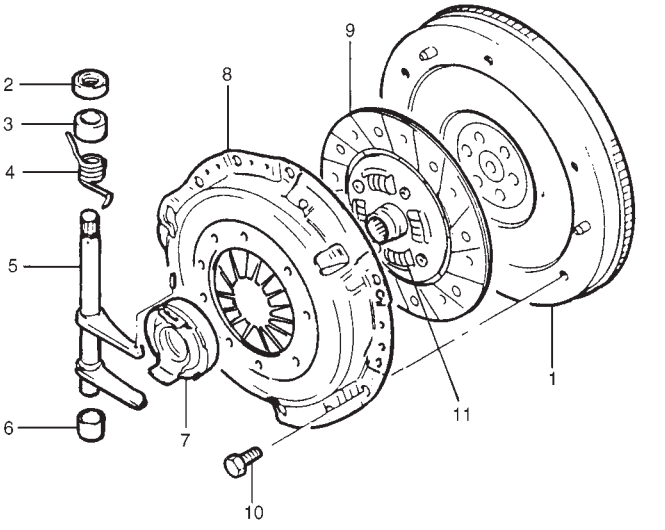
UNIT REPAIR OVERHAUL

CLUTCH COVER, CLUTCH DISC AND FLYWHEEL

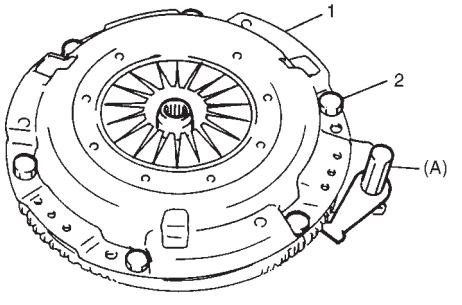
(1.3 liter engine)



(1.6 liter engine)



1. Flywheel
2. Release shaft seal
3. No.2 bush
4. Return spring
5. Release shaft
6. No.1 bush
7. Release bearing
8. Clutch cover
9. Clutch disc
10. Clutch cover bolt
11. Torsion spring



1. Clutch cover
2. Bolt

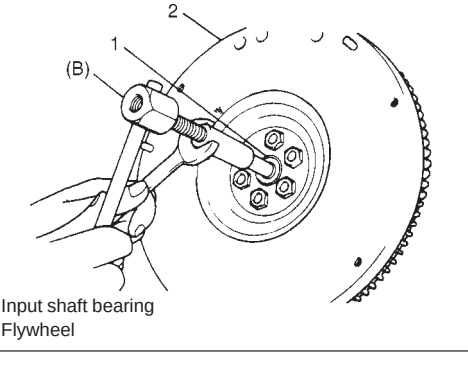
DISMOUNTING AND REMOUNTING OF TRANSMISSION

Refer to pages 7A-14 and 7A-15.

REMOVAL

1) Hold flywheel stationary with special tool and remove clutch cover bolts, clutch cover and clutch disc.

Special Tool
(A): 09924-17810



1. Input shaft bearing
2. Flywheel

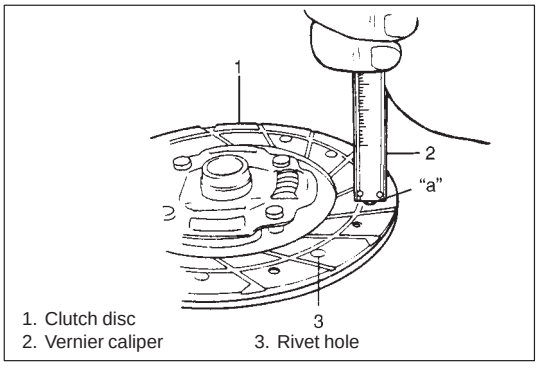
2) Pull out input shaft bearing by using special tool and wrench.

Special Tool
(B): 09917-58010

INSPECTION

Input Shaft Bearing

Check bearing for smooth rotation and replace it if abnormality is found.



1. Clutch disc
2. Vernier caliper
3. Rivet hole

Clutch Disc

Measure depth of rivet head depression, i.e. distance between rivet head and facing surface.

If depression is found to have reached service limit at any of holes, replace disc assembly.

Rivet head depth

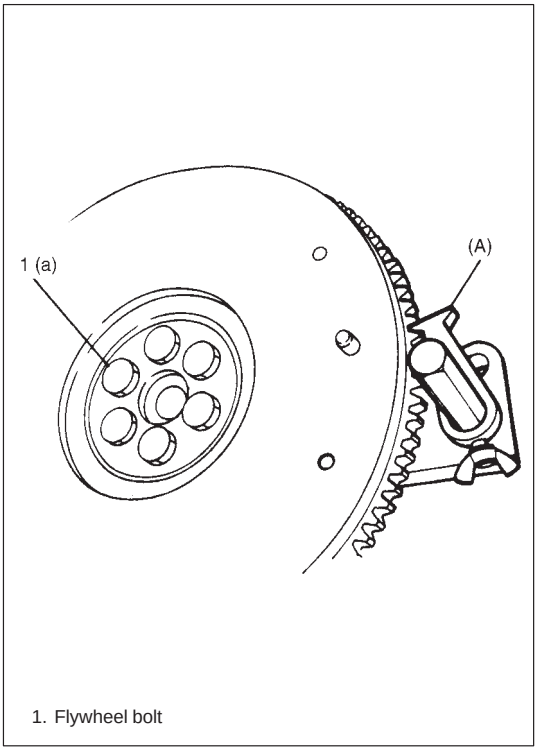
"a": Standard 1.3 – 1.9 mm (0.05 – 0.07 in.) (1.3 liter engine)
1.4mm (0.06 in.) (1.6 liter engine)
Limit 0.5 mm (0.02 in.)

Clutch Cover

1) Check diaphragm spring for abnormal wear or damage.
2) Inspect pressure plate for wear or heat spots.
3) If abnormality is found, replace it as assembly.
   Do not disassemble it into diaphragm and pressure plate.

Flywheel

Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.



1. Flywheel bolt

INSTALLATION

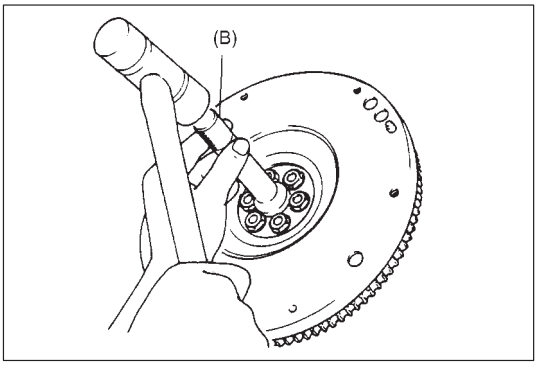
NOTE:

Before assembling, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.

1) Install flywheel to crankshaft and tighten bolts to specification.

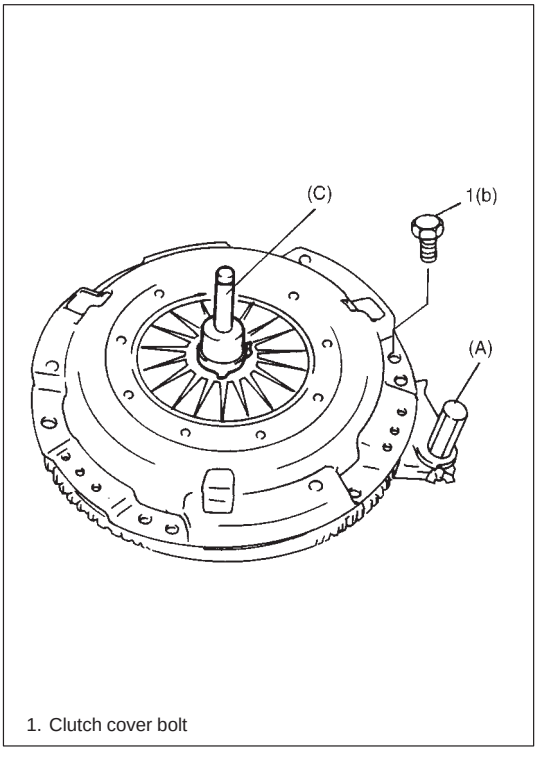
Special Tool
(A): 09924-17810

Tightening Torque
(a): 78 N·m (7.8 kg-m, 56.5 lb-ft)



2) Using special tool, install input shaft bearing to flywheel.

Special Tool
(B): 09925-98210



1. Clutch cover bolt

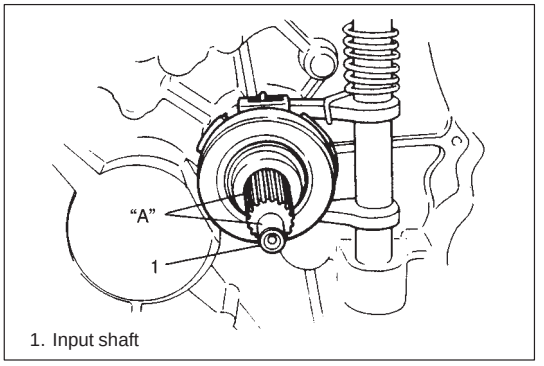
3) Aligning clutch disc with flywheel center by using special tool, install clutch cover and bolts.
Then tighten bolts to specification.

NOTE:

- **While tightening clutch cover bolts, compress clutch disc with special tool (clutch center guide) by hand so that disc is centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

Special Tool
(A): 09924-17810
(C): 09923-36330

Tightening Torque
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Input shaft

4) Slightly apply grease to input shaft, then join transmission assembly with engine. Refer to p. 7A-15 for remounting procedure.

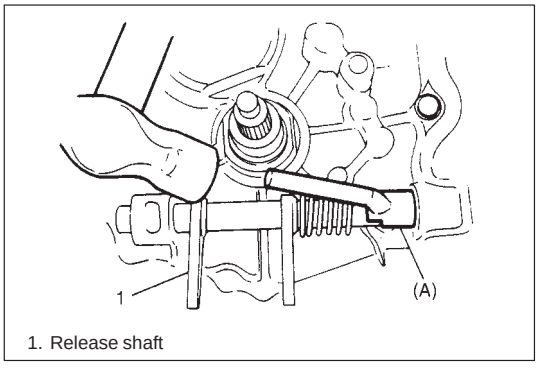
"A": SUZUKI SUPER GREASE I, 99000-25210

NOTE:
Turn crankshaft a little through flywheel gear while inserting transmission input shaft to clutch disc until splines mesh.

CLUTCH RELEASE SYSTEM

REMOVAL

1) Remove release arm by loosening its bolt.
2) Take out release bearing by turning release shaft.
3) Unhook return spring by using pliers.

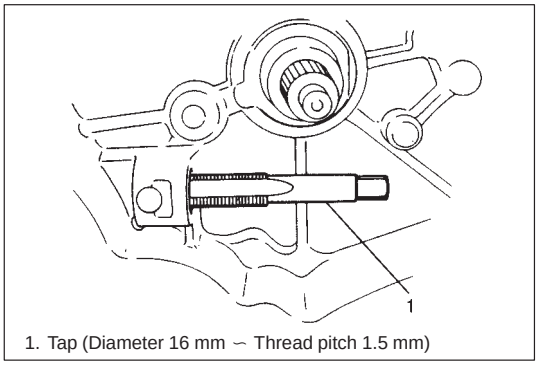


1. Release shaft

4) Drive out No.2 bush by using special tool and hammer. Release shaft seal will also be pushed out.

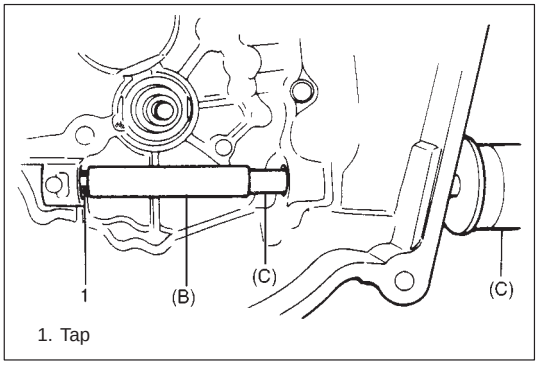
Special Tool
(A): 09922-46010

5) Remove release shaft.



1. Tap (Diameter 16 mm – Thread pitch 1.5 mm)

6) Remove release shaft No.1 bush.



1. Tap

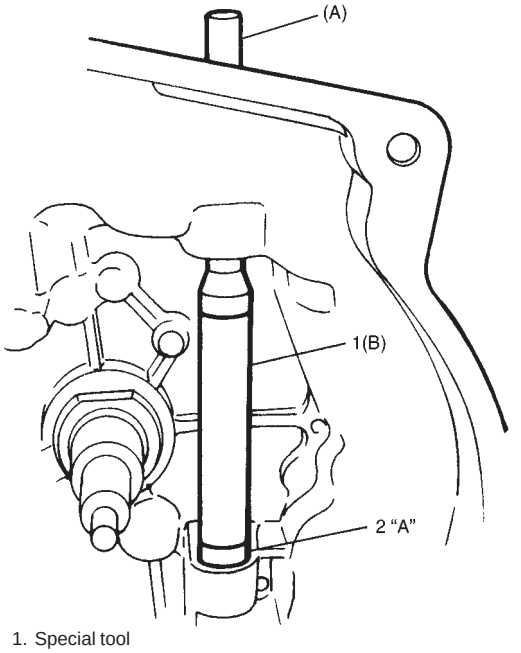
7) Leaving tap in No. 1 bush, screw in joint pipe over tap, join sliding shaft with joint pipe, and then drive out bush.

Special Tool
(B): 09923-46020
(C): 09930-30104

INSPECTION

1) Check clutch release bearing for smooth rotation.
2) Inspect smoothness of release bearing retaining portion of transmission case and correct or replace right case as necessary.

CAUTION:
Do not wash release bearing. Washing may cause grease leakage and consequential bearing damage.



1. Special tool (Joint pipe 09923-46020) or the like
2. No.1 bush

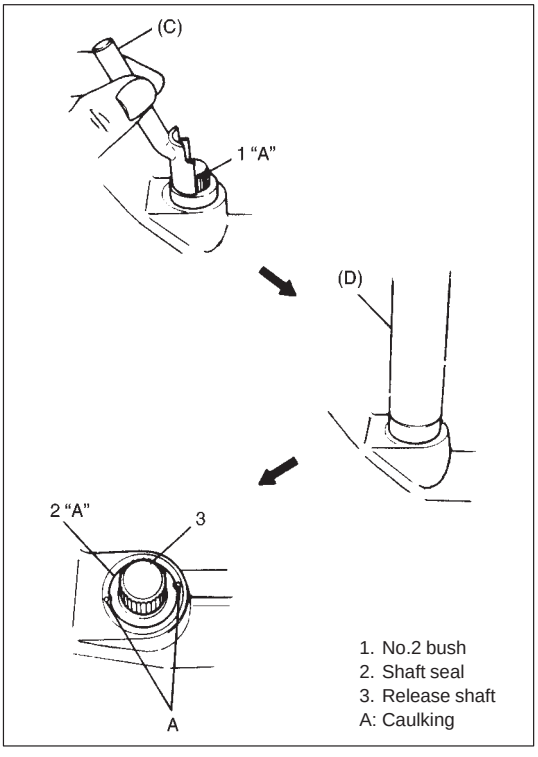
INSTALLATION

1) Drive in a new No.1 bush by using adequate drive handle and hammer and then apply grease to bush inside.

   Special Tool
   (A): 09943-88211
   (B): 09923-46020 or the like

   "A": SUZUKI SUPER GREASE A, 99000-25010

2) Install release shaft with return spring applied to it.



1. No.2 bush
2. Shaft seal
3. Release shaft

A: Caulking

3) Apply grease to No.2 bush inside and press-fit it by using the same special tool as in removal.

   "A": SUZUKI SUPER GREASE A

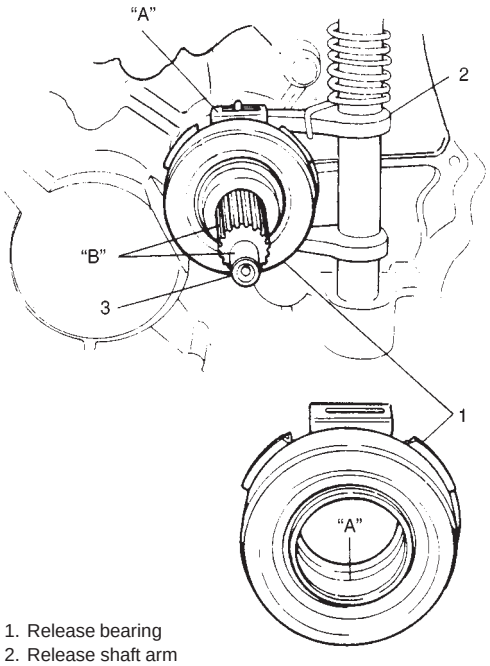
   Special Tool
   (C): 09922-46010

4) Coat grease to shaft seal and then install it till it is flush with case surface. Use special tool for this installation and face seal lip downward (inside).

   "A": SUZUKI SUPER GREASE A

   Special Tool
   (D): 09925-98221

5) Caulk seal at A by using caulking tool and hammer.



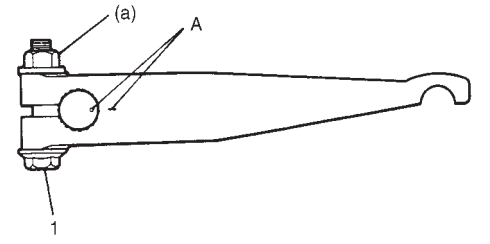
1. Release bearing
2. Release shaft arm
3. Input shaft

6) Hook return spring.
7) Apply grease to release bearing inside and release shaft arm, then set bearing.

"A": SUZUKI SUPER GREASE A, 99000-25010

8) Apply small amount of grease to input shaft spline and front end as well.

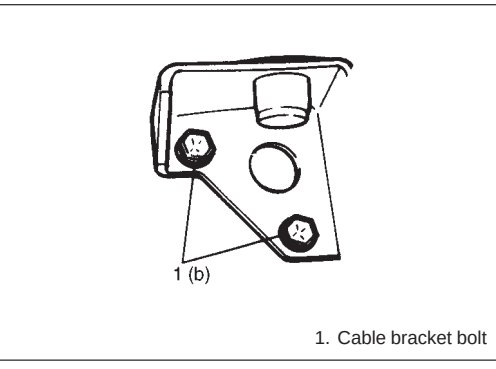
"B": SUZUKI SUPER GREASE I, 99000-25210



1. Release arm bolt
A: Align punch marks

9) Set release arm to release shaft aligning their punch marks, then tighten bolt.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Cable bracket bolt

10) If clutch cable bracket has been removed or replaced, install it with 2 bolts.

Tightening Torque
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

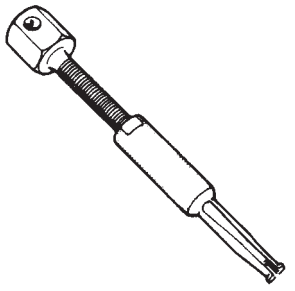
TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening Torque		
	N·m	kg-m	lb-ft
1. Clutch cable outer bolts	11	1.1	8.0
2. Flywheel bolts	78	7.8	56.5
3. Clutch cover bolts	23	2.3	17.0
4. Release arm bolt	23	2.3	17.0
5. Cable bracket bolts	23	2.3	17.0

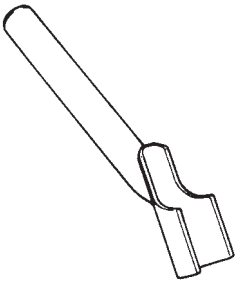
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	○ Cable end hook and joint pin. ○ Release shaft bushes and seal. ○ Release shaft arm.
	SUZUKI SUPER GREASE I (99000-25210)	Input shaft and front end.
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	Clutch cable fastening portion with dash panel.

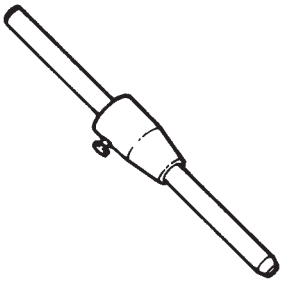
SPECIAL TOOLS



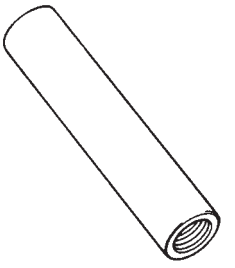
09917-58010
Bearing remover



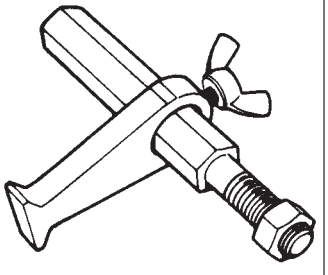
09922-46010
Bush remover



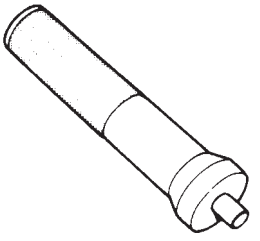
09923-36330
Clutch center guide



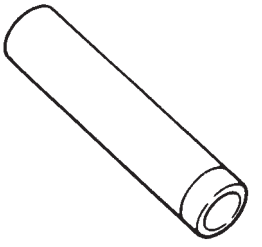
09923-46020
Joint pipe



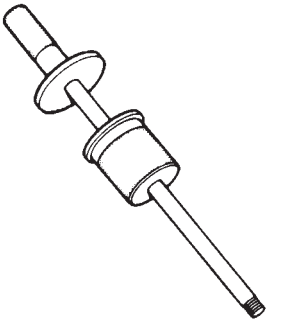
09924-17810
Flywheel holder



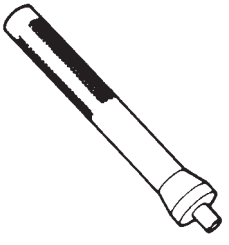
09925-98210
Input shaft bearing
installer



09925-98221
Bearing installer



09930-30104
Sliding shaft



09943-88211
Bearing installer

SECTION 7C1

CLUTCH (HYDRAULIC TYPE)

WARNING:
For vehicles equipped with Supplement Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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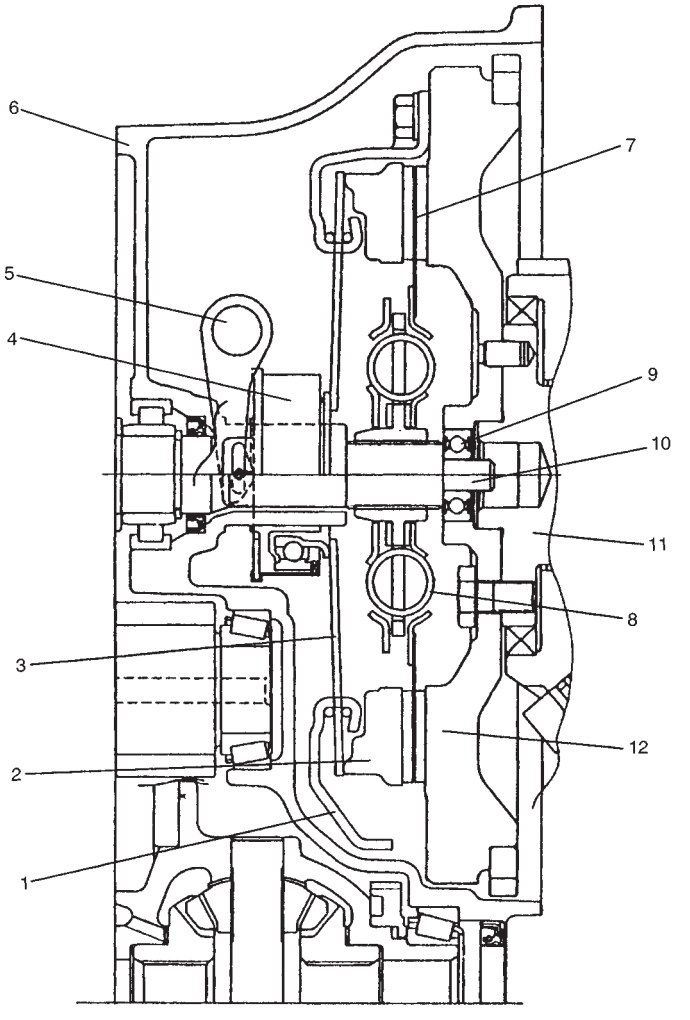
GENERAL DESCRIPTION

The clutch is a hydraulically controlled diaphragm spring clutch of a dry single disc type. The diaphragm spring is of a tapering-finger type, which is a solid ring in the outer diameter part, with a series of tapered fingers pointing inward.

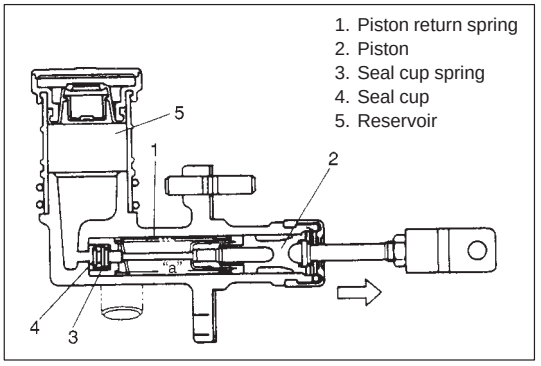
The disc, carrying four torsional coil springs, is positioned on the transmission input shaft with an involute spline fit.

The clutch cover is secured to the flywheel, and carries the diaphragm spring in such a way that the peripheral edge of the spring pushes on the pressure plate against the flywheel (with the disc in between), when the clutch release bearing is held back. This is the engaged condition of the clutch.

Depressing the clutch pedal causes the release bearing to advance and pushes on the tips of the tapered fingers of the diaphragm spring. When this happens, the diaphragm spring pulls the pressure plate away from the flywheel, thereby interrupting the flow of drive from flywheel through clutch disc to transmission input shaft.



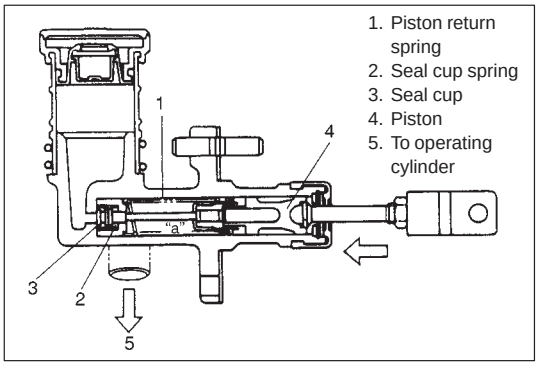
1. Clutch cover
2. Pressure plate
3. Diaphragm spring
4. Release bearing
5. Release shaft
6. Transmission right case
7. Clutch disc
8. Torsional spring
9. Input shaft bearing
10. Input shaft
11. Crankshaft
12. Flywheel



CLUTCH MASTER CYLINDER

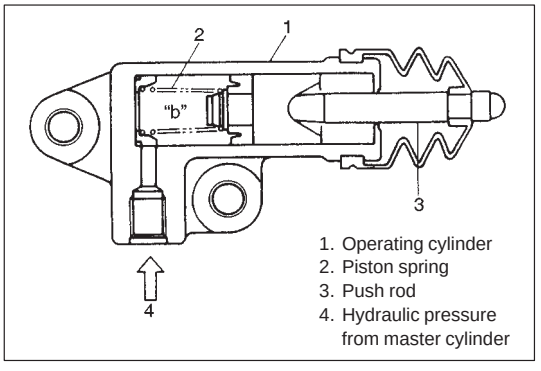
WHEN NOT OPERATING

As the piston is pushed to the right as shown by the return spring force, no hydraulic pressure is generated in the chamber “a”. The spring force also compresses the seal cup spring, opening the oil passage between the reservoir and the chamber “a”.



WHEN OPERATING

Depressing the clutch pedal causes the piston to move to the left as shown, thereby the piston return spring is compressed. Then the seal cup, by its own spring force, closes the oil passage between the reservoir and the chamber “a”. Immediately after this closure, hydraulic pressure is generated in the chamber “a” and it is applied to the operating cylinder on the transmission.

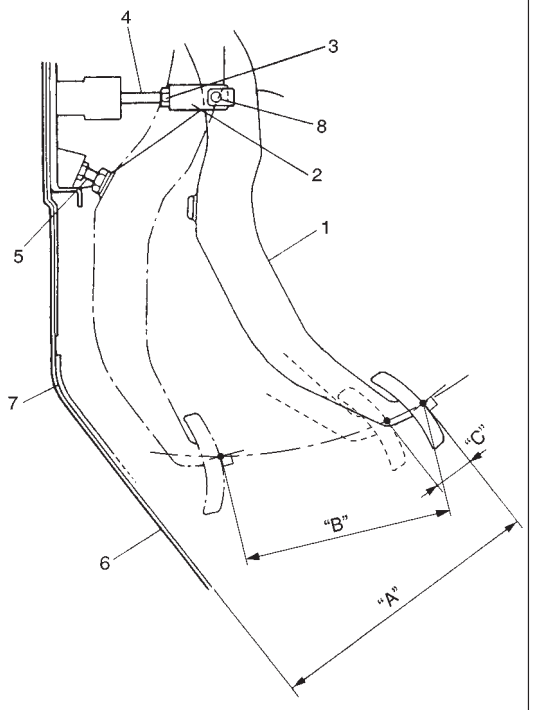


OPERATING CYLINDER

When the operating cylinder is not operating, the push rod is pushed against the release arm only by the piston spring force.
When it is operating, the hydraulic pressure from the clutch master cylinder is applied to the chamber “b”. Then the piston pushes the push rod to move the clutch release arm, causing the clutch disc to operate.

DIAGNOSIS

Condition	Possible cause	Correction
Slipping	○ Improper clutch pedal free travel. ○ Worn or oily clutch disc facing. ○ Warped disc, pressure plate or flywheel surface. ○ Weakened diaphragm spring. ○ Master cylinder piston or seal cup not returning.	Replace clutch arm or master cylinder. Replace disc. Replace disc, clutch cover or flywheel. Replace clutch cover. Repair master cylinder.
Dragging clutch	○ Improper clutch pedal free travel. ○ Weakened diaphragm spring, or worn spring tip. ○ Rusted input shaft splines. ○ Damaged or worn splines of transmission input shaft. ○ Excessively wobbly clutch disc. ○ Clutch facings broken or dirty with oil. ○ Fluid leakage.	Replace clutch arm or master cylinder. Replace clutch cover. Lubricate. Replace input shaft. Replace disc. Replace disc. Repair or replace.
Clutch vibration	○ Glazed (glass-like) clutch facings. ○ Clutch facings dirty with oil. ○ Release bearing slides unsmoothly on input shaft bearing retainer. ○ Wobbly clutch disc, or poor facing contact. ○ Weakened torsion springs in clutch disc. ○ Clutch disc rivets loose. ○ Distorted pressure plate or flywheel surface. ○ Weakened or loosened engine mounting bolt or nut.	Repair or replace disc. Replace disc. Lubricate or replace input shaft bearing retainer. Replace disc. Replace disc. Replace disc. Replace clutch cover or flywheel. Retighten or replace mounting.
Noisy clutch	○ Worn or broken release bearing. ○ Input shaft front bearing worn down. ○ Excessive rattle of clutch disc hub. ○ Cracked clutch disc. ○ Pressure plate and diaphragm spring rattling.	Replace release bearing. Replace input shaft bearing. Replace disc. Replace disc. Replace clutch cover.
Grabbing clutch	○ Clutch disc facings soaked with oil. ○ Clutch disc facings excessively worn. ○ Rivet heads showing out of facing. ○ Weakened torsion springs.	Replace disc. Replace disc. Replace disc. Replace disc.



1. Clutch pedal arm
2. Clutch master cylinder clevis
3. Clevis lock nut
4. Cylinder push rod
5. Pedal stopper bolt
6. Dash panel
7. Floor carpet
8. Clevis pin

ON-VEHICLE SERVICE

MAINTENANCE SERVICE

CLUTCH PEDAL

Clutch Pedal Free Height "A"

1) Check "A" for conformance to below specification.

   Clutch pedal height "A"
   Left hand steering vehicle : 191 – 201 mm (7.52 – 7.91 in.)
   Right hand steering vehicle : 202 – 212 mm (7.95 – 8.35 in.)

2) If "A" is not within specification, adjust it by loosening clevis lock nut and turning push rod.
3) Be sure to tighten lock nut to specification after adjustment.

Clutch Pedal Distance "B"

1) Depress clutch pedal till pedal arm contacts stopper bolt and measure height "B" as shown in the left figure and check it for conformance to below specification.

   Clutch pedal distance "B": 118 – 128 mm (4.65 – 5.04 in.)

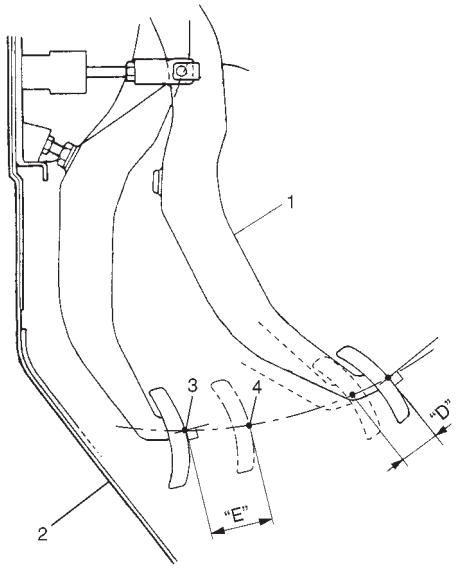
2) If "B" is not within specification, correct it by adjusting height of stopper bolt.

Clutch Pedal Free Travel "C"

1) Depress clutch pedal, stop the moment clutch resistance is felt, and measure how much pedal has moved (clutch pedal free travel) as represented by "C" in the left figure. Then check its conformance to below specification.

   Clutch pedal free travel "C": 15 – 20 mm (0.59 – 0.79 in.)

2) If "C" is not within specification, check pedal arm and master cylinder and replace defective part.



1. Clutch pedal arm
2. Dash panel
3. Full stroke point
4. Release point

Cylinder Push Rod Play "D"

1) Press clutch pedal gradually with finger, stop when slight increase of resistance is felt and measure how much pedal has moved (push rod play) as represented by "D" as shown. Then check its conformance to below specification.

   Push rod play "D": Max. 3 mm (0.12 in.)

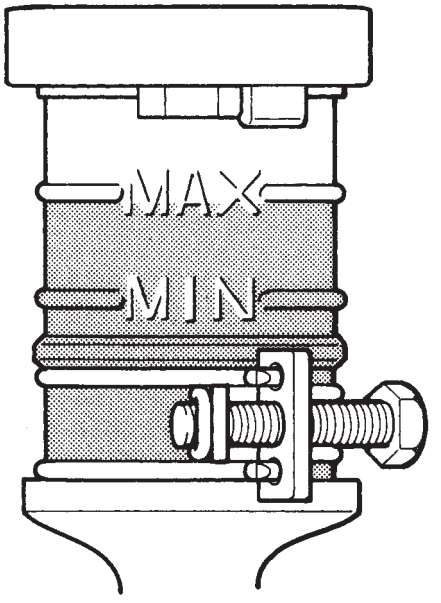
2) If "D" is not within specification, replace clevis pin or pedal arm.

Clutch Release Margin "E"

1) Pull up parking brake fully and block wheels.
2) Start engine and keep engine at idle with neutral gear position.
3) Without clutch pedal depressed, be slow to shift the shift lever to reverse position until transmission emits gear contact noise.
4) Be slow to depress clutch pedal, and at gear contact noise died position (release point) stop depressing.
5) Measure distance between release point and full stroke point on clutch pedal which is shown by "E" in the figure.

   Clutch release margin "E": 25 mm (1.0 in.) or more

6) If "E" is not within specification, it is possible that air is trapped in this system. If suspected so, bleed air.
   Upon completion of above inspection and adjustment, start engine and check clutch for proper operation.



CLUTCH FLUID

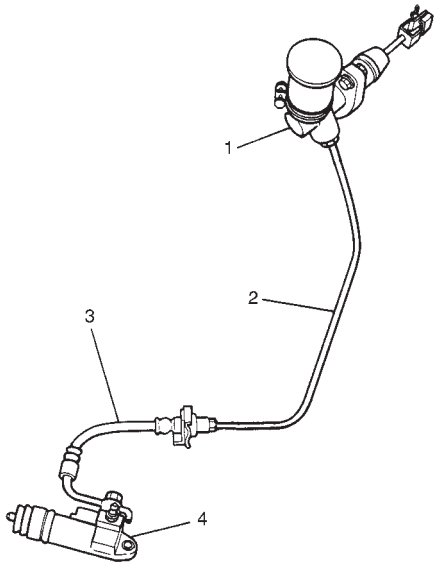
Fluid level should be always between MIN and MAX lines on reservoir. If fluid decreases quickly, check for leakage, repair leaky point, if any, and add fluid up to MAX level.

NOTE:

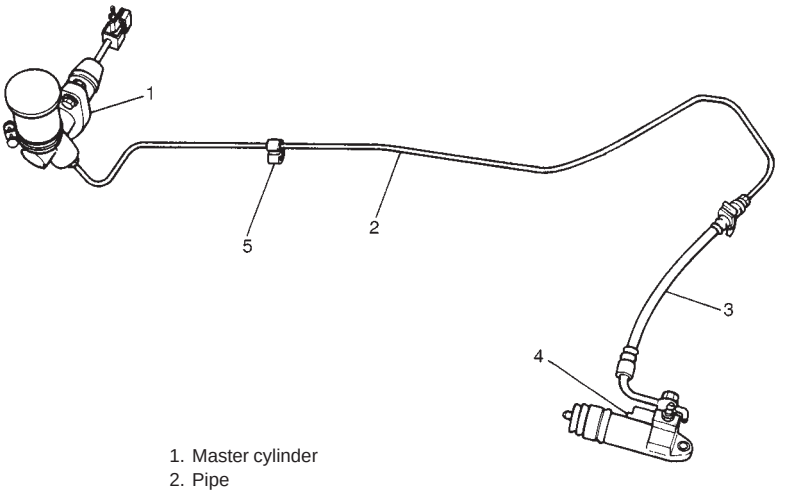
- **Brake fluid damages painted surface badly. Should it get on painted surface, remove it immediately and clean surface thoroughly.**
- **Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use container which has been used for mineral oil or which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic clutch system and water will mix with brake fluid, lowering fluid boiling point.**
  Keep all fluid containers capped to prevent contamination.
- **Make sure not to use fluid whose container cap was first opened more than a year ago.**

CLUTCH FLUID PIPE AND HOSE

For left-hand steering vehicle



For right-hand steering vehicle

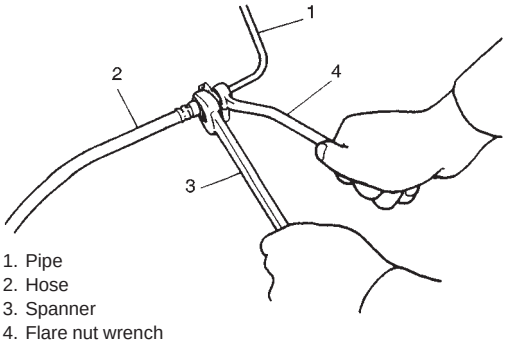


1. Master cylinder
2. Pipe
3. Hose
4. Operating cylinder
5. Clamp

REMOVAL

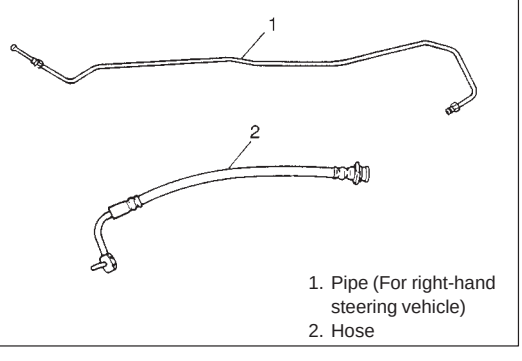
NOTE:
Do not allow fluid to get on painted surface.

1) Remove dust and dirt from each joint of hose and pipe to be disconnected and clean around reservoir cap.
2) Take out fluid with syringe or such.
3) Disconnect fluid pipe from hose.



1. Pipe
2. Hose
3. Spanner
4. Flare nut wrench

NOTE:
To disconnect pipe from hose, separate them by using flare nut wrench and spanner so as not to kink them.



1. Pipe (For right-hand steering vehicle)
2. Hose

INSPECTION

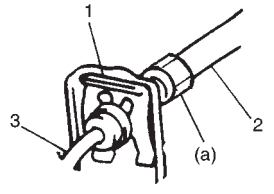
Check pipe and hose for dent, kink, crack, dirt and dust. Replace if check result is not satisfactory.

INSTALLATION

Reverse removal procedure for installation, and note the following instruction.

NOTE:

- ○ **For air bleeding of master cylinder alone, it must be removed from vehicle body.**
  (For procedures of removal and installation of master cylinder and air bleeding, refer to "CLUTCH MASTER CYLINDER" in this section.)
- ○ **Do not allow fluid to get on painted surface.**
- ○ **Do not allow pipe and hose to contact hard against vehicle body or other parts.**
- ○ **Install each clamp securely.**
- ○ **For installation angle of each hose, refer to the preceding page.**

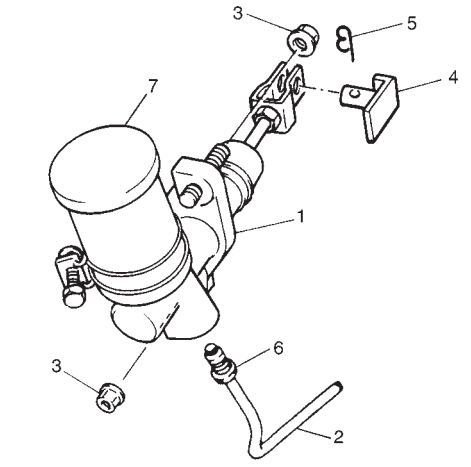


1. E-ring
2. Hose
3. Pipe

- ○ **Install E-ring securely as shown.**

  Tightening Torque
  (a): 16 N·m (1.6 kg-m, 11.5 lb-ft)

- ○ **After installation, check clutch pedal free travel and bleed air from system.**
- ○ **Check fluid leakage.**
- ○ **Add fluid close to MAX level of reservoir.**



1. Master cylinder
2. Clutch pipe
3. Attaching nut
4. Clevis
5. Clevis pin
6. Flare nut
7. Reservoir cap

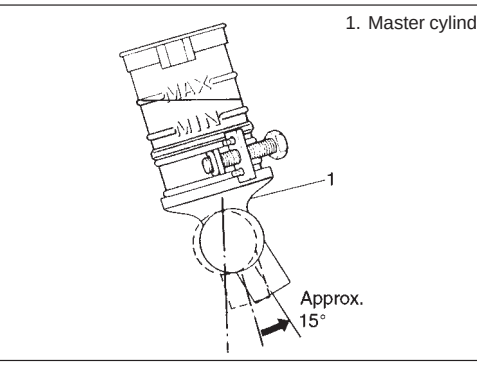
CLUTCH MASTER CYLINDER

REMOVAL

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Remove clevis.
3) Disconnect fluid pipe from master cylinder.

   NOTE:
   Do not allow fluid to get on painted surfaces.

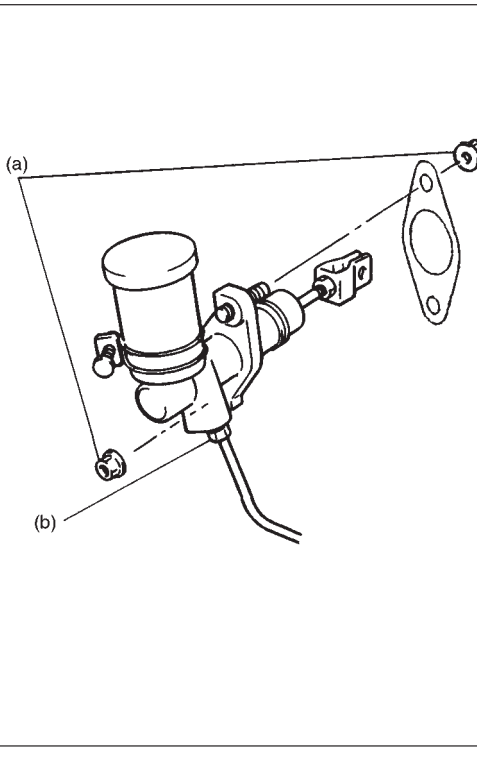
4) Remove master cylinder attaching nuts.
5) Remove master cylinder assembly and gasket.



INSTALLATION

1) To bleed air from master cylinder itself, tilt it as shown and add fluid into it.

   NOTE:
   After bleeding air from master cylinder, plug pipe hole in it to prevent fluid from spilling out of it till pipe is connected.



2) Install master cylinder assembly and new gasket to body, attaching nuts.

   NOTE:
   Do not reuse gasket.

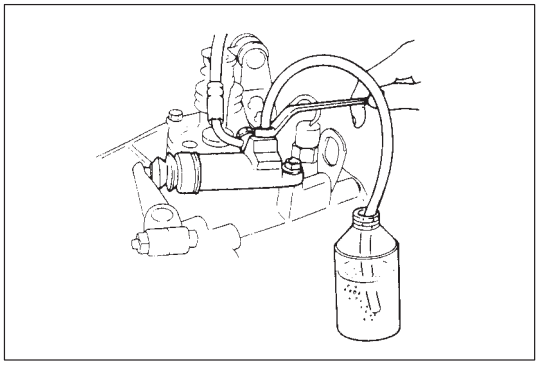
3) Tighten attaching nuts to specified torque.

   Tightening Torque
   (a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

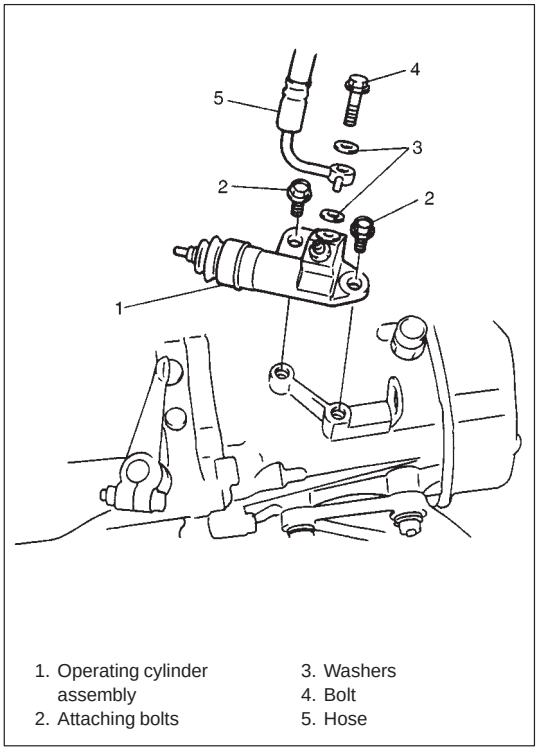
4) Connect fluid pipe and tighten flare nut to specified torque.

   Tightening Torque
   (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

5) Install clevis and clevis pin.



6) Fill reservoir with specified brake fluid and check fluid leakage.
7) After installation, bleed air from system. (Refer to Section 5 for air bleed procedure.)
8) Check clutch pedal free travel. (Refer to “MAINTENANCE SERVICE” in this section.)



1. Operating cylinder assembly
2. Attaching bolts
3. Washers
4. Bolt
5. Hose

CLUTCH OPERATING CYLINDER

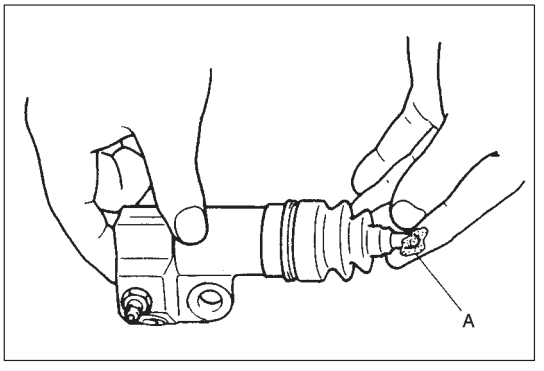
REMOVAL

NOTE:
Do not allow fluid to get on painted surfaces.

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Disconnect fluid hose from operating cylinder.
3) Remove operating cylinder attaching bolts and operating cylinder.

INSTALLATION

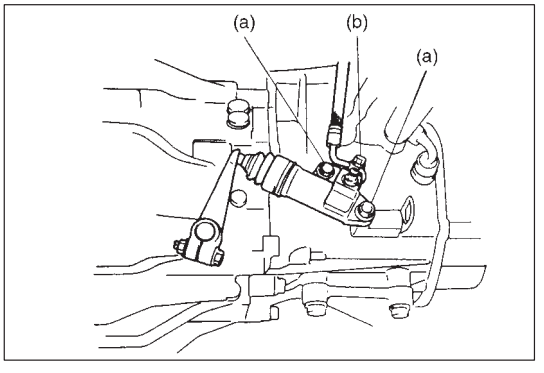
1) For air bleeding of master cylinder alone, it must be removed from vehicle body.
   (For procedures of removal and installation of master cylinder assembly and air bleeding, refer to “CLUTCH MASTER CYLINDER” in this section.)



2) Apply small amount of grease to rod tip.

   NOTE:
   Don’t allow any grease to be on boot.

   “A”: GREASE 99000-25010(SUZUKI SUPER GREASE A)

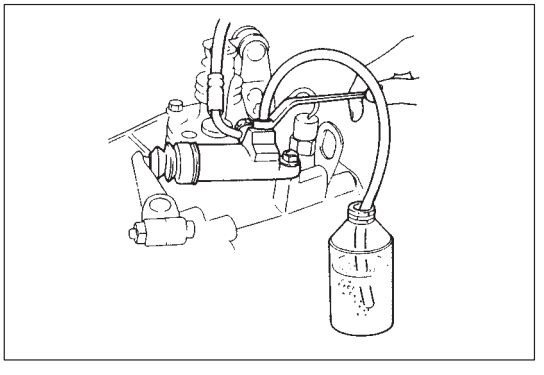


3) Install clutch operating cylinder and tighten attaching bolts to specified torque.

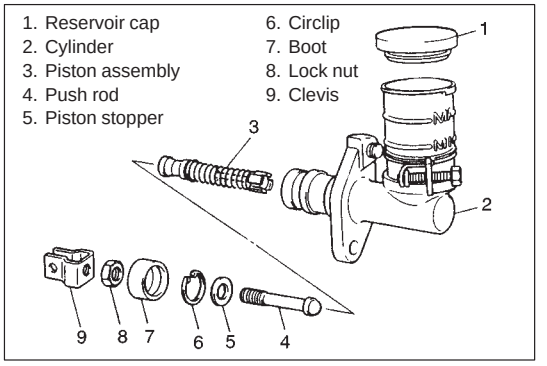
   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

4) Connect clutch fluid hose and tighten bolt to specified torque.

   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)



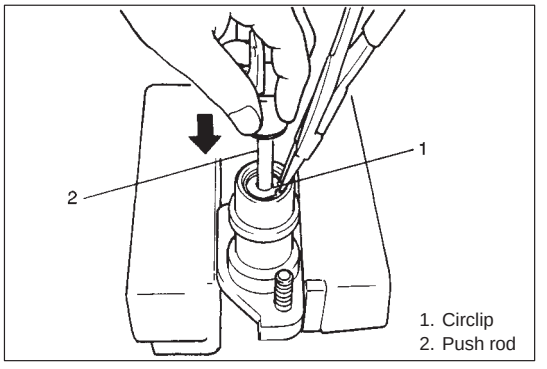
5) Fill reservoir with specified brake fluid and check for fluid leakage.
6) After installation, bleed air from system. (Refer to Section 5 for air bleed procedure.)
7) Check clutch pedal free travel. (Refer to “MAINTENANCE SERVICE” in this section.)



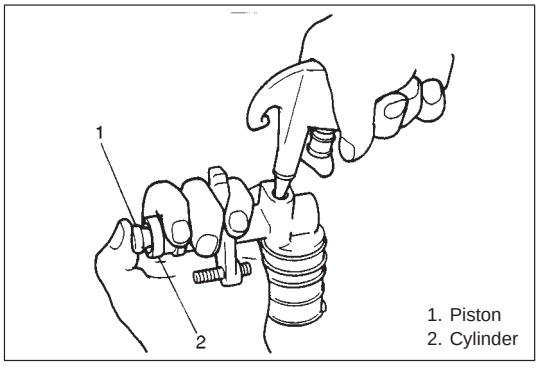
UNIT REPAIR OVERHAUL

CLUTCH MASTER CYLINDER

DISASSEMBLY



1) Remove boot and then circlip with piston pushed in.



2) Blow compressed air gradually into hole for pipe connection to remove piston assembly, using care to prevent it from jumping out.

INSPECTION

Inspect all disassembled parts for wear or damage, and replace parts if necessary.

NOTE:

○ **Wash disassembled parts with brake fluid.**

○ **Do not reuse piston assembly and circlip.**

Inspect cylinder bore for scoring or corrosion.
It is best to replace corroded cylinder. Corrosion can be identified as pits or excessive roughness.

NOTE:

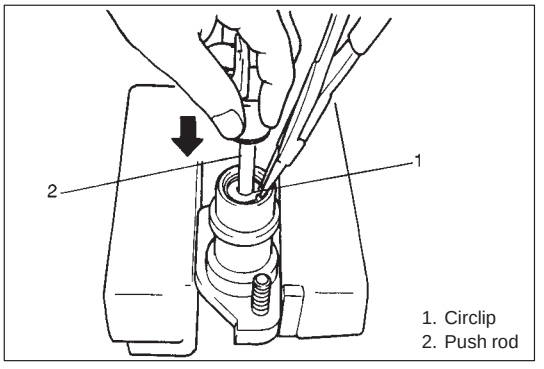
Polishing bore of cylinder with cast aluminum body with anything abrasive is prohibited, as damage to cylinder bore may occur.

Rinse cylinder in clean brake fluid. Shake excess rinsing fluid from cylinder. Do not use a cloth to dry cylinder, as lint from cloth cannot be kept away from cylinder bore surfaces.

REASSEMBLY

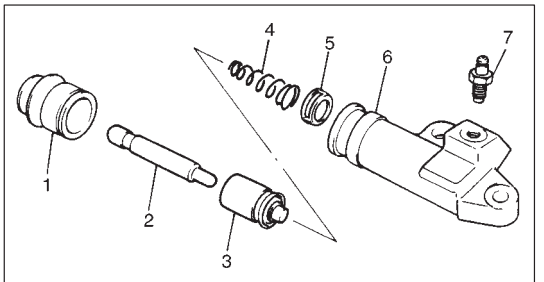
NOTE:
Before installation, wash each part in specified brake fluid.

1) Apply brake fluid to inside of piston assembly and cylinder body.
2) Install piston assembly into cylinder.



1. Circlip
2. Push rod

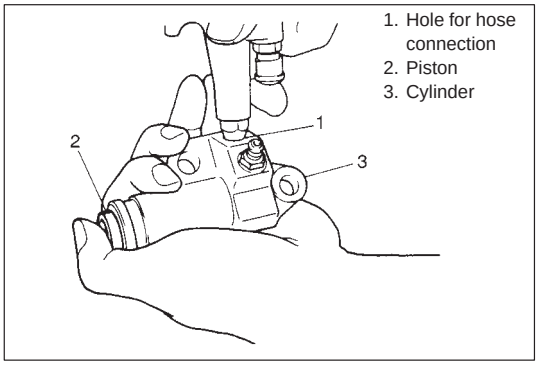
3) With piston pushed down, install circlip as shown.
4) Install boot.



1. Boot
2. Push rod
3. Piston assembly
4. Piston spring
5. Cup retainer
6. Cylinder
7. Bleeder screw

CLUTCH OPERATING CYLINDER

DISASSEMBLY



1. Hole for hose connection
2. Piston
3. Cylinder

1) Remove boot and then push rod.
2) Remove piston by blowing compressed air into bolt hole where hose was connected, using care to prevent it from jumping out.

INSPECTION

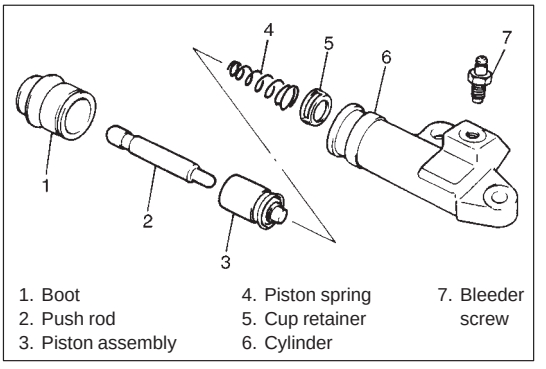
Inspect all disassembled parts for wear or damage, and replace parts if necessary.

NOTE:
○ **Wash disassembled parts with brake fluid.**
○ **Do not reuse piston cups.**

Inspect cylinder bore for scoring or corrosion.
It is best to replace corroded cylinder. Corrosion can be identified as pits or excessive roughness.

NOTE:
Polishing bore of cylinder with anything abrasive is prohibited, as damage to cylinder bore may occur.

Rinse cylinder in clean brake fluid. Shake excess rinsing fluid from cylinder. Do not use a cloth to dry cylinder, as lint from cloth cannot be kept away from cylinder bore surfaces.

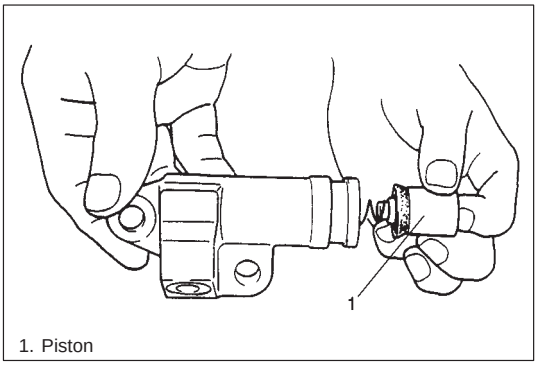


1. Boot
2. Push rod
3. Piston assembly
4. Piston spring
5. Cup retainer
6. Cylinder
7. Bleeder screw

REASSEMBLY

NOTE:
Before installation, wash each part in specified brake fluid.

1) Assemble piston as shown in the left figure.
2) Apply brake fluid to piston assembly and inside of cylinder.

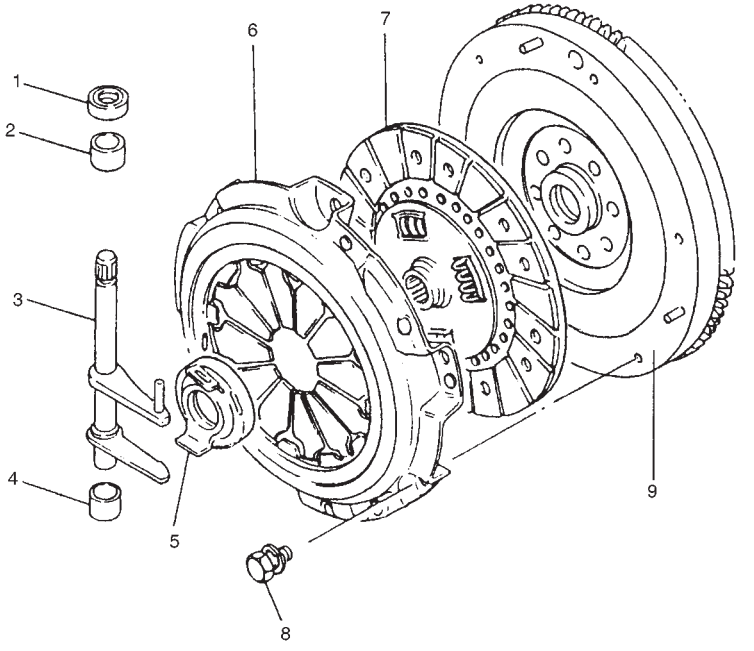


1. Piston

3) Install piston assembly into cylinder. When inserting it, be careful not to cause damage to lip of piston cup.

4) Install boot and push rod.

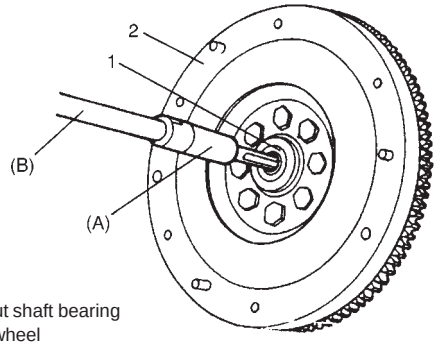
CLUTCH COVER, CLUTCH DISC AND FLYWHEEL



1. Release shaft seal
2. No.2 bush
3. Release shaft
4. No.1 bush
5. Release bearing
6. Clutch cover
7. Clutch disc
8. Clutch cover bolt
9. Flywheel

REMOVAL

1) Dismount transmission. Refer to “DISMOUNTING OF TRANSMISSION” in Section 7A.
2) Remove clutch cover, clutch disc and fly wheel. Refer to “CLUTCH COVER, CLUTCH DISC AND FLY WHEEL REMOVAL” in Section 7C.



1. Input shaft bearing
2. Flywheel

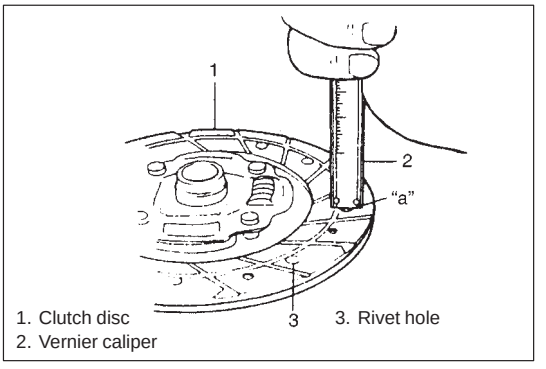
3) When pulling out input shaft bearing from flywheel, use the following special tool.

Special Tool
(A): 09921-20210
(B): 09930-30104

INSPECTION

Input Shaft Bearing

Check bearing for smooth rotation and replace it if abnormality is found.



1. Clutch disc
2. Vernier caliper
3. Rivet hole

Clutch Disc

Measure depth of rivet head depression, i.e. distance between rivet head and facing surface.
If depression is found to have reached service limit at any of holes, replace disc assembly.

Rivet head depth

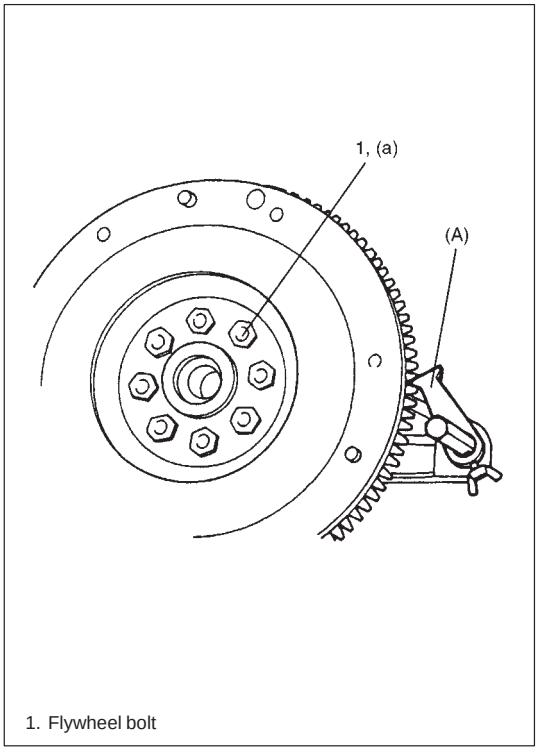
"a": Standard 1.3 – 1.9 mm (0.051 – 0.074 in.)
Limit 0.5 mm (0.02 in.)

Clutch Cover

1) Check diaphragm spring for abnormal wear or damage.
2) Inspect pressure plate for wear or heat spots.
3) If abnormality is found, replace it as assembly.
   Do not disassemble it into diaphragm and pressure plate.

Flywheel

Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.



1. Flywheel bolt

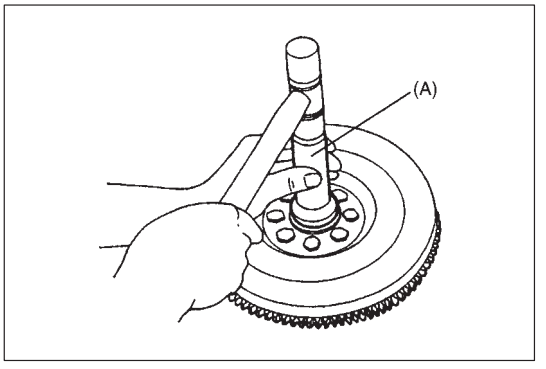
INSTALLATION

NOTE:
Before assembling, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.

1) Install flywheel to crankshaft and tighten bolts to specification.

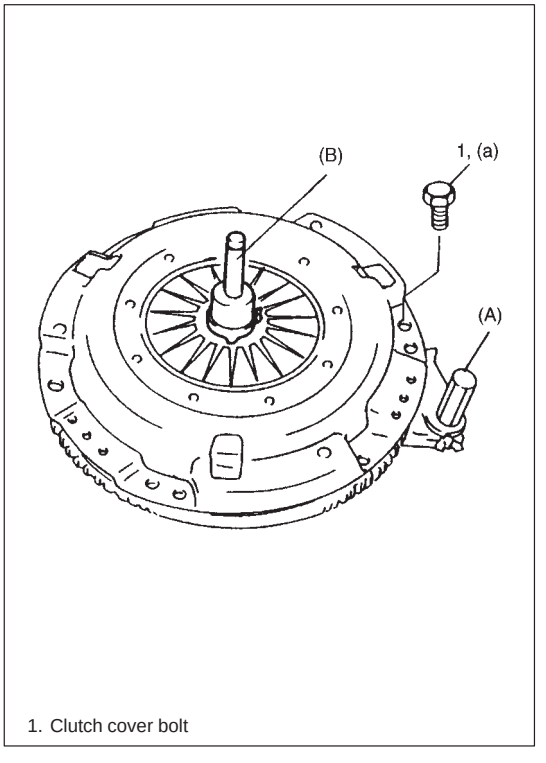
Special Tool
(A): 09924-17810

Tightening Torque
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)



2) Using special tool, install input shaft bearing to flywheel.

Special Tool
(A): 09913-76010



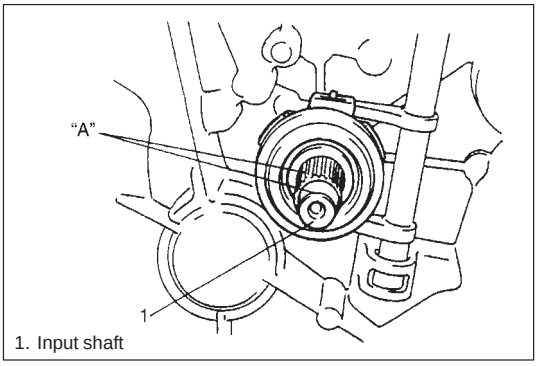
1. Clutch cover bolt

3) Aligning clutch disc with flywheel center by using special tool, install clutch cover and bolts.
Then tighten bolts to specification.

NOTE:
- **While tightening clutch cover bolts, compress clutch disc with special tool (clutch center guide) by hand so that disc is centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

Special Tool
(A): 09924-17810
(B): 09923-36320

Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Input shaft

4) Slightly apply grease to input shaft, then join transmission assembly with engine. Refer to "REMOUNTING" under "UNIT REPAIR OVERHAUL" in Section 7A.

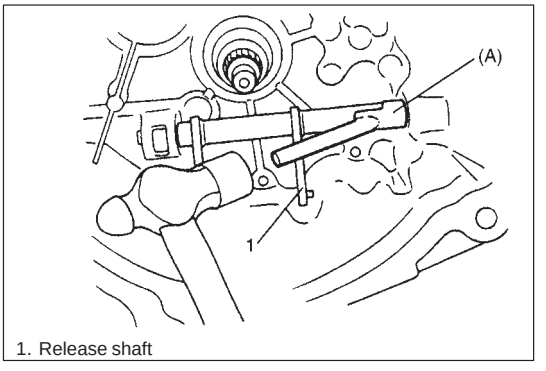
"A": GREASE 99000-25210 (SUZUKI SUPER GREASE I)

NOTE:
When inserting transmission input shaft to clutch disc, turn crankshaft little by little to match the spline mesh.

CLUTCH RELEASE SYSTEM

REMOVAL

1) Remove release arm by loosening its bolt.
2) Take out release bearing by turning release shaft.

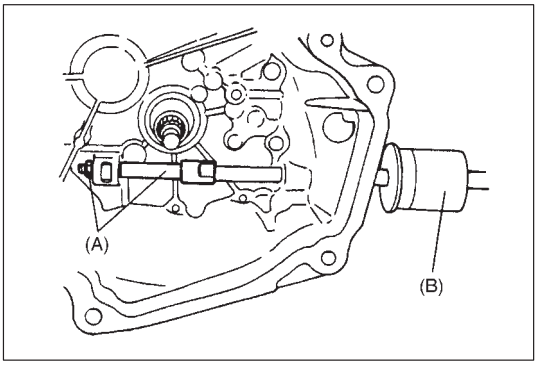


1. Release shaft

3) Drive out No.2 bush by using special tool and hammer. Release shaft seal will also be pushed out.

Special Tool
(A): 09922-46010

4) Remove release shaft.



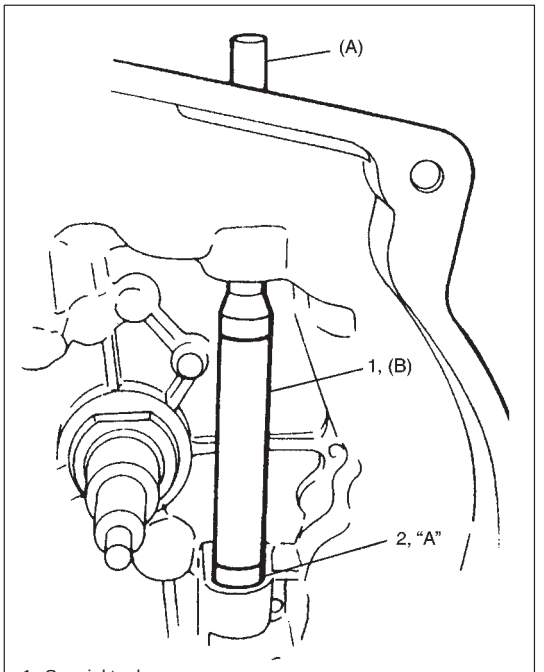
5) Pull No.1 bush out by using special tools.

Special Tool
(A): 09925-46010
(B): 09930-30104

INSPECTION

1) Check clutch release bearing for smooth rotation.
2) Inspect smoothness of release bearing retaining portion of transmission case and correct or replace right case as necessary.

CAUTION:
Do not wash release bearing. Washing may cause grease leakage and consequential bearing damage.



1. Special tool
   (Joint pipe 09923-46020) or the like
2. No.1 bush

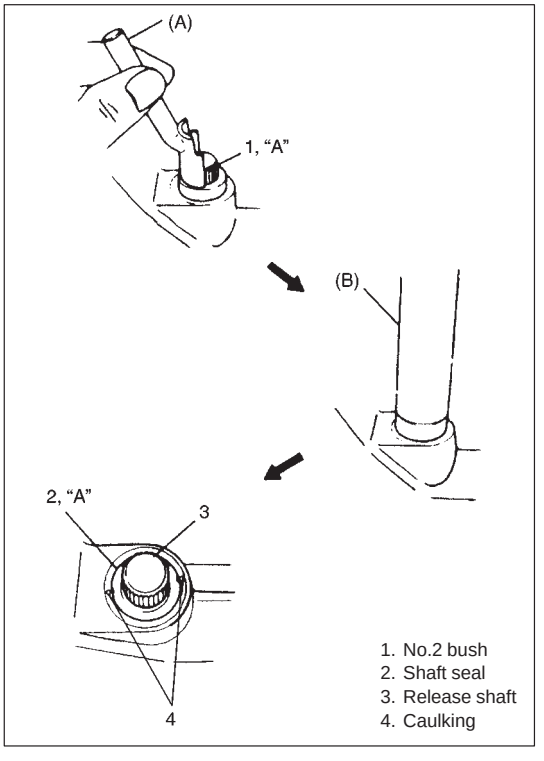
INSTALLATION

1) Drive in a new No. 1 bush by using adequate drive handle and hammer and then apply grease to bush inside.

   Special Tool
   (A): 09943-88211
   (B): 09923-46020 or the like

   "A": GREASE 99000-25010 (SUZUKI SUPER GREASE A)

2) Install release shaft with return spring applied to it.



1. No.2 bush
2. Shaft seal
3. Release shaft
4. Caulking

3) Apply grease to No.2 bush inside and press-fit it by using the same special tool as in removal.

   "A": GREASE 99000-25010 (SUZUKI SUPER GREASE A)

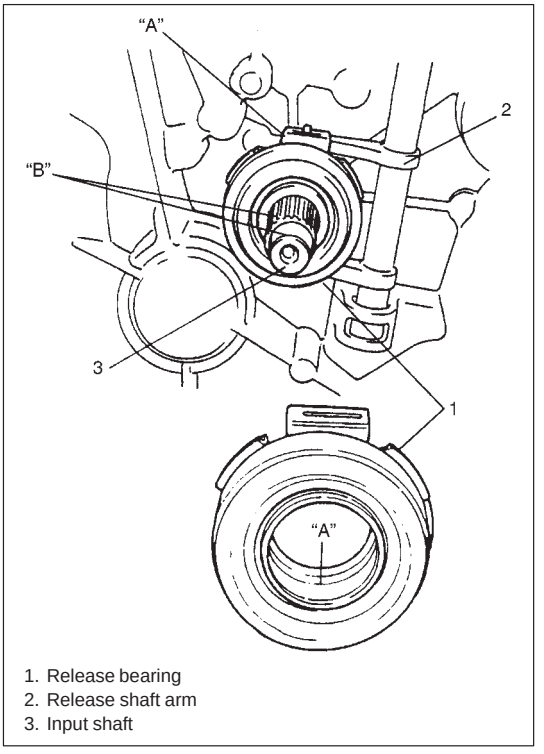
   Special Tool
   (A): 09922-46010

4) Coat grease to shaft seal and then install it till it is flush with case surface. Use special tool for this installation and face seal lip downward (inside).

   "A": GREASE 99000-25010 (SUZUKI SUPER GREASE A)

   Special Tool
   (B): 09925-98221

5) Caulk seal at A by using caulking tool and hammer.



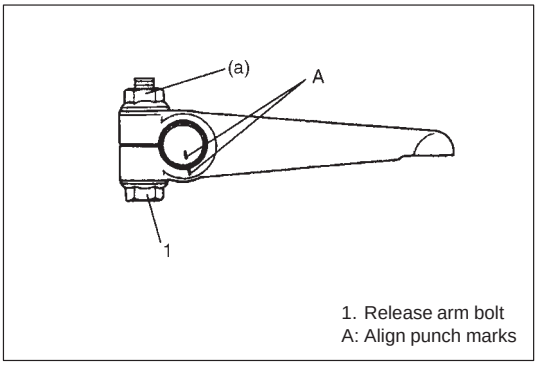
1. Release bearing
2. Release shaft arm
3. Input shaft

6) Hook return spring.
7) Apply grease to release bearing inside and release shaft arm, then set bearing.

"A": GREASE 99000-25010 (SUZUKI SUPER GREASE A)

8) Apply small amount of grease to input shaft spline and front end as well.

"B": GREASE 99000-25210 (SUZUKI SUPER GREASE I)



1. Release arm bolt
A: Align punch marks

9) Set release arm to release shaft aligning their punch marks, then tighten bolt.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

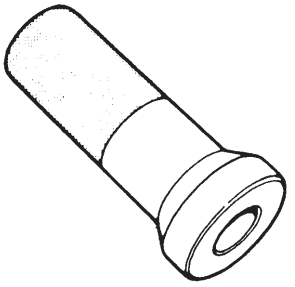
TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening Torque		
	N·m	kg-m	lb-ft
1. Flare nut	16	1.6	11.5
2. Master cylinder nut	13	1.3	9.5
3. Flywheel bolts	70	7.0	51.0
4. Clutch cover bolts	23	2.3	17.0
5. Release arm bolt	13	1.3	9.5
6. Operating cylinder bolt	23	2.3	17.0
7. Clutch hose union bolt			

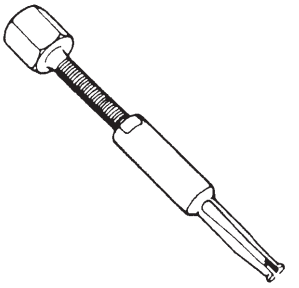
REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	○ Clutch master cylinder clevis ○ Release shaft bushes and seal. ○ Release shaft arm. ○ Push rod tip of operating cylinder.
	SUZUKI SUPER GREASE I (99000-25210)	Input shaft spline front end.
Clutch fluid (Brake fluid)	DOT3 or SAE J1703	○ Clutch reservoir. ○ Clutch master cylinder. ○ Clutch operating cylinder.

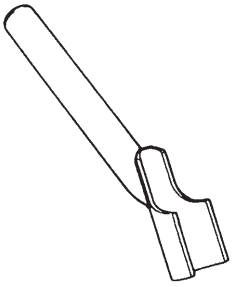
SPECIAL TOOL



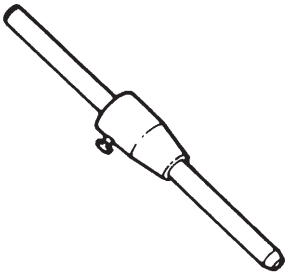
09913-76010
Bearing installer



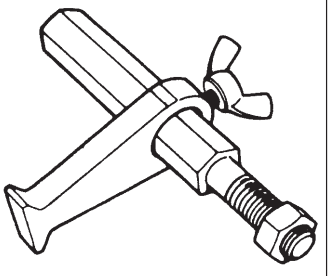
09921-20210
Bearing remover



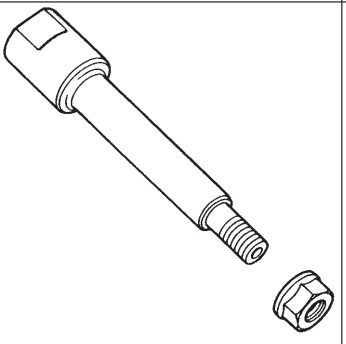
09922-46010
Bush remover



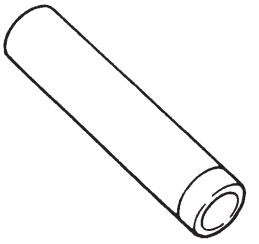
09923-36320
Clutch center guide



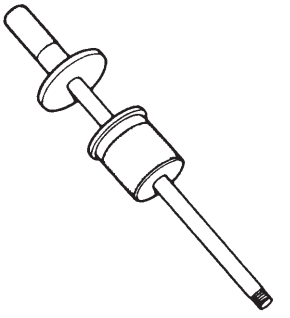
09924-17810
Flywheel holder



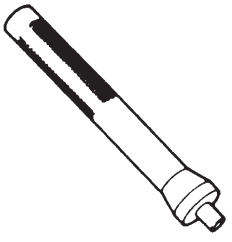
09925-46010
Bush remover



09925-98221
Bearing installer



09930-30104
Sliding shaft



09943-88211
Bearing installer

SECTION 7F

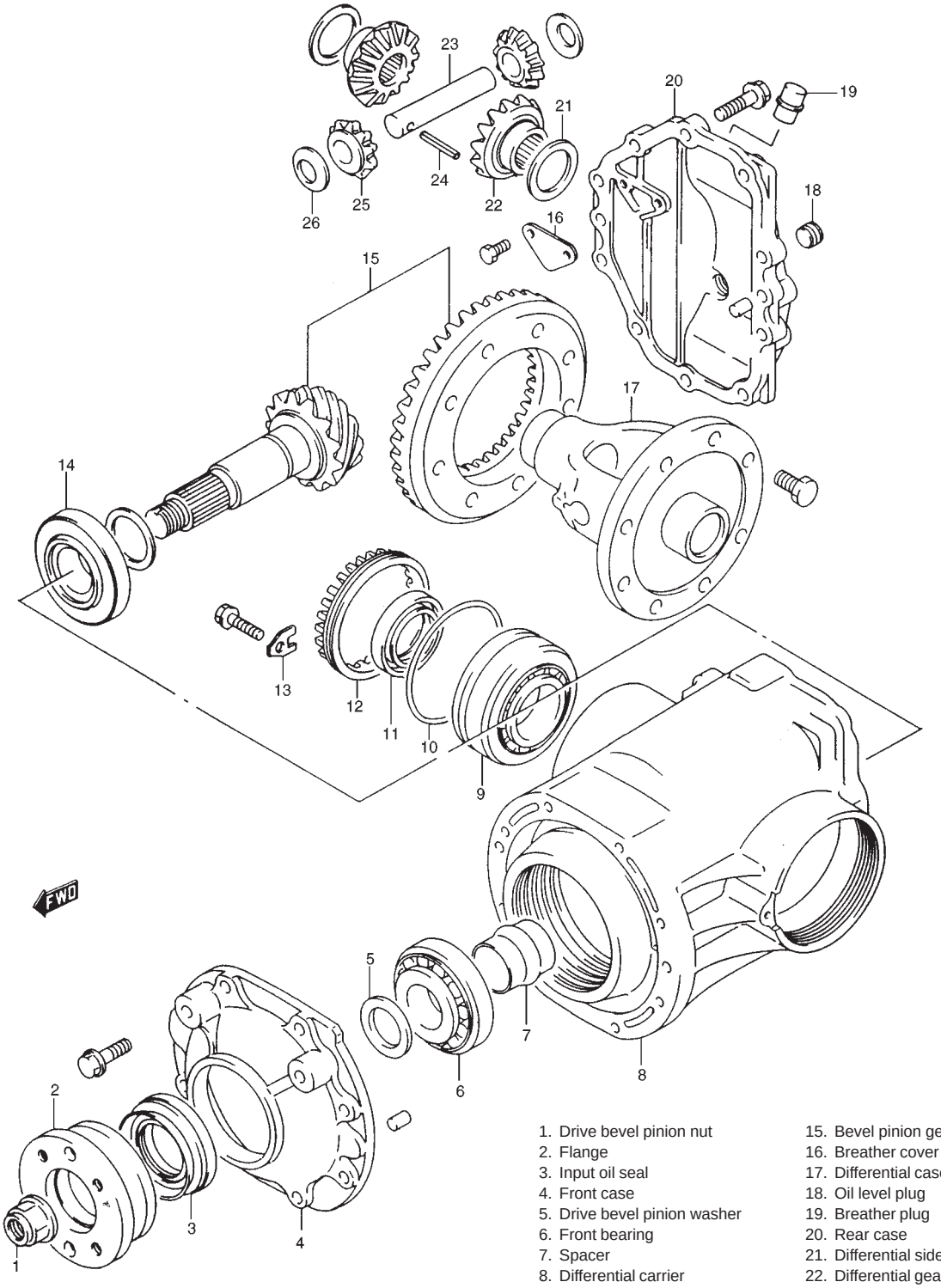
REAR DIFFERENTIAL

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GENERAL DESCRIPTION

The differential assembly uses a hypoid bevel pinion and gear.
The differential assembly is decisive in that the drive power is concentrated there. Therefore, use of genuine parts and specified torque is compulsory. Further, because of sliding tooth meshing with high pressure between bevel pinion and gear, it is mandatory to lubricate them by hypoid gear oil.



1. Drive bevel pinion nut
2. Flange
3. Input oil seal
4. Front case
5. Drive bevel pinion washer
6. Front bearing
7. Spacer
8. Differential carrier
9. Side bearing
10. Side bearing O-ring
11. Side bearing oil seal
12. Retainer
13. Retainer stopper
14. Rear bearing
15. Bevel pinion gear set
16. Breather cover
17. Differential case
18. Oil level plug
19. Breather plug
20. Rear case
21. Differential side washer
22. Differential gear
23. Differential pinion shaft
24. Differential pinion shaft pin
25. Differential pinion
26. Differential pinion washer

DIAGNOSIS

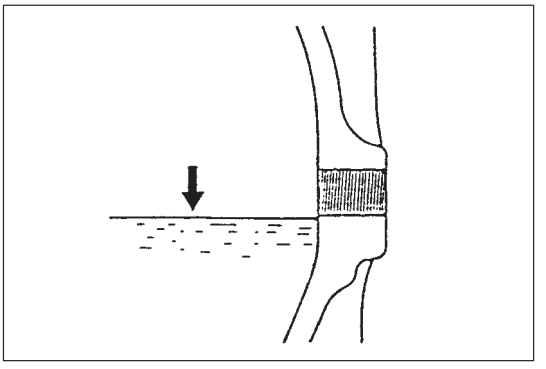
Condition	Possible Cause	Correction
Gear noise	○ Deteriorated or water mixed lubricant	Repair and replenish
	○ Inadequate or insufficient lubricant	Repair and replenish
	○ Maladjusted backlash between bevel pinion and gear	Adjust as prescribed
	○ Improper tooth contact in the mesh between bevel pinion and gear	Adjust or replace
	○ Loose bevel gear securing bolts	Replace or retighten
	○ Damaged side gear(s) or side pinion(s)	Replace
Bearing noise	○ (Constant noise) Deteriorated or water mixed lubricant	Repair and replenish
	○ (Constant noise) Inadequate or Insufficient lubricant	Repair and replenish
	○ (Noise while coasting) Damaged bearing(s) of bevel pinion	Replace
	○ (Noise while turning) Damaged differential side bearing(s)	Replace
Oil leakage	○ Clogged breather plug	Clean
	○ Worn or damaged oil seal	Replace
	○ Excessive oil	Adjust oil level

ON-VEHICLE SERVICE

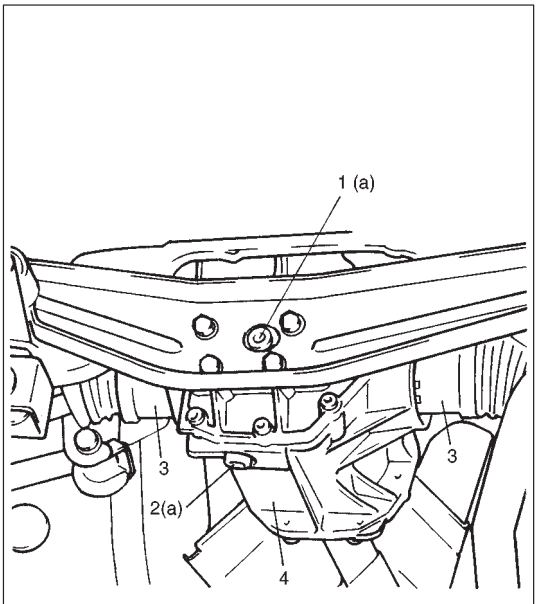
MAINTENANCE SERVICE

NOTE:
Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

CHANGING OIL
NOTE:
It is highly recommended to use SAE 80W-90 viscosity.



1) Before oil change or inspection, be sure to stop engine and set vehicle horizontally.
2) Check oil level and existence of leakage. If leakage is found, correct its cause.



1. Level/filler plug
2. Drain plug
3. Rear drive shaft
4. Rear differential

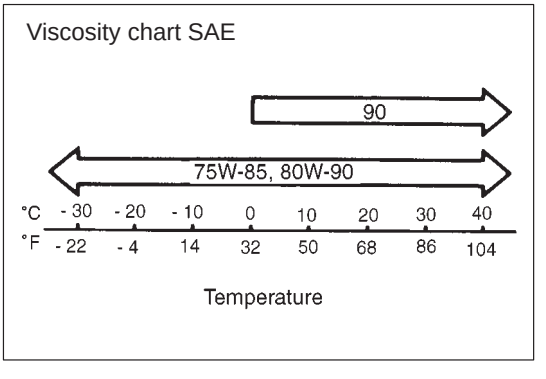
3) Remove level/filler and drain plugs, then drain old oil.
4) Tighten drain plug to specified torque, after applying sealant to its thread.
   NOTE:
   New drain and level/filler plug is applied sealant.

   "A": Sealant 99000-31110

   Tightening Torque
   (a): 21 N·m (2.1 kg-m, 15.5 lb-ft)
5) Fill proper amount of new gear oil as specified below (roughly up to level hole).
6) Tighten level/filler plug to specified torque, after applying sealant to its thread.
   NOTE:
   New drain and level/filler plug is applied sealant.

   "A": Sealant 99000-31110

   Tightening Torque
   (a): 21 N·m (2.1 kg-m, 15.5 lb-ft)



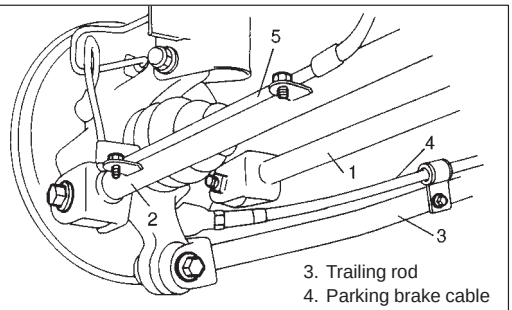
Specified gear oil : **Hypoid gear oil API GL-5**
SAE 75W-85 or 80W-90
For oil viscosity, refer to the chart at the left.

Oil capacity : **0.7 liters (1.5/1.2 US/Imp. pt)**

UNIT REPAIR OVERHAUL

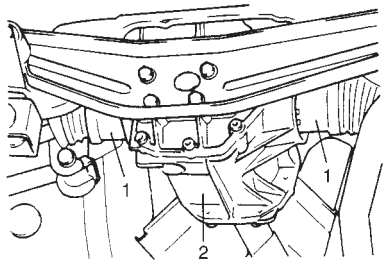
DISMOUNTING

1) Hoist vehicle and remove wheels.
2) Drain oil from rear differential. (Refer to “OIL CHANGE” in this section.)



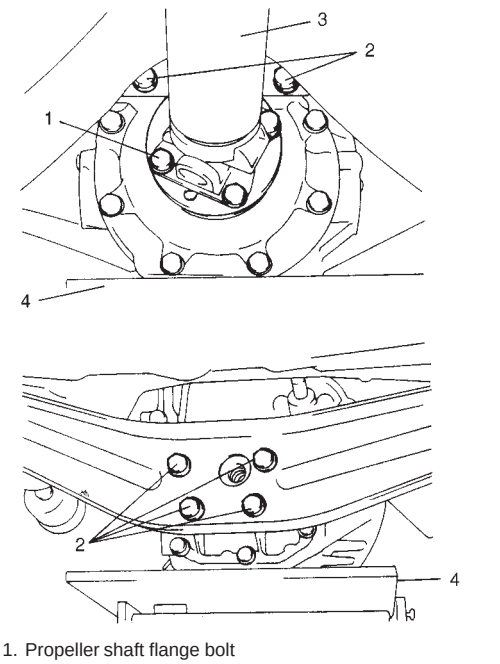
1. No.1 control rod
2. No.2 control rod
3. Trailing rod
4. Parking brake cable
5. Wheel speed sensor (equipped with ABS)

3) Remove parking brake cable from trailing rod.
4) If vehicle is equipped with ABS, remove wheel speed sensor harness from No.2 control rod.
5) Remove No.1 and No.2 control rod outer bolt.
6) Remove trailing rod rear bolt.



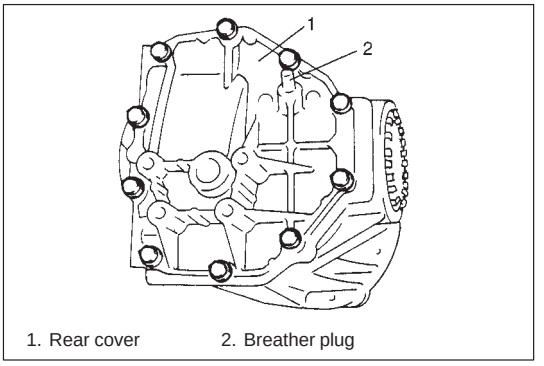
1. Rear drive shaft
2. Rear differential

7) Remove rear drive shafts from rear differential.



1. Propeller shaft flange bolt
2. Rear differential mounting bolts
3. Propeller shaft
4. Jack

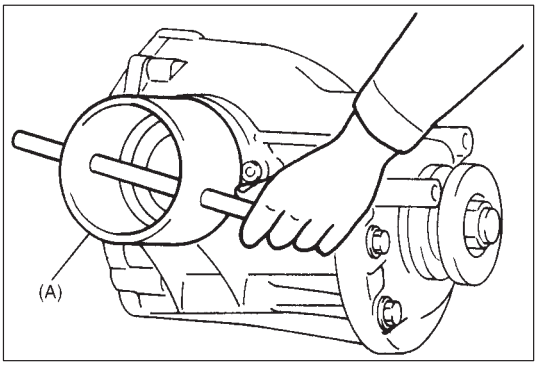
8) Place jack so that differential assembly will not tilt.
9) Remove 4 propeller shaft flange bolts from rear differential, and then pull out propeller shaft from rear differential.
10) Remove 6 rear differential mounting bolts.



1. Rear cover
2. Breather plug

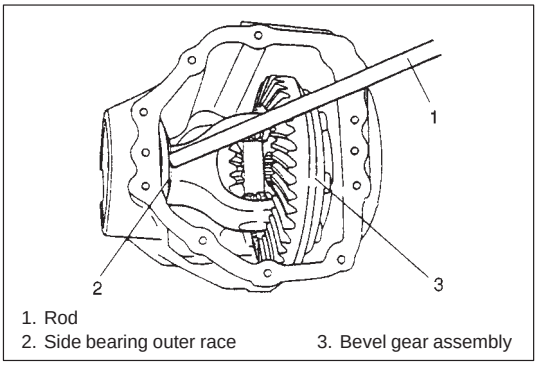
DISASSEMBLY

1) Remove rear cover.
2) Remove breather plug from rear cover.



3) Remove differential side bearing stopper and then remove differential side bearing retainer.

Special Tool
(A): 09923-58520

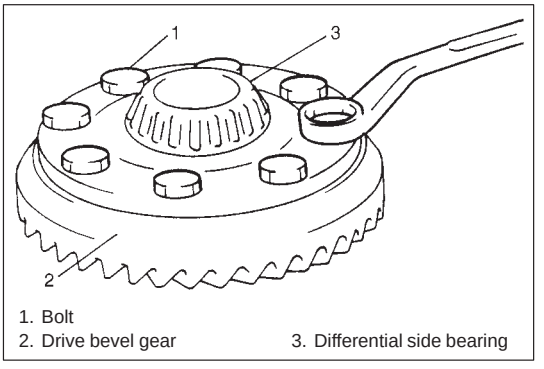


1. Rod
2. Side bearing outer race
3. Bevel gear assembly

4) Using some appropriate rod, drive out differential side bearing outer races.

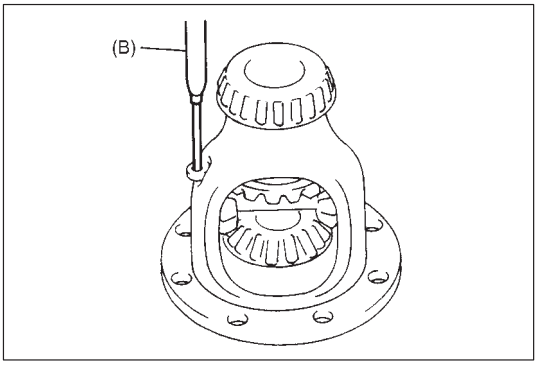
NOTE:
When driving out differential side bearing outer races, be very careful not to cause damage to tooth surface of bevel gear.

5) Remove bevel gear assembly.



1. Bolt
2. Drive bevel gear
3. Differential side bearing

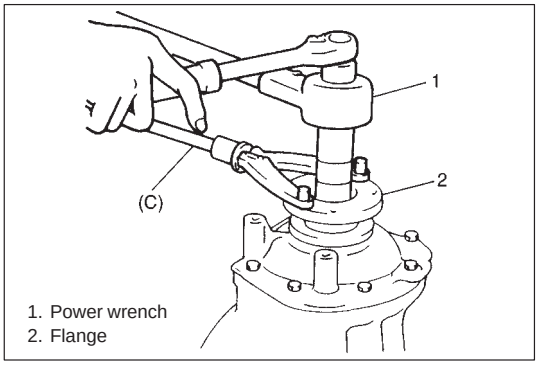
6) Remove bevel gear bolts and then remove drive bevel gear.
7) Remove differential side bearings.



8) Drive out differential side pinion shaft pin with special tool and hammer.

Special Tool
(B): 09922-85811

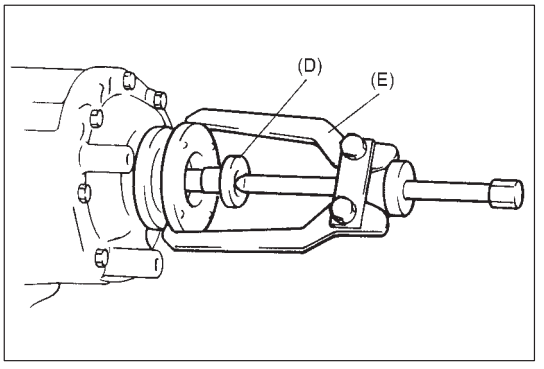
9) Disassemble differential side gears, pinions, washers and and shaft in differential case.



1. Power wrench
2. Flange

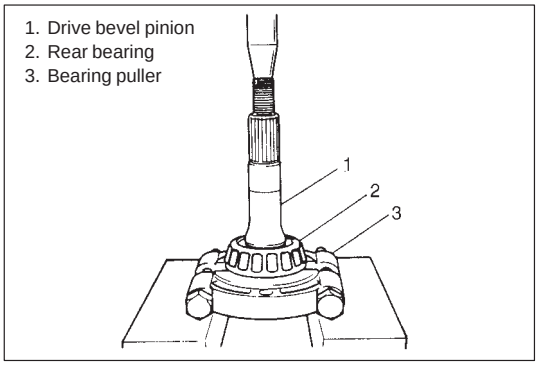
10) Remove caulking of flange nut with special tool and power wrench.

(C): 09930-40113



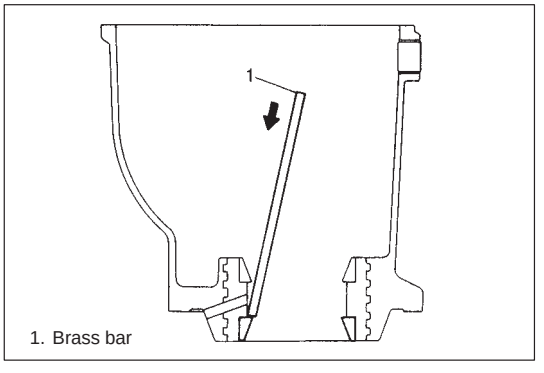
11) Remove flange and washer from drive bevel pinion, and then drive out drive bevel pinion.

Special Tool
(D): 09913-85230
(E): 09913-65135



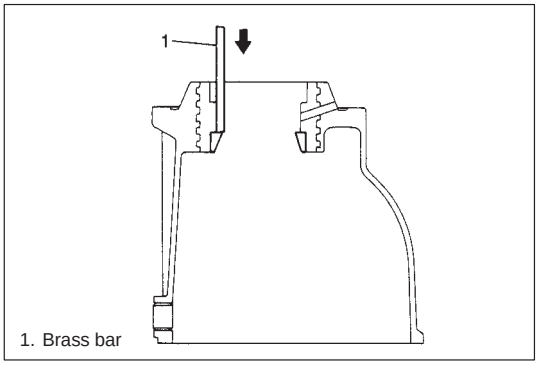
1. Drive bevel pinion
2. Rear bearing
3. Bearing puller

12) Remove rear bearing by using bearing puller and press.



1. Brass bar

13) Using a hammer and brass bar, drive out front bearing outer race.



1. Brass bar

14) Drive out rear bearing outer race in the same way as in the Step 13).

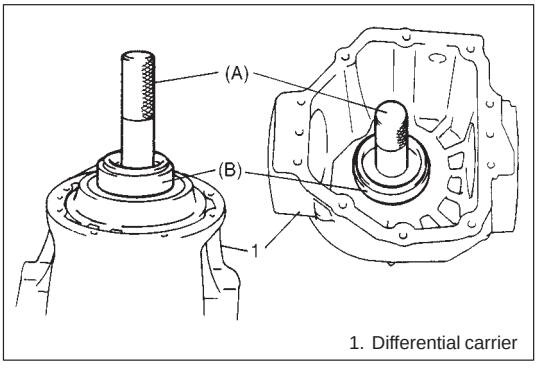
INSPECTION

○ Check flange for wear or damage.
○ Check bearings for wear or discoloration.
○ Check differential carrier for cracks.
○ Check drive bevel pinion and bevel gear for wear or cracks.
○ Check side gears, pinion gears and pinion shaft for wear or damage.
○ Check side gear spline for wear or damage.

ADJUSTMENT AND REASSEMBLY

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below.

CAUTION:
○ Bevel gear and pinion must be replaced as a set when either replacement becomes necessary.
○ When replacing taper roller bearing, replace as inner race & outer race assembly.

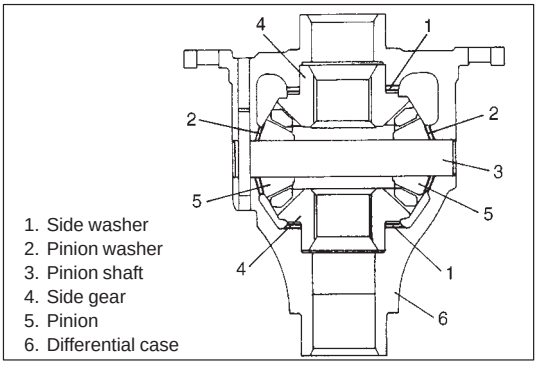


1. Differential carrier

DIFFERENTIAL CARRIER

For press-fitting bevel pinion bearing outer races by using special tools as shown in left figure.

Special Tool
(A): 09924-74510
(B): 09951-16090

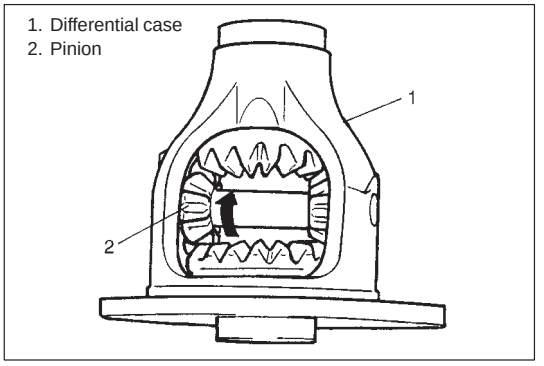


1. Side washer
2. Pinion washer
3. Pinion shaft
4. Side gear
5. Pinion
6. Differential case

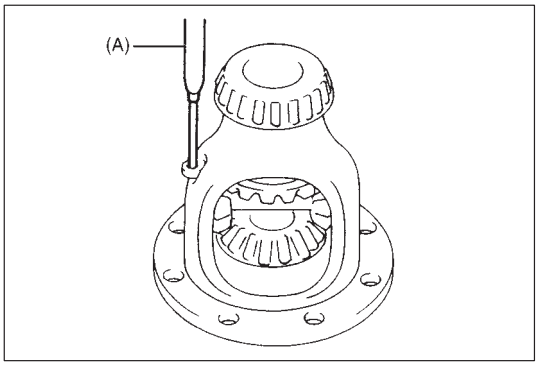
DIFFERENTIAL CASE

1) After applying differential oil to side gear, pinions, pinion shaft and washers, install them in differential case.

NOTE:
Used left and right differential side washers are not interchangeable.

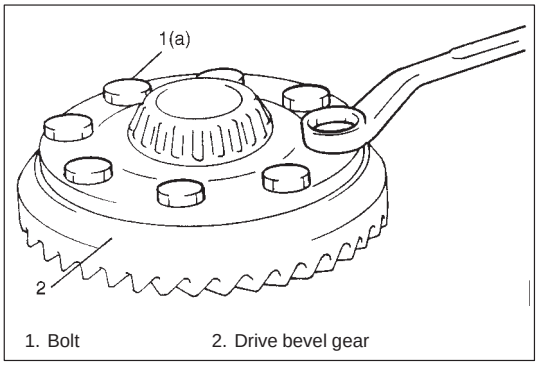


2) Check pinion gear for smooth rotation.



3) Align pinion shaft hole position with differential case and drive in differential pinion shaft pin till they are flush with end surface of case.

Special Tool
(A): 09922-85811

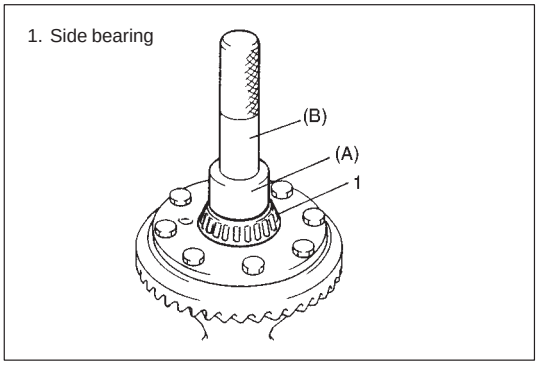


4) Apply thread lock cement to thread of bevel gear bolts.
5) Put bevel gear on differential case and fasten them with 8 bolts by tightening them to specified torque.

CAUTION:
Use of any other bolts than that specified is prohibited.

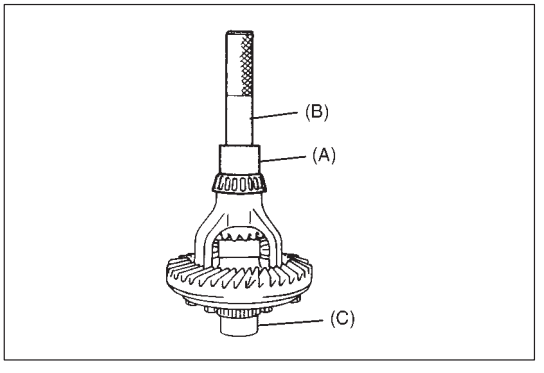
"A": Thread Lock Cement 99000-32020
Tightening Torque
(a): 73 N·m (7.3 kg-m, 52.0 lb-ft)

DIFFERENTIAL SIDE BEARING



1) Press-fit side bearing with special tool.

Special Tool
(A): 09951-16060
(B): 09924-74510

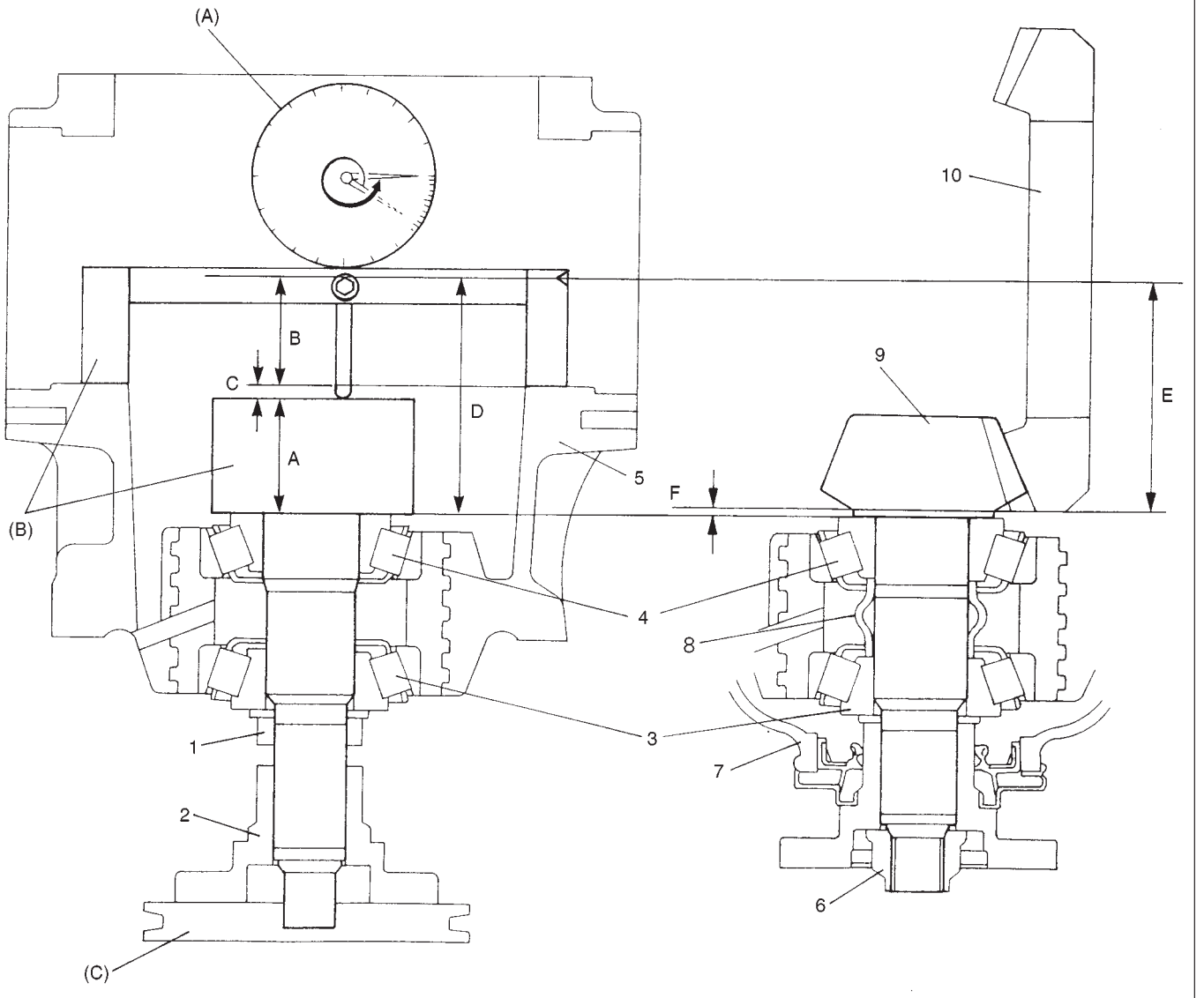


2) Hold bearing press-fitted in Step 1) with holder and press-fit side bearing on the other side.

NOTE:
Be sure to use bearing holder for the purpose of protecting lower bearing.
Special Tool
(A): 09951-16060
(B): 09924-74510
(C): 09923-78210

DRIVE BEVEL PINION

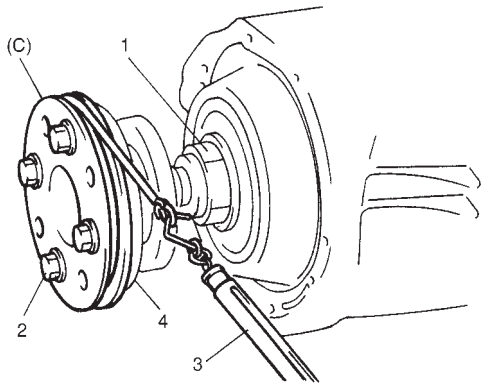
To engage bevel pinion and gear correctly, it is prerequired to install bevel pinion to differential carrier properly by using adjusting shim as described on following pages. Shown in this page are relative positions of bevel pinion, differential carrier and mounting dummy.



A: Pinion dummy height
B: Mounting dummy height
C: Measured dimension
D: Differential carrier mounting distance (A + B + C)
E: Bevel pinion mounting distance (Marked in shaft in mm)
F: Shim size for mounting distance adjustment (D – E)

1. 36 mm nut (Spare parts No.09159-28002)
2. Flange
3. Front bearing
4. Rear bearing
5. Differential carrier
6. Drive bevel pinion nut
7. Front case
8. Spacer
9. Bevel pinion
10. Bevel gear

Special Tool
(A): 09900-20606
(B): 09922-77280
(C): 09922-75222



1. 36 mm nut (Spare parts No.09159-28002)
2. Flange bolt
3. Spring balance (1-5 or 1-10 kg range)
4. Flange

1) Install bevel pinion dummy with front and rear bearings into differential carrier and then tighten 36 mm nut (Spare parts No.09159-28002) lightly by hand.

Special Tool
(B): 09922-77280

2) Install flange to bevel pinion dummy.
3) Install special tool to flange by using 4 flange nuts.

Special Tool
(C): 09922-75222

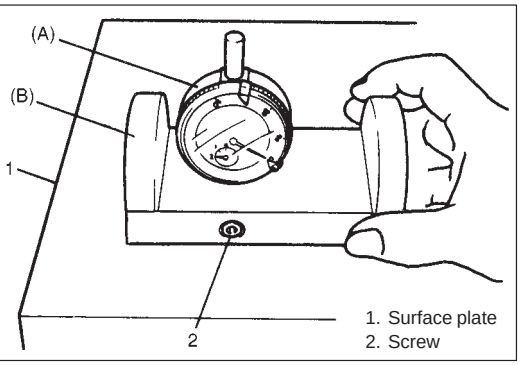
4) Tighten 36 mm nut while turning dummy so that specified bearing preload is obtained.

NOTE:
- **This installation requires no spacer or oil seal.**
- **Before taking measurement with special tool, apply thin coat of differential oil to bearings and turn bevel pinion dummy a few times to ensure its good fitting.**

Pinion bearing preload : 8.0 kg-cm (7.0 lb-in)
Starting torque with special tool : 1.6 kg (3.5 lb)

5) Set dial gauge to bevel pinion mounting dummy and make 0 (zero) adjustment on surface plate.

Special Tool
(A): 09900-20606
(B): 09922-77280

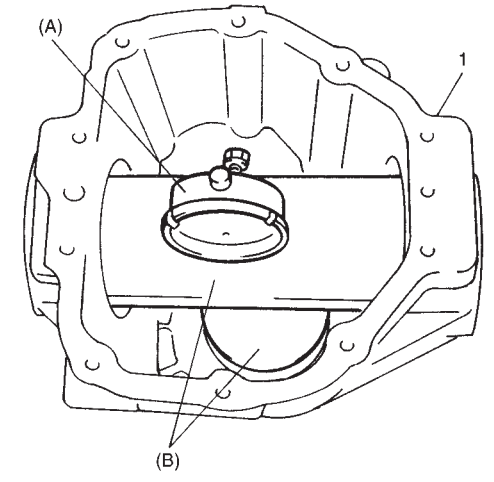


1. Surface plate
2. Screw

6) Place zero-adjusted mounting dummy and dial gauge set on pinion dummy and take measurement between zero position and extended dial gauge measuring tip.

NOTE:
- **Repeat turning back and force of dummy and measure distance as far as top surface of pinion dummy accurately.**
- **When dial gauge measuring tip extends from 0 (zero) position, pointer turns counterclockwise.**

Special Tool
(A): 09900-20606
(B): 09922-77280

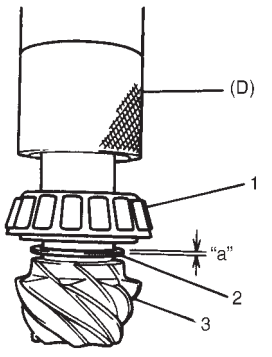


1. Differential carrier

7) Obtain adjusting shim thickness by using measured value by dial gauge (which represents C in page 7F-10) in following equation.

Necessary shim thickness (F)	= 80 +	Dial gauge measured value (C)	–	Measurement printed on pinion (E)

80 in above equation is A + B of mounting dummy as shown in page 7F-10.



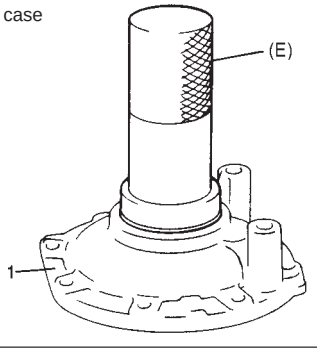
1. Rear bearing
2. Adjusting shim
3. Bevel pinion

8) Select adjusting shim closest to calculated value from among following available sizes and put it in place and then press-fit rear bearing.

Available shim thickness	0.30, 0.87, 0.84, 0.81, 0.78, 0.75, 0.72, 0.69, 0.66, 0.63 and 0.60 mm 0.012, 0.034, 0.033, 0.032, 0.031, 0.029, 0.028, 0.027, 0.026, 0.025 and 0.024 in.

"a" : Closest value to F (Calculated)
Special Tool
(D): 09925-18011

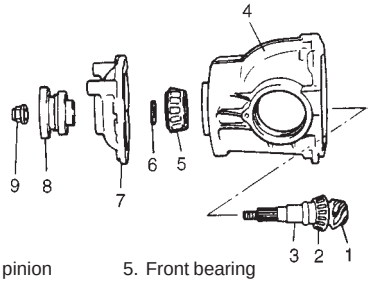
1. Front case



9) Using special tool and plastic hammer, drive oil seal into differential carrier front case till it becomes flush with front case end. Then apply grease to oil seal lip.

"A": Grease 99000-25010

Special Tool
(E): 09913-85210



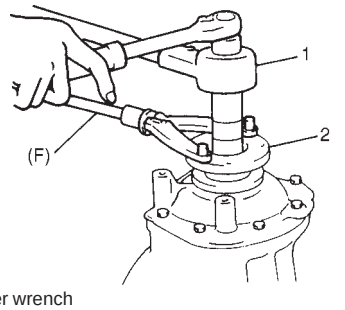
1. Bevel pinion
2. Rear bearing
3. Spacer
4. Differential carrier
5. Front bearing
6. Washer
7. Front case
8. Flange
9. Nut

10) With new pinion spacer inserted as shown in left figure, install front bearing to differential carrier.

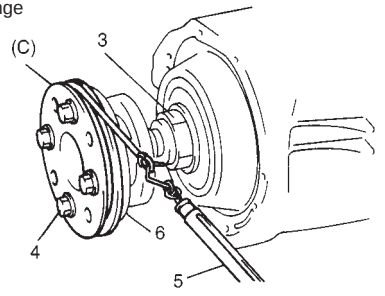
NOTE:
Apply differential oil to front and rear bearings.

11) Install washer to bevel pinion.
12) After applying sealant to mating surface of front cover, install it to differential carrier.

"A": Sealant 99000-31110



1. Power wrench
2. Flange



3. 36 mm nut (Spare parts No. 09159-28002)
4. Flange bolt
5. Spring balance (1 – 5 or 1 – 10 kg range)
6. Flange

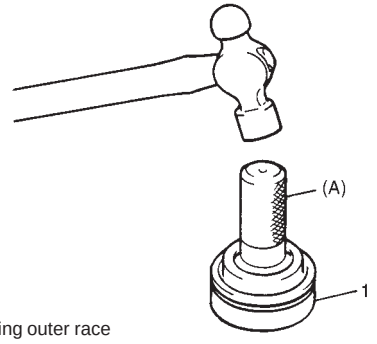
13) Install flange to bevel pinion and tightening flange nut gradually with special tool and power wrench to specified torque while turning bevel pinion.
Set preload of bevel pinion to specification.

NOTE:
- **Before taking measurement with spring balance, check for smooth rotation by hand.**
- **Be sure to tighten gradually and carefully till specified starting torque is obtained. Turning back overtightened flange nuts should be avoided.**

Special Tool
(C): 09922-75222
(F): 09930-40113

Tightening Torque
(a): 200 N·m (20.0 kg-m, 145.0 lb-ft)

Pinion bearing preload: 5 – 13 kg-cm (4.4 – 11.2 lb-in)
Starting torque with special tool: 1 – 2.6 kg (2.2 – 5.7 lb)



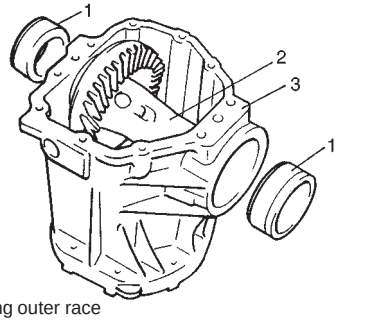
1. Bearing outer race

ASSEMBLING UNIT

1) Install side oil seal to bearing outer race.
Then apply grease to oil seal lip.

"A": Grease 99000-25010

Special Tool
(A): 09913-75520

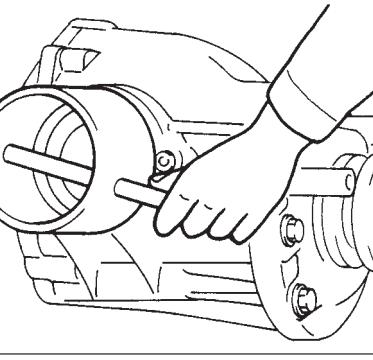


1. Bearing outer race
2. Differential case
3. Differential carrier

2) Place bearing outer races on their respective bearings.

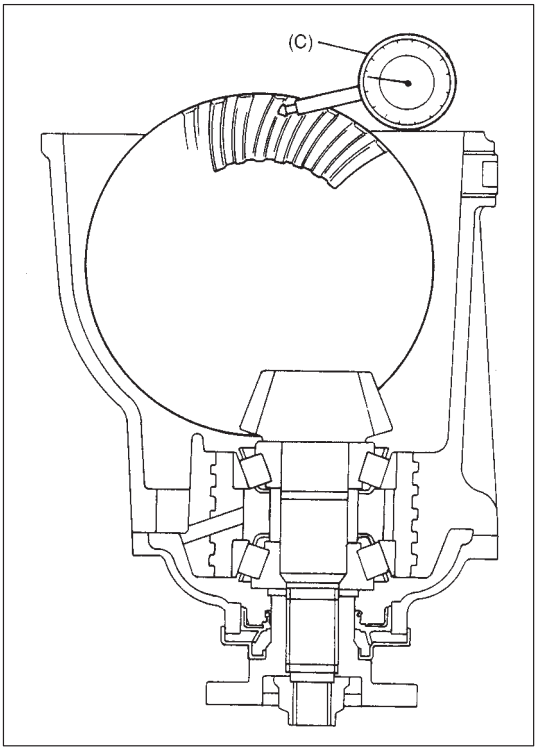
NOTE:
Used left and right outer races are not interchangeable.

3) After applying differential oil to side bearings, install case assembly in carrier.



4) Tighten bearing retainer.

Special Tool
(B): 09923-58520

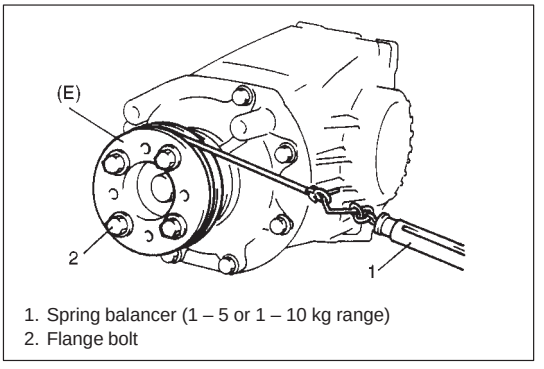


5) To measure drive bevel gear backlash, set dial gauge at right angle to bevel gear tooth, fix drive bevel pinion, tighten both retainers and read dial gauge while moving bevel gear.

NOTE:
- ○ **Be sure to apply measuring tip of dial gauge at right angles to convex side of tooth.**
- ○ **As a practical measure following would be recommended to obtain specified backlash and side bearing preload at the same time.**
  1. **Obtain specified backlash by turning both retainers inward lightly.**
  2. **Tighten both retainers further by one notch at a time.**
- ○ **Measure at least 4 points on drive bevel gear periphery.**

Special Tool
(B): 09923-58520
(C): 09900-20606
(D): 09900-20701

Standard backlash: 0.1 – 0.2 mm (0.004 – 0.008 in.)



1. Spring balancer (1 – 5 or 1 – 10 kg range)
2. Flange bolt

6) With bevel gear installed, measure starting torque by using special tool.

Special Tool
(E): 09922-75222

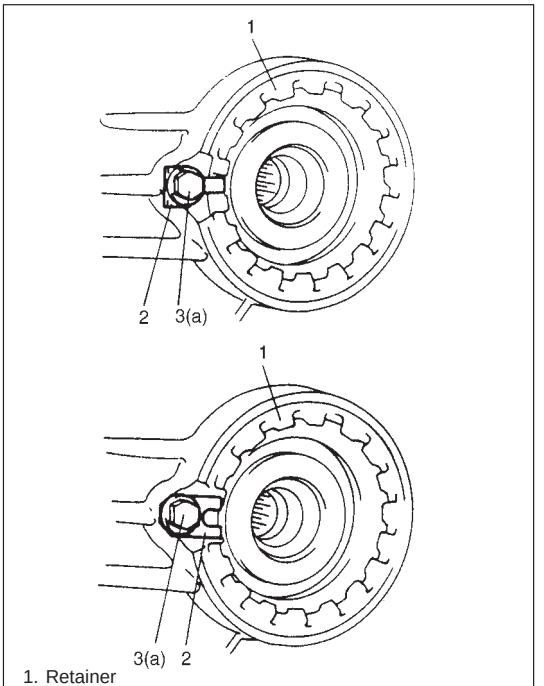
Side bearing preload:
Measure bevel pinion preload +3 – 5 kg-cm (2.6 – 4.3 lb-in)

Starting torque with special tool:
Measure bevel pinion starting torque + 0.6 – 1 kg (1.3 – 2.2 lb)

7) Install retainer stoppers.

NOTE:
Change shape of retainer stopper depending on position of tooth on retainer.

Tightening Torque
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

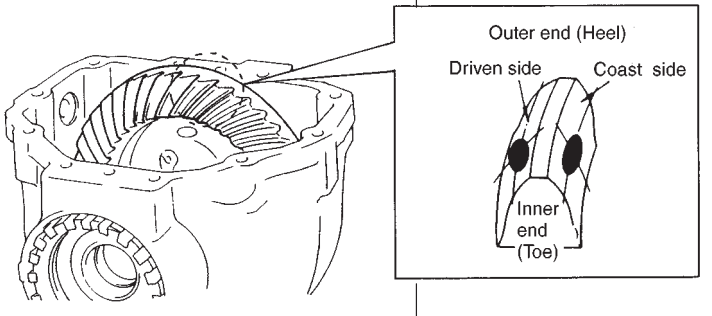
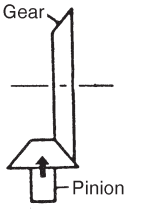
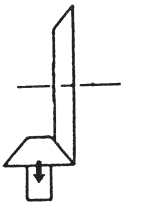


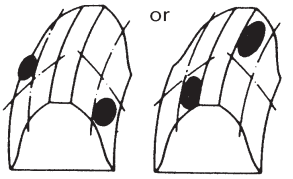
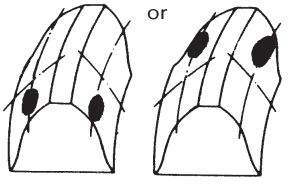
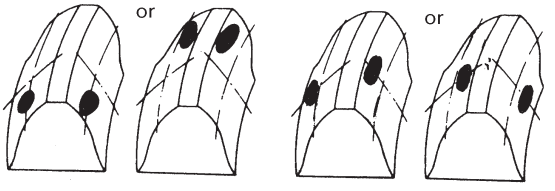
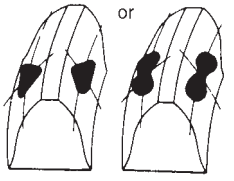
1. Retainer
2. Stopper
3. Bolt

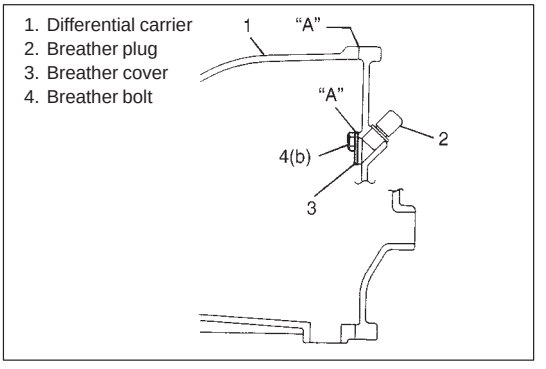
8) Check gear tooth surface contact.
Apply red lead paste to tooth surface of drive bevel gear and turn it by hand to check its contact with drive bevel pinion.
Check contact pattern, referring to following chart. If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.

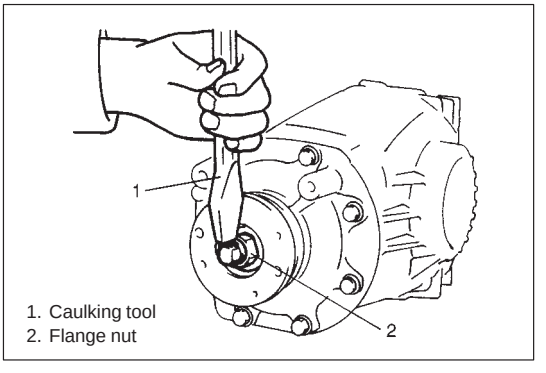
NOTE:
- ○ **Apply red lead paste all around bevel gear but not so much as to become sticky.**
- ○ **Be careful not to turn bevel gear more than one full revolution, for it will hinder accurate check.**

GEAR TOOTH SURFACE CONTACT

TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY
	NORMAL
	HIGH CONTACT Pinion is positioned too far from the center of drive bevel gear. 1. Increase thickness of pinion height adjusting shim and position pinion closer to gear center. 2. Adjust drive bevel gear backlash to specification. 
	LOW CONTACT Pinion is positioned too close to the center of drive bevel gear. 1. Decrease thickness of pinion height adjusting shim and position pinion farther from gear center. 2. Adjust drive bevel gear backlash to specification. 

TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY
	If adjustment is impossible, replace differential carrier.
	○ Drive bevel gear or drive bevel pinion defective. ○ Poor squareness of differential carrier. ○ Differential carrier surface where gear is installed is defective. Replace defective part as an assembly.
	1. Check seating of bevel gear or differential case. (Check bevel gear for runout). 2. If adjustment is impossible, replace drive bevel gear and pinion as a set or differential carrier.
	Replace drive bevel gear and pinion as a set or differential case, if found defective.



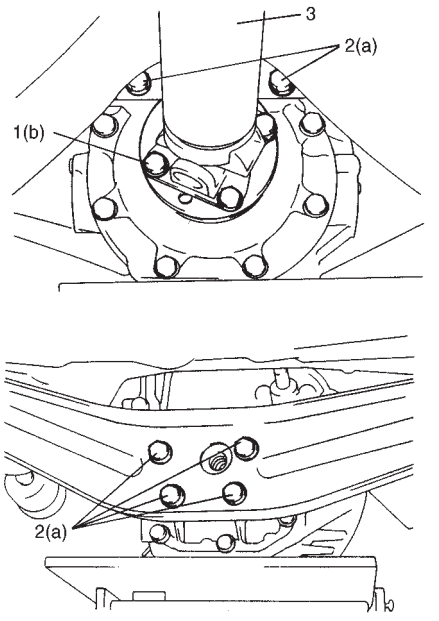


9) Upon completion of gear tooth contact check in Step 8), after applying sealant to breather cover, install breather plug to rear cover.
10) After applying sealant to rear cover, install rear cover to differential carrier.

"A": Sealant 99000-31110

Tightening Torque
(b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)
Tightening Torque for rear cover bolts
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

11) Caulk flange nut with caulking tool and hammer.



1. Propeller shaft flange bolt
2. Rear differential mounting bolts
3. Propeller shaft

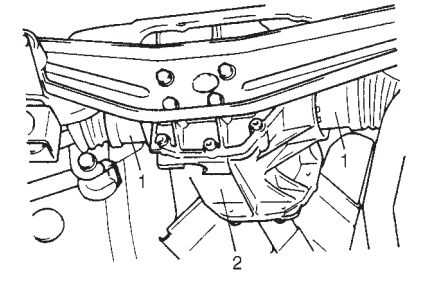
REMOUNTING

1) Install propeller shaft to joint flange aligning match marks.
2) Install rear differential to mounting bracket and tighten 6 mounting bolts to specified torque.

   Tightening Torque
   (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

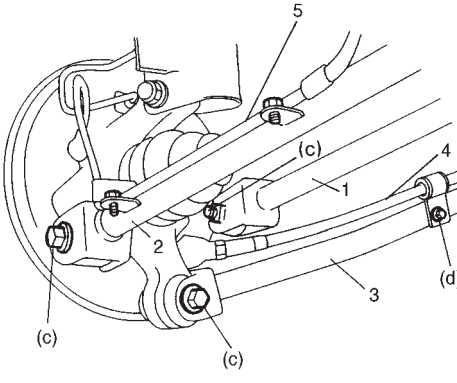
3) Tighten 4 propeller shaft flange bolts to specified torque.

   Tightening Torque
   (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)



1. Rear drive shaft
2. Rear differential

4) Drive in rear drive shaft to rear differential.



1. No.1 control rod
2. No.2 control rod
3. Trailing rod
4. Parking brake cable
5. Wheel speed sensor (equipped with ABS)

5) Tighten No.1 and No.2 control rod outer bolt and trailing rod rear bolt to specified torque.

   Tightening Torque
   (c): 90 N·m (9.0 kg-m, 65.0 lb-ft)

6) Tighten parking brake cable bracket bolt to specified torque.

   Tightening Torque
   (d): 10 N·m (1.0 kg-m, 7.5 lb-ft)

7) If it is equipped with ABS, tighten wheel speed sensor harness bracket bolts.
8) Fill hypoid gear oil as specified.
   (Refer to “OIL CHANGE” in this section.)
9) Install wheels.
10) Lower lift

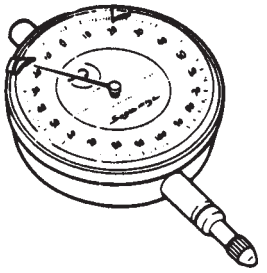
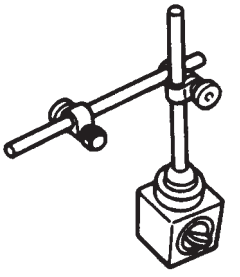
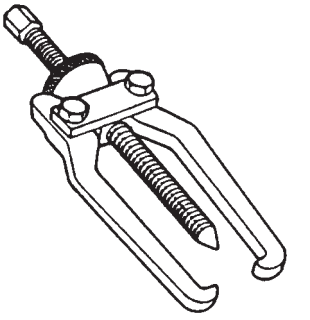
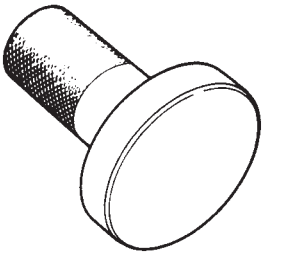
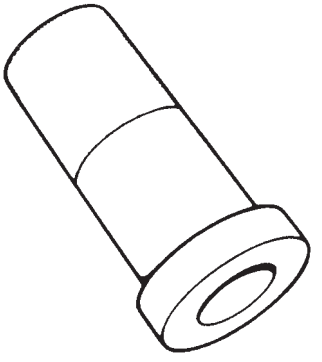
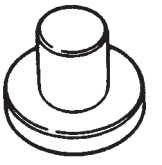
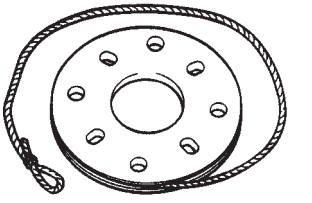
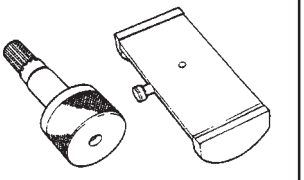
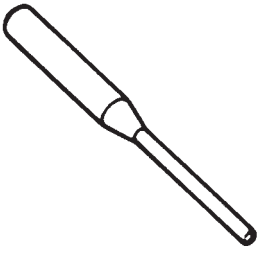
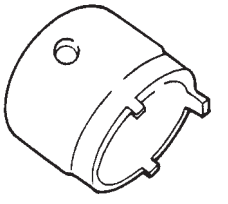
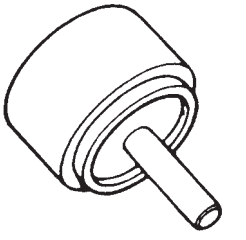
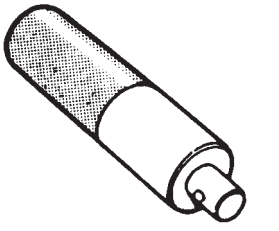
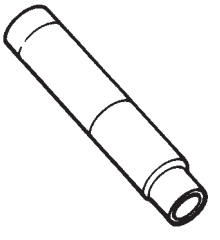
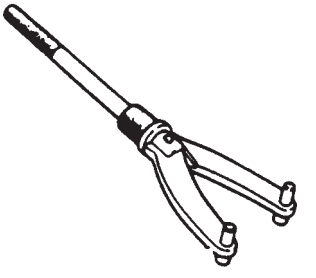
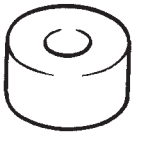
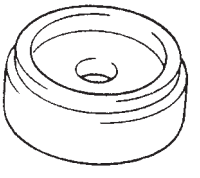
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
1. Differential oil filler/level plug	21	2.1	15.5
2. Differential oil drain plug			
3. Propeller shaft flange bolts	23	2.3	17.0
4. Bevel gear bolts	73	7.3	53.0
5. Bearing retainer stopper bolts	10	1.0	7.5
6. Breather plug bolts	5.5	0.55	4.0
7. Rear cover bolts	23	2.3	17.0
8. Flange nut	200	20.0	145.0
9. Differential mounting bolts	50	5.0	36.5
10. No.1 and No.2 control rod outer bolt	90	9.0	65.0
11. Trailing rod rear bolt			
12. Parking brake cable bracket bolt	10	1.0	7.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Thread lock cement	THREAD LOCK CEMENT SUPER 1333B (99000-32020)	Bevel gear bolts
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO.1215 (99000-31110)	○ Rear differential drain and level/filler plugs ○ Breather plug cover ○ Mating surface of differential front and rear covers

SPECIAL TOOLS

 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09913-65135 Bearing puller	 09913-75520 Bearing installer
 09913-85210 Bearing installer	 09913-85230 Bearing removing jig	 09922-75222 Preload adjuster	 09922-77280 Bearing pinion adjuster set
 09922-85811 Spring pin remover	 09923-58520 Differential side bearing adjuster No.2	 09923-78210 Bearing installer	 09924-74510 Installer attachment
 09925-18011 Bearing installer	 09930-40113 Rotor holder	 09951-16060 Lower arm bush remover	 09951-16090 Oil seal installer

SECTION 8

BODY ELECTRICAL SYSTEM

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
When the text says "If equipped", the subject vehicle may or may not be equipped with that system depending on models or statutory regulations.

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GENERAL DESCRIPTION

The body electrical components of this vehicle are designed to operate on 12 volts power supplied by the battery. The electrical system utilizes negative grounded polarity.

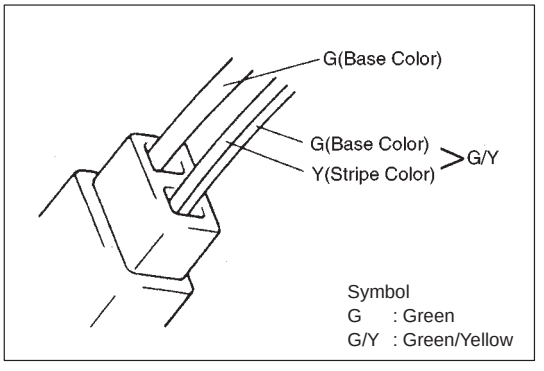
WIRING

All body low voltage wires are insulated. The insulation is color coded for identification of individual body circuit.

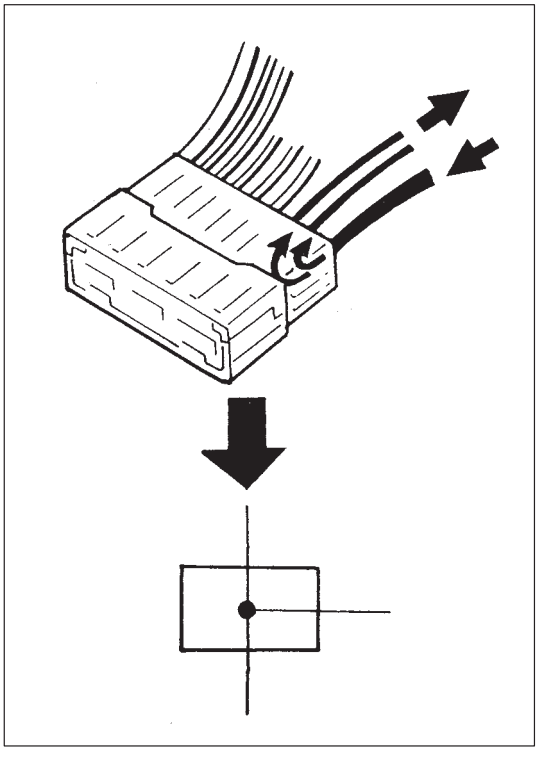
Symbol	Wire Color	Symbol	Wire color
B	Black	Or	Orange
Bl	Blue	R	Red
Br	Brown	W	White
G	Green	Y	Yellow
Gr	Gray	P	Pink
Lbl	Light blue	V	Violet
Lg	Light green		

WIRE COLOR SYMBOLS

The initial alphabet(s) of the color name is used to represent each color as listed at the left.



There are two types of wire color: one-color type and 2-color type (with a stripe). In case of 2-color type, the first alphabet (“G” of the example in the figure at the left) represents the basic color (color of wire insulation) and the next alphabet (“Y” of the example) represents the color of stripe.

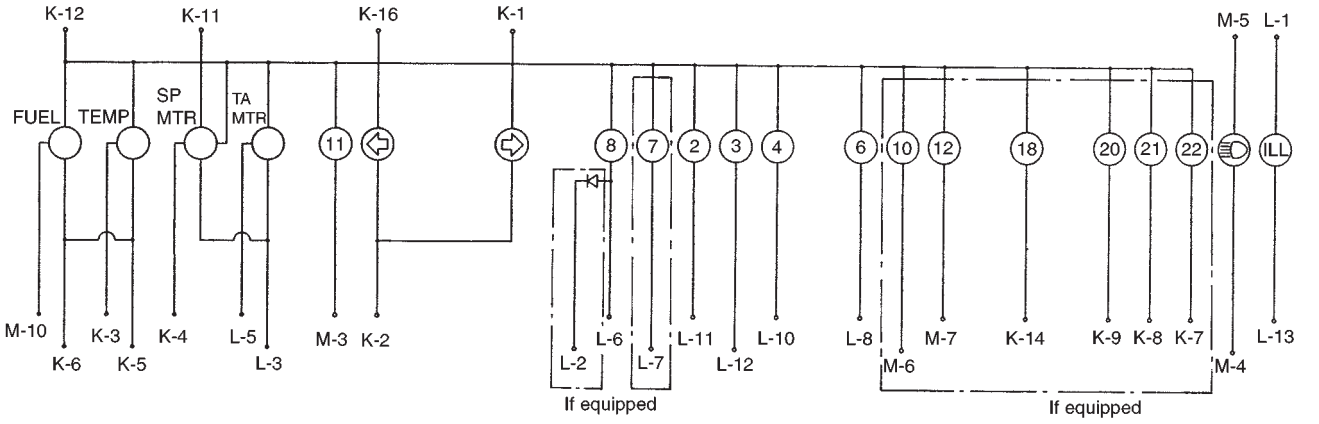


JOINT CONNECTOR (J/C)

- ○ Wiring of this vehicle employs joint connectors (J/C) which drive one wire into several different wires or combine several different wires into one wire.
- ○ The joint connector is as shown.

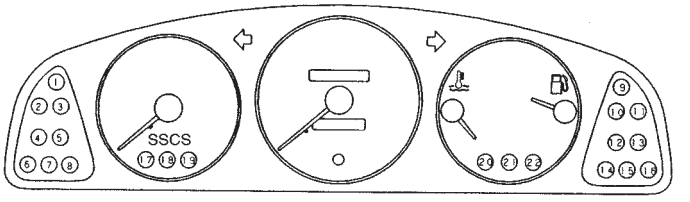
INSTRUMENTS AND GAUGES

COMBINATION METER WIRING

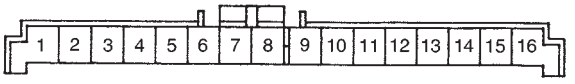


NOTE:

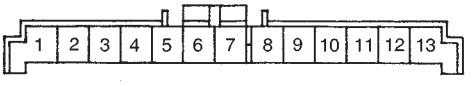
- **"☆" : Australian spec. vehicle only.**
- **Terminal arrangement of instrument harness coupler viewed from harness side.**



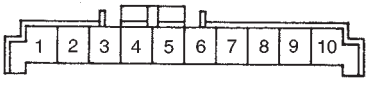
Coupler K



Coupler L



Coupler M



	1	2	3	4	5	6	7	8		9	10		11		12
Indicator				AIR BAG								ABS	CHECK ENGINE		
Color		RED	RED	RED		RED		RED		BLUE	AMBER	AMBER	AMBER	AMBER	AMBER

	13	14	15	16	17	18	19	20	21	22			FUEL	TURN
Indicator						SPORT		POWER	O/D OFF	SNOW				
Color						GREEN		AMBER	AMBER	AMBER			AMBER	GREEN

Coupler K

1. To combination switch	
LH steering vehicle	G/W
RH steering vehicle	G/Y
2. To ground	B
3. To ECT sensor	P/B
4. To VSS	V/Y
5. To ground	B
6. To ECM	Bl/Y
7. To A/T control module (if equipped)	Bl/R
8. To A/T control module (if equipped)	Lg
9. To A/T control module (if equipped)	Bl
10. Blank	–
11. To ECM	V
12. To ignition switch	B/W
13. Blank	–
14. Suspension control module (if equipped)	V/W
15. Blank	–
16. To combination switch	
LH steering vehicle	G/Y
RH steering vehicle	G/W

Coupler L

1. To main fuse	R/Y
2. To ignition switch (if equipped)	P
3. To ground	B/Or
4. Blank	–
5. To ECM	Br
6. To brake fluid level switch and parking brake switch and EBD warning lamp relay (if equipped)	R/B
7. Blank	–
8. To generator	W/R
9. Blank	–
10. To air bag control module (if equipped)	Bl
11. To oil pressure switch	Y/R
12. To warning control module/ buzzer (if equipped)	Y/Bl
13. To tail light relay	R/Bl

Coupler M

1. Blank	–
2. Blank	–
3. To ECM	V
4. To combination switch	R
5. To main fuse box	Bl/B
6. To ABS control module (if equipped)	R/Bl
7. To ECM (if equipped)	Br/W
8. Blank	–
9. Blank	–
10. To fuel level gauge	P/Bl

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Speedometer shows no operation.	IG. fuse blown Speed sensor faulty Speedometer faulty Wiring or grounding faulty	Replace fuse to check for short. Check speed sensor. Replace speedometer. Repair.
Fuel level meter shows no operation.	IG. fuse blown Fuel meter faulty Fuel level gauge unit faulty Wiring or grounding faulty	Replace fuse to check for short. Check meter. Check gauge unit. Repair.
Coolant (Water) temp. meter shows no operation.	IG. fuse blown Coolant (Water) temp. meter faulty Coolant (Water) temp. sending unit faulty Wiring or grounding faulty	Replace fuse to check for short. Check meter. Check sending unit. Repair.
Oil pressure light shows no lighting.	Light fuse blown Bulb burnt out Oil pressure switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check switch. Repair.
Brake warning light (parking brake light) shows no lighting.	Light fuse blown Bulb burnt out Parking brake switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check parking brake switch. Repair.
Seat belt warning light/ buzzer show no lighting/ sounding.	Light fuse blown Bulb burnt out Buzzer faulty (no sounding) Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Replace buzzer. Repair.
Main switch key warning buzzer shows no sounding. (Applicable to vehicle equipped with buzzer.)	Buzzer fuse blown Buzzer faulty Wiring or grounding faulty	Replace fuse to check for short. Replace buzzer. Repair.
Light warning buzzer shows no sounding. (Applicable to vehicle equipped with buzzer)	Buzzer fuse blown Buzzer faulty Driver side door switch faulty	Replace fuse to check for short. Replace buzzer. Replace door switch.

REMOVE AND INSTALLATION

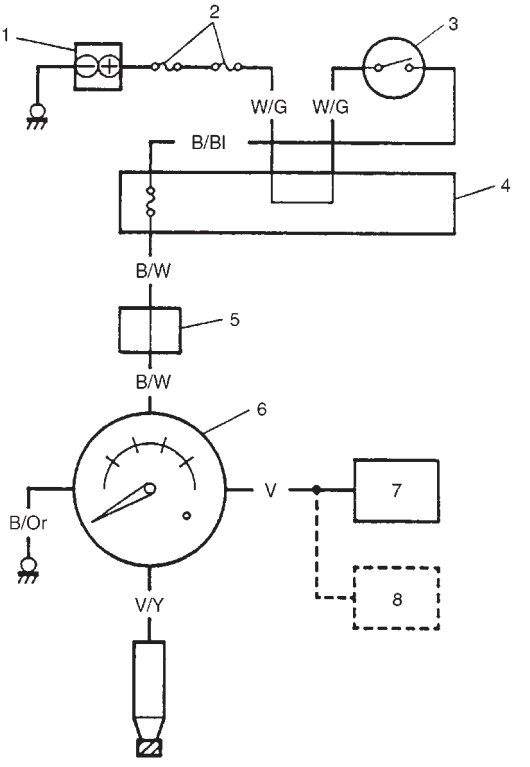
1) Remove instrument cluster panel.
2) Disconnect coupler from combination meter.
3) Remove combination meter.
4) Reverse removal procedure for installation.

SPEEDOMETER AND SENSOR

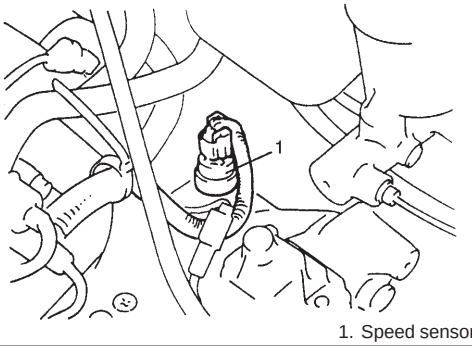
DESCRIPTION OF CIRCUIT

The speedometer circuit consists of the speedometer installed inside the combination meter and the speed sensor installed to the transmission case.

WIRING CIRCUIT



1. Battery
2. Main fuse
3. Ignition switch
4. Junction/fuse block
5. Joint connector
6. Speedometer
7. ECM
8. Cruise controller (if equipped)
9. Speed sensor



1. Speed sensor

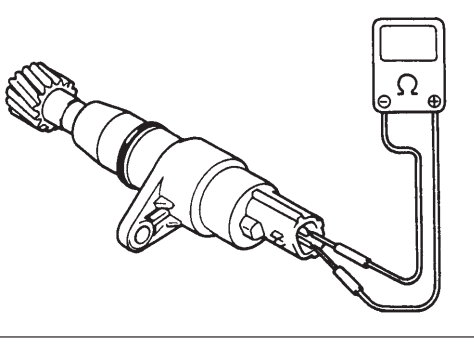
SPEED SENSOR

Removal

1) Disconnect coupler from speed sensor.
2) Remove speed sensor.

Installation

Reverse removal procedure for installation.



Inspection

○ Resistance between terminals should be within the following range.

Coil resistance (20° – 30°C): 300 – 450Ω

○ When speed sensor shaft is turned with fingers, resistance due to magnetic force (click) should be felt.

FUEL LEVEL METER AND GAUGE UNIT

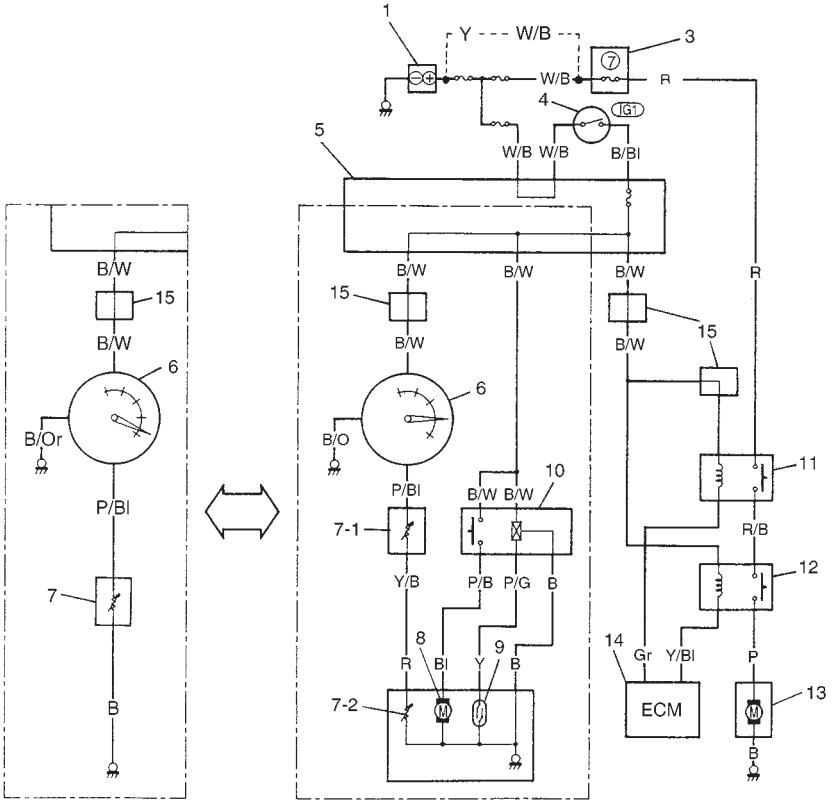
DESCRIPTION OF CIRCUIT

The fuel level meter circuit consists of the fuel level meter installed inside the combination meter and the fuel level gauge(s) installed to the fuel tank.

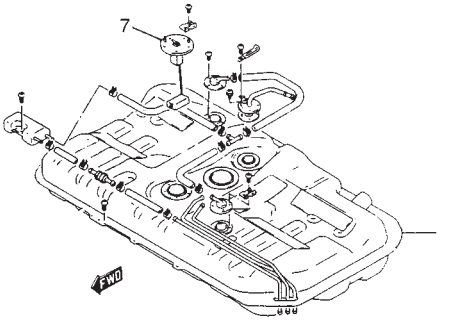
Current flowing through the meter coil is changed to control the meter pointer. That is, when fuel is full, the fuel level gauge unit resistance is decreased with more current flowing into the meter coil, causing the meter pointer to point at the “F” position.

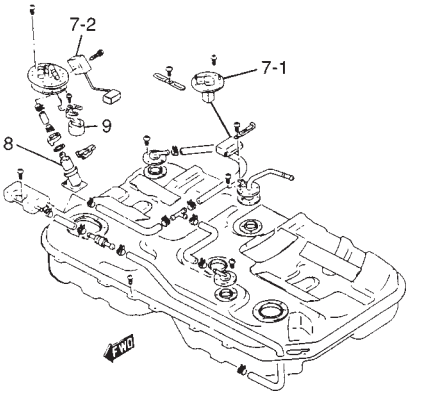
NOTE:

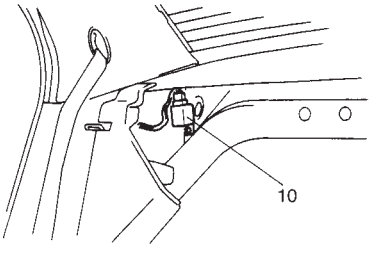
– – – – –: German spec. vehicle only.



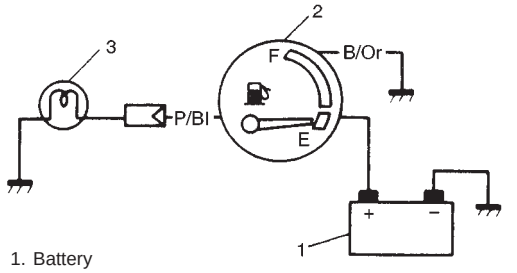
< 2WD model > **< 4WD model >**







1. Battery
2. Main fuse
3. Relay/fuse box
4. Ignition switch
5. Junction/fuse block
6. Fuel meter
7. Fuel level gauge assembly
7-1. Fuel level main gauge assembly
7-2. Fuel level sub gauge assembly
8. Sub fuel pump
9. Float switch
10. Fuel pump controller
11. Fuel injection main relay
12. Fuel pump relay
13. Main fuel pump
14. ECM
15. Joint connector



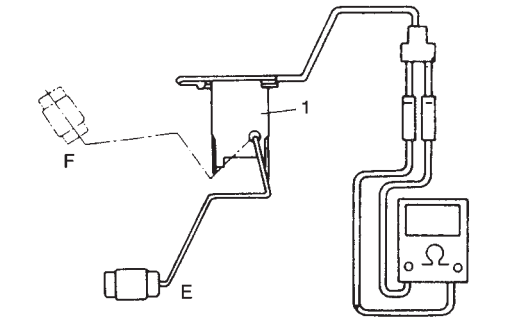
1. Battery
2. Fuel meter
3. Test light (12V, 3.4W)

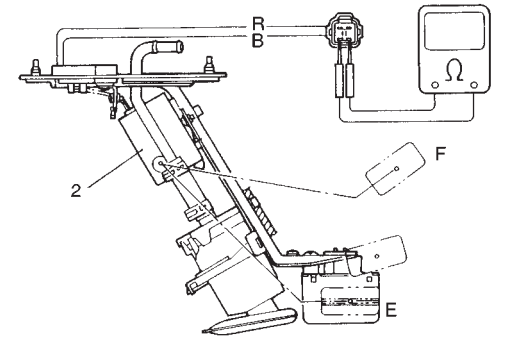
INSPECTION

FUEL LEVEL METER

1) Remove rear seat.
2) Disconnect “P/BI” lead wire going to gauge unit.
3) Use a bulb (12V 3.4W) in position to ground lead wire as illustrated.
4) Turn ignition switch ON.
   Make sure that bulb is lighted with meter pointer fluctuating several seconds thereafter. If meter is faulty, replace.

F: Full
E: Empty





1. Fuel level (main) gauge
2. Fuel level sub gauge

GAUGE UNIT

Use an ohmmeter to confirm that resistance of level gauge unit changes with change of float position.

2WD model

Position	Resistance (Ω)
E	112 – 128
F	1 – 5
1/2	28.5 – 36.5

4WD model

Position	Resistance (Ω)	
	Main	Sub
E	59 – 61	43.5 – 50.5
F	0.5 – 2.5	0.5 – 2
1/2	46.7 – 48.7	27.5 – 33.5

FUEL PUMP, CONTROLLER AND FLOAT SWITCH

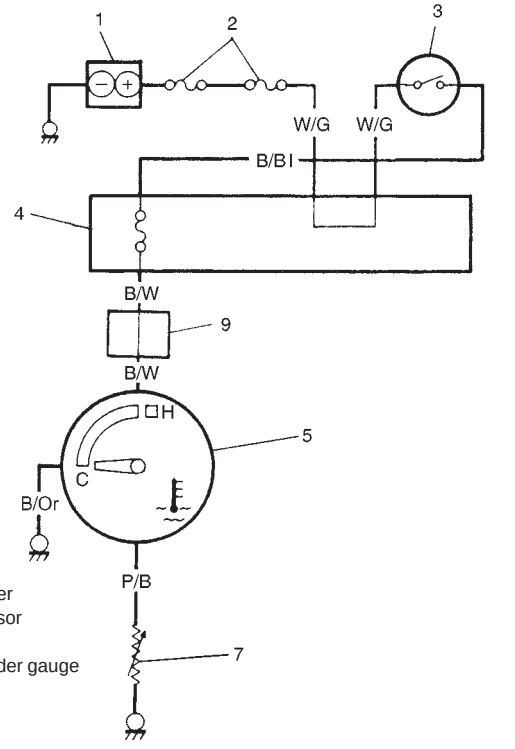
Refer to Section 6E1 “FUEL DELIVERY SYSTEM” in this manual.

ENGINE COOLANT TEMPERATURE METER AND SENDER GAUGE

DESCRIPTION OF CIRCUIT

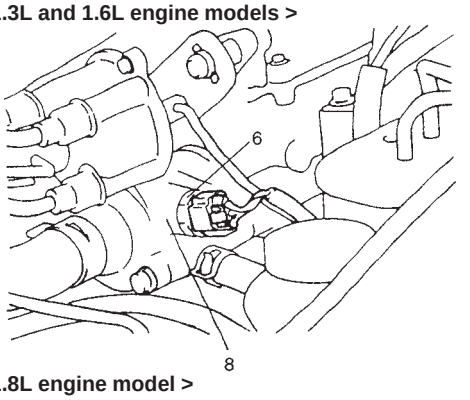
The engine coolant temperature meter is located in the instrument panel and its sender gauge on the inlet manifold. The circuit is as shown below.

The sender gauge shows different resistance values depending on the coolant temperature. This causes a current flowing through the temperature meter coil to change, controlling the meter pointer. That is, when the coolant temperature rises, the sender gauge resistance is decreased with more current flowing through the meter coil, thus allowing the meter pointer to move away from the “C” position.

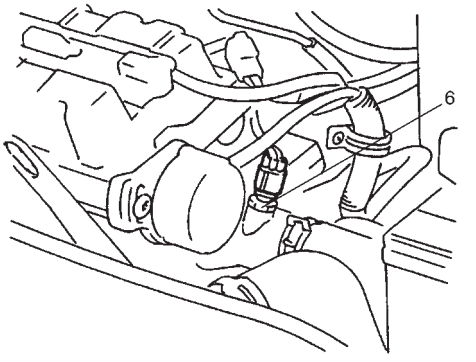


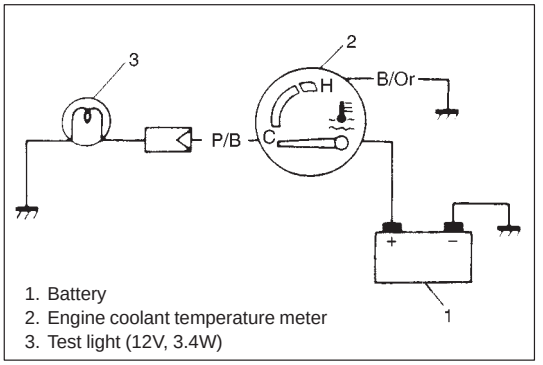
1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Engine coolant temperature meter
6. Engine coolant temperature sensor (ECT sensor)
7. Engine coolant temperature sender gauge (in ECT sensor)
8. Thermostat case
9. Joint connector

< 1.3L and 1.6L engine models >



< 1.8L engine model >



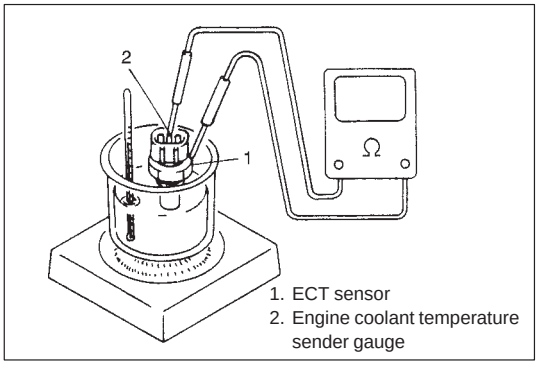


1. Battery
2. Engine coolant temperature meter
3. Test light (12V, 3.4W)

INSPECTION

ENGINE COOLANT TEMPERATURE METER

1) Disconnect “P/B” lead wire going to sender gauge installed at the water outlet cap.
2) Use a bulb (12V 3.4W) in position to ground wire as illustrated.
3) Turn main switch ON. Confirm that bulb is lighted with meter pointer fluctuating several seconds thereafter.
   If meter is faulty, replace.

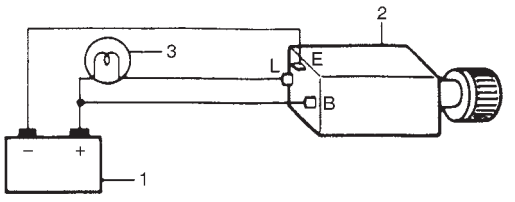


1. ECT sensor
2. Engine coolant temperature sender gauge

SENDER GAUGE (IN ECT SENSOR)

Warm up sender gauge. Thus make sure its resistance is decreased with increase of its temperature.

Temperature	Resistance
50 · C (122 · F)	190 – 260 I
80 · C (176 · F)	55 – 65 I
100 · C (212 · F)	25 – 35 I



1. Battery
2. Illumination controller
3. Test light (12V, 3.4W)

ILLUMINATION CONTROLLER

Inspection

Use a bulb to wire as illustrated.

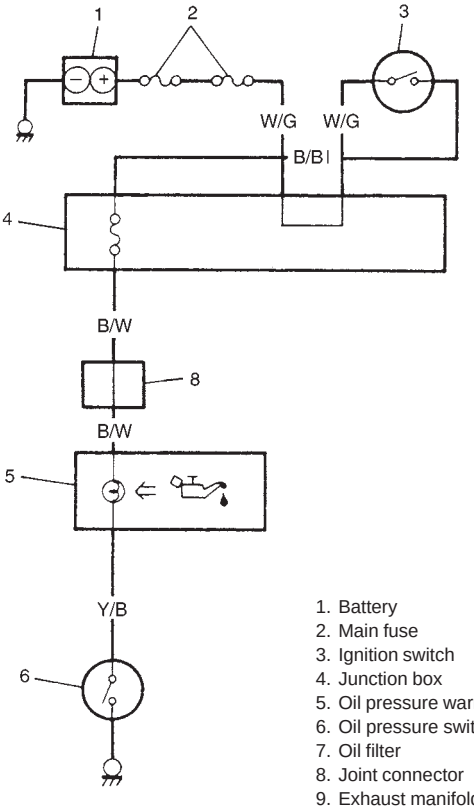
Make sure that illumination controller knob is turned clockwise to brighten test light and counterclockwise to darken it.

OIL PRESSURE LIGHT

DESCRIPTION OF CIRCUIT

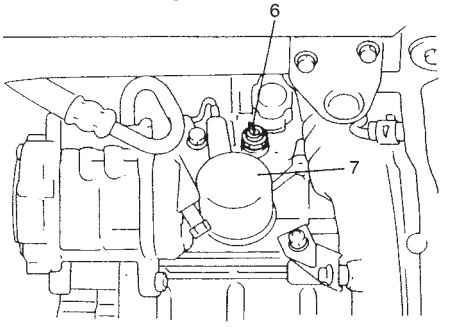
The oil pressure circuit consists of the oil pressure switch installed to the cylinder block and the light (warning light) inside the combination meter.

The oil pressure switch operates in such a way that it is switched OFF when oil pressure is produced by the started engine and then fed to switch.

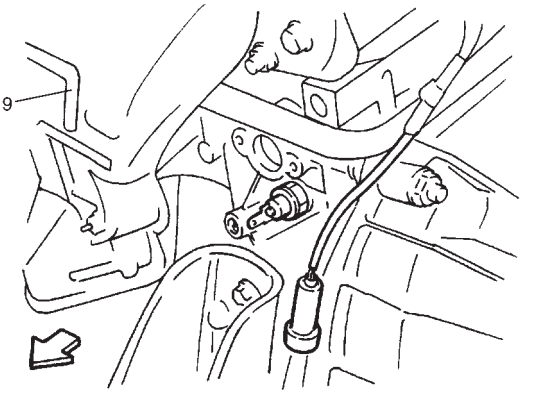


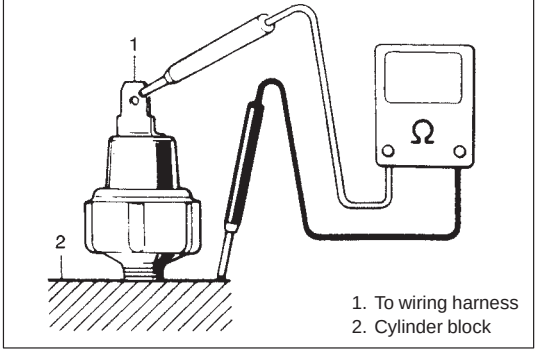
1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Oil pressure warning light
6. Oil pressure switch
7. Oil filter
8. Joint connector
9. Exhaust manifold cover

< 1.3L and 1.6L engine models >



< 1.8L engine model >





1. To wiring harness
2. Cylinder block

INSPECTION

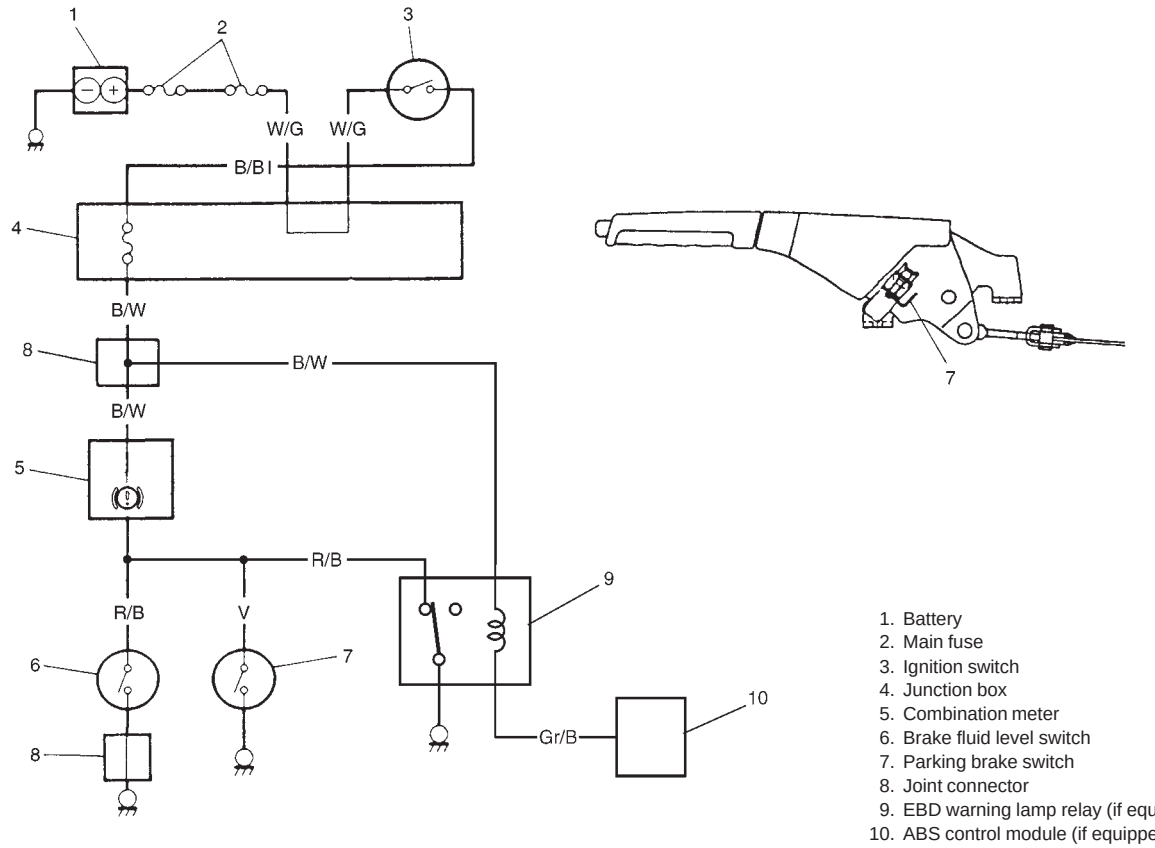
Use an ohmmeter to check oil pressure switch continuity.

During Engine Running	No continuity
At Engine Stop	Continuity

BRAKE WARNING LIGHT

DESCRIPTION OF CIRCUIT

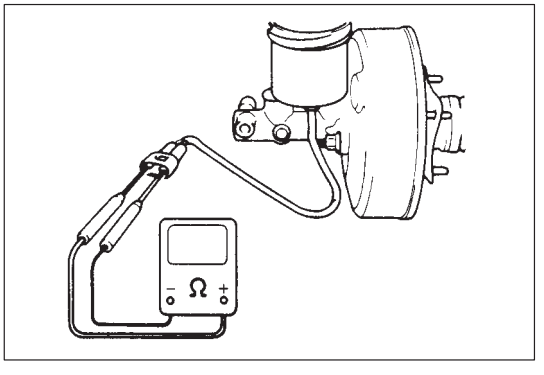
The brake warning light circuit consists of a brake fluid level switch installed in the master cylinder reservoir, and the light (brake warning light) inside the combination meter. Also, this circuit is additionally provided with the parking brake switch which warns that the parking brake is applied.



1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Combination meter
6. Brake fluid level switch
7. Parking brake switch
8. Joint connector
9. EBD warning lamp relay (if equipped)
10. ABS control module (if equipped)

OPERATION OF WARNING LIGHT

1) Warning light comes on when engine is stopped while ignition switch is turned on and parking brake is applied.
2) For bulb check, check that warning light comes on briefly during engine start regardless of brake fluid level position and parking brake operation.
3) After starting engine, release parking brake.
   If light goes off, brake fluid level is adequate.



INSPECTION

BRAKE FLUID LEVEL SWITCH

Use an ohmmeter to check switch for continuity.

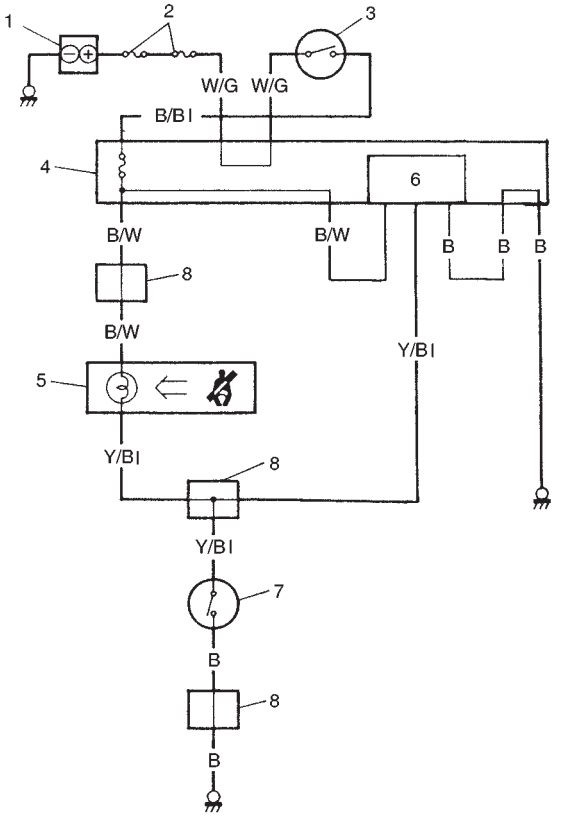
If found defective, replace switch.

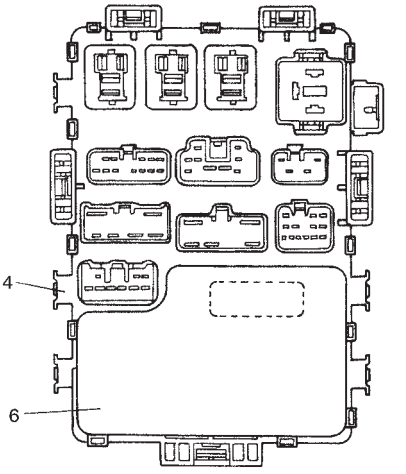
OFF position (float up)	No continuity
ON position (float down)	Continuity

SEAT BELT WARNING LIGHT/BUZZER (if equipped)

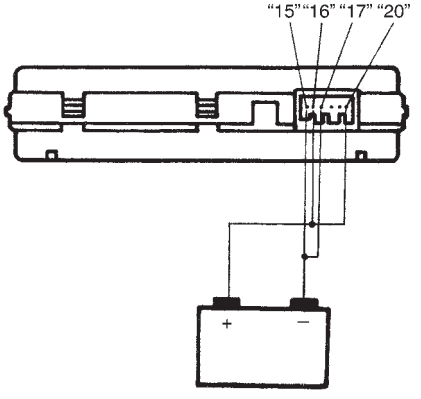
DESCRIPTION OF CIRCUIT

The seat belt warning light/buzzer circuit is a system to light and sound the light and buzzer respectively for several seconds, urging the driver to wear his seat belt. After several seconds, the light goes OFF and the buzzer stops sounding whether the seat belt is worn or not.





1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Seat belt warning light
6. Warning controller/buzzer
7. Seat belt switch
8. Joint connector



INSPECTION

When warning light/buzzer fails to make lighting/sounding, use above circuit diagram as reference to check bulb, buzzer, wiring, etc.

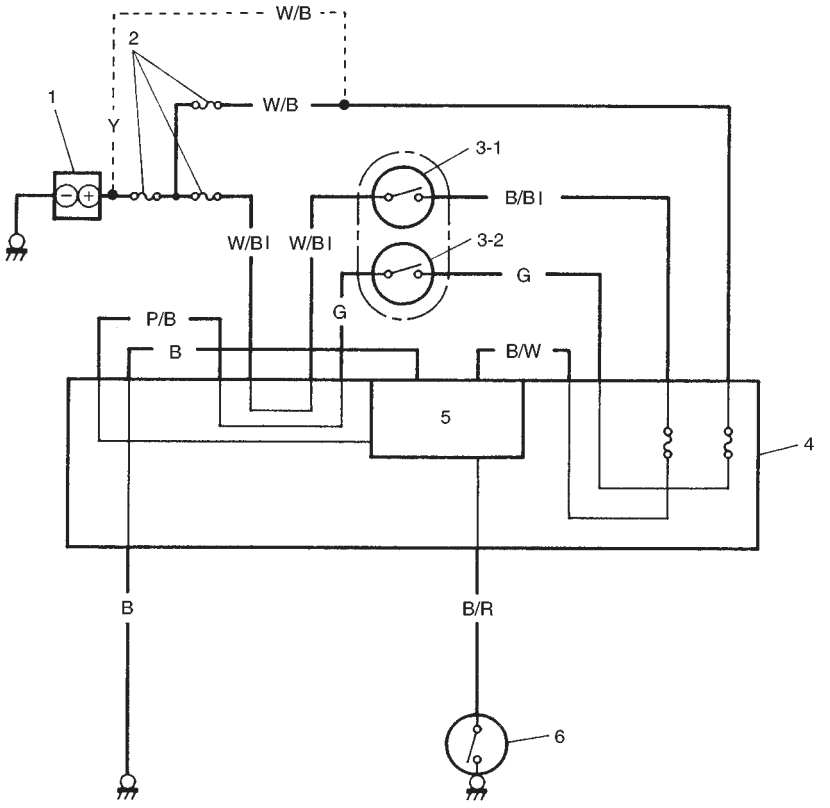
INSPECTION OF WARNING CONTROLLER

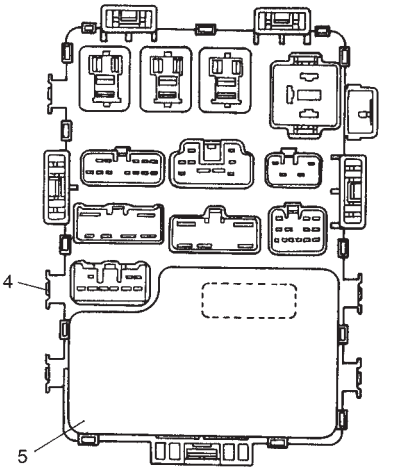
Connect negative (–) terminal of battery to terminals "15" and "17" of controller and positive (+) terminal of battery to terminals "16" and "20" of controller and check that buzzer emits buzzing sound for 4 – 8 seconds. Also, it should operate likewise when terminals are disconnected and reconnected. If check result is not satisfactory, replace.

IGNITION SWITCH KEY REMAINDER WARNING BUZZER

DESCRIPTION OF CIRCUIT

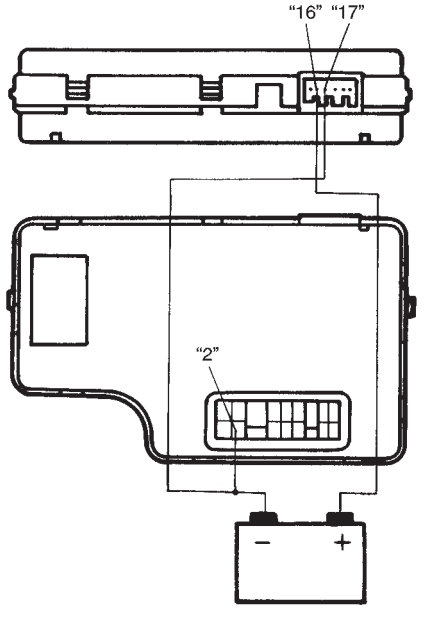
The ignition switch key remainder warning buzzer circuit is a system to sound the buzzer if the driver leaves the vehicle the with ignition switch key inserted so as to urge him to take it out.





NOTE:
– – – – –: German spec. vehicle only

1. Battery
2. Main fuse
3-1. Ignition switch
3-2. Key switch
4. Junction box
5. Warning controller/buzzer
6. Door switch (Drive side)



INSPECTION

If main switch key remainder warning buzzer does not sound, use its wiring diagram in above figure as reference to check buzzer, wiring, etc.

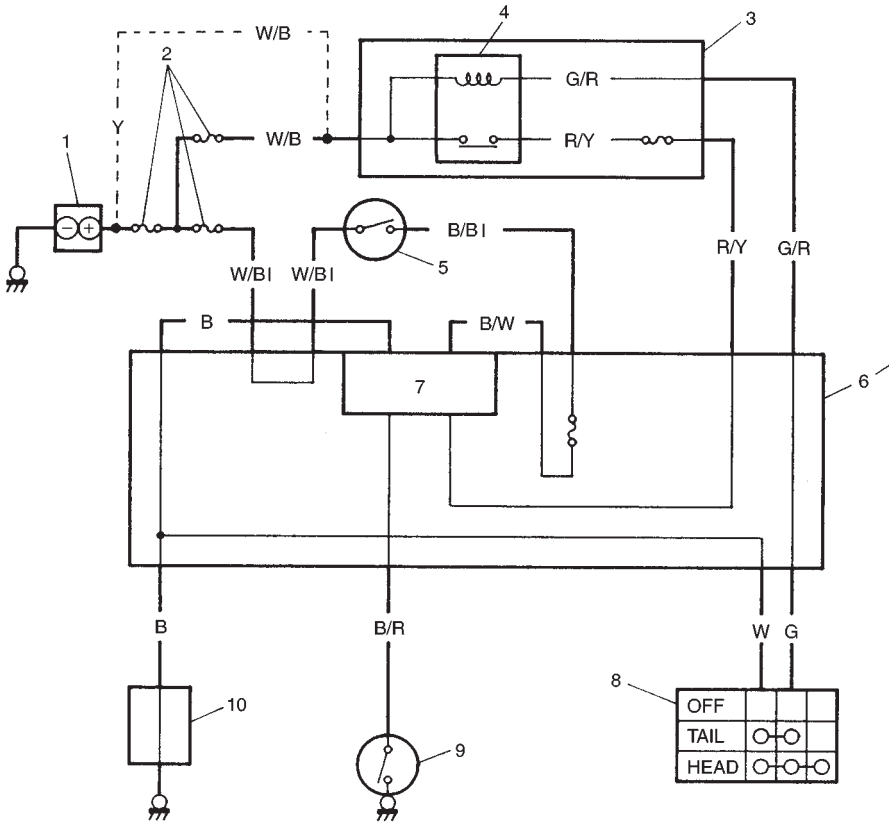
INSPECTION OF WARNING CONTROLLER/BUZZER

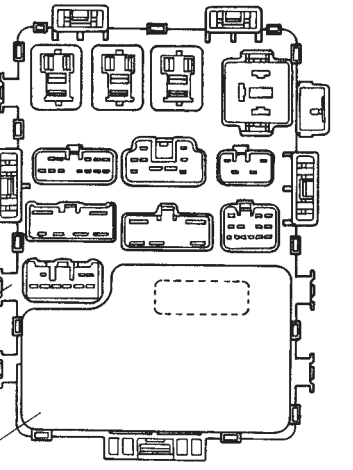
With positive (+) terminal of battery connected to terminal "16" of controller and negative (–) one to "2" and "17" as shown in figure. If buzzer emits buzzing sound then, controller is in good condition. If not, replace.

LIGHT REMAINDER WARNING BUZZER

DESCRIPTION OF CIRCUIT

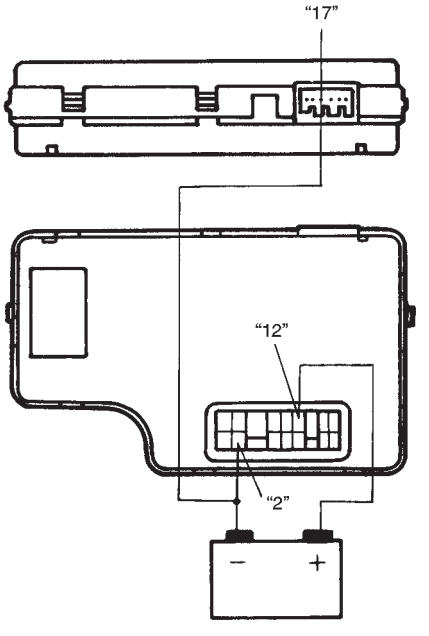
The light remainder warning buzzer circuit is a system designed to sound the buzzer if the driver opens the door (driver's side) while the lights (headlight and small light) are still on, warning him to turn off the lights.





NOTE:
– – – – –: German spec. vehicle only

1. Battery
2. Main fuse
3. Relay/fuse box
4. Tail light relay
5. Ignition switch
6. Junction box
7. Warning controller/ buzzer
8. Combination (light) switch
9. Door switch (driver side)
10. Joint connector



INSPECTION

If light remainder warning buzzer does not sound or interior light shows no lighting, use the above circuit diagram as reference to check buzzer, wiring, etc.

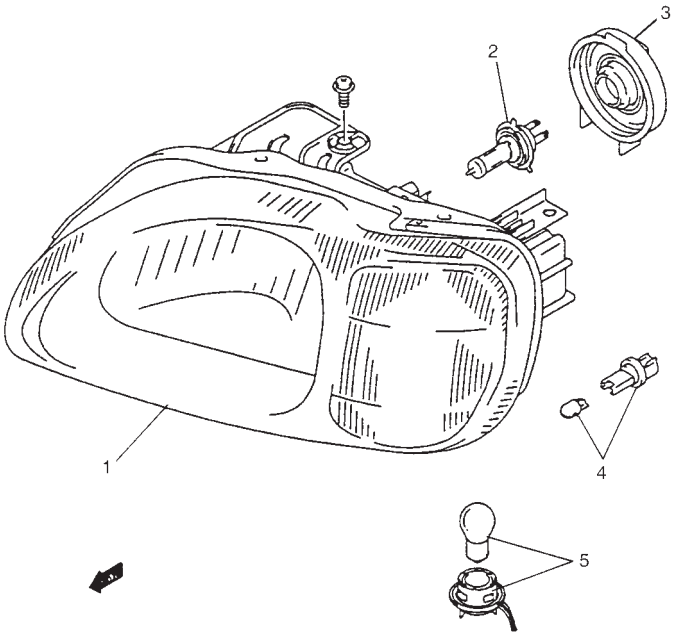
INSPECTION OF WARNING CONTROLLER/BUZZER

First, connect positive (+) terminal of battery to terminals "12" of controller and negative (–) one to terminal "2" and "17".

If buzzer emits buzzing sound then, controller is in good condition. If not, replace.

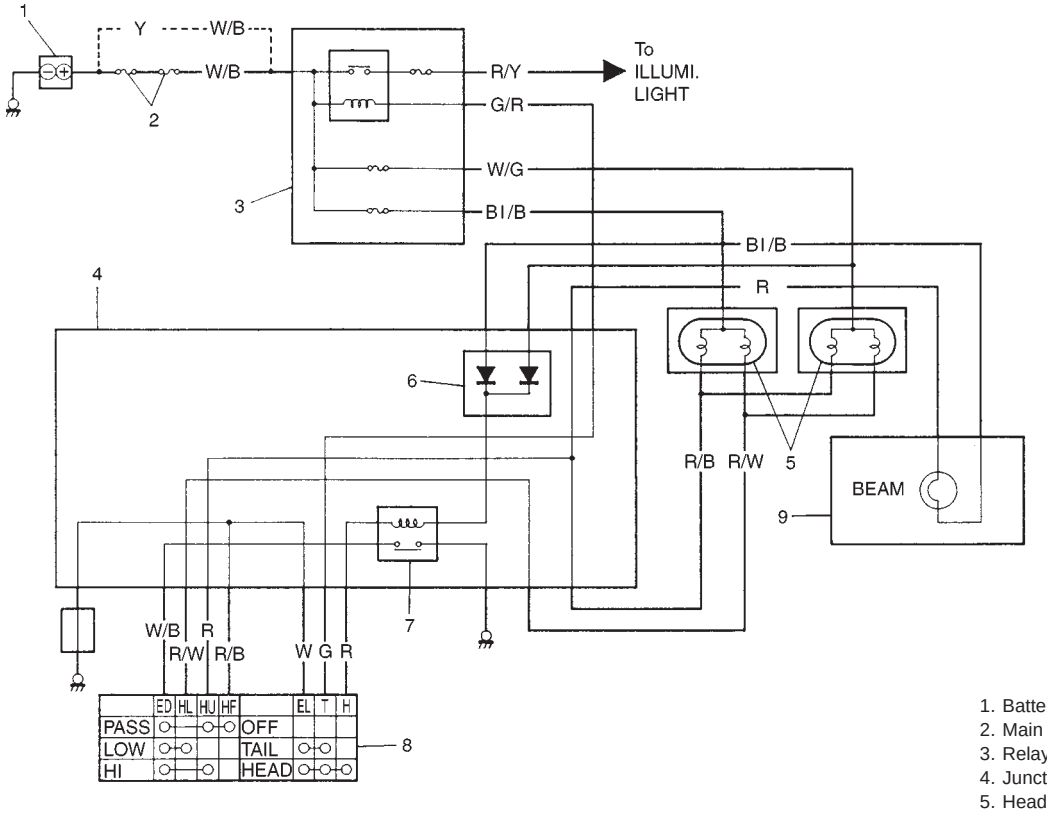
LIGHTING SYSTEMS

HEADLIGHTS



1. Headlight
2. Bulb
3. Socket cover
4. Front position light
5. Turn signal light

WIRING CIRCUIT

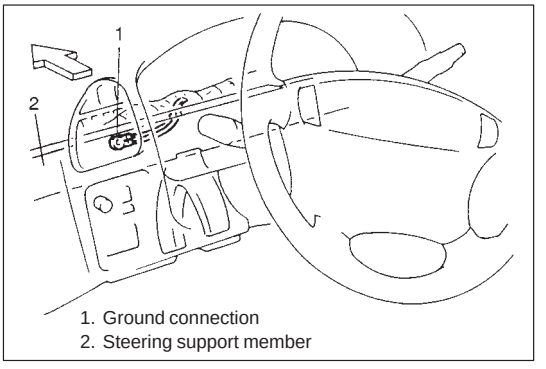


1. Battery
2. Main fuse
3. Relay/fuse box
4. Junction/fuse block
5. Headlight
6. Diode unit
7. Light relay
8. Lighting, dimmer and passing switch
9. High beam indicator light

NOTE:
– – – – –: German spec. vehicle only

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Only one light does not light.	○ Bulb burnt Out ○ Fuse blown ○ Socket, wiring or grounding faulty	Replace bulb. Replace fuse. Repair as necessary.
Headlights do not light.	○ Main fuse and/or fuses blown ○ Lighting and dimmer switches faulty ○ Defective light relay ○ Defective diode ○ Wiring or grounding faulty	Replace main fuse and/or fuses to check for short. Check switches. Replace light relay. Replace warning controller. Repair as necessary.
Only one beam (“Hi” or “Lo”) does not light.	○ Bulb burn Out ○ Lighting or dimmer switch faulty	Replace bulb. Check switch.



1. Ground connection
2. Steering support member

INSPECTION

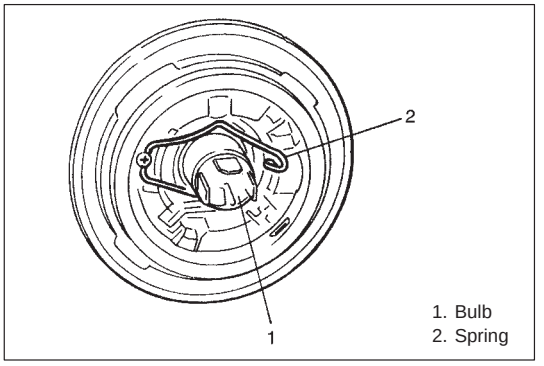
Circuit Continuity

1) Headlight is grounded at fender apron RH panel and steering support member.
2) Check lighting and dimmer switch for each terminal-to-terminal continuity. Refer to “COMBINATION SWITCH” in this section.

REMOVAL AND INSTALLATION

1) Disconnect negative cable at battery.
2) Remove front bumper. Refer to “FRONT BUMPER” in Section 9.
3) Disconnect couplers from headlight bulb, position light, turn signal light and headlight leveling actuator (if equipped).
4) Remove headlight unit.

Reverse removal procedure for installation.



1. Bulb
2. Spring

BULB REPLACEMENT

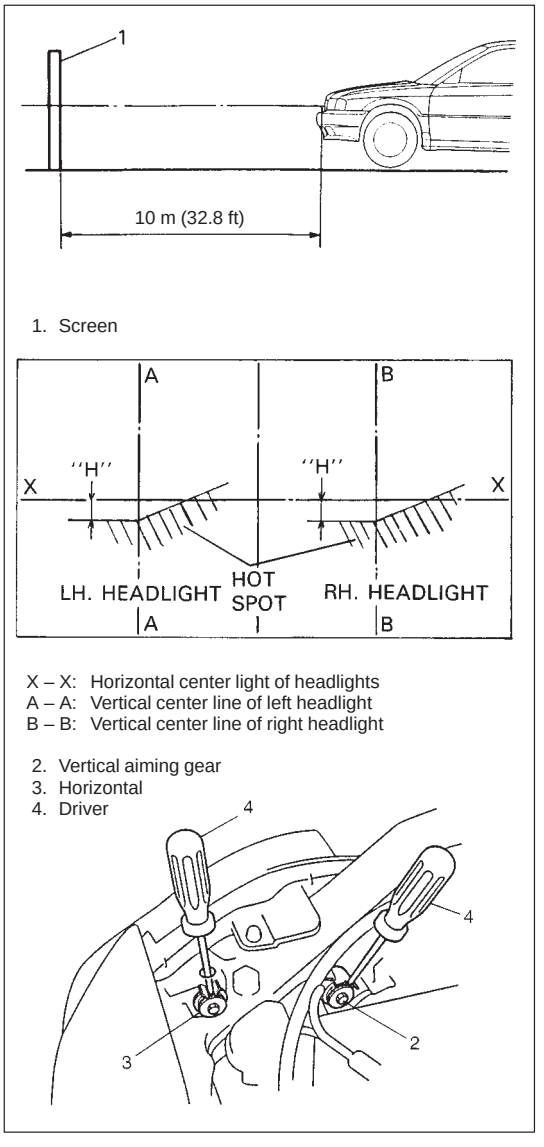
WARNING:
Don't touch when bulb is hot.

1) Disconnect negative (–) cable at battery.
2) Remove air cleaner box.
3) Disconnect harness from bulb.
4) Remove socket cover and bulb.
5) Replace bulb and install in reverse removal procedure.

HEADLIGHT AIMING WITH SCREEN

NOTE:
Unless otherwise obligated by local regulations, adjust headlight aiming according to the following procedure.

Before adjustment, make sure the following.
(1) Place vehicle on a flat surface and blank wall 10 m (32.8 ft) ahead of headlight surface.
(2) Adjust air pressure of all tires to a specified value respectively.
(3) Move vehicle body up and down by hand.
(4) Carry out with one driver (75 kg, 165 lb) aboard.



1. Screen

X – X: Horizontal center light of headlights
A – A: Vertical center line of left headlight
B – B: Vertical center line of right headlight

2. Vertical aiming gear
3. Horizontal
4. Driver

ADJUSTMENT

1) Check to see if hot spot (high intensity zone) of each main (low) beam axis falls as illustrated.

   Clearance "H": Approximately 130 mm (5.15 in.)

2) If headlight aiming is not set properly, align it to specification by adjusting aiming gears.

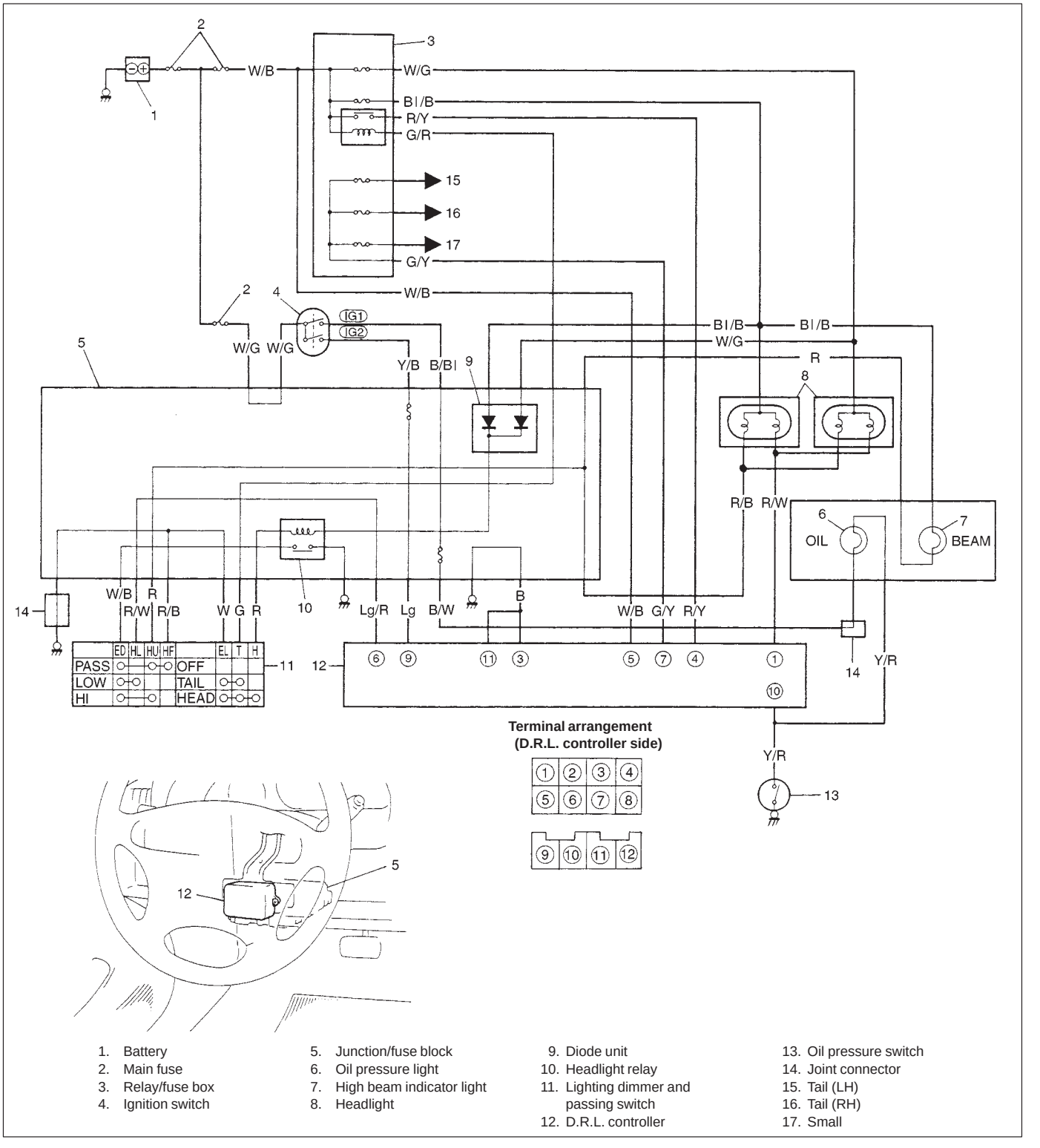
DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM (if equipped)

GENERAL DESCRIPTION

With this system, low beam of headlights and small lights turn ON when the engine is started and they turn OFF when it is stopped.

This system is so designed that the lighting switch has a priority. That is, when the lighting switch is set to the small light position while the engine is running and this system is at work (headlights and small lights are ON), only small lights remain ON and headlights turn OFF.

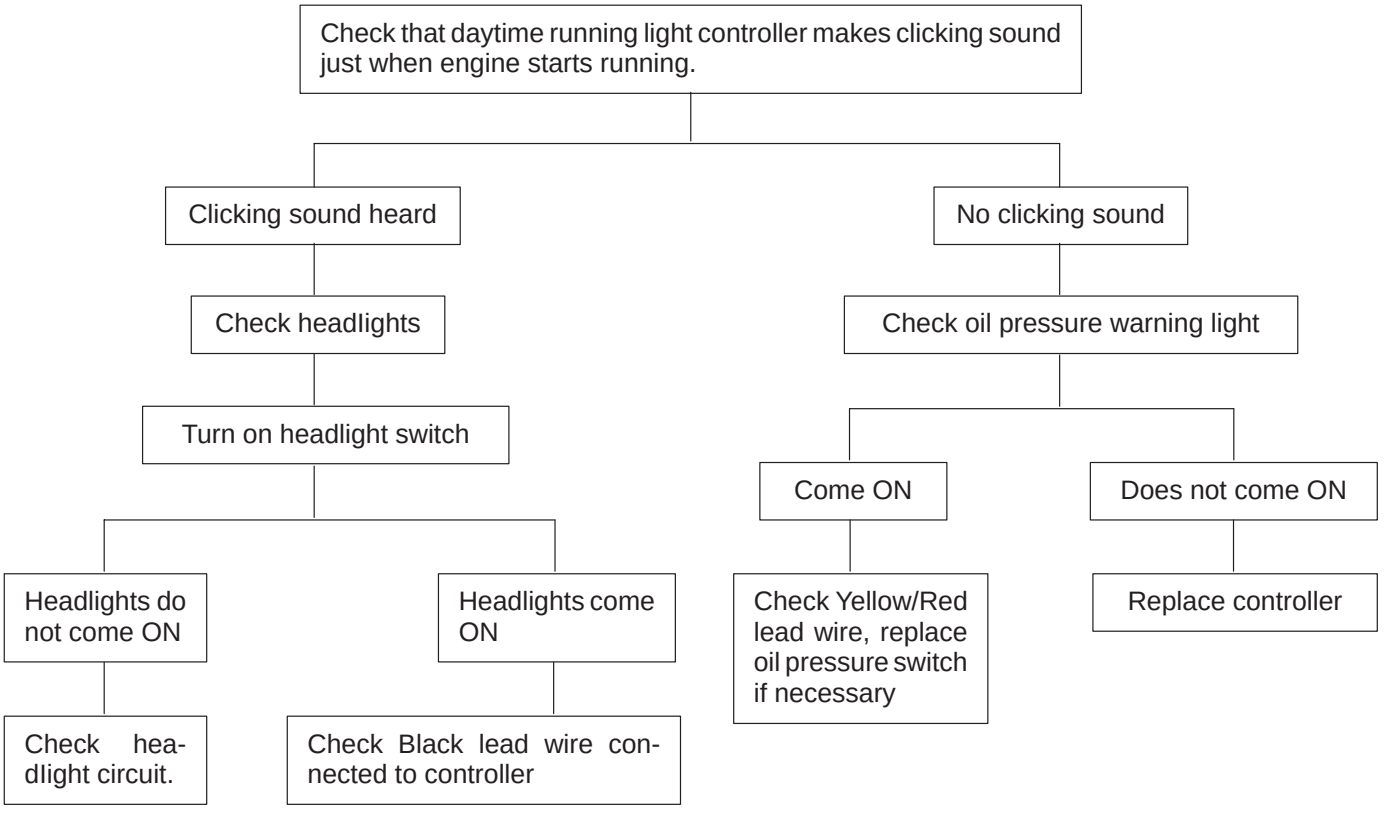
WIRING CIRCUIT AND LOCATION



1. Battery
2. Main fuse
3. Relay/fuse box
4. Ignition switch
5. Junction/fuse block
6. Oil pressure light
7. High beam indicator light
8. Headlight
9. Diode unit
10. Headlight relay
11. Lighting dimmer and passing switch
12. D.R.L. controller
13. Oil pressure switch
14. Joint connector
15. Tail (LH)
16. Tail (RH)
17. Small

TROUBLE DIAGNOSIS

When a trouble has occurred in this system, check and correct it according to the following flow chart.



HEADLIGHT BEAM LEVELING SYSTEM (If equipped)

GENERAL DESCRIPTION

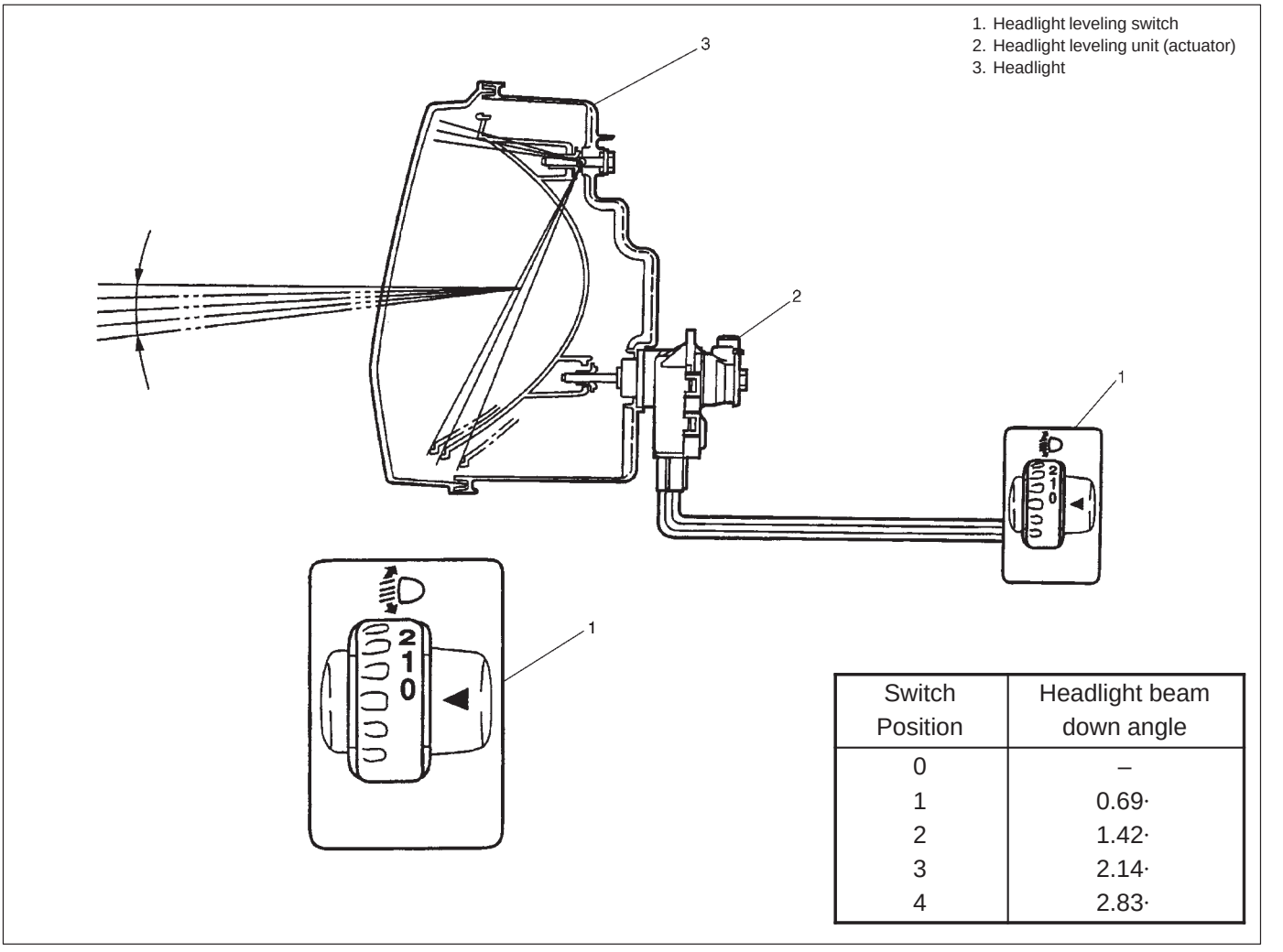
This system consists of the headlight leveling switch and headlight leveling actuator. It is used to lower both headlight aiming angles from the initial setting level by operating the leveling switch on the instrument.

NOTE:

When inspecting and adjusting the headlight beam, make sure to set the leveling switch to the "0" position with the ignition switch "ON", or down stroke from the initial setting level will be reduced.

Operation

The headlight leveling actuator is mounted behind headlight assembly and connected to the headlight reflector. When the headlight leveling switch knob is turned, the headlight leveling actuator operates and it changes the headlight aiming angle according to the position selected by the leveling switch knob.

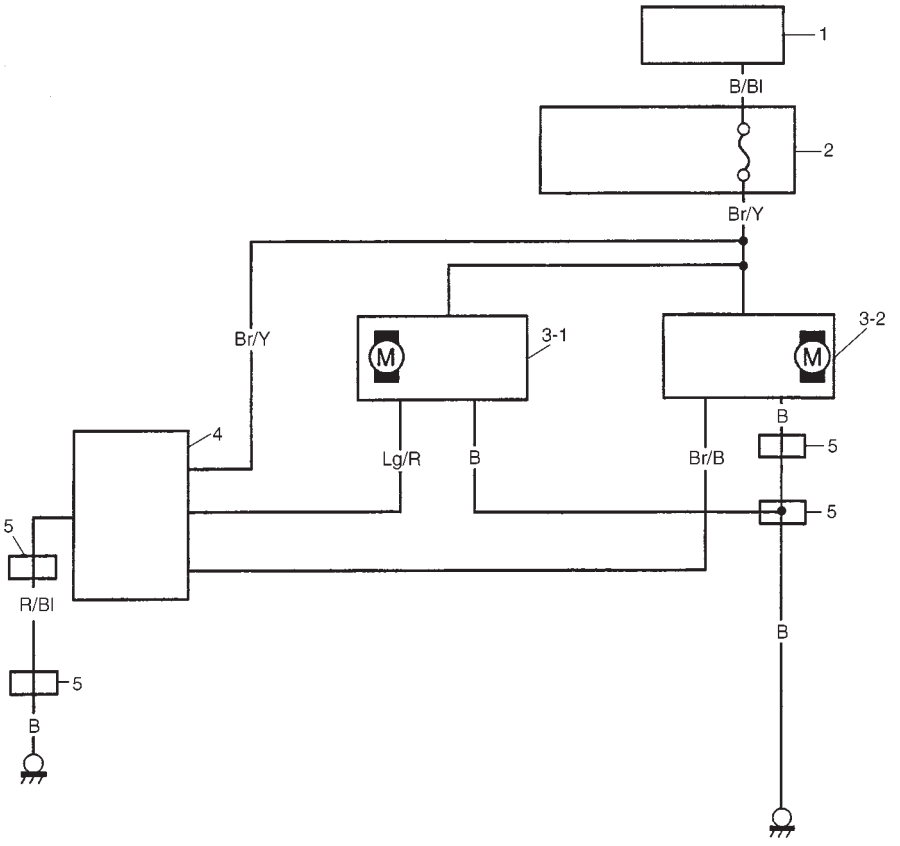


Switch Position	Headlight beam down angle
0	–
1	0.69·
2	1.42·
3	2.14·
4	2.83·

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Both headlights reflector do not move	○ Fuse blown	Check circuit and replace fuse.
	○ Leveling switch faulty	Check switch or replace it as necessary.
	○ Supply voltage too low	Recharge or replace battery.
One of headlights reflector (either Right or Left) does not move	○ Socket, wiring or grounding faulty	Repair as necessary.
	○ Actuator does not function	Replace headlight assembly.
	○ Headlight assembly itself deformed	Replace headlight assembly.

WIRING CIRCUIT



1. Ignition switch
2. Junction box
3-1. Leveling motor (LH)
3-2. Leveling motor (RH)
4. Leveling switch
5. Joint connector

INSPECTION

LEVELING SWITCH

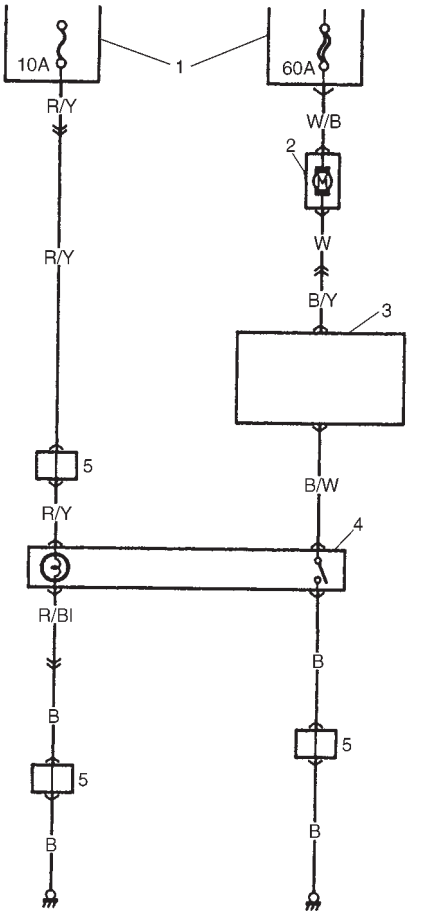
To check the switch operation, substitute it with a new one. If proper operation is obtained, it means the switch is defective.
Replace it with a new one.

LEVELING ACTUATOR

All headlight system couplers connected including leveling actuator and switch, and at Ignition switch ON, listen to the leveling actuator sound on both actuators according to the movement of the leveling switch. If no sound is heard with the movement of the leveling switch, replace headlight assembly.

HEADLIGHT WASHER (If equipped)

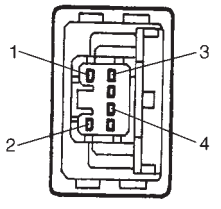
WIRING CIRCUIT



1. Fuse
2. Head light cleaner motor
3. DRL controller
4. Headlight washer switch
5. Joint connector

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Washer malfunctions.	○ Washer hose or nozzle clogged	Repair.
	○ Washer motor faulty	Check motor.
	○ Headlight washer switch faulty	Check switch.
	○ Wiring faulty	Repair.



INSPECTION

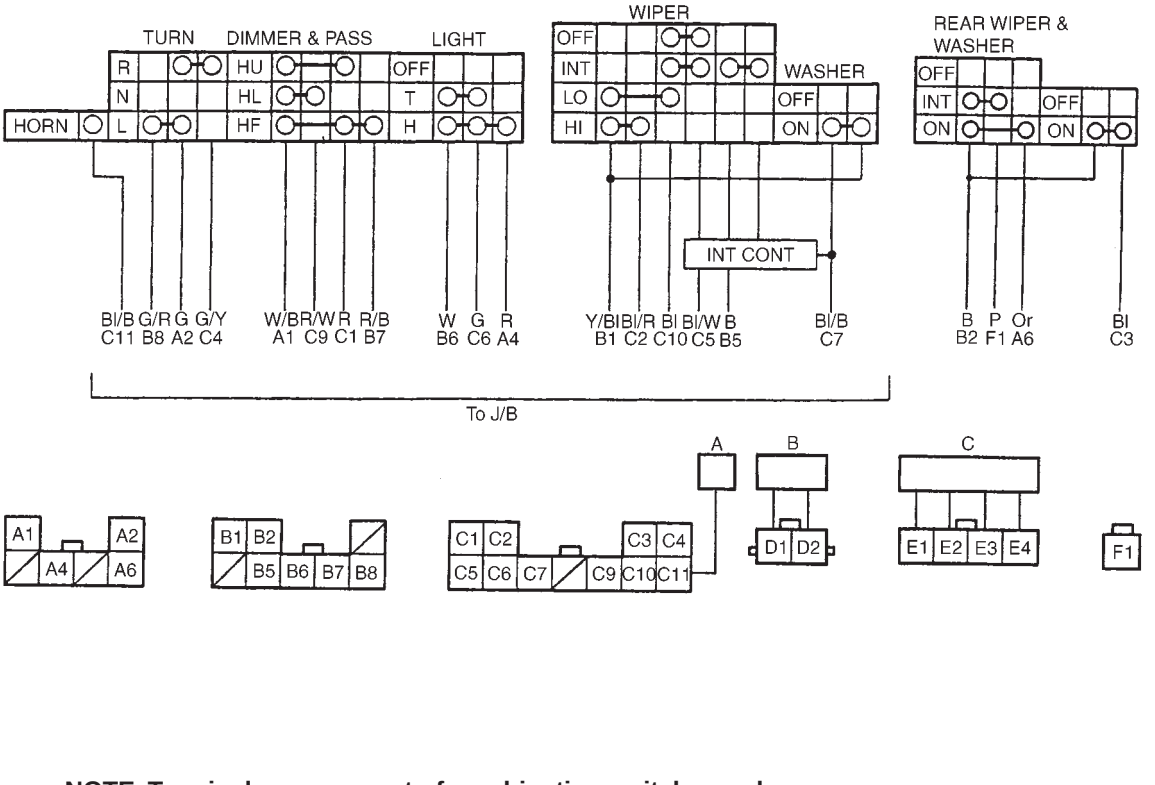
HEADLIGHT WASHER SWITCH

Use a circuit tester to check headlight washer switch for continuity.
If switch has no continuity between terminals, replace.

	1	2	3	4
	Bl/W	B	R/Bl	R/Y
OFF			○	○
ON	○	○		

COMBINATION SWITCH

Combination switch incorporates lighting, turn signal, hazard warning light, dimmer, passing light and wiper/washer switches and steering angle sensor.



NOTE: Terminal arrangement of combination switch coupler viewed from harness coupler.

A. Horn switch
B. Air bag inflator (if equipped)
C. Steering sensor (if equipped)

Inspection

1) Disconnect negative (–) cable at battery.
2) Disconnect combination switch lead wire connectors from junction/fuse box.
3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

Removal/Installation

For removal/installation of combination switch, refer to Section 3C or 3C1.

NOTE:
Some vehicles are not provided with INTERMITTENT position depending on specification.

IGNITION (MAIN) SWITCH

Inspection

1) Disconnect negative (–) cable at battery.
2) Disable air bag system. Refer to “Disabling Air Bag System” in Section 9J.
3) Disconnect main switch lead wire connectors from junction/fuse block and air bag harness.

Checking continuity between terminals

Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace main switch.

Key \ Position \ Wire color		W/G	Bl	B/Bl	Y/B	B/Y	B/W	B	G	G
OUT	LOCK	○								
IN	ACC	○	○							
	ON	○	○	○	○				○	○
	START	○		○		○	○	○		

Removal

1) Disconnect negative (–) cable at battery.
2) Disable air bag system. Refer to “DISABLING AIR BAG SYSTEM” in Section 9J.
3) Remove steering column referring to Section 3C1 of this manual. And then remove steering lock/main switch from steering column, referring to Section 3C1.

Installation

1) Install steering lock/main switch and steering column referring to Section 3C1 of this manual.
2) Enable air bag system. Refer to “DISABLING AIR BAG SYSTEM” in Section 9J.

NOTE:
When installing steering column, special care must be used for tightening sequence and each torque.

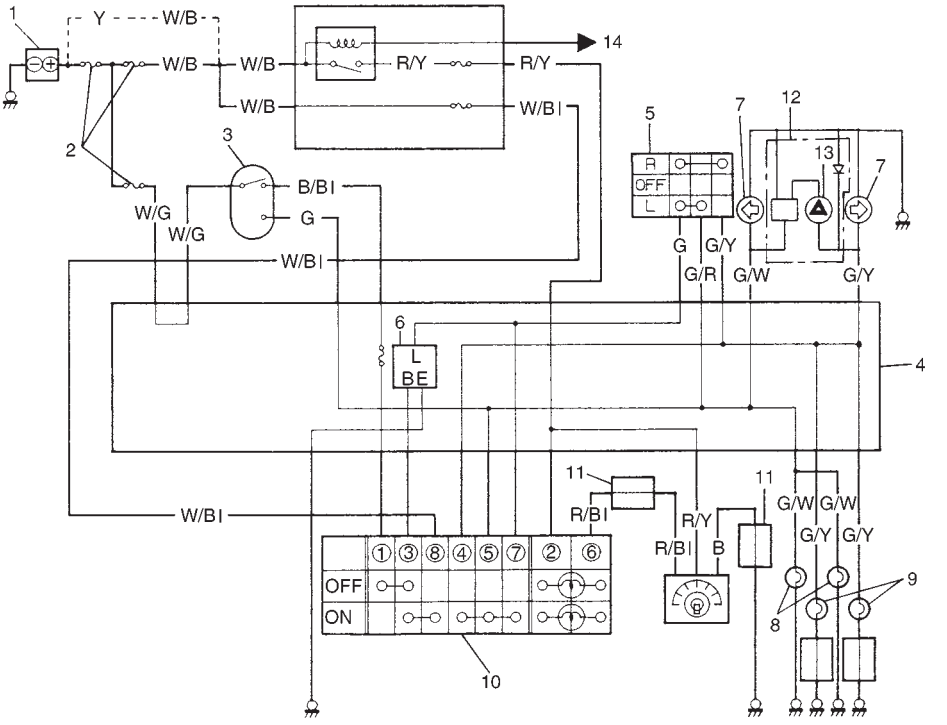
TURN SIGNAL AND HAZARD WARNING LIGHTS

WIRING CIRCUIT

NOTE:

○ – – – – –: German spec. vehicle only

○ This figure shows LH steering vehicle.

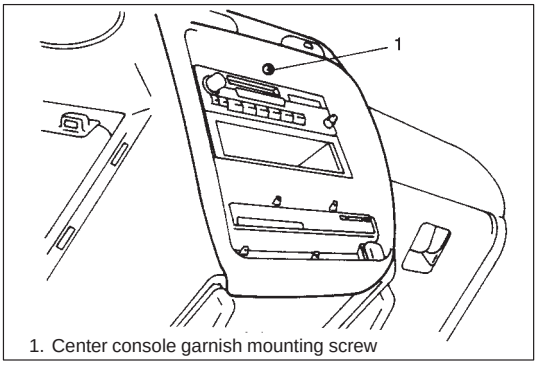


1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Turn signal switch
6. Turn signal relay
7. Turn signal pilot light
8. Left turn signal
9. Right turn signal
10. Hazard switch
11. Joint connector
12. Hazard indicator circuit (if equipped)
13. Hazard indicator light
14. To lighting switch

➡ – ⑧: Refer to hazard switch (next page)

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Flash rate high or one side only flashes	○ Faulty ground	Repair.
	○ Wrong bulb	Replace.
	○ One of light bulbs burnt out or right or left side of front or rear side	Replace.
	○ Defective turn signal-and-hazard warning relay	Replace.
	○ Open circuit or high resistance existing between turn signal-and-hazard warning switch and lights on one side.	Repair.
No flashing	○ Blown fuse on turn signal-and-hazard warning circuit	Replace.
	○ Open circuit or high resistance existing between battery and switch	Repair.
	○ Defective relay	Replace.
	○ Defective switch	Replace.
Flash rate low	○ Supply voltage too low	Recharge battery.
	○ Defective relay.	Repair.

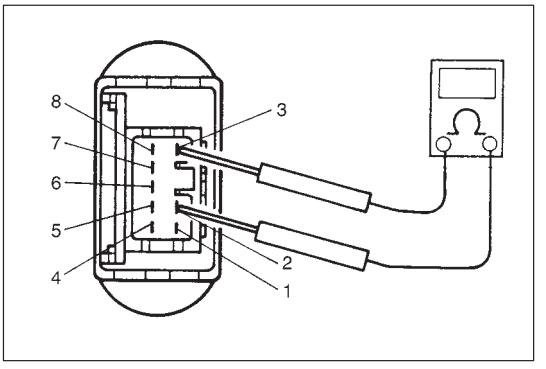


1. Center console garnish mounting screw

HAZARD SWITCH

Removal

1) Remove heater control lever knobs.
2) Remove center console garnish.
3) Detach hazard switch.
4) Disconnect hazard switch coupler.



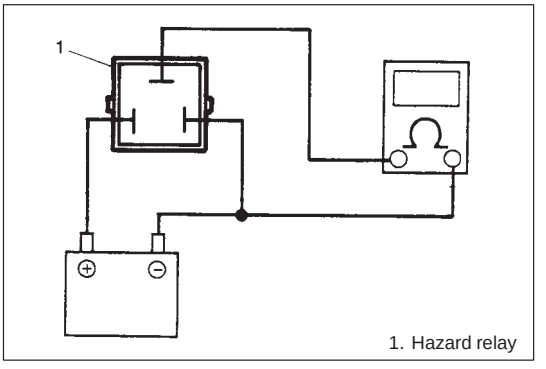
Inspection

Use a circuit tester to check the continuity of each switch position.
If any continuity is not obtained, replace switch.

	6	8	7	3	2	1	4	5
OFF	○	○					○	○
ON		○	○	○	○	○	○	○

Installation

Reverse removal procedure for installation.



1. Hazard relay

HAZARD RELAY

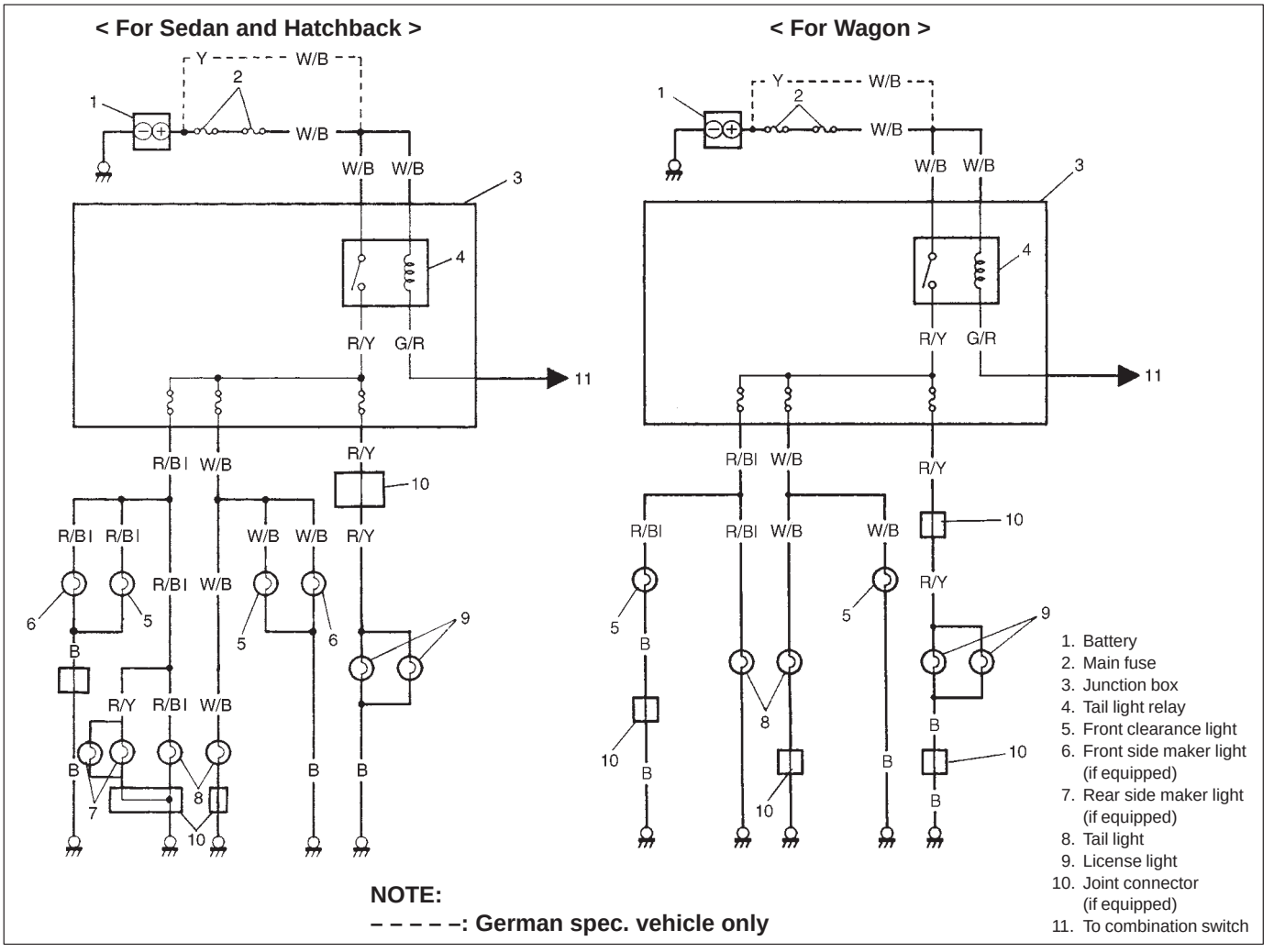
The turn signal/hazard relay is located in the junction/fuse box.

Inspection

Connect battery and tester as shown.
Unless a continued click sound is heard, replace relay.

CLEARANCE, TAIL AND LICENSE LIGHTS

WIRING CIRCUIT



1. Battery
2. Main fuse
3. Junction box
4. Tail light relay
5. Front clearance light
6. Front side maker light (if equipped)
7. Rear side maker light (if equipped)
8. Tail light
9. License light
10. Joint connector (if equipped)
11. To combination switch

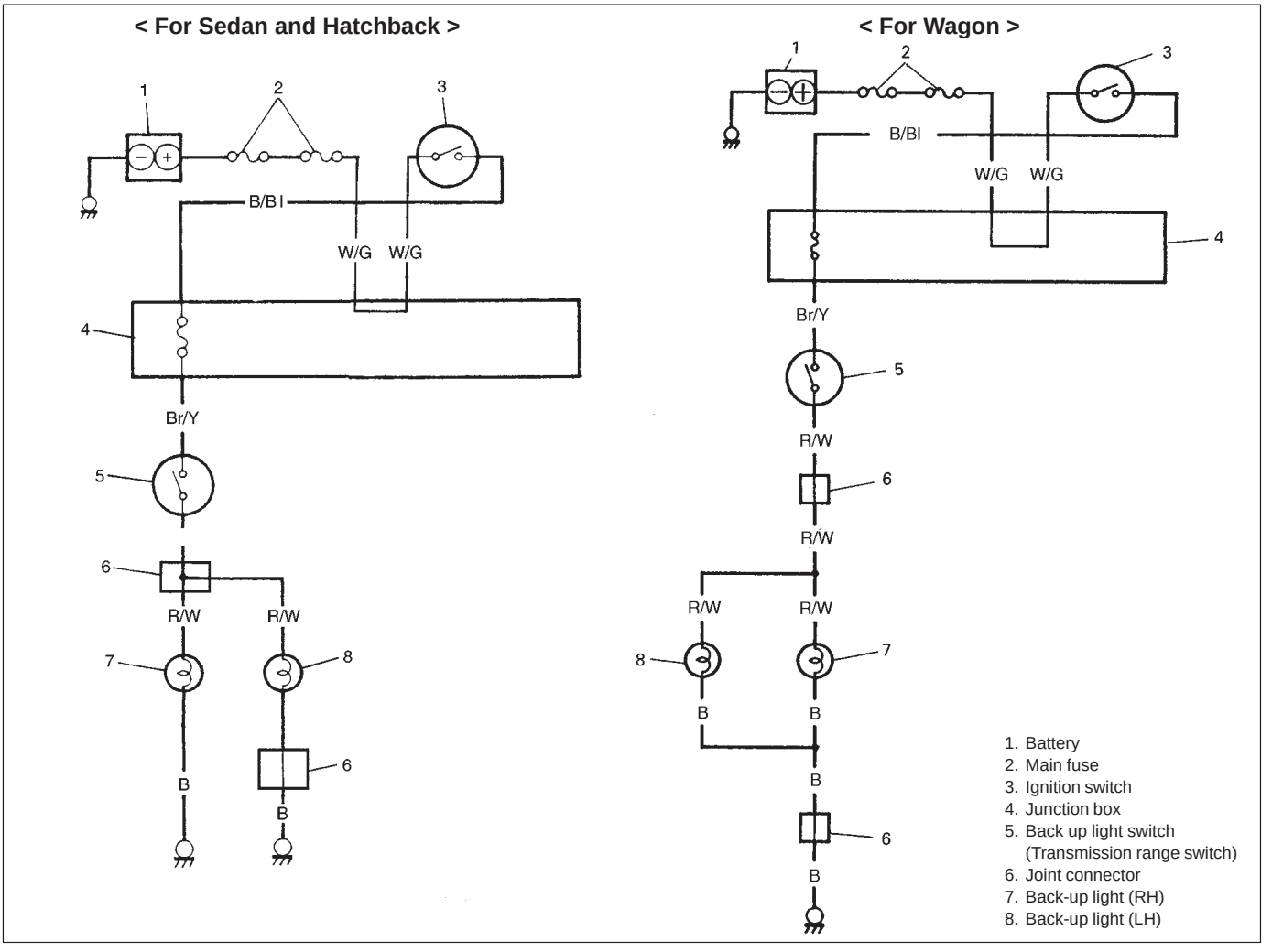
NOTE:
– – – – –: German spec. vehicle only

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Lights do not light.	○ Main fuse and/or fuses blown	Replace fuses to check for short.
	○ Light relay faulty	Replace light relay.
	○ Lighting switch faulty	Check switch.
	○ Wiring or grounding faulty	Repair as necessary.

BACK-UP LIGHTS

WIRING CIRCUIT

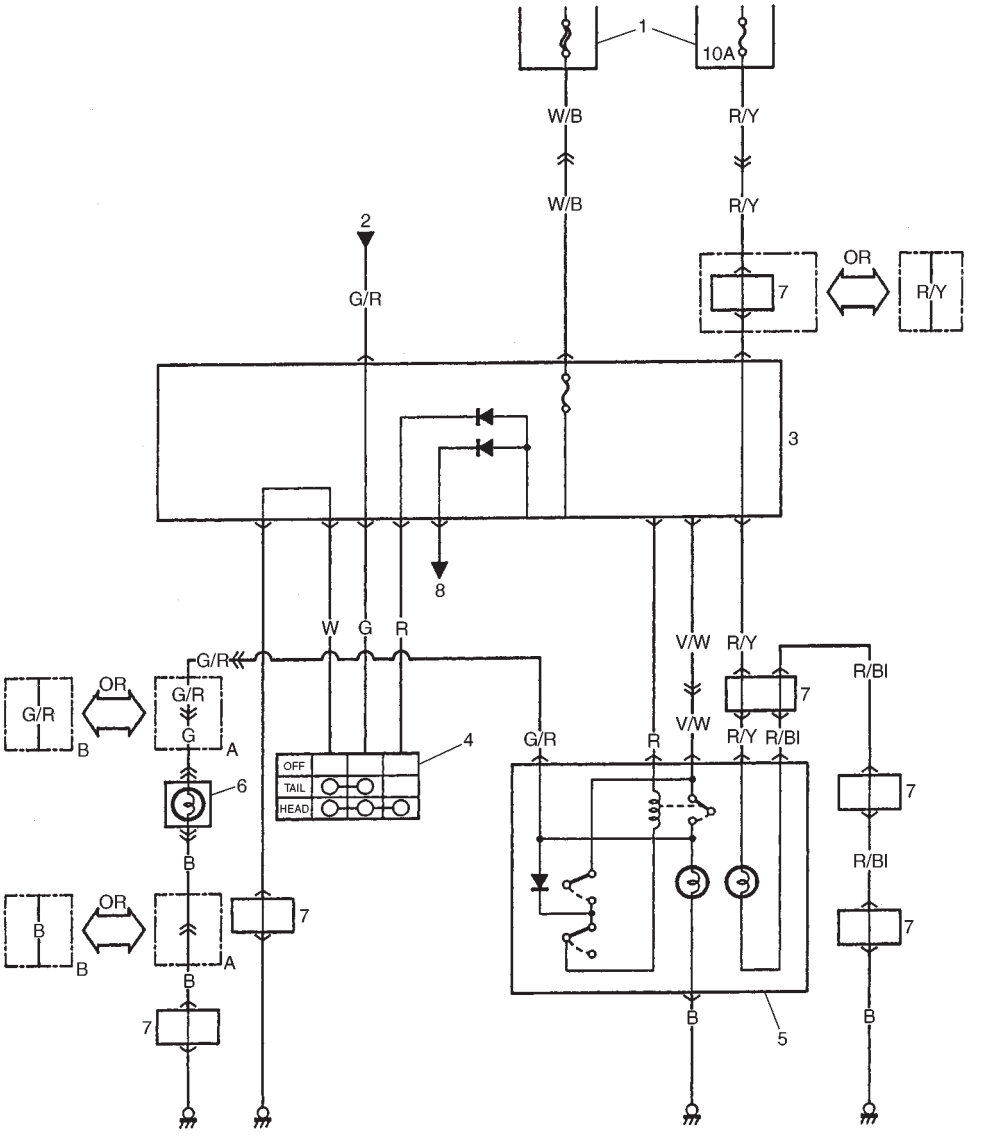


TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Back-up lights do not light.	○ Fuse blown	Replace fuse to check for short.
	○ Bulb burnt out	Replace.
	○ Back-up light switch or transmission range switch faulty	Check switch.
	○ Wiring or grounding faulty	Repair as necessary.

REAR FOG LIGHT (If equipped)

WIRING CIRCUIT

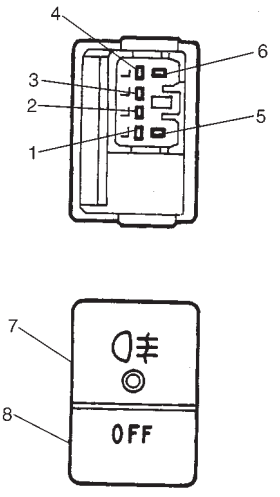


1. Fuse
2. Tail light relay
3. Junction box
4. Lighting switch
5. Rear fog light switch
6. Rear fog light
7. Joint connector
8. Not used

A. Wagon model
B. 3 door/4door model

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Rear fog light does not come on.	○ Main fuse and/or fuses blown	Replace main fuse and/or fuses to check for short.
	○ Light relay faulty	Replace light relay.
	○ Lighting switch faulty	Check switch.
	○ Wiring or grounding faulty	Repair as necessary.



7. Rear fog switch
8. Off switch

INSPECTION

REAR FOG LIGHT SWITCH

Use a circuit tester to check rear fog light switch for continuity. Hold the switch button (ON or OFF) pushed during checking switch as shown.

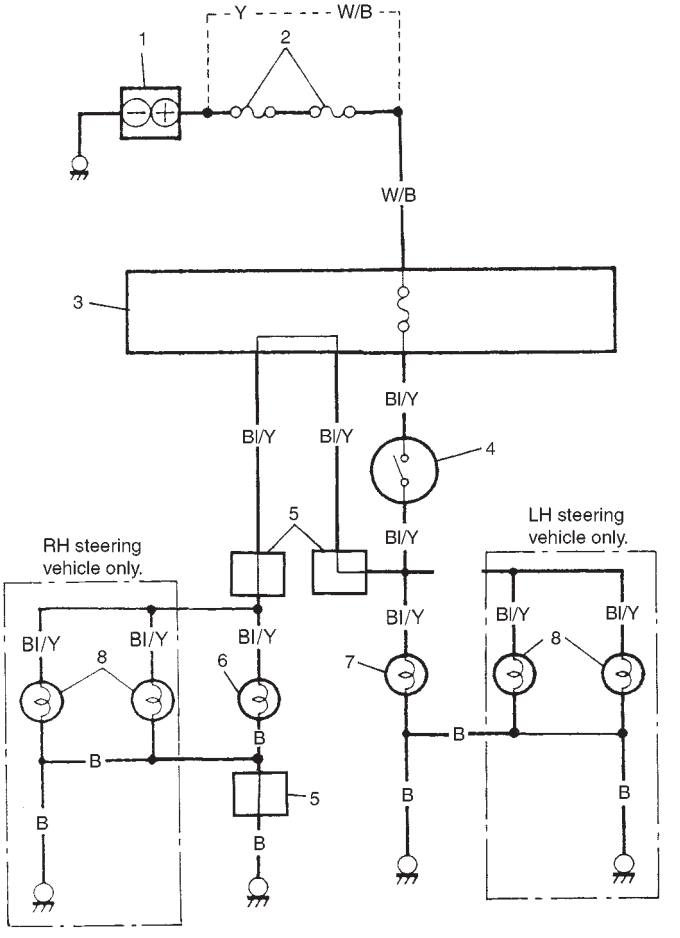
RR FOG SW \ OFF SW \ TERMINAL		2	5	4	1	3	6
FREE	FREE		○	○	○	○	○
	PUSH		○	○	○	○	○
PUSH	FREE	○	○		○	○	○
	PUSH		○	○	○	○	○

NOTE:

Rear fog lamps light up only when headlamps or front fog lamps (if equipped) are on. While rear fog lamps are on, turning off headlamps or front fog lamps will cause rear fog lamps to turn off.

BRAKE LIGHTS

WIRING CIRCUIT



NOTE:
– – – – –: German spec. vehicle only.

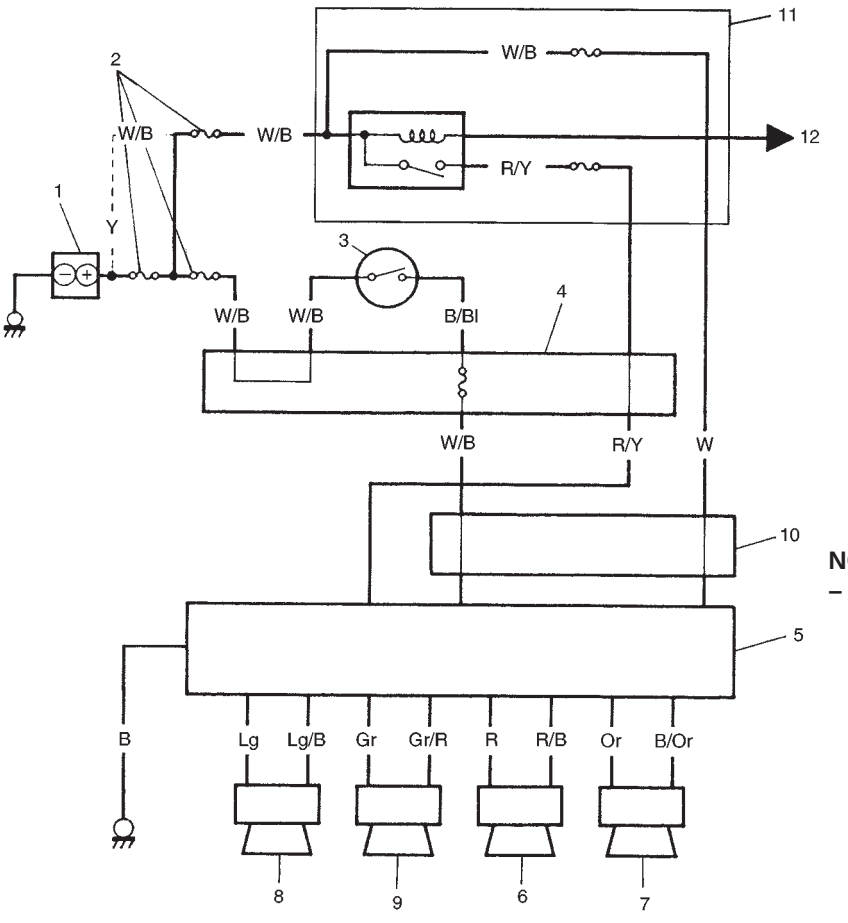
1. Battery
2. Main fuse
3. Junction box
4. Stop light switch
5. Joint connector
6. Brake light (Driver side)
7. Brake light (Passenger side)
8. High mounted stop light

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Stop lights do not light.	○ Fuse blown ○ Bulb burnt out ○ Stop light switch faulty ○ Wiring or grounding faulty	Replace fuse to check for short. Replace. Adjust or replace switch. Repair as necessary.
Stop lights stay on.	○ Stop light switch faulty	Adjust or replace switch.

RADIO (If equipped)

WIRING CIRCUIT



NOTE:
– – – – –: German spec. vehicle only.

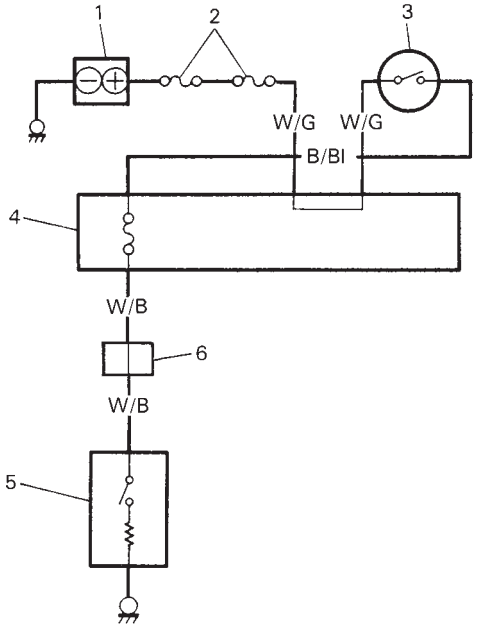
1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Radio
6. Front speaker (LH)
7. Front speaker (RH)
8. Rear speaker (LH)
9. Rear speaker (RH)
10. Joint connector
11. Relay/fuse box
12. To combination switch

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Radio does not work.	○ Fuse blown	Replace fuse to check for short.
	○ Main switch faulty	Check switch.
	○ Radio faulty	Repair or replace.
	○ Speaker faulty	Repair or replace.
	○ Wiring or grounding faulty	Repair as necessary.

CIGARETTE LIGHTER

WIRING CIRCUIT



1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Cigarette lighter
6. Joint connector

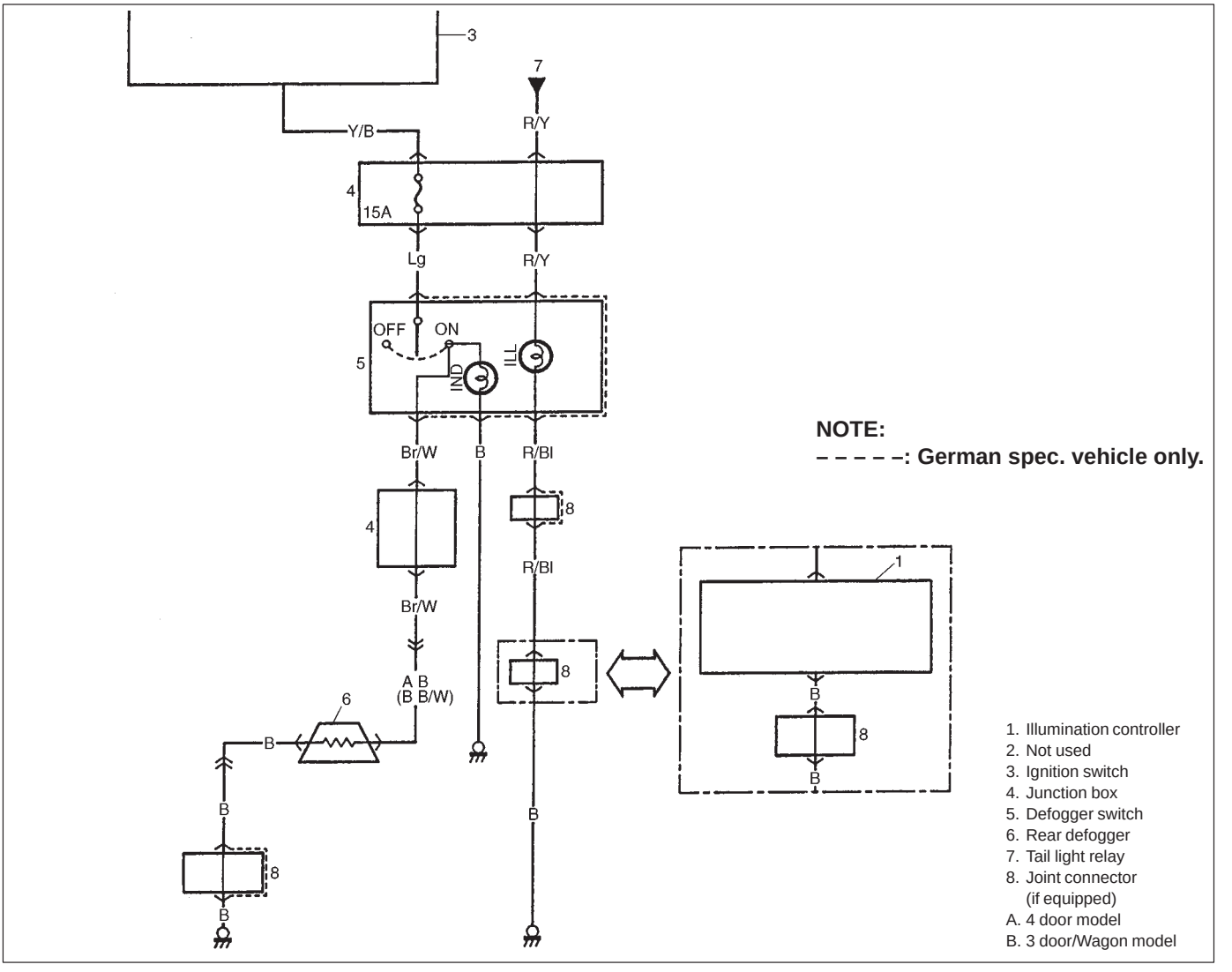
TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Cigarette lighter does not work.	○ Fuse blown	Replace fuse to check for short.
	○ Main switch faulty	Check switch.
	○ Cigarette lighter faulty	Repair or replace.
	○ Wiring or grounding faulty	Repair as necessary.

REAR WINDOW DEFOGGER (If equipped)

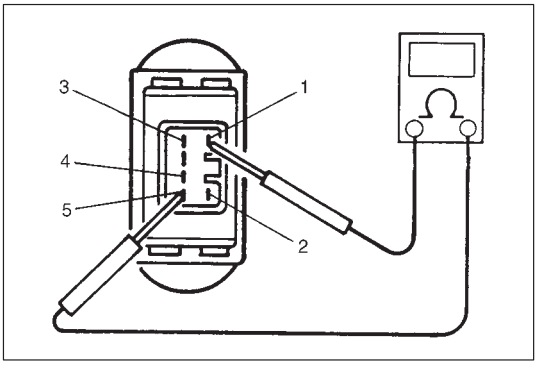
The rear window defogger system has horizontal ceramic silver compound elements and two vertical bus bar. The system is operated by the defogger switch in the instrument panel.

WIRING DIAGRAM



TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Defogger does not work.	○ Defogger switch faulty	Check switch.
	○ Defogger heat wire faulty	Check heat wire.
	○ Wiring or grounding faulty	Repair as necessary.

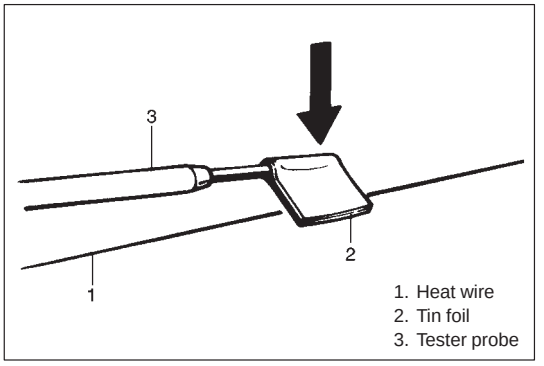


INSPECTION

DEFOGGER SWITCH

Use a circuit tester to check defogger switch for continuity. If switch has no continuity between terminals, replace.

	2	4	5	1	3
	Lg	Br/W	B	R/Y	R/Bl
OFF		○	○		
ON	○	○	○	○	○

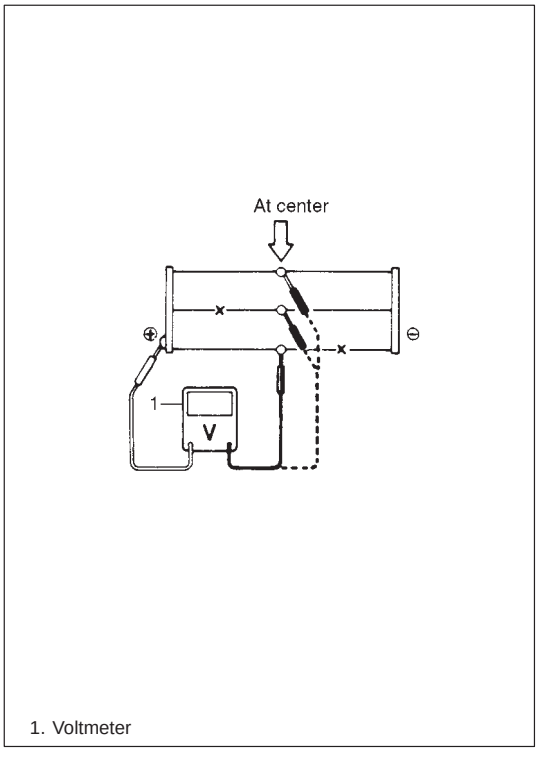


1. Heat wire
2. Tin foil
3. Tester probe

DEFOGGER WIRE

NOTE:

- **When cleaning rear window glass, use a dry cloth to wipe it along wire direction.**
- **When cleaning glass, do not use detergent or abrasive containing glass cleaner.**
- **When measuring wire voltage, use a tester with negative probe wrapped with a tin foil which should be held down on wire by finger pressure.**

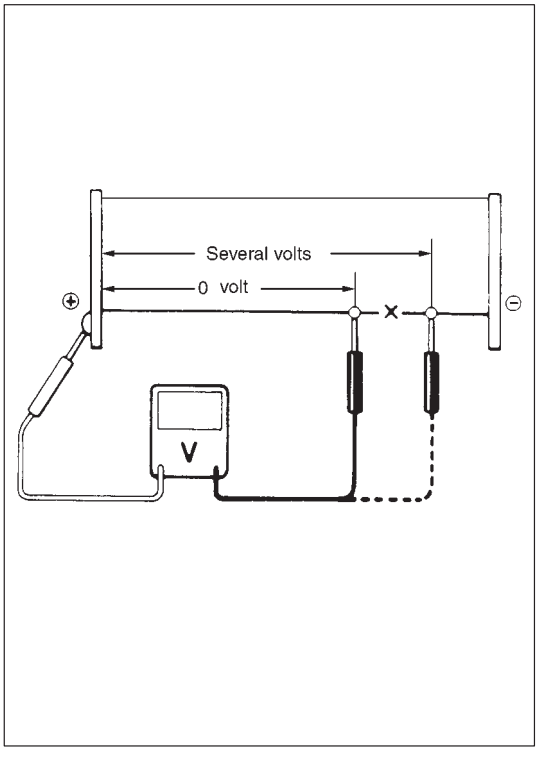


1. Voltmeter

1) Checking wire damage
   a) Turn main switch ON.
   b) Turn defogger switch ON.
   c) Use a voltmeter to check voltage at the center of each heat wire, as shown.

Voltage	Criteria
Approximately 5V	Good (No break in wire)
Approximately 10V or 0V	Broken wire

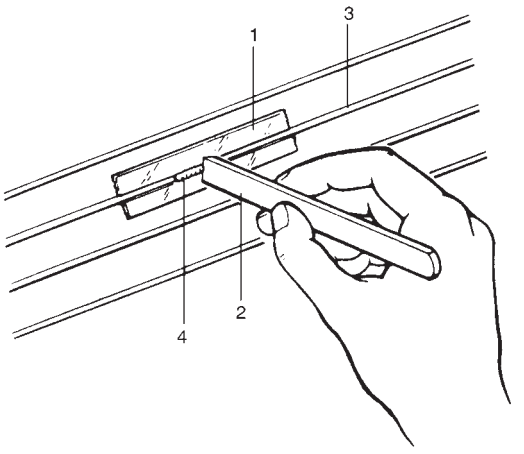
If measured voltage is 10V, wire must be damaged between its center and positive end. If voltage is 0, wire must be damaged between its center and ground.



2) Locating damage in wire
   a) Touch voltmeter positive (+) lead to heat wire positive terminal end.
   b) Touch voltmeter negative (–) lead with a foil strip to heat wire positive terminal end, then move it along wire to the negative terminal end.
   c) The place where voltmeter fluctuates from 0 to several volts is where there is damage.

NOTE:

If heat wire is free from damage, voltmeter should indicate 12V at heat wire positive terminal end and its indication should decrease gradually toward zero at the other terminal (ground).



1. Masking tape
2. Wood spatula
3. Broken wire
4. Repair agent

REPAIR

DEFOGGER CIRCUIT

1) Use white gasoline for cleaning.
2) Apply masking tape at both upper and lower sides of heat wire to be repaired.
3) Apply commercially-available repair agent with a fine-tip brush.
4) Two to three minutes later, remove masking tapes previously applied.
5) Leave repaired heat wire as it is for at least 24 hours before operating defogger again.

INSTALLATION

When installing rear window defogger (optional), have the following parts available.

○ Back window glass
○ Defogger switch
○ Defogger lead wires (positive and negative wire)

REMOVAL

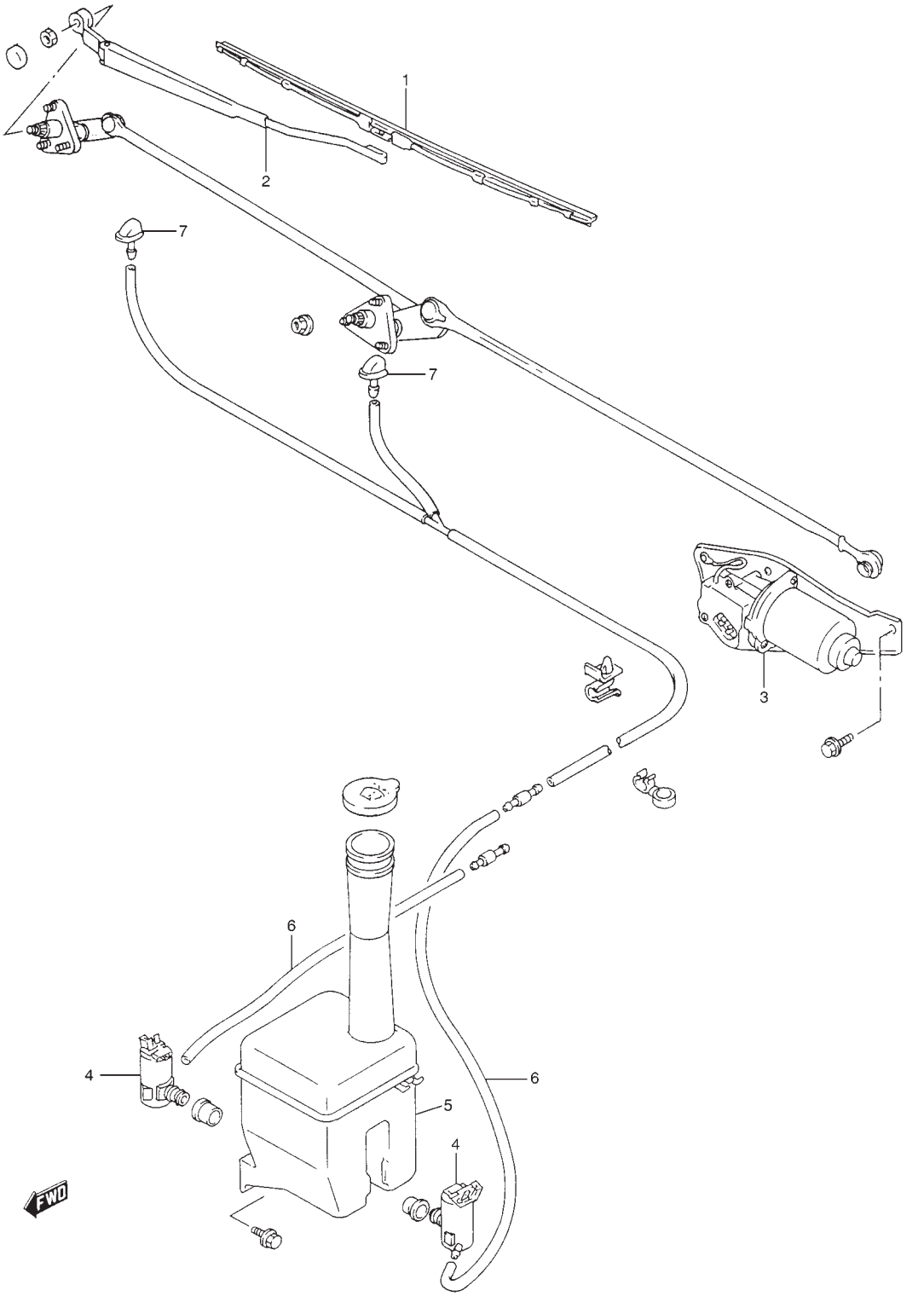
Remove back window glass.
For removal procedure, refer to Section 9.

INSTALLATION

1) Disconnect negative (–) cable from battery.
2) Install back window (or back door) glass.
3) Connect lead wires to harness connectors.
4) Install defogger switch on instrument panel and connect switch connector to harness connector.

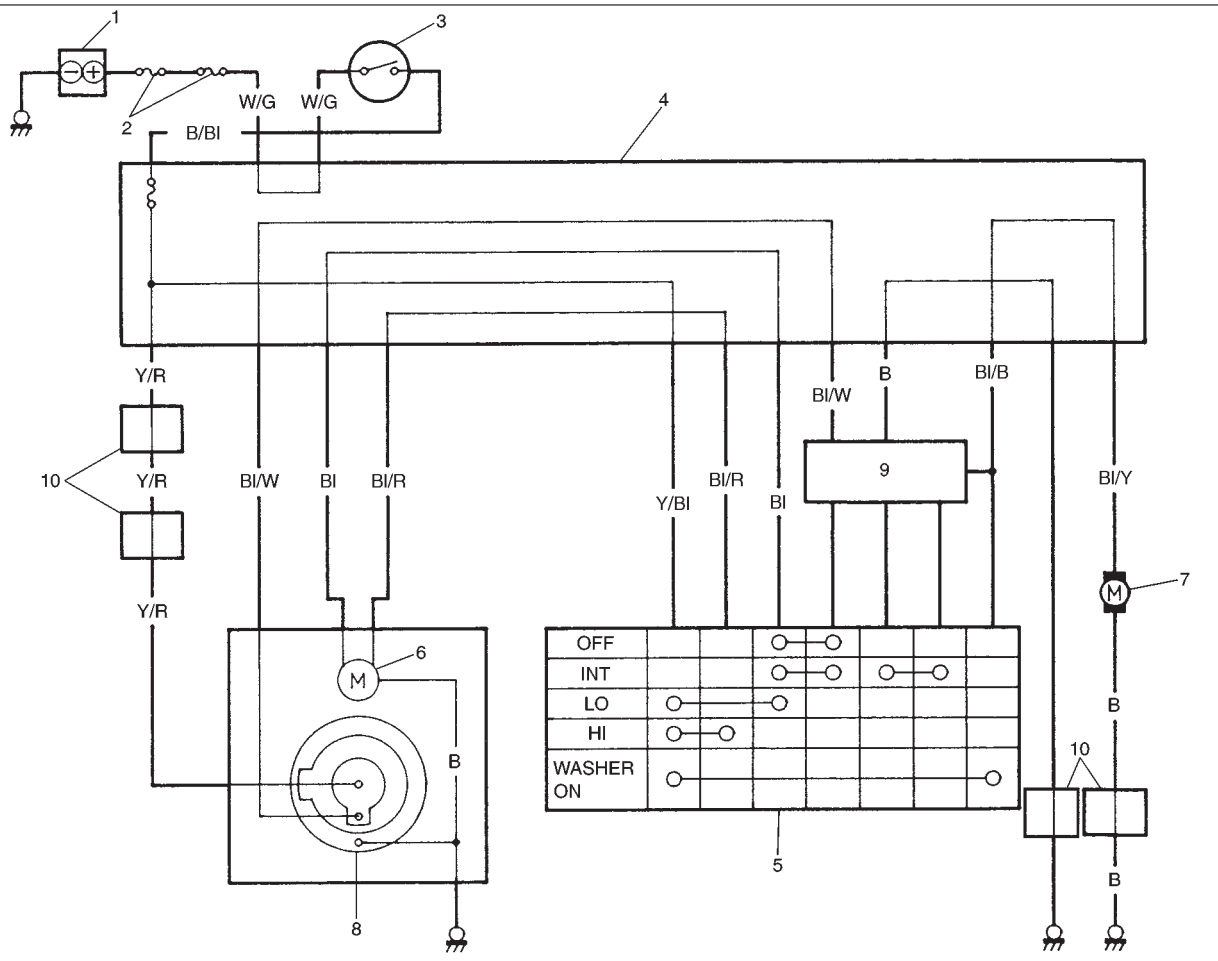
WINDSHIELD WIPERS (FRONT WIPER) AND WASHER

The windshield wiper is 3-speed type and the windshield washer is equipped with a separate-type washer pump. The washer tank is located inside of the front part of the left front fender. It has washer pumps for the front and rear respectively.



1. Wiper blade
2. Wiper arm
3. Wiper motor
4. Washer pump
5. Washer tank
6. Washer hose
7. Washer nozzle

WIRING CIRCUIT



1. Battery
2. Main fuse
3. Ignition switch
4. Junction box
5. Wiper and washer switch
6. Wiper motor
7. Washer pump
8. Wiper return switch
9. Wiper intermittent relay
10. Joint connector

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Wiper malfunctions or does not return to original position.	○ Wiper fuse blown	Replace blown fuse to check for short.
	○ Wiper motor faulty	Check motor.
	○ Wiper control switch faulty	Check switch.
	○ Wiring or grounding faulty	Repair.
Washer malfunctions.	○ Washer hose or nozzle clogged	Repair.
	○ Washer motor faulty	Check motor.
	○ Wiper control switch faulty	Check switch.
	○ Wiring faulty	Repair.

INSPECTION

WIPER/WASHER SWITCH

Use a circuit tester to check switch for each terminal-to-terminal continuity referring to “COMBINATION METER” in this section.

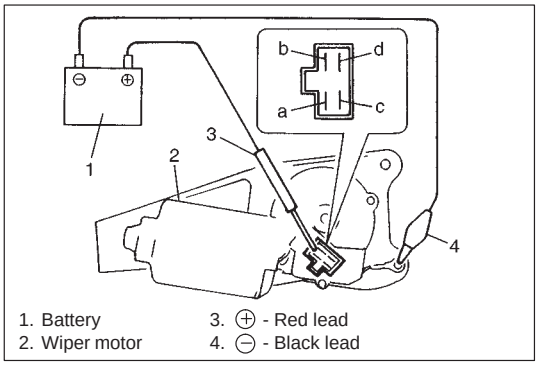
WIPER MOTOR

REMOVAL

1) Disconnect wiper motor coupler.
2) Remove wiper motor assembly mounting bolt, and remove wiper motor assembly from wiper link.

INSTALLATION

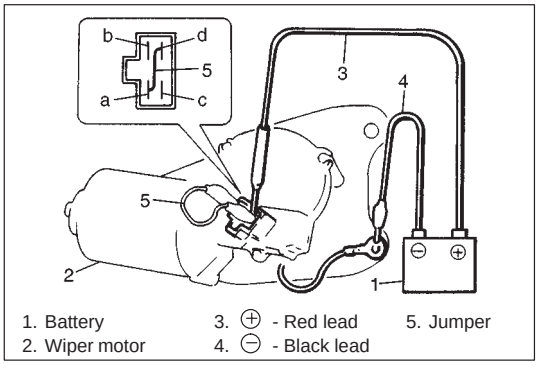
Reverse removal procedure for installation.



1. Battery
2. Wiper motor
3. ⊕ - Red lead
4. ⊖ - Black lead

INSPECTION

1) As illustrated left, use a 12 V battery to connect its (+) terminal to “a” terminal, and its (–) terminal to Black lead cord. If motor rotates at a low revolution speed of 47 – 57 rpm, it is proper. As for high speed check, connect battery (+) terminal to “b” terminal, and its (–) terminal to Black lead cord. If motor rotates at a high revolution speed of 70 – 84 rpm, it is proper.



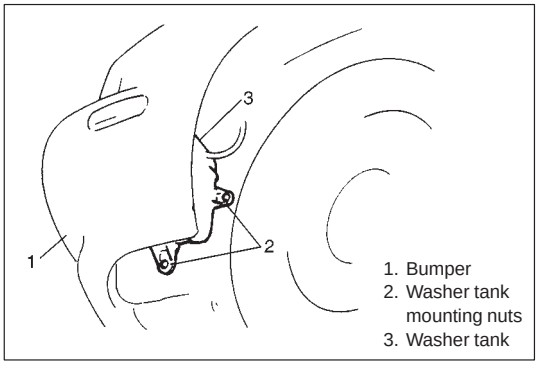
1. Battery
2. Wiper motor
3. ⊕ - Red lead
4. ⊖ - Black lead
5. Jumper

2) Testing automatic stop action
   Connect battery (+) terminal to motor “c” terminal, and (–) terminal to Black lead cord, respectively. Use a jumper to short “d” and “a” terminals to each other to check whether motor shaft stops at a given position. This position must conform to start position. Stop motor again and again with the jumper to confirm that it stops at the same position.

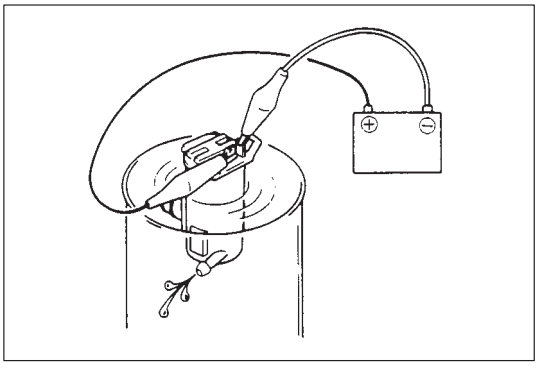
WASHER PUMP

REMOVAL

1) Disconnect battery (–) cable.
2) Remove front fender lining (LH).
3) Remove washer tank fitting screws.
4) Disconnect pump lead wires and hoses.
5) Remove washer tank.
6) Remove pump from tank.



1. Bumper
2. Washer tank mounting nuts
3. Washer tank

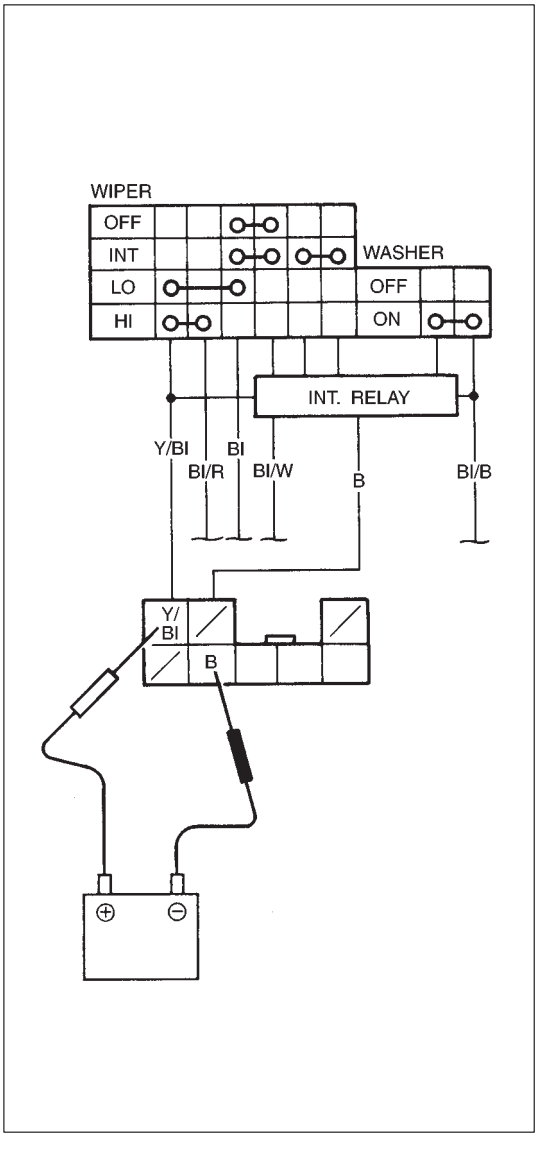


INSPECTION

Connect battery (+) and (–) terminals to pump (+) and (–) terminals respectively to check pumping rate.

INSTALLATION

Reverse removal procedure for installation.

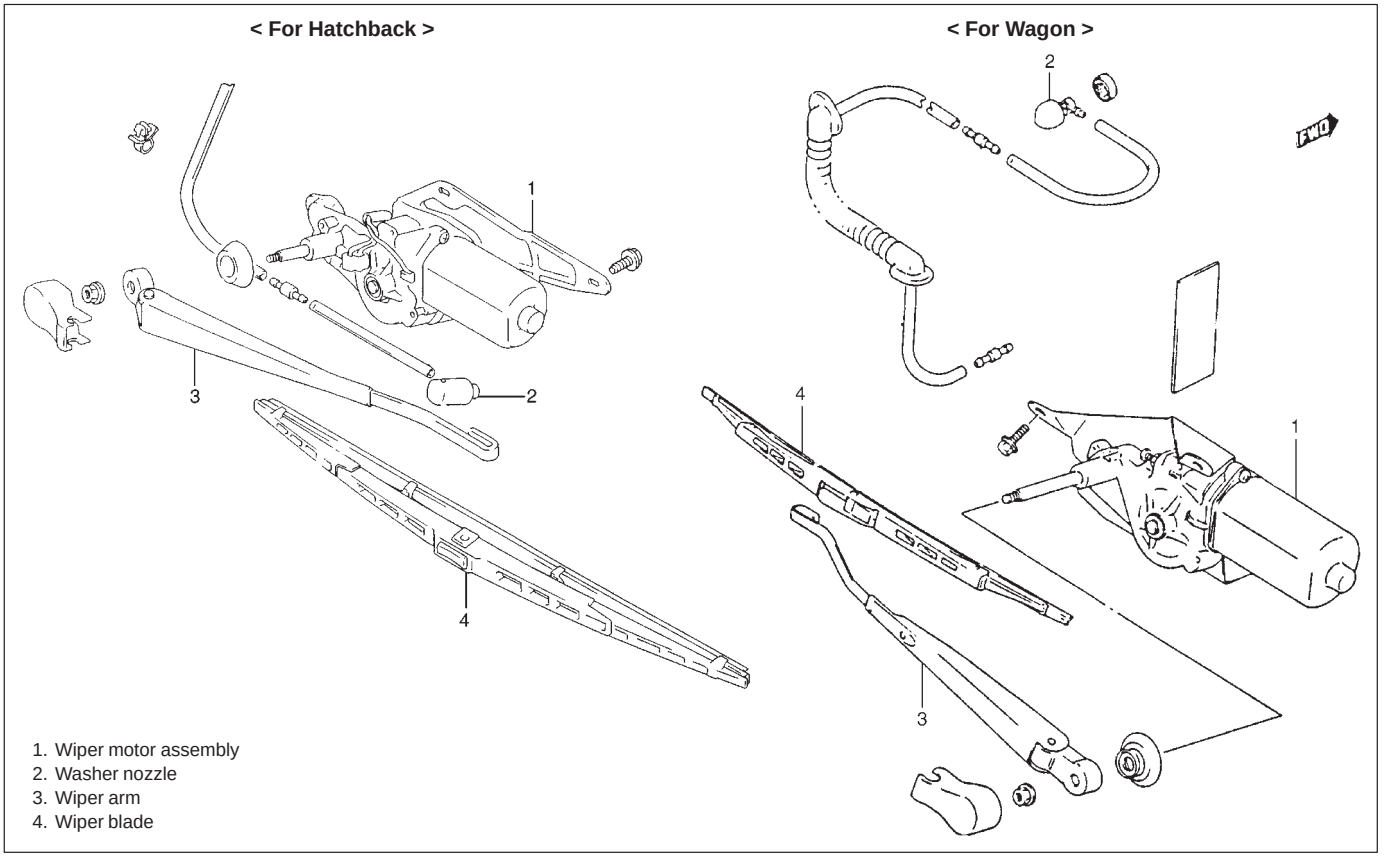


INTERMITTENT WIPER RELAY

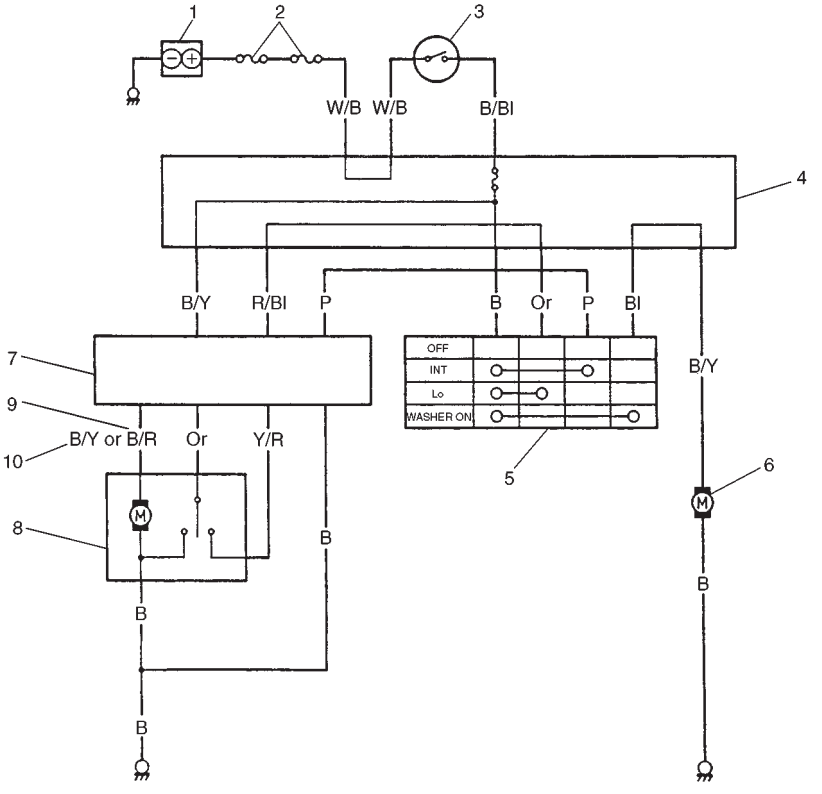
1) Disconnect combination switch couplers from junction box.
2) Turn wiper switch on to INT position.
3) Apply 12 V DC to terminals intermittently by connecting and disconnecting service wire tips as shown in figure.
4) If operating clicks can be heard from relay, intermittent wiper relay functions is good.

REAR WINDOW WIPER AND WASHER (If equipped)

The rear window wiper is of the one-speed type, and its washer is equipped with a separate-type washer pump.



WIRING CIRCUIT



DESCRIPTION OF CIRCUIT AND TROUBLE DIAGNOSIS

Refer to “WINDSHIELD WIPER” in this section.

INSPECTION

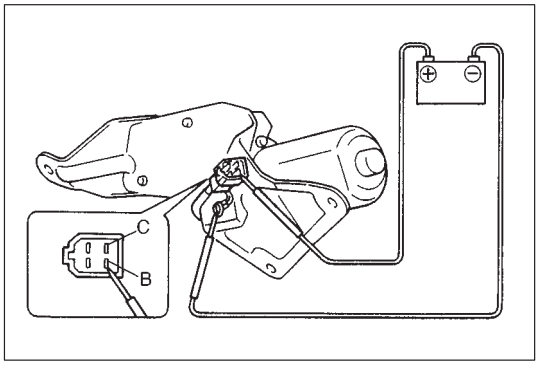
WIPER AND WASHER SWITCHES

Refer to “COMBINATION SWITCH” in this section.

WASHER PUMP

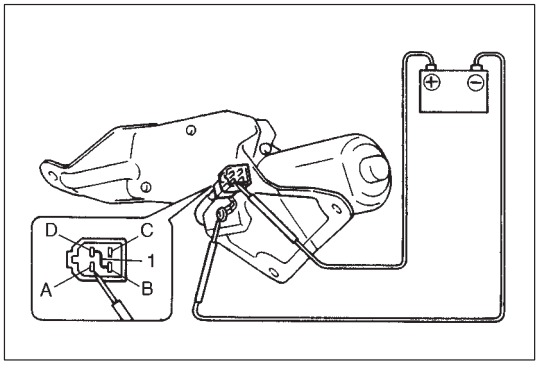
In the same manner as with the windshield washer pump, check pumping rate.

Refer to “WINDSHIELD WIPERS AND WASHERS” in this section.



WIPER MOTOR

1) As shown left, use a 12V battery to connect its (+) and (–) terminals to “B” terminal and “C” terminal respectively. Then motor should rotate at a rate of 35 – 45 rpm.

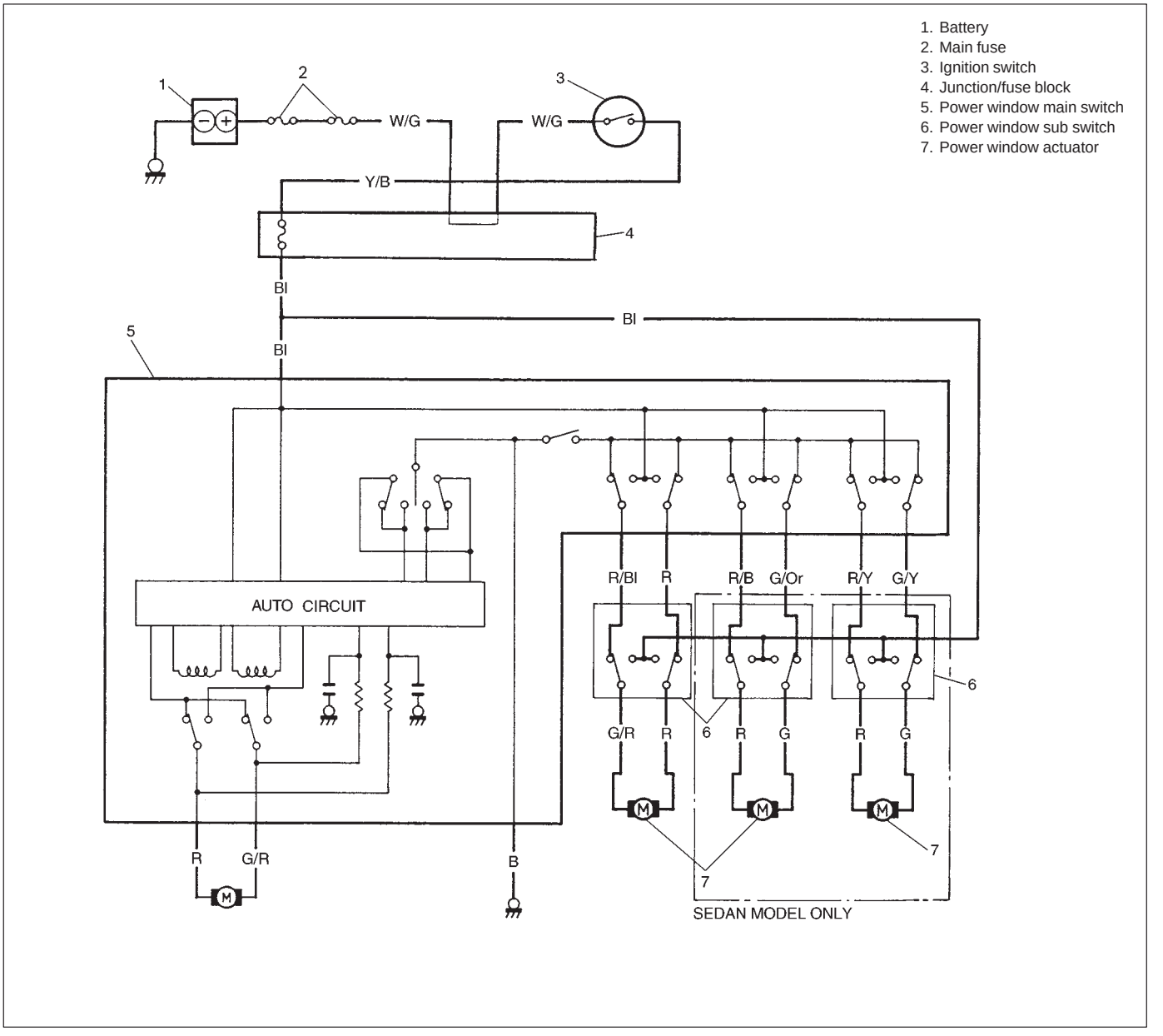


2) Testing automatic stop action
   a) First, connect battery (+) terminal to “B” terminal and battery (–) terminal to “C” terminal and let the motor turn.
   b) Then disconnect “B” terminal from battery and let the motor stop.
   c) Next connect terminal “B” and “D” with a jumper wire (1) and connect “A” terminal to battery (+) terminal. Observe the wiper motor turns once again, then stops at a given position.
   d) Repeat these steps several times, and inspect if the motor stops at the given position every time.

POWER WINDOW CONTROL SYSTEM (If equipped)

The power window control system is so designed that it electrically controls up & down movement of side door window glass by means of the motor which is installed to the window regulator.
The system consists of the ignition switch, power window switches. window regulator motors and related wiring harness.

WIRING CIRCUIT

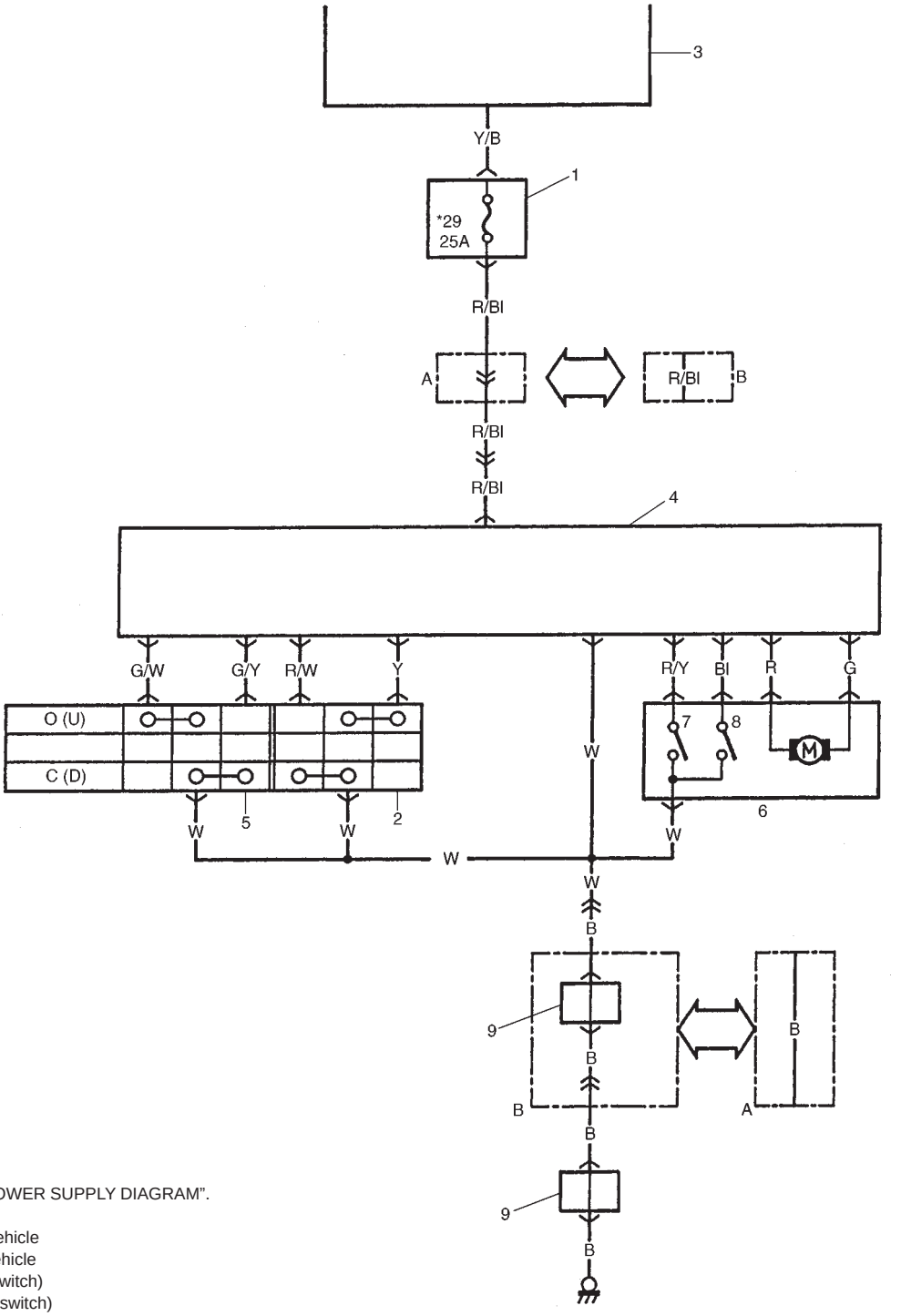


TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
All power window motors do not operate.	○ Main fuse and/or fuses blown ○ Wiring or grounding faulty	Replace main fuse and/or fuses to check for short. Repair as necessary.
Some switches do not operate.	○ Wiring or coupler faulty ○ Window lock switch faulty	Repair as necessary. Replace.
Only one actuator does not faulty.	○ Wiring or coupler faulty ○ Actuator faulty	Repair as necessary. Replace.

POWER SLIDING ROOF (If equipped)

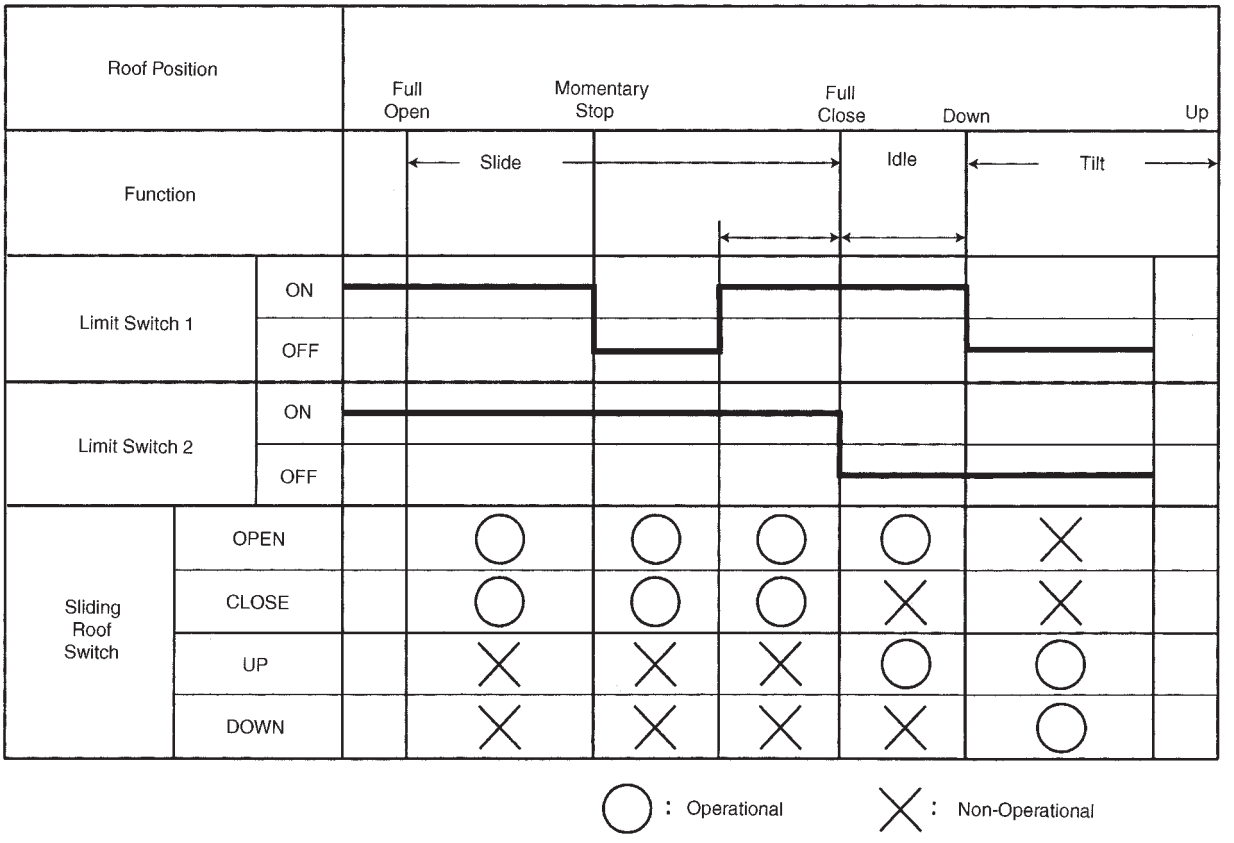
WIRING CIRCUIT



* 29: Refer to “POWER SUPPLY DIAGRAM”.

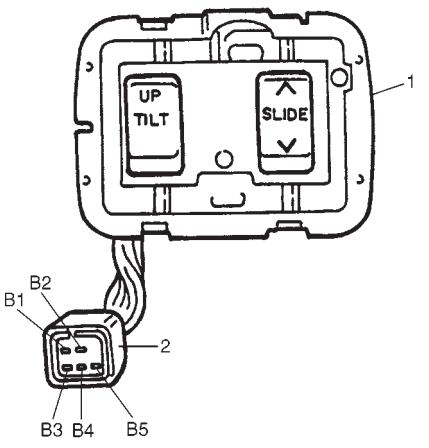
A: RH steering vehicle
B: LH steering vehicle
O: OPEN (slide switch)
C: CLOSE (slide switch)
U: UP (tilt switch)
D: DOWN (tilt switch)
1. Junction box
2. Sliding roof tilt switch
3. Ignition switch
4. Sliding roof control relay
5. Sliding roof slide switch
6. Sliding roof drive gear assembly (motor)
7. Limit switch 1
8. Limit switch 2
9. Joint connector

OPERATION



TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
Sliding roof does not operate (sliding roof motor runs OK)	○ Foreign object stuck in sliding roof rail ○ Misinstallation of sliding roof rail ○ Conflicts of sliding roof parts ○ Misinstallation of sliding roof drive cable	Remove or clean stuck object. Install correctly. Fix conflicts. Install correctly.
Sliding roof does not operate (sliding roof motor does not run)	○ Blown fuse ○ Faulty sliding roof control relay ○ Faulty sliding roof switch ○ Faulty sliding roof motor ○ Wiring or grounding faulty	Replace. Replace. Replace. Replace. Repair as necessary.



1. Sliding roof switch
2. Sliding roof switch coupler

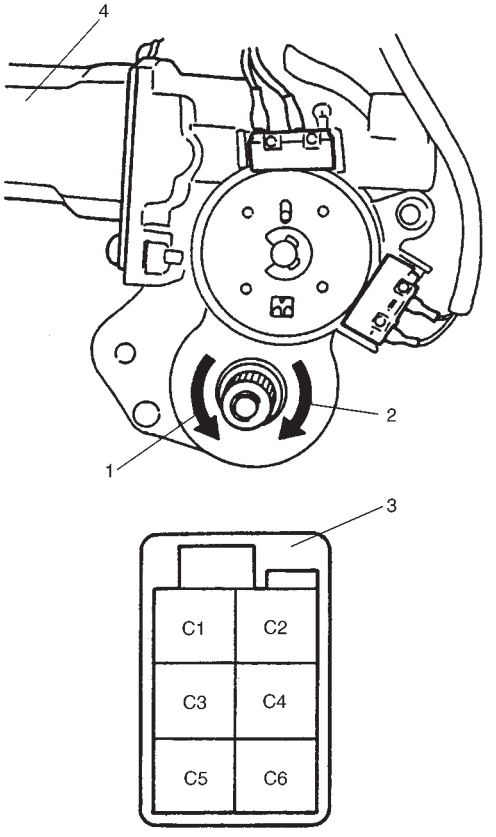
INSPECTION

SLIDING ROOF SWITCH

Inspect switch continuity between terminals.

	SLIDE SWITCH			TILT SWITCH		
	B1	B5	B3	B2	B5	B4
OPEN (UP)	○	○			○	○
OFF						
CLOSE (DOWN)		○	○	○	○	

If any of continuity is not obtained, replace sliding roof switch.



1. Close/up direction
2. Open/down direction
3. Sliding roof drive gear assembly coupler
4. Sliding roof drive gear assembly

SLIDING ROOF DRIVE GEAR ASSEMBLY

Inspection of Motor

1) Disconnect sliding roof drive gear assembly coupler.
2) Connect (+) battery lead to terminal C2 and (–) battery lead to terminal C1 and check that the motor turns to the left (close/up direction).
3) Reverse polarity (connect (–) battery lead to terminal C2 and (+) battery lead to terminal C1) and check that the motor turns to the right (open/down direction).
4) If motor does not operate as above 2) and 3) replace it.

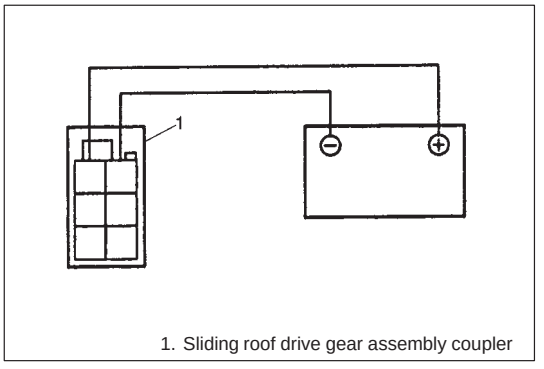
Inspection for noise-protection ground

1) Check that the continuity exists between terminal C4 and the body of motor.

CIRCUIT BREAKER

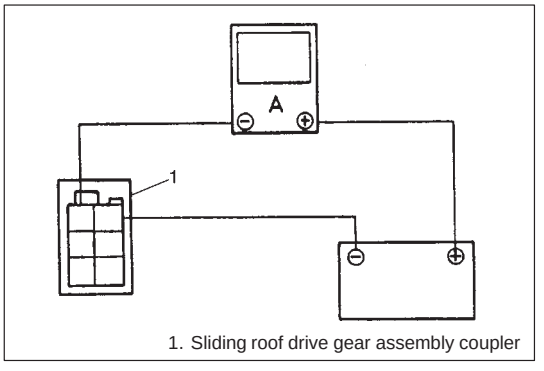
NOTE:
This inspection must be done with the complete sliding roof assembly installed of the vehicle.

1) Disconnect coupler from sliding roof drive gear assembly.



1. Sliding roof drive gear assembly coupler

2) Connect (–) Battery lead terminal C2, (+) battery lead to terminal C1, then open sliding roof completely.
3) Disconnect (–) battery lead from terminal C2.

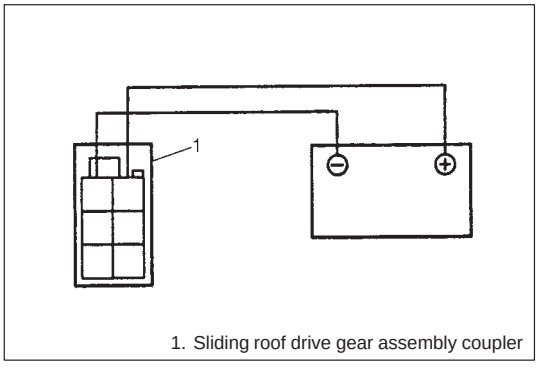


1. Sliding roof drive gear assembly coupler

4) Connect ammeter between terminal C1 and (+) battery lead.
5) Measure time that the current falling down around 16A – 23A to 0A when (–) battery lead connected terminal C2 again.

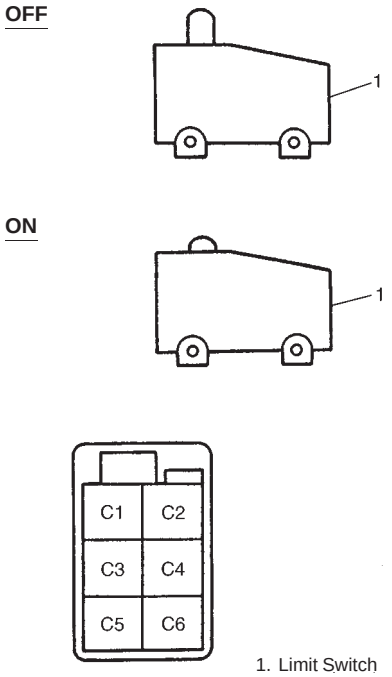
   Standard measured time: 10 – 60 sec.

   If measured time is out of specification, replace sliding roof drive gear assembly.
6) When the current reaches 0A, disconnect both terminal C2 and C1 from battery lead.



1. Sliding roof drive gear assembly coupler

7) 60 seconds after the disconnection of terminal C2 and C1, connect (+) battery lead to terminal C2, (–) battery lead to terminal C1 and check that the sliding roof operates to closing direction.

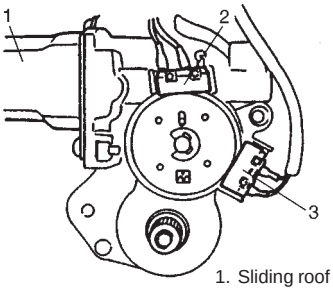


1. Limit Switch
2. Sliding roof drive coupler

LIMIT SWITCH 1 AND LIMIT SWITCH 2

1) Remove limit switch from sliding roof drive gear assembly and check continuity between terminal when limit switch is ON and OFF.

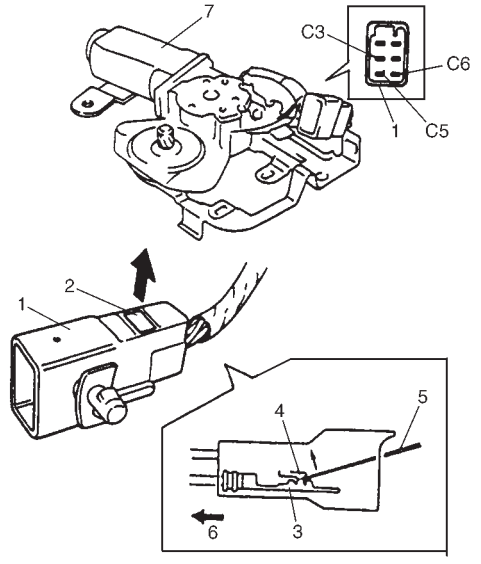
	SLIDE SWITCH		TILT SWITCH	
	C3	C6	C3	C5
ON	○	○	○	○
OFF				



1. Sliding roof drive gear assembly
2. Limit switch 2
3. Limit switch 1

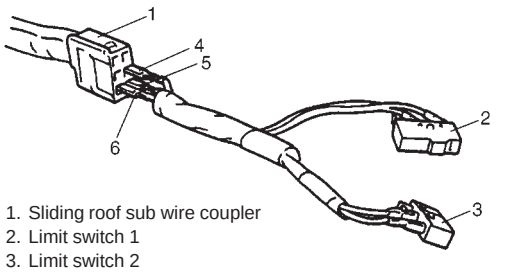
SLIDING ROOF CONTROL RELAY

1) Remove sliding roof drive gear assembly. Refer to Section 9 of this manual for details.
2) Remove limit switch 1 and limit switch 2 from sliding roof drive gear assembly.



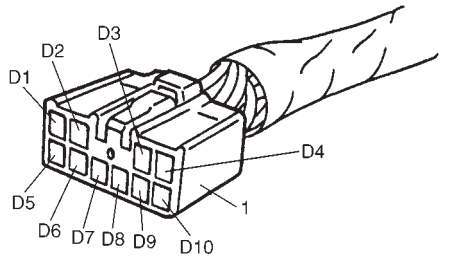
1. Sliding roof drive gear assembly coupler
2. Stopper
3. Sliding roof drive gear coupler terminals
4. Terminal lock
5. Thin steel rod
6. Pull out while unlocking
7. Sliding roof drive gear assembly

3) Disconnect sliding roof drive gear assembly coupler from sliding roof sub wire.
4) Pull out terminal C3, C5 and C6 from sliding roof drive gear assembly coupler. To pull terminals out, first unlock stopper upward, then pull out wires (terminals) gently while unlocking the terminal lock.
   Terminals C3, C5 and C6 are the limit switch wires.



1. Sliding roof sub wire coupler
2. Limit switch 1
3. Limit switch 2
4. White/Black wire terminal
5. Red/Yellow wire terminal
6. Red wire terminal

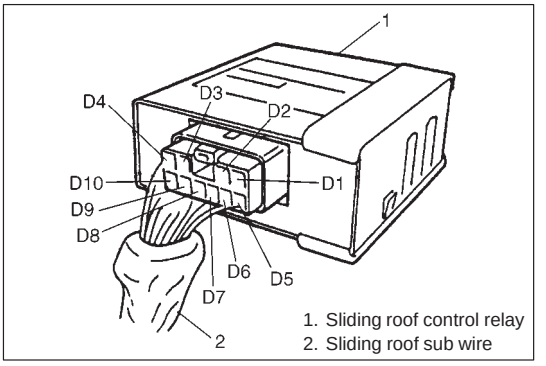
5) Connect sliding roof switch to sliding roof sub wire.
6) Connect limit switch wires to sliding roof sub wire connector where they should be connected.



1. Sliding roof sub wire
(To sliding roof control relay)

7) Disconnect sliding roof sub wire from sliding roof control relay.
8) Check resistance and voltage at the following condition.
If any of measured condition does not below standard values, the problem exists on the vehicle, not on the sliding roof control relay.

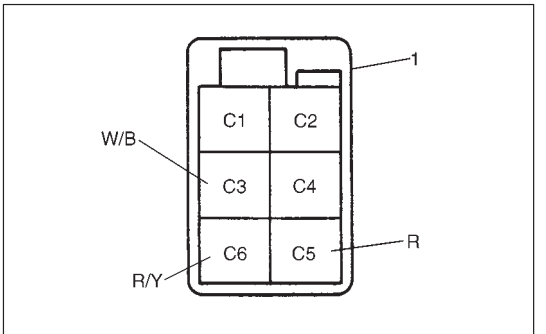
Terminal ⊕		Terminal ⊖	Check for	Condition	Standard Value
D6	–	Body ground	Resistance	Anytime	Continuity
D2	–	Body ground	Voltage	Ignition SW OFF → ON	0V → 10 – 14V
D8	–	Body ground	Resistance	Slide switch OFF → OPEN	∞ → Continuity
D7	–	Body ground	Resistance	Slide switch OFF → CLOSE	∞ → Continuity
D4	–	Body ground	Resistance	Tilt switch OFF → UP	∞ → Continuity
D10	–	Body ground	Resistance	Tilt switch OFF → DOWN	∞ → Continuity
D3	–	Body ground	Resistance	Limit switch 1 OFF → ON	∞ → Continuity
D9	–	Body ground	Resistance	Limit switch 2 OFF → ON	∞ → Continuity
D1	–	Body ground	Resistance	Anytime	∞
D5	–	Body ground	Resistance	Anytime	∞



1. Sliding roof control relay
2. Sliding roof sub wire

9) Connect sliding roof sub wire to sliding roof control relay.
10) Check voltage and resistance at the following condition.
If any of measured value does not below standard values, replace sliding roof control relay.

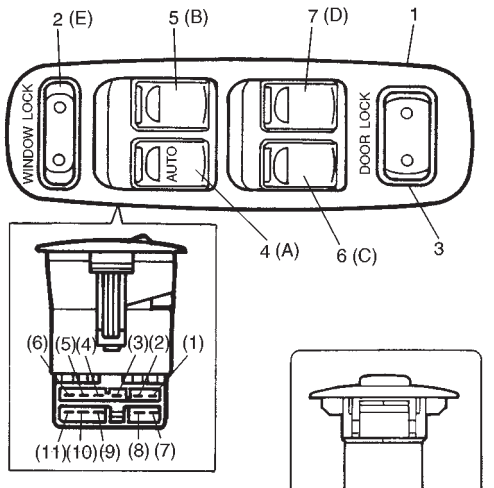
Terminal ⊕	Terminal ⊖	Check for	Condition	Standard Value
D1	Body ground	Resistance	All switches OFF	Continuity
D1	Body ground	Voltage	Ignition switch ON, limit switch 2 OFF tilt switch OFF → UP	0V → 10 – 14V
D1	Body ground	Voltage	Ignition switch ON, limit switch 2 ON slide switch OFF → CLOSE	0V → 10 – 14V
D1	Body ground	Voltage	Ignition switch ON, limit switch 2 ON, slide switch CLOSE, limit switch 1 ON → OFF	10 – 14V → 0V
D1	Body ground	Voltage	Ignition switch ON, limit switch 1 ON, slide switch CLOSE, limit switch 2 ON → OFF	10 – 14V → 0V
D5	Body ground	Resistance	All switches OFF	Continuity
D5	Body ground	Voltage	Ignition switch ON, limit switch 1 OFF, limit switch 2 OFF, tilt switch OFF → DOWN	0V → 10 – 14V
D5	Body ground	Voltage	Ignition switch ON, limit switch 2 OFF, tilt switch DOWN, limit switch 1 OFF → ON	10 – 14V → 0V
D5	Body ground	Voltage	Ignition switch ON, limit switch 1 ON, slide switch OFF → OPEN	0V → 10 – 14V
D5	Body ground	Voltage	Ignition switch ON, limit switch 2 ON, slide switch OFF → OPEN	0V → 10 – 14V



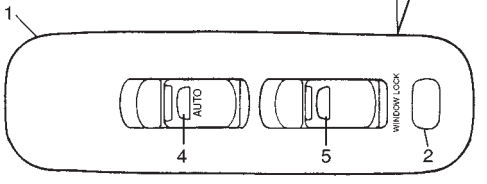
1. Sliding roof drive gear assembly coupler

11) After all inspection are done, put limit switch, wire terminals back to sliding roof drive gear assembly coupler and install limit switches to sliding roof drive gear assembly. Finally reinstall sliding roof drive gear assembly to the vehicle.

Sedan model (LH steering vehicle)



Hatch-Back model



1. Power window main switch
2. Power window lock switch
3. Power door lock switch
4. Driver side window switch
5. Passenger side window switch
6. Rear LH window switch
7. Rear RH window switch

Power Window Main Switch

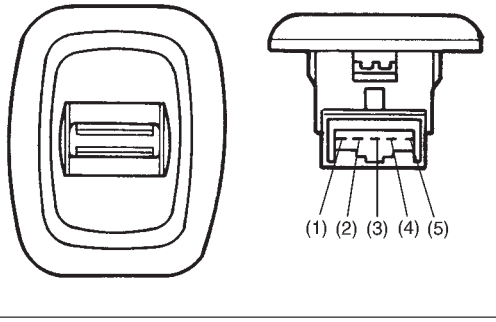
Inspect switch continuity between terminals.

(A) Driver side window switch

	(3)	(1)	(2)	(11)
UP	○	○	○	○
OFF		○	○	○
DOWN	○	○	○	○

Passenger and rear side window switches.

	SWITCH POSITION	TERMINAL				
CONNECTOR / (E)	(B)	(3)	(5)	(6)	(11)	(12)
	(C)		(7)	(8)		
	(C)		(9)	(10)		
UNLOCK	UP	○	○	○	○	○
	OFF		○	○	○	○
	DOWN	○	○	○	○	○
LOCK	UP	○	○			
	OFF		○	○		
	DOWN	○		○		



Power Window Sub Switch

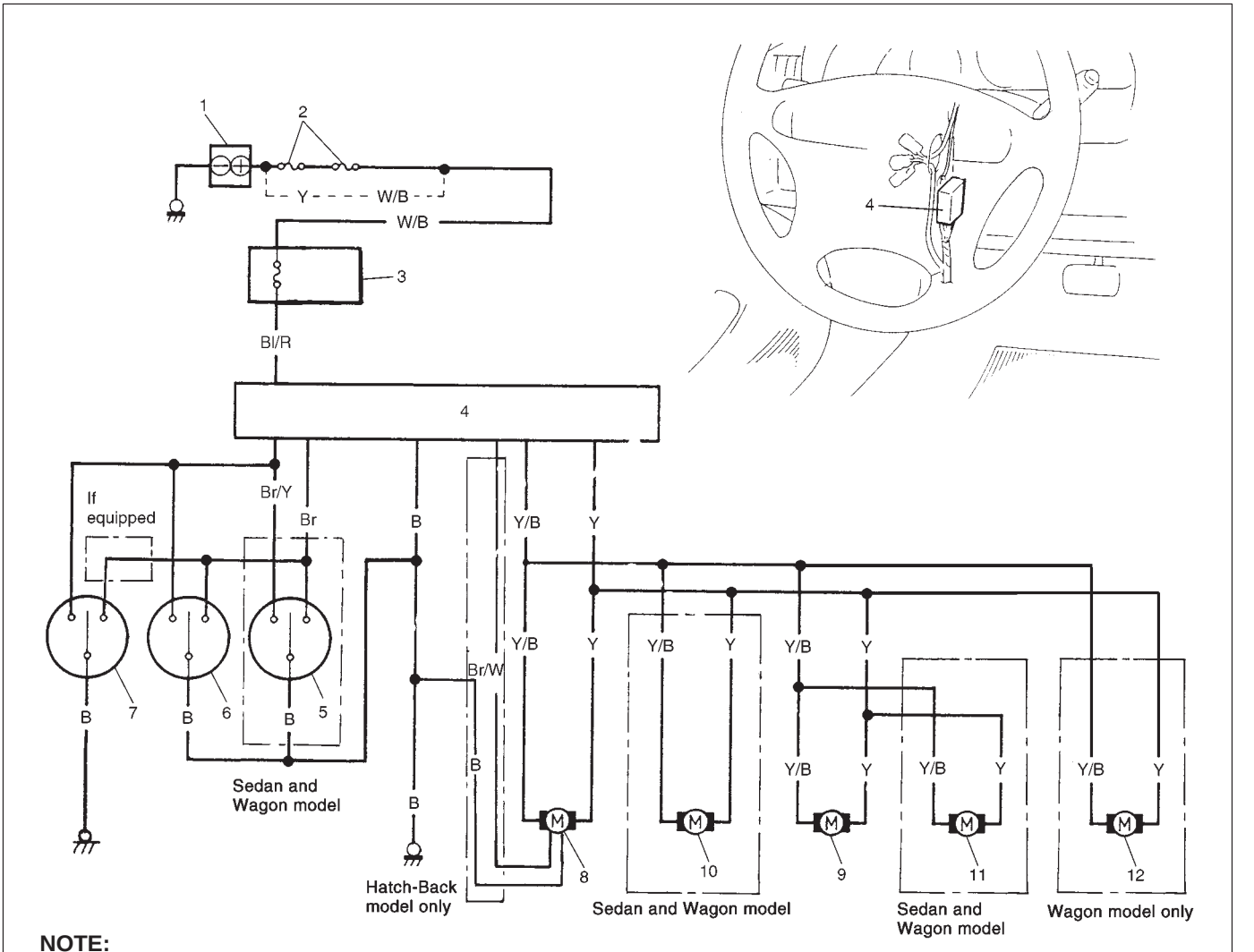
Inspect switch continuity between terminal.

	(1)	(2)	(3)	(4)	(5)
UP	○	○	○		○
OFF	○	○		○	○
DOWN	○		○	○	○

POWER DOOR LOCK CONTROL SYSTEM (If equipped)

The power door lock control system consists of the power door lock controller, door lock switch, door lock actuator and related wiring harness.

WIRING CIRCUIT



NOTE:
– – – – –: German spec. vehicle only

1. Battery
2. Main fuse
3. Junction/fuse block
4. Power door lock controller
5. Door lock switch
6. Key cylinder switch (driver side)
7. Key cylinder switch (passenger side)
8. Driver side door lock actuator
9. Passenger side door lock actuator
10. Rear door lock actuator (LH) (if equipped)
11. Rear door lock actuator (RH) (if equipped)
12. Back door lock actuator (if equipped)

TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
All power door locks do not operate.	○ Main fuse and/or fuses blown	Replace main fuse and/or fuses to check for short.
	○ Wiring or grounding faulty	Repair as necessary.
	○ Power door lock switch, door lock actuator or key cylinder switch faulty.	Repair as necessary.
	○ Controller faulty	Replace.
Only one power door lock does not operate.	○ Wiring or coupler faulty	Repair as necessary.
	○ Actuator (door lock motor) faulty	Replace.

KEYLESS ENTRY SYSTEM (if equipped)

GENERAL DESCRIPTION

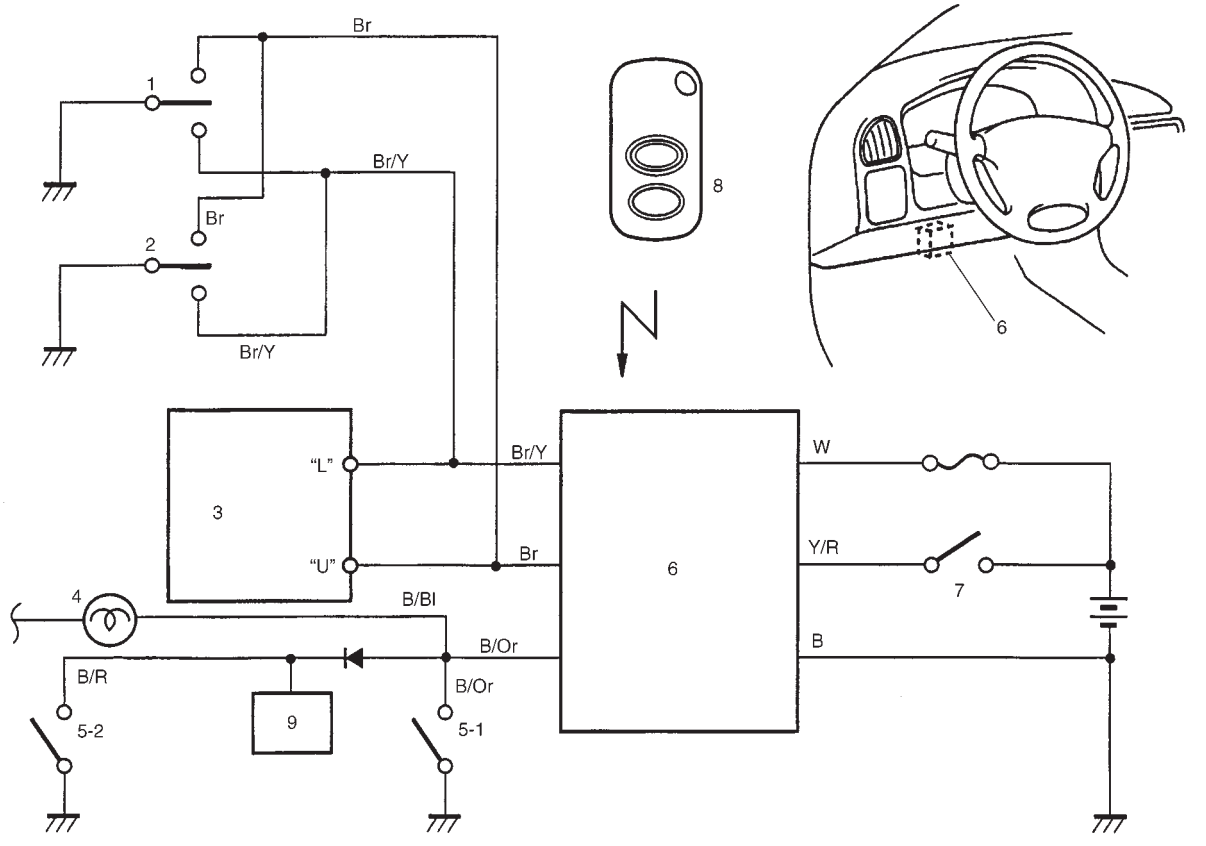
The keyless entry system uses radio wave. When the button on the transmitter is pressed, a signal is transmitted in the form of radio wave to the receiver. Then the signal causes the door lock controller to lock and unlock the door.

OPERATION

The door locks can not operated with the transmitter when either of the following conditions applies.

○ For 2 seconds after the ignition switch is turned from ON to OFF position.
○ The ignition switch is at ON or START position.
○ Any door is open.

WIRING CIRCUIT



"L". Lock signal
"U". Unlock signal
1. Door lock switch
2. Key cylinder switch
3. Power door lock controller
4. Room lamp
5-1. Door switch (except driver's side)
5-2. Door switch (driver's side)
6. Receiver
7. Ignition switch
8. Transmitter
9. Buzzer

TROUBLE DIAGNOSIS

Condition	Possible Cause	Correction
The power door lock function is available but the keyless entry function is not.	○ Fuse blown ○ Code registration error ○ Transmitter battery dead ○ Wiring or grounding faulty ○ Receiver faulty ○ Transmitter faulty	Replace fuse to check for short. Register code. Replace battery. Repair as necessary. Replace. Replace.
Only one power door lock does not operate.	○ Wiring or coupler faulty ○ Actuator (door lock motor) faulty	Repair as necessary. Replace.
Operation distance unstable.	○ Transmitter battery dead ○ Transmitter faulty	Replace battery. Replace.

NOTE:

- **○ The operation distance of this system varies depending on the position where the transmitter is operated, at the front side, the rear side or the lateral side. The distance can be affected by radio noises from a TV station, a power plant, a broadcasting station and so forth.**
- **○ If power door lock does not operate, refer to "POWER DOOR LOCK CONTROL SYSTEM" of the same section.**



1. Slot

TRANSMITTER

REPLACEMENT OF THE BATTERY

If the transmitter becomes unreliable, replace the battery.
As the battery power is consumed, the operation distance will be shorter.

1) Put the edge of a coin or a flat blade screw driver in the slot of the transmitter and pry it open.
2) Replace the battery (lithium disc-type CR2025 or equivalent) so its ⊕ terminal faces the "+" mark of the transmitter.

> **CAUTION:**
> **Use care not to allow grease or dirt to be attached on the printed circuit board and the battery.**

3) Close the transmitter firmly.
4) Make sure the door locks can be operated with the transmitter.

NOTE:

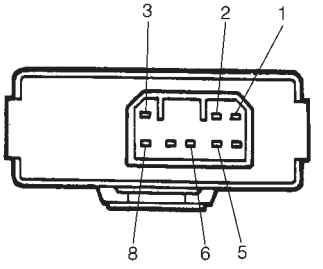
- **○ To prevent theft, be sure to break the transmitter before discarding it.**
- **○ Dispose of the used battery properly according to applicable rules or regulations. Do not dispose of lithium batteries with ordinary household trash.**

CODE REGISTRATION PROCEDURE

1) Start of code registration
   (Initial conditions: IG switch OFF, all doors closed)
2) Open the door and then turn ON the IG switch within 10 seconds.
3) Turn OFF the IG switch within 10 seconds after it is turned ON.
4) Turn the door switch ON and OFF 3 times within 20 seconds after the IG switch is turned OFF.
5) Within 10 seconds after the door switch is turned ON, turn ON the IG switch and then OFF within next 10 seconds.
6) After LOCK and UNLOCK operation once, the registration mode is set.
7) Press the UNLOCK button of the transmitter once within 60 seconds after the registration mode is set.
8) LOCK and UNLOCK operation once again completes the registration procedure.

NOTE:

- ○ **Perform the above procedure to register a code.**
- ○ **Two codes can be registered.**
- ○ **When a new code is registered, the oldest one will be cleared.**



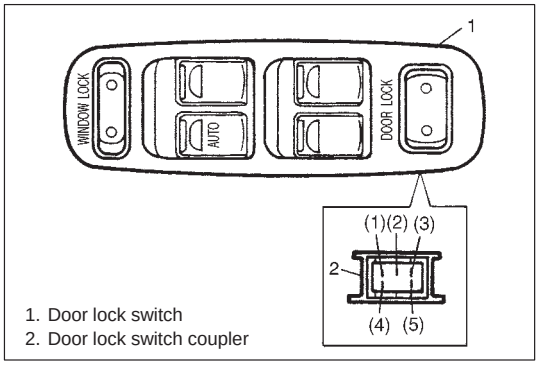
1. To power door lock controller (Unlock)
2. To power door lock controller (Lock)
3. To IG switch
5. To door switch
6. To GND
8. To battery

RECEIVER

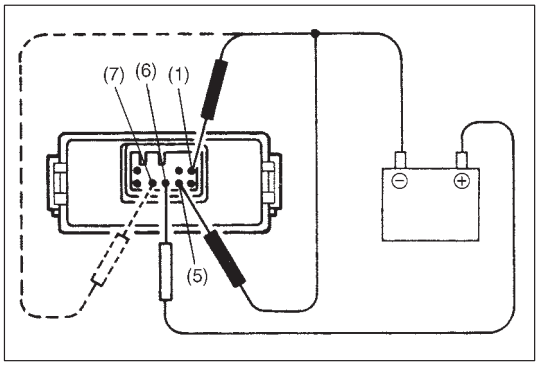
INSPECTION

Using a tester, check for continuity and voltage between each terminal of the connector connected to the receiver and the body ground at the following condition.

Terminal	Check for	Condition	Standard value
1	Continuity	Unlock the driver's seat side door by using the key.	No continuity → Continuity
2	Continuity	Lock the driver's seat side door by using the key.	No continuity → Continuity
3	Voltage	Insert the ignition key and turn ON the ignition switch.	0V→10 – 14v
5	Voltage	Open any one of all closed doors.	10 – 14V→0V
6	Continuity	Anytime	Continuity
8	Voltage	Anytime	10 – 14V



1. Door lock switch
2. Door lock switch coupler



INSPECTION

Power Door Lock Switch

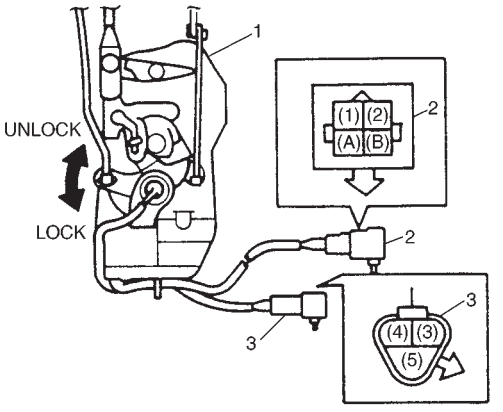
Inspect switch continuity between terminals.

	(2)	(3)	(4)
LOCK		○——	——○
OFF			
UNLOCK	○——	——○	

Power Door Lock Controller

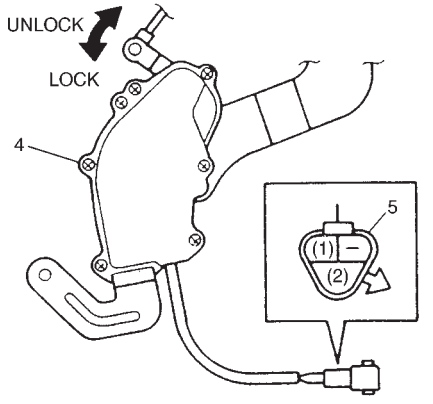
1) Disconnect power door lock controller coupler.
2) Connect (+) cord and (–) cord of 12V battery to coupler terminal (1), (5) and (6) as shown in figure.
3) Disconnect cord from terminal (5) and connect it to terminal (7).
4) Repeat Steps 2) and 3) several times and if relay operation is heard every time, it means that controller is operating.

Front Door



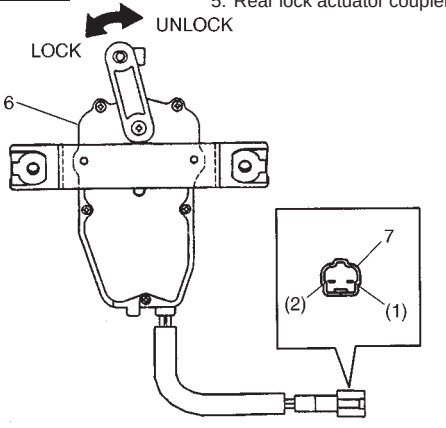
1. Front door lock actuator
2. Front door lock actuator coupler
3. Key cylinder switch coupler

Rear Door



4. Rear door lock actuator
5. Rear lock actuator coupler

Back Door



6. Back door lock actuator
7. Back door lock actuator coupler

Power Door Lock Actuator

1) Disconnect power door lock actuator coupler.
2) Connect (+) cord and (–) cord of 12V battery to coupler terminal (1) and (2).
3) Actuator is proved to be operating properly if (–) cord connection to terminal (1) results in “Lock” and its connection to terminal (2) results in “Unlock”.
4) Hatch-back model only.
   Use an ohmmeter to check terminal between (A) and (B).
   When key cylinder switch is on “LOCK” position, there should be no continuity between them. When key cylinder switch is on “UNLOCK” position, there should be continuity between them.

Key Cylinder Switch

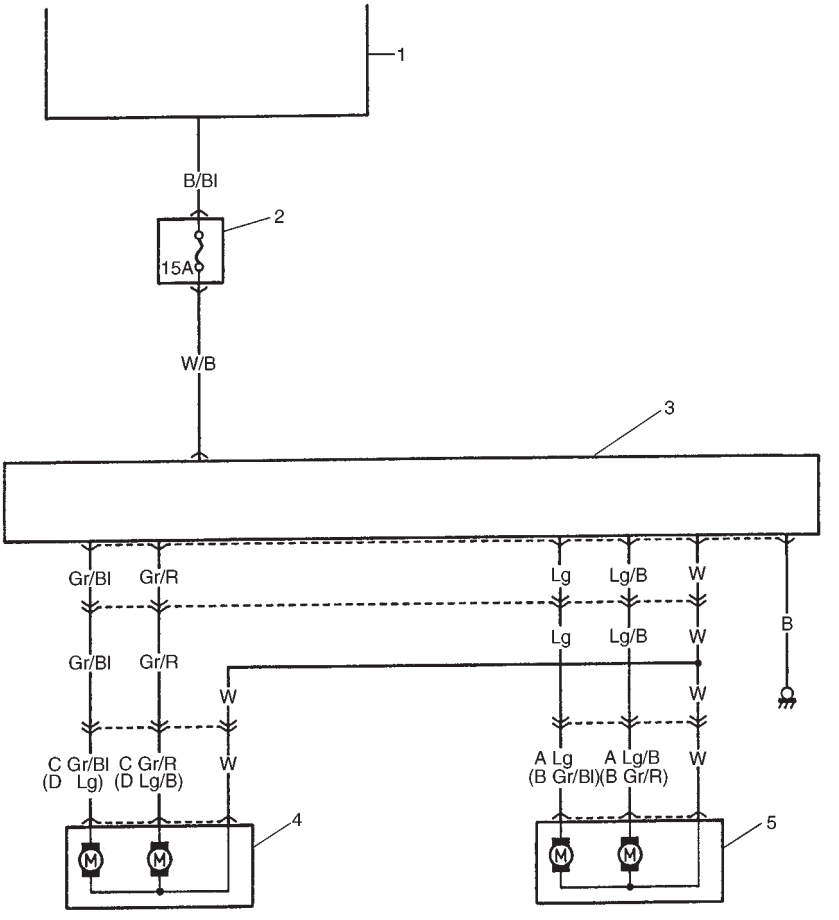
Inspection switch continuity between terminals.

	(3)	(4)	(5)
LOCK		○——	——○
OFF			
UNLOCK	○——	——○	

POWER MIRROR CONTROL SYSTEM (If equipped)

The power mirror control system consists of the power mirror control switch, mirror actuator and related wiring harness.

WIRING CIRCUIT

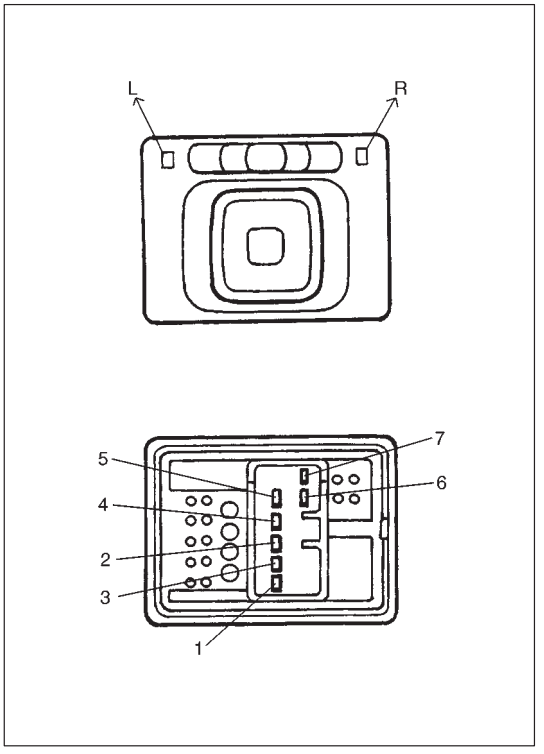


A: LH steering vehicle with power window
B: Other than A model
C: RH steering vehicle with power window
D: Other than C model

1. Ignition switch
2. Junction box
3. Power mirror control switch
4. Power mirror actuator (Left side)
5. Power mirror actuator (Right side)

TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
All power mirror do not operate.	○ Main fuse and/or fuses blown ○ Wiring or grounding faulty ○ Power mirror switch faulty. ○ Controller faulty	Replace main fuse and/or fuses to check for short. Repair as necessary. Replace. Replace.
Only one power mirror does not operate.	○ Wiring or coupler faulty ○ Actuator (mirror motor) faulty	Repair as necessary. Replace.

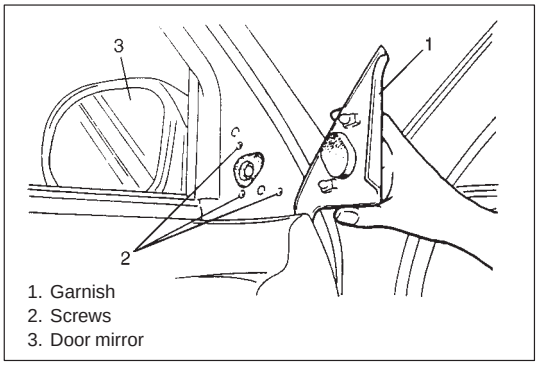


INSPECTION

Mirror Switch

1) Take out mirror switch from instrument panel.
2) Check continuity at each switch position by using a circuit tester.
   If any continuity is not obtained, replace mirror switch.

RH	1	2	3	6	5
LH				7	4
UP	○	○	○	○	
DOWN	○	○	○	○	
LEFT	○	○	○		○
RIGHT	○	○	○		○

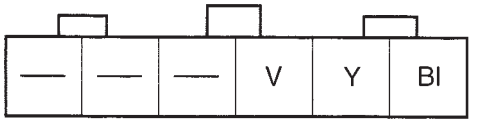


1. Garnish
2. Screws
3. Door mirror

Door Mirror

1) Remove garnish and screws from door.
2) Remove door mirror from door by disconnecting coupler.

MIRROR CONNECTOR (Both side)



Operation	V	Bl	Y
Up	⊖	⊕	
Down	⊕	⊖	
Left	⊖		⊕
Right	⊕		⊖

3) Check that door mirror operates properly when battery voltage is applied to connector terminals.

   If faulty is found, correct or replace.

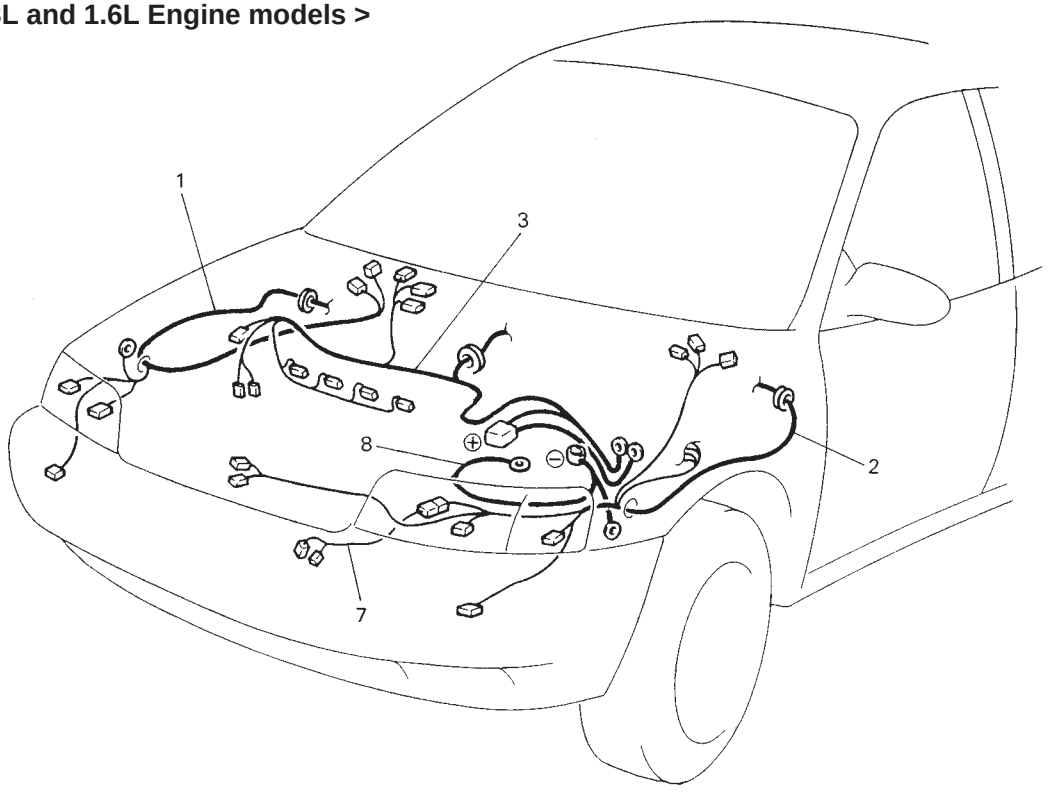
NOTE:
When installing door mirror to door, be careful not to pinch harness between door and door mirror.

WIRING HARNESS ROUTING

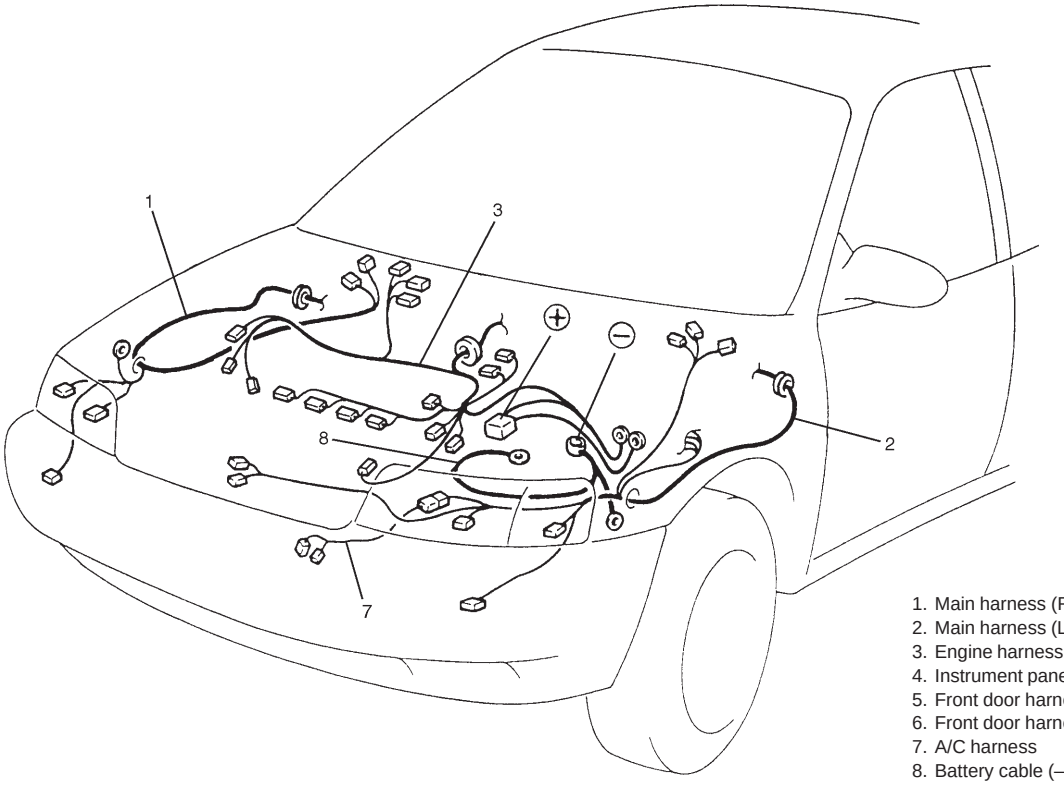
NOTE:
These figures show LH steering vehicle.

ENGINE ROOM

< 1.3L and 1.6L Engine models >



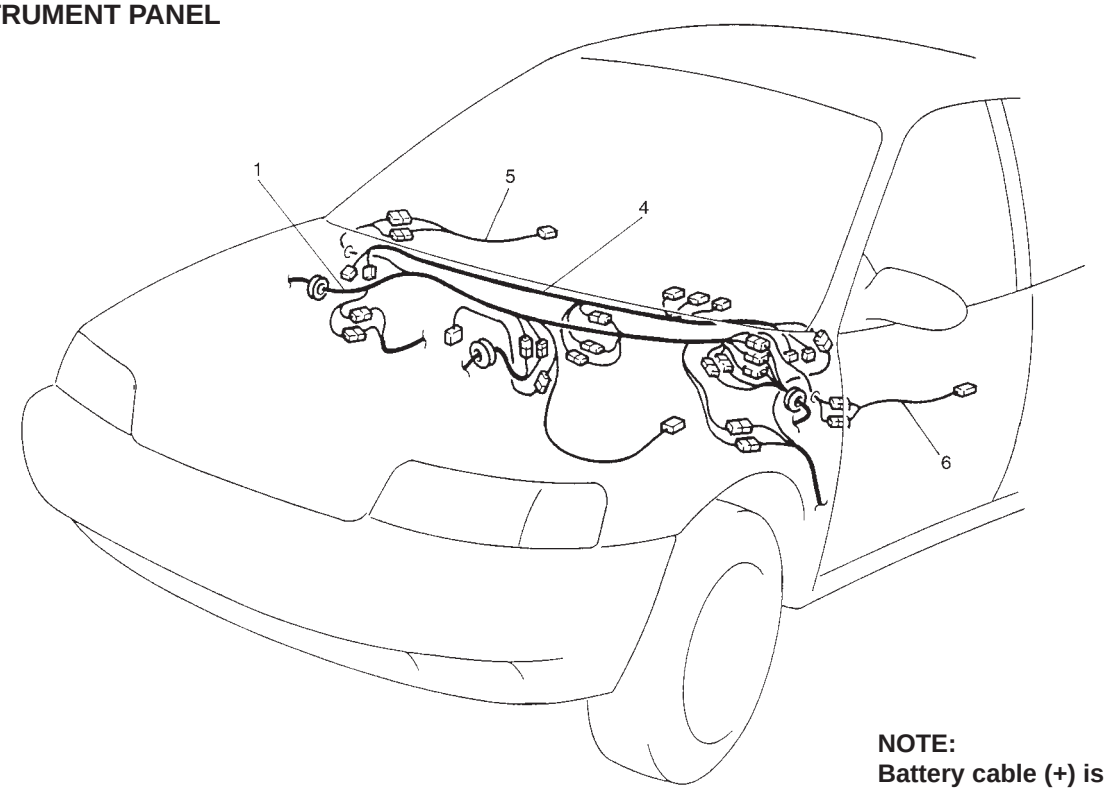
< 1.8L Engine model >



1. Main harness (RH)
2. Main harness (LH)
3. Engine harness
4. Instrument panel harness
5. Front door harness (RH)
6. Front door harness (RH)
7. A/C harness
8. Battery cable (–)

NOTE:
These figures show LH steering vehicle.

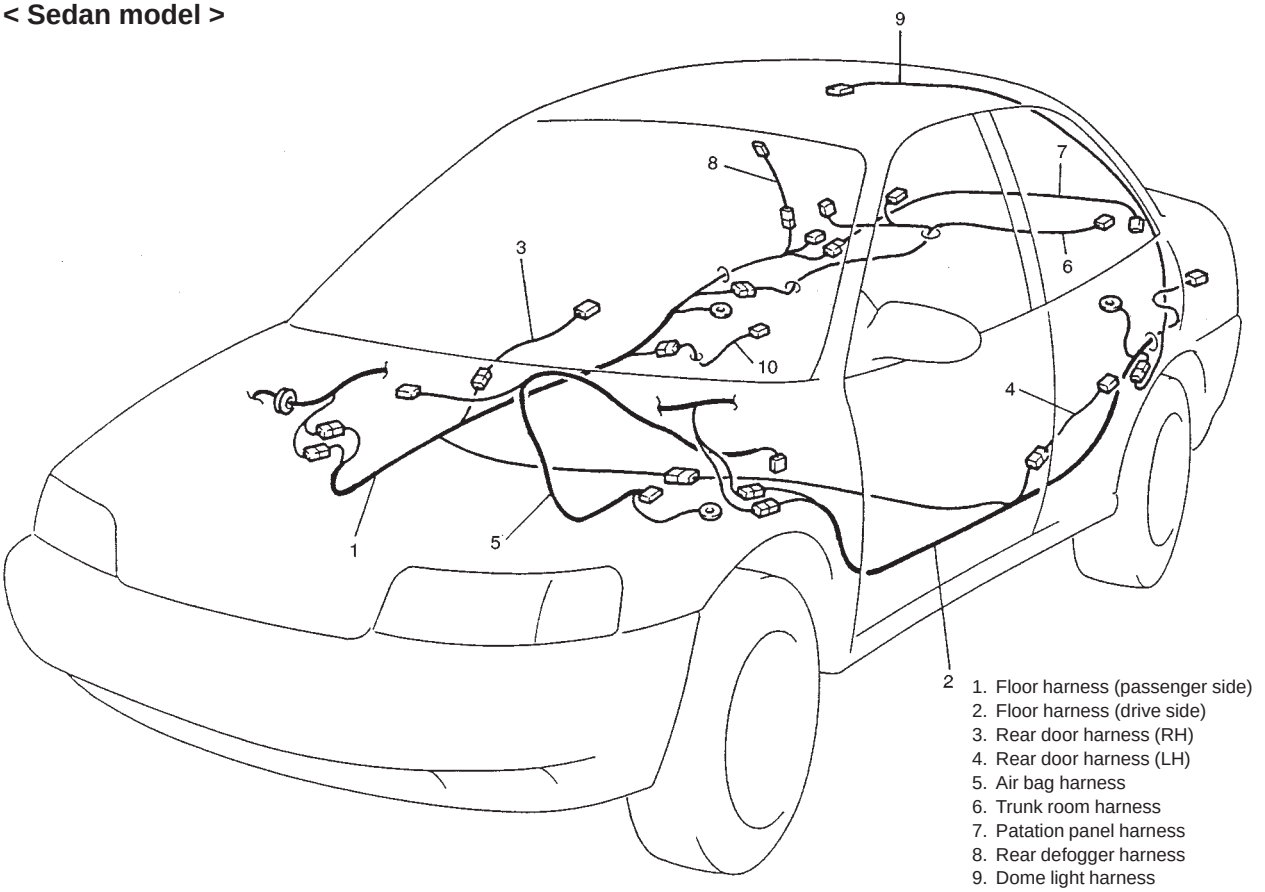
INSTRUMENT PANEL



NOTE:
Battery cable (+) is included in Engine harness.

FLOOR

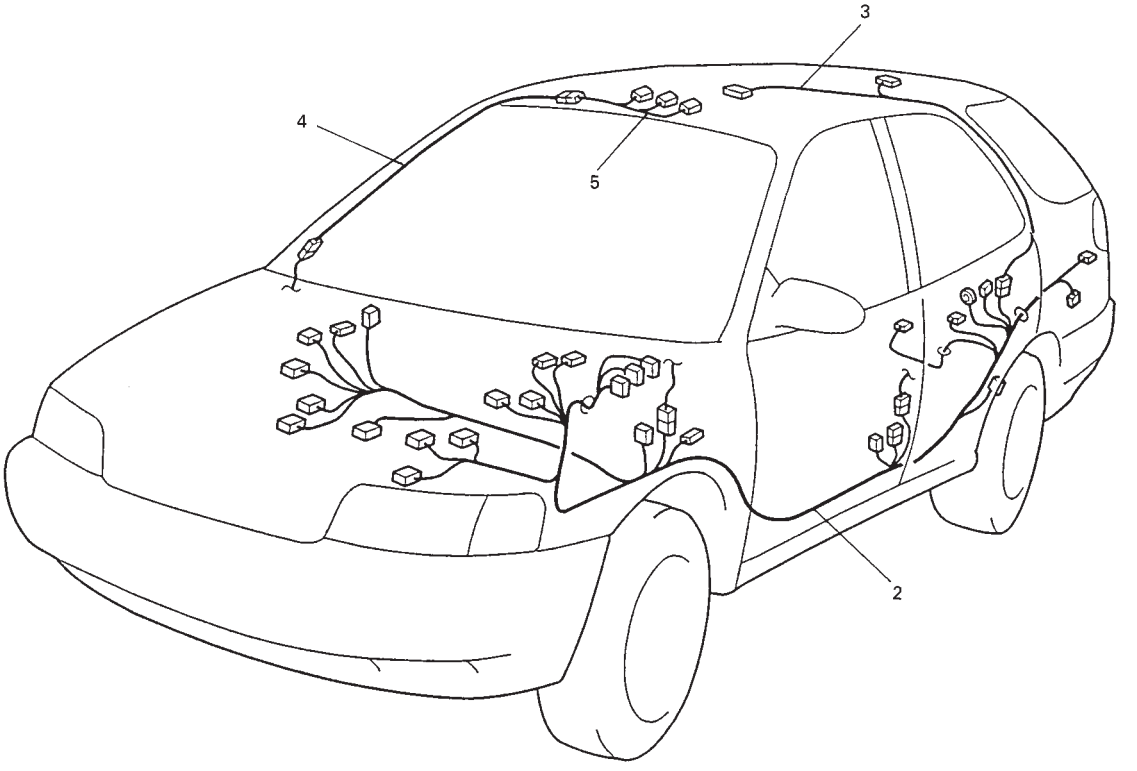
< Sedan model >

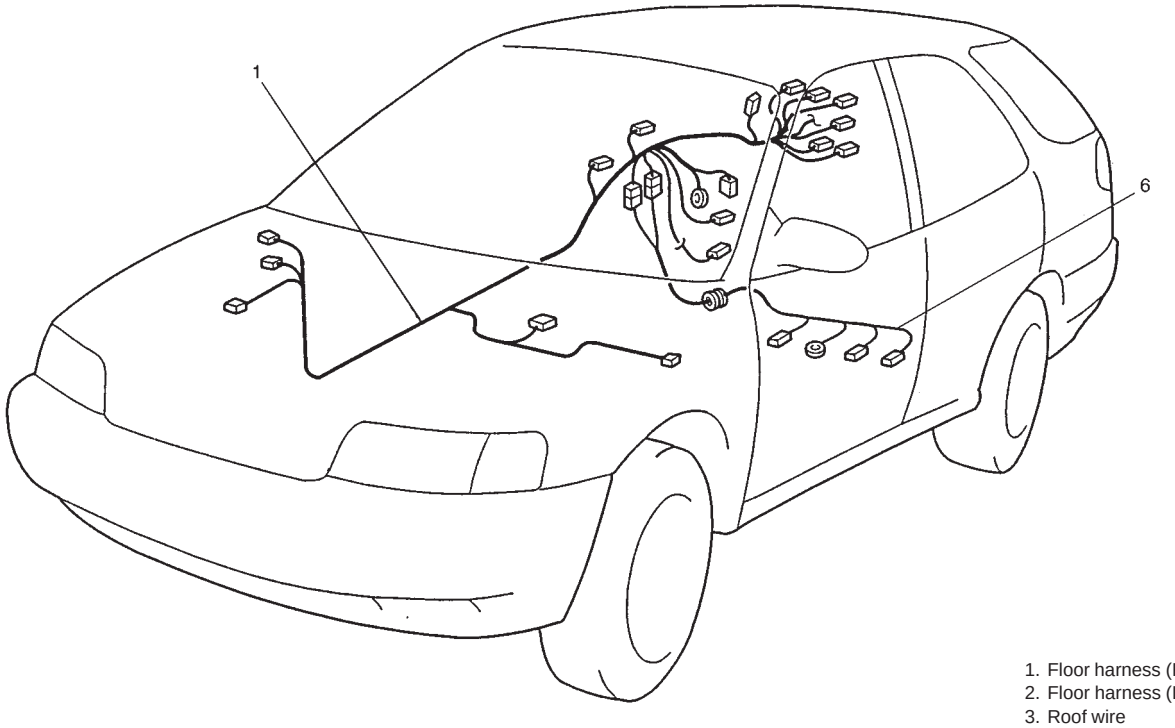


1. Floor harness (passenger side)
2. Floor harness (drive side)
3. Rear door harness (RH)
4. Rear door harness (LH)
5. Air bag harness
6. Trunk room harness
7. Patation panel harness
8. Rear defogger harness
9. Dome light harness
10. Fuel pump harness

FLOOR

< Wagon model >

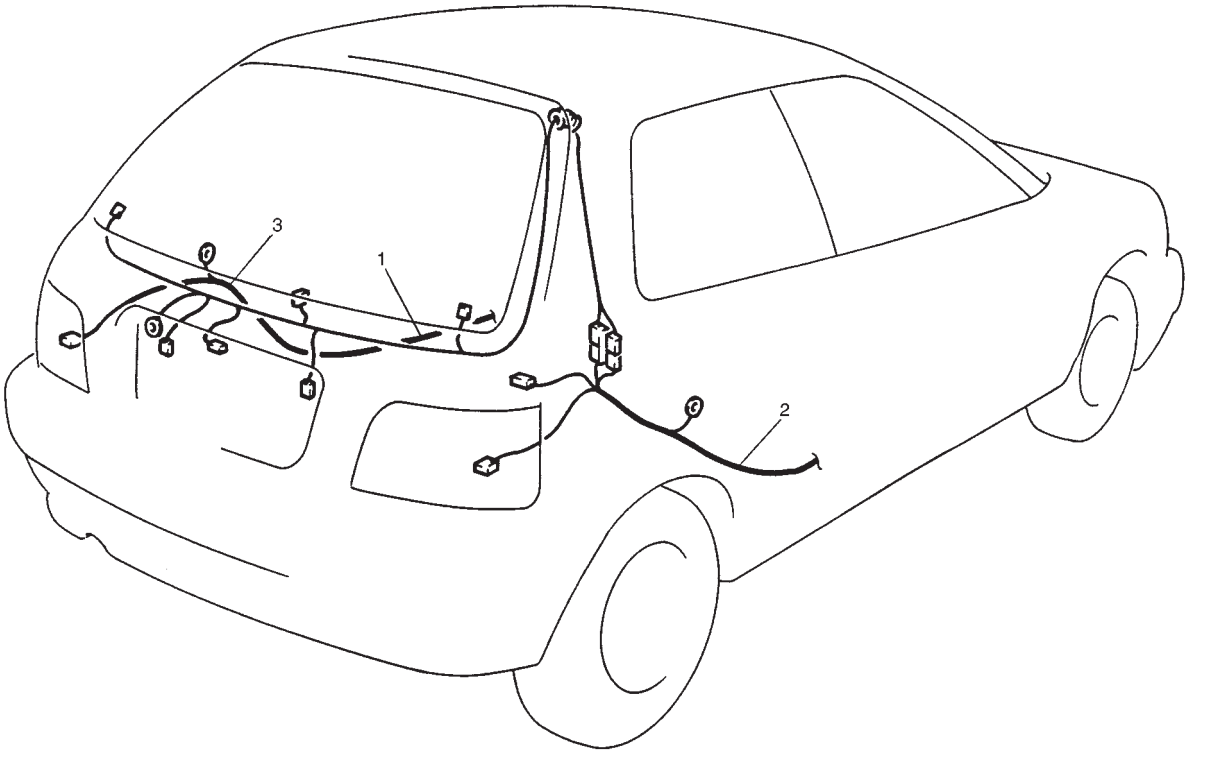




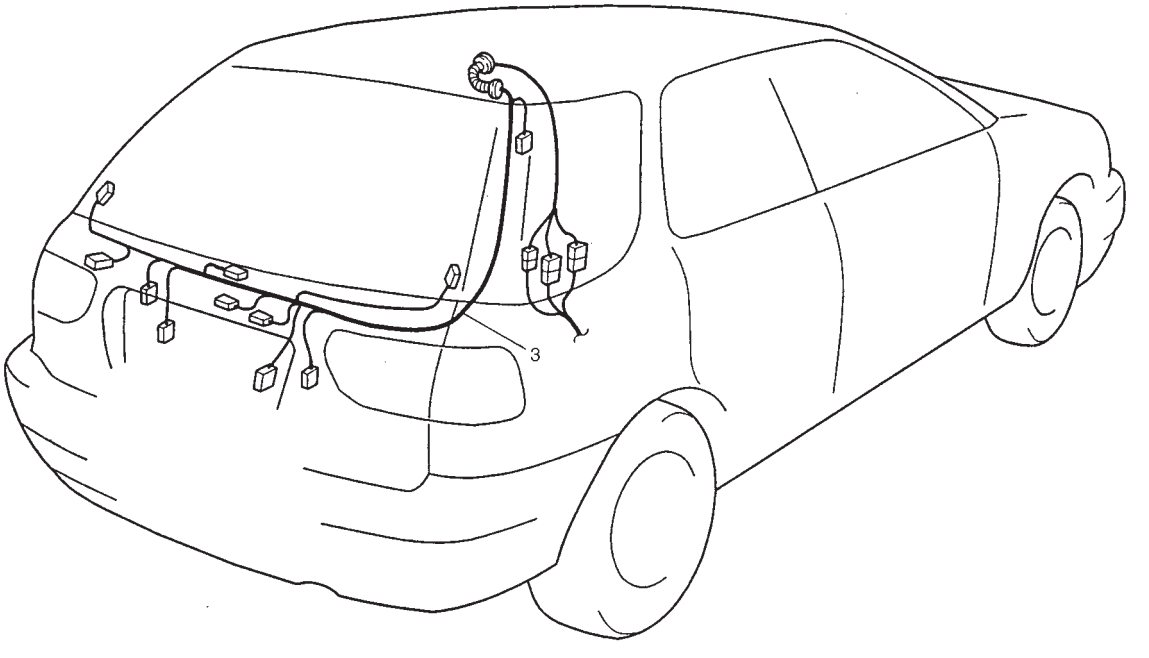
1. Floor harness (RH)
2. Floor harness (LH)
3. Roof wire
4. Sliding roof wire
5. Sliding roof sub wire
6. Fuel pump wire

BACK DOOR

< Hatch back model >



< Wagon model >

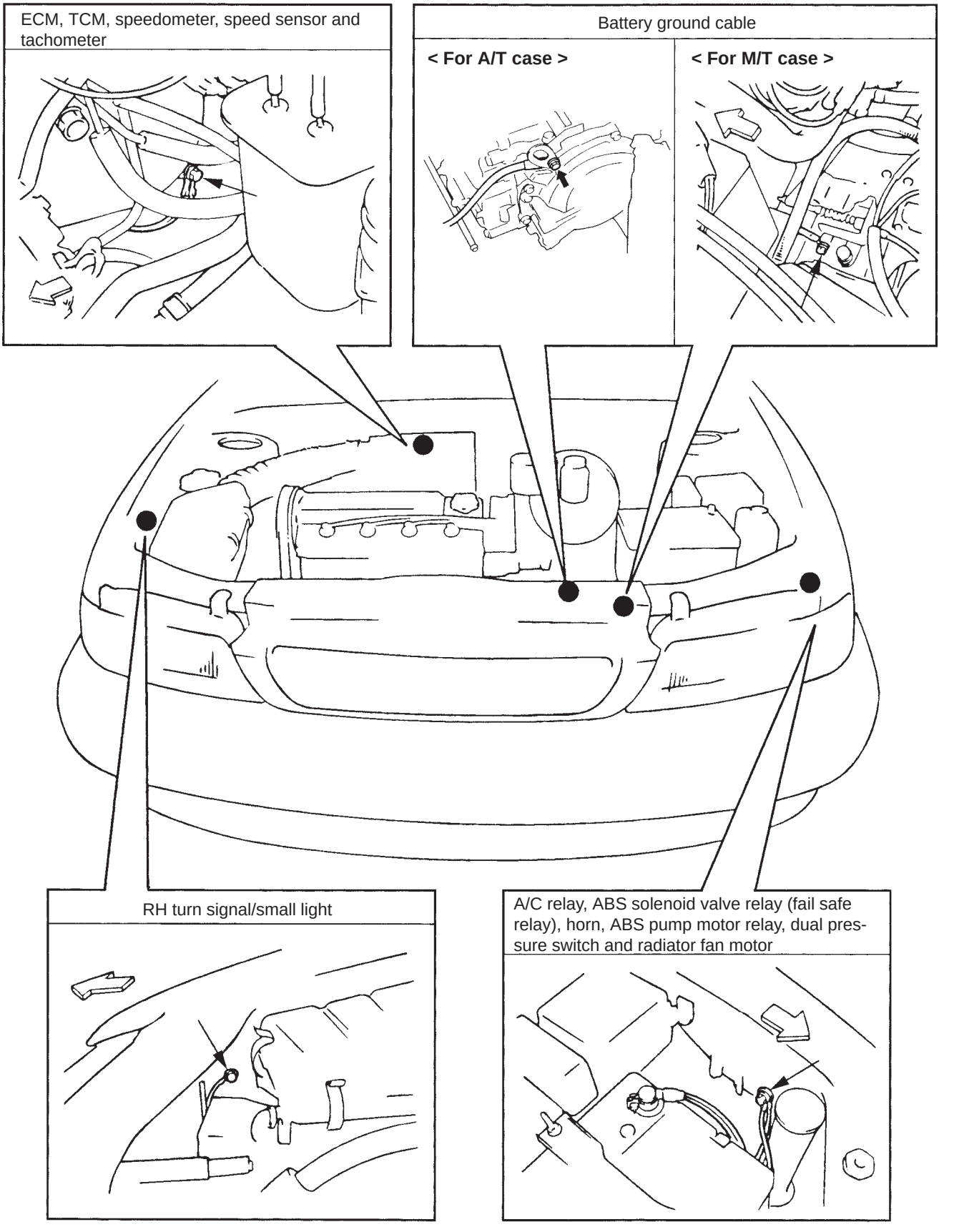


1. Floor harness (passenger side)
2. Floor harness (drive side)
3. Back door harness

GROUNDING POINT

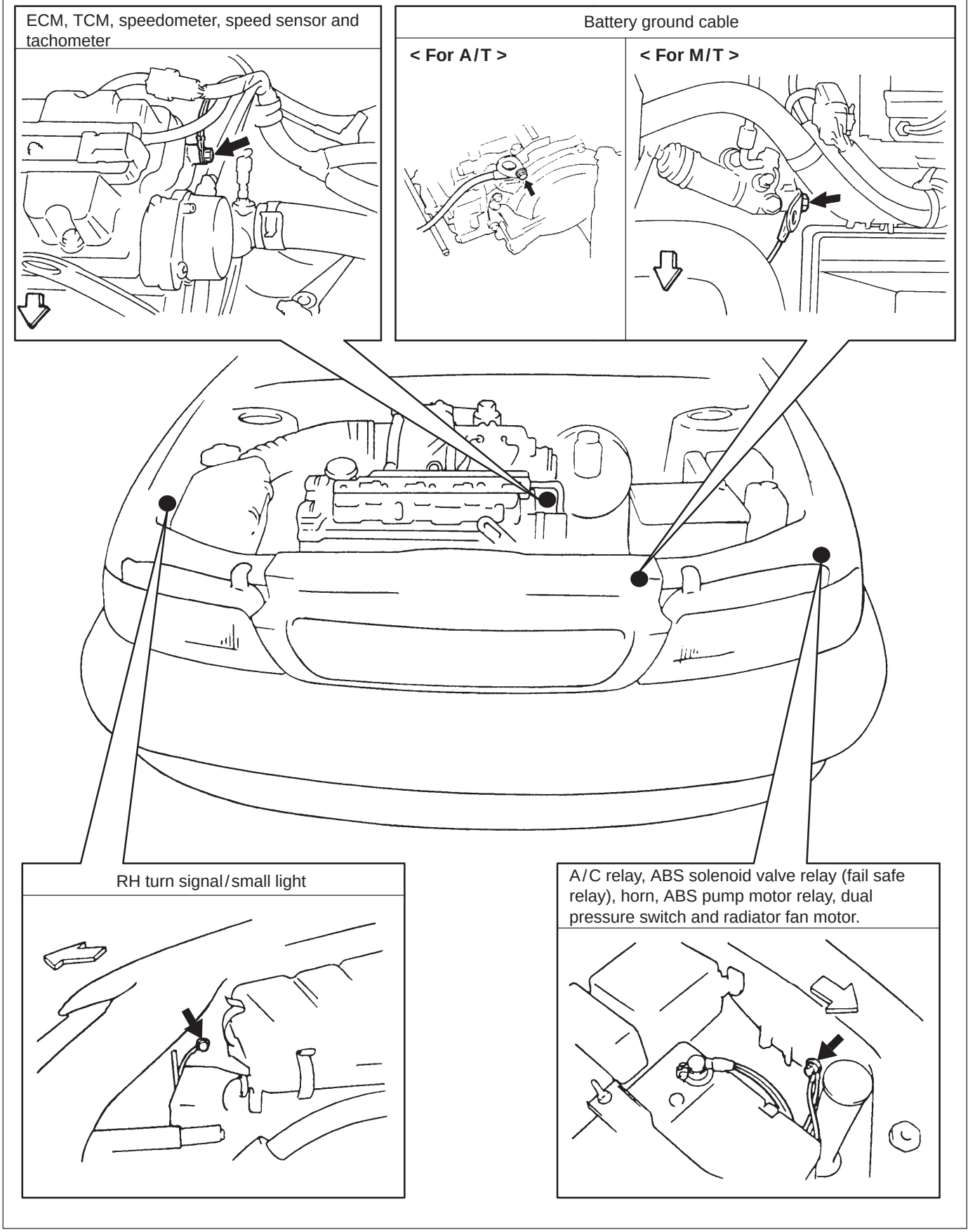
NOTE:
These figures show LH steering vehicle.

ENGINE ROOM (For 1.3L and 1.6L ENGINE MODELS)



NOTE:
These figures show LH steering vehicle.

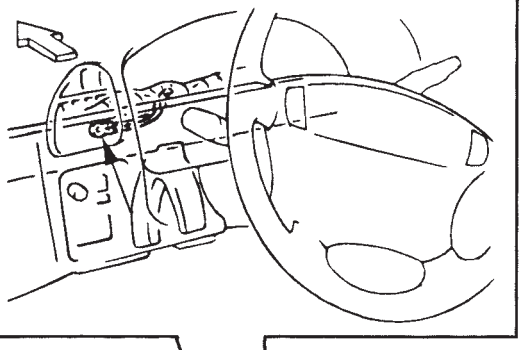
ENGINE ROOM (FOR 1.8L ENGINE MODEL)

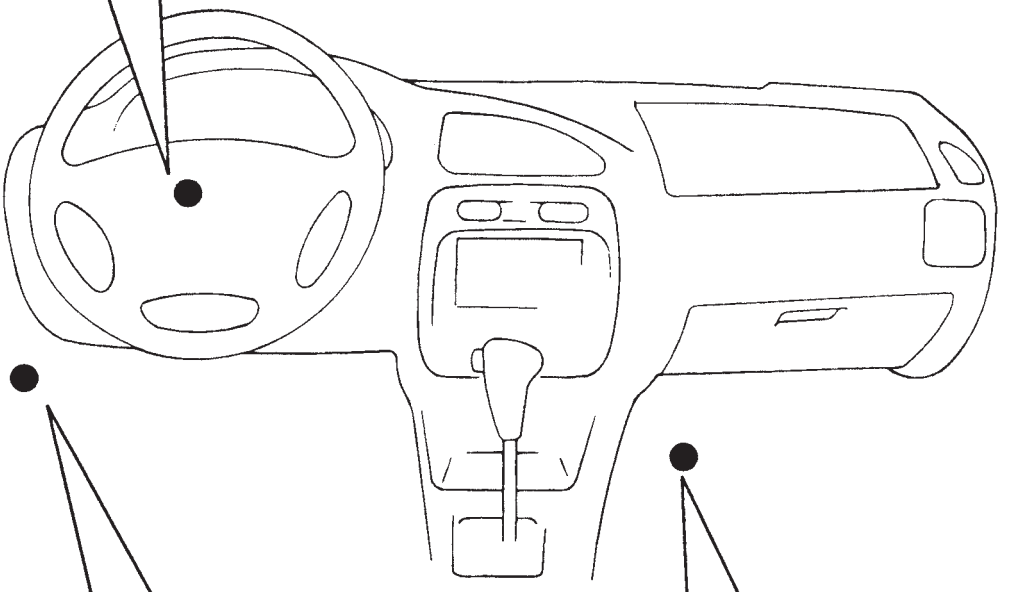


NOTE:
These figures show LH steering vehicle.

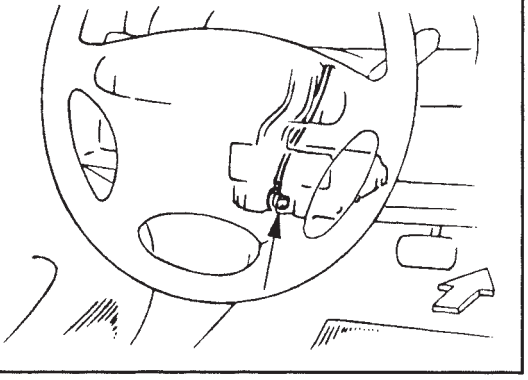
INSTRUMENT PANEL

Turn signal/hazard indicator light, illumination controller, cruise main switch, coolant temperature gauge, radio, cigarette lighter and power mirror switch

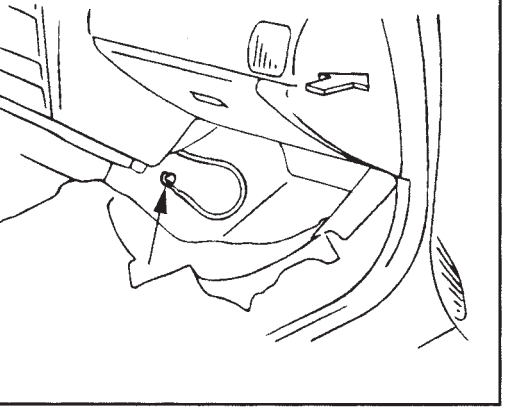




Combination meter, brake fluid level switch, turn signal/small light (LH), A/C amplifier, D.R.L. resister, ABS controller, noise suppressor and wind-windshield washer motor



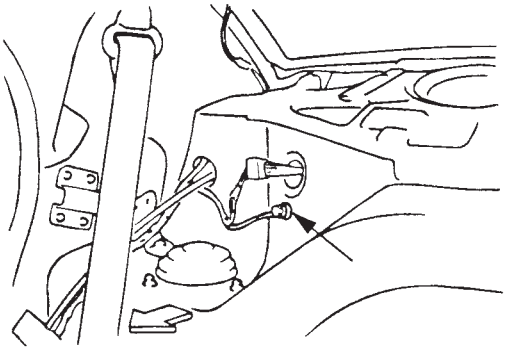
Heater blower motor



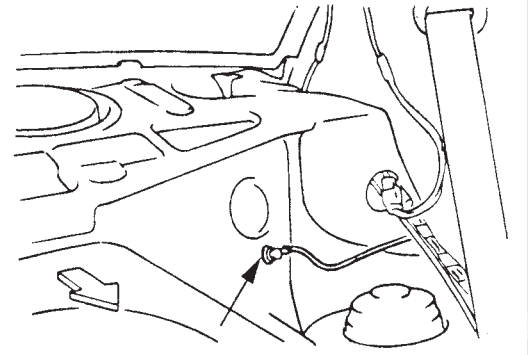
NOTE:
These figures show LH steering vehicle.

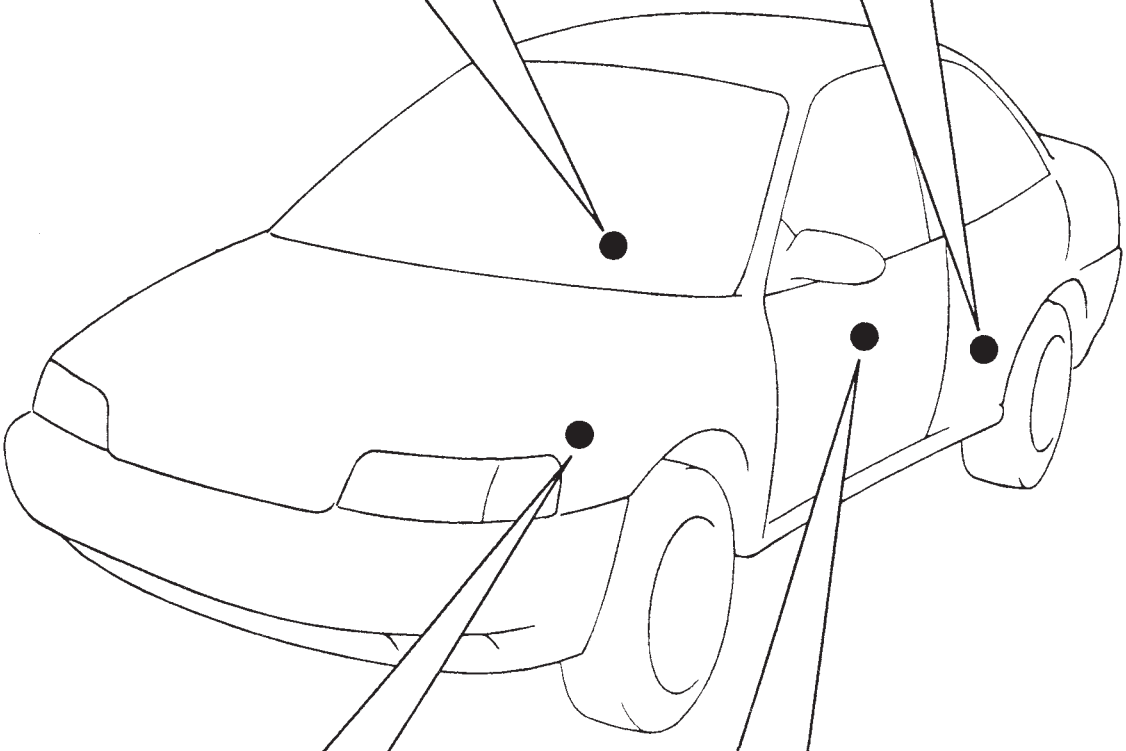
FLOOR

Rear combination light (RH), license light, rear defogger, key cylinder switch (RH) and fuel pump and gauge (4WD model)

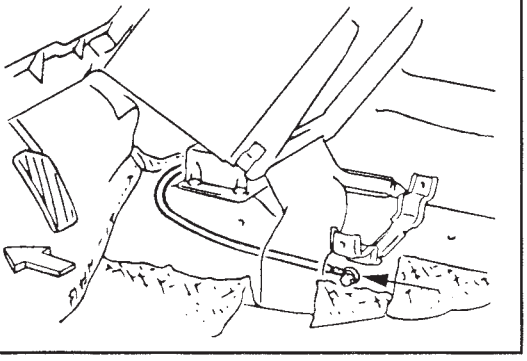


Ignition switch, combination switch, rear combination light (LH), rear side marker light, D.R.L., headlight, turn signal/hazard relay, dome light, drivers seat belt switch, power door lock controller, key cylinder switch (LH) and warning controller/buzzer

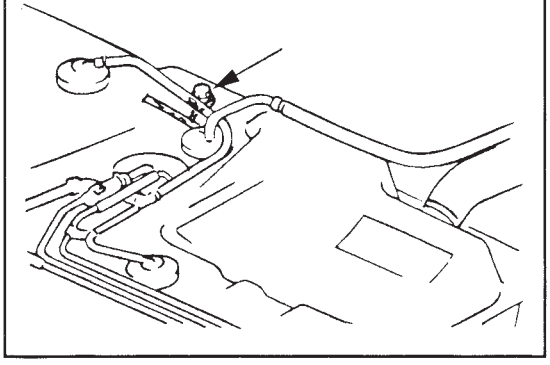




Air bag (SDM)



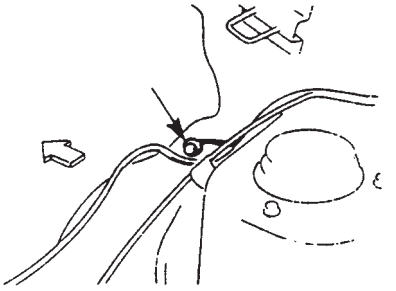
Fuel pump and gauge (2WD model)



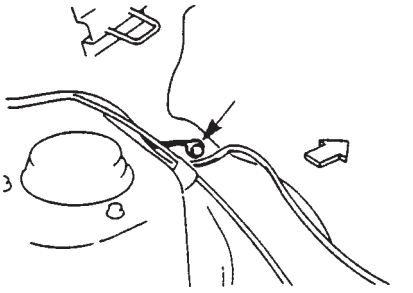
NOTE:
These figures show LH steering vehicle.

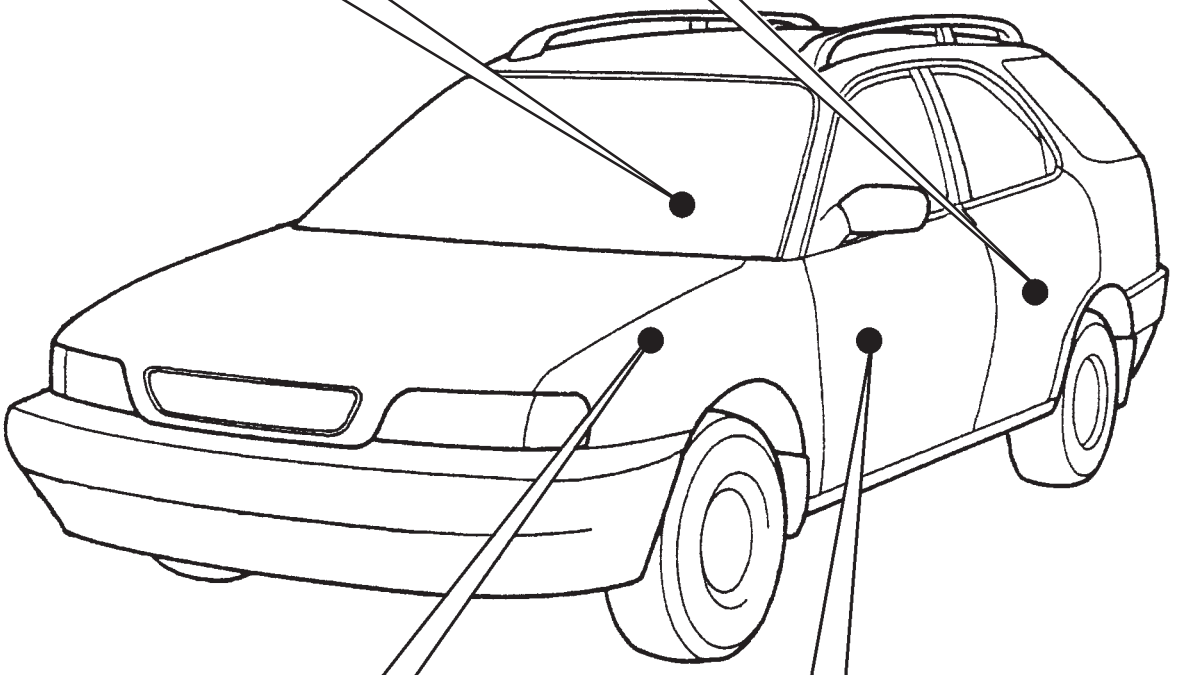
FLOOR (Hatch-back model)

Rear combination light (RH), license light, rear defogger, key cylinder switch (RH), back door switch, high-mounted stop light, rear wiper motor, rear wiper relay, SSCS controller, SSCS switch and power door lock controller (RH steering vehicle).

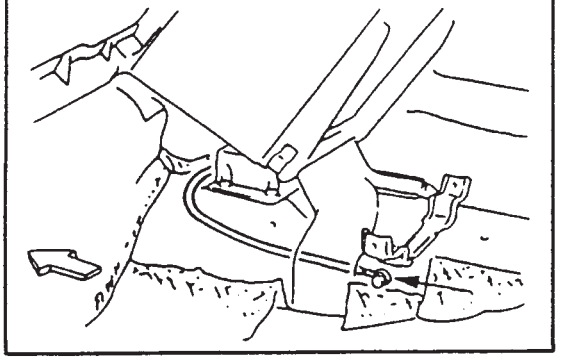


Ignition switch, combination switch, rear combination light (LH), D.R.L., headlight, turn signal/hazard relay, dome light, drivers seat belt switch, cruise controller, power window main switch, power door lock controller, key cylinder switch (LH), warning controller/buzzer, immobilizer controller, headlight leveling motor, O/D switch, A/T mode switch and ABS controller.

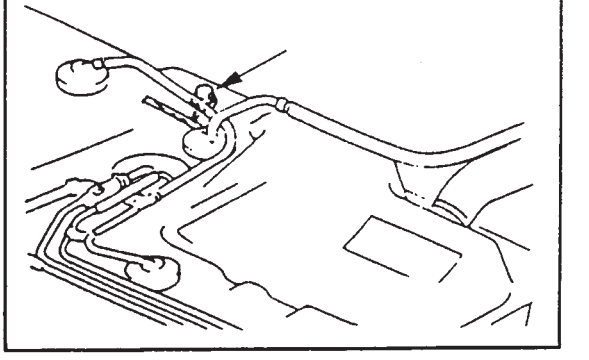




Air bag (SDM)



Fuel pump and gauge
(For 2WD vehicle only)



SECTION 8G

IMMOBILIZER CONTROL SYSTEM (IF EQUIPPED)

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

NOTE:
Whether the immobilizer indicator lamp is used in the particular vehicle or not depends on vehicle specifications. If there is a exhaust No.1 pipe with manifold catalytic converter, the vehicle is equipped with immobilizer indicator lamp and if there isn't , it is not equipped with immobilizer indicator lamp. For details of exhaust No.1 pipe, refer to Section 6K in this manual.

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GENERAL DESCRIPTION

The immobilizer control system is designed to prevent vehicle burglar and consists of following components.

- ○ Engine control module / Powertrain control module (ECM/PCM)
- ○ Immobilizer Control Module
- ○ Ignition key (with built-in transponder)
- ○ Coil antenna

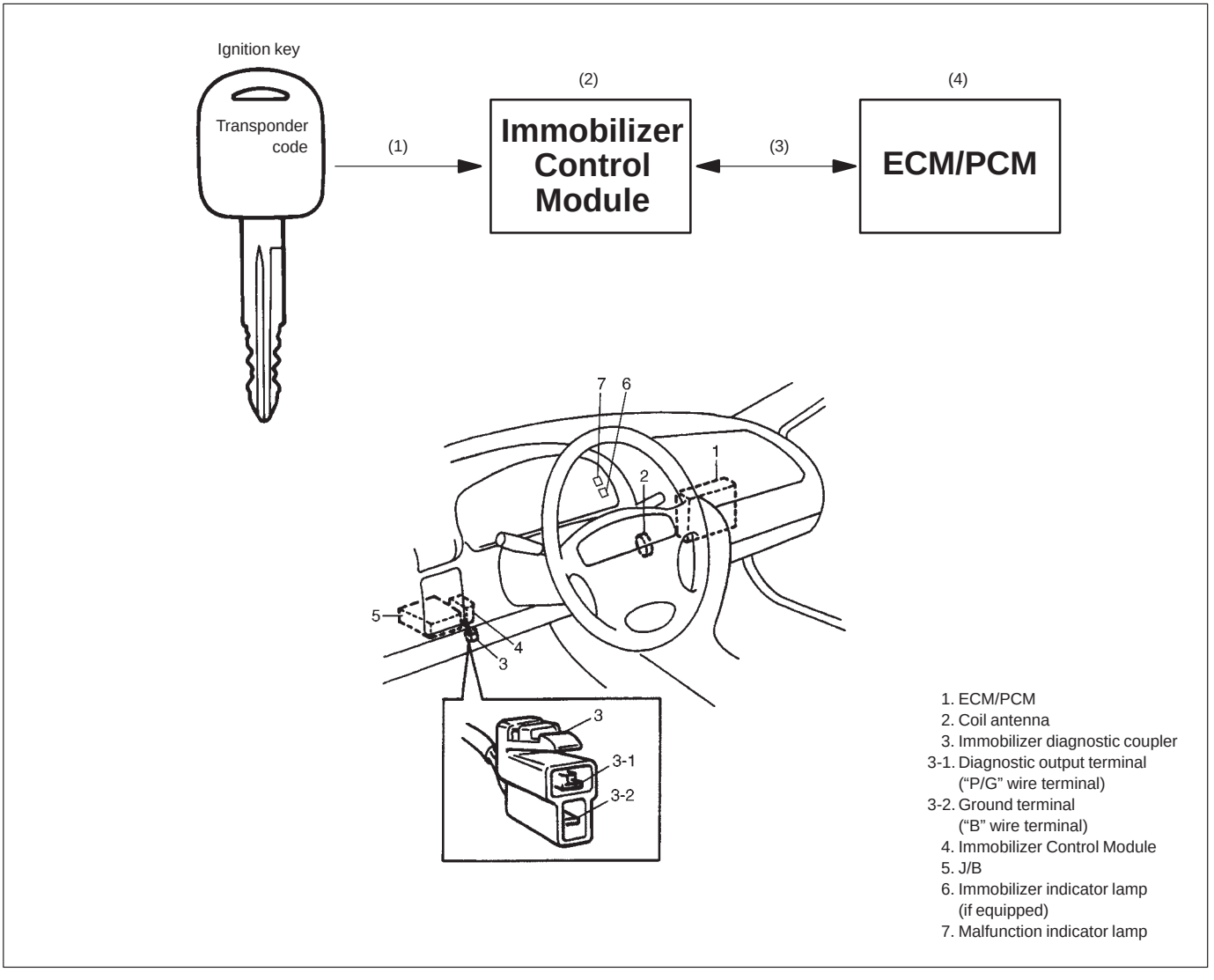
Operation of this system is as follows.

(1) Each ignition key has its own code Transponder code stored in memory. When the ignition switch is turned ON, Immobilizer Control Module tries to read the Transponder code through the coil antenna installed to the steering lock assembly.

(2) Immobilizer Control Module compares the Transponder code read in (1) and that registered in Immobilizer Control Module and checks if they match.

(3) When it is confirmed that two Transponder codes match each other as described above, Immobilizer Control Module and ECM/PCM check if ECM/Immobilizer Control Module codes registered in them respectively match.

(4) Only when it is confirmed that ECM/Immobilizer Control Module codes match, the engine starts running. If Transponder codes in Step (2) or ECM/Immobilizer Control Module codes in Step (3) do not match, ECM / PCM will stop operation of the injector and the ignitor (i.e., ignition of spark plug).



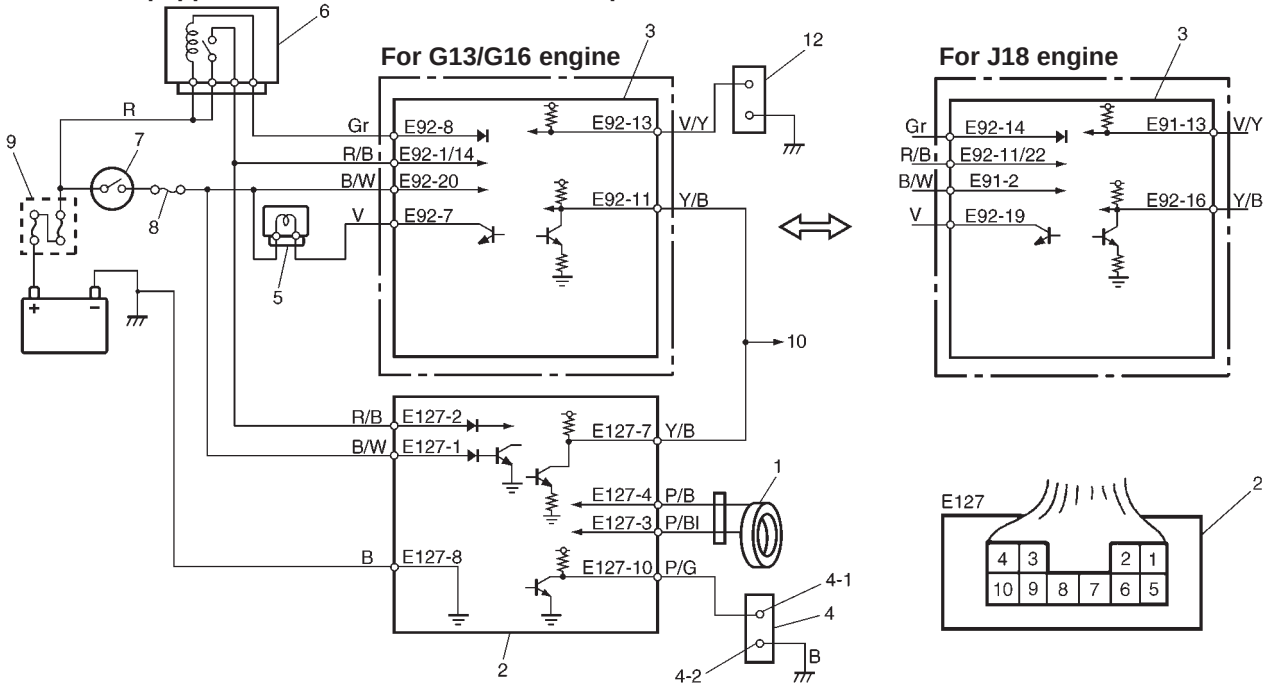
1. ECM/PCM
2. Coil antenna
3. Immobilizer diagnostic coupler

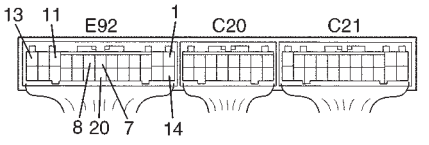
3-1. Diagnostic output terminal ("P/G" wire terminal)

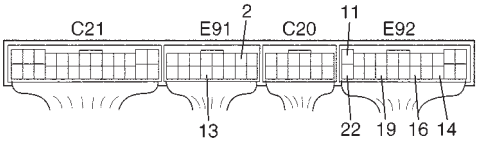
3-2. Ground terminal ("B" wire terminal)

4. Immobilizer Control Module
5. J/B
6. Immobilizer indicator lamp (if equipped)
7. Malfunction indicator lamp

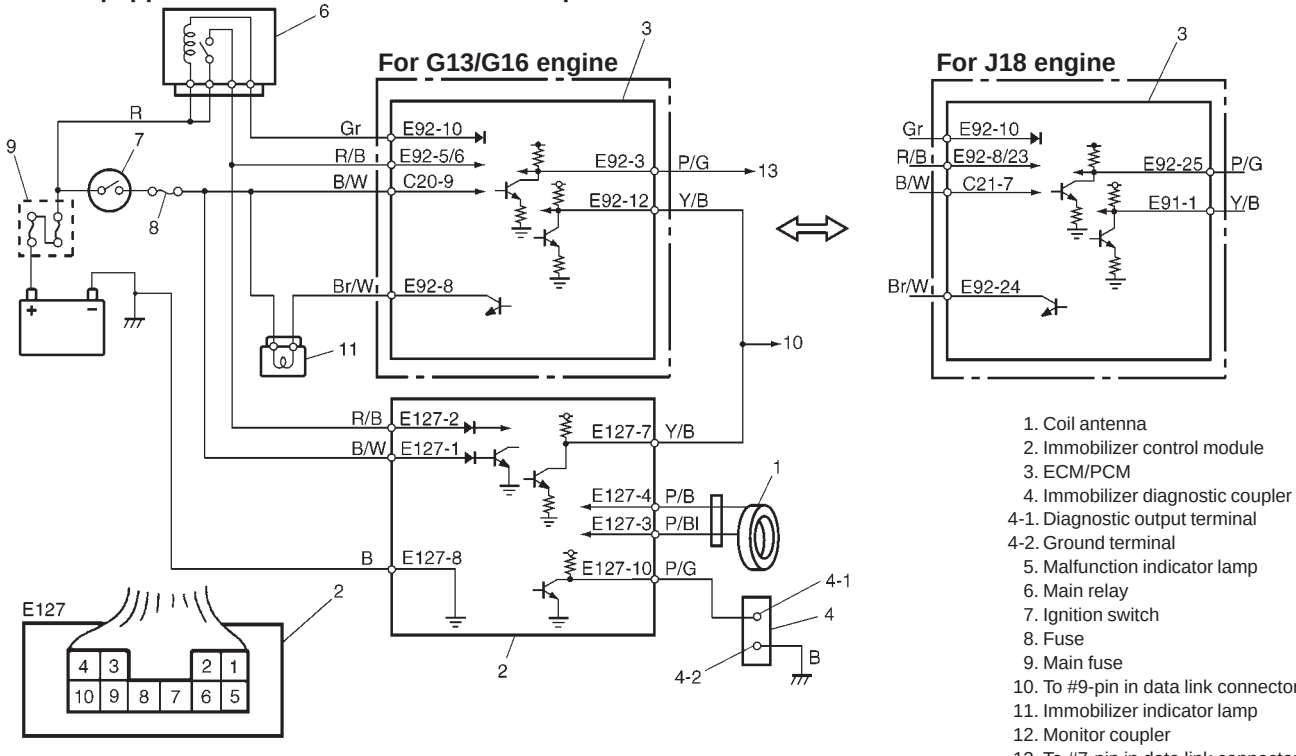
<Vehicle not equipped with immobilizer indicator lamp>

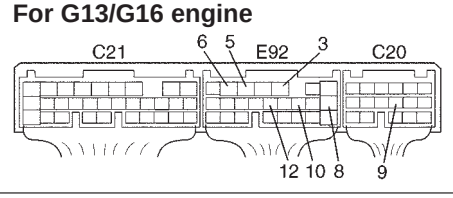


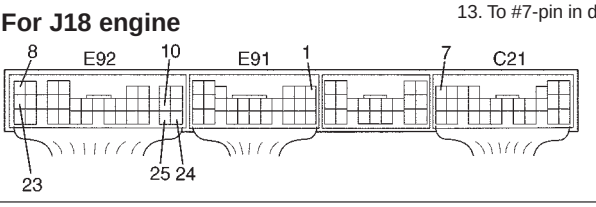




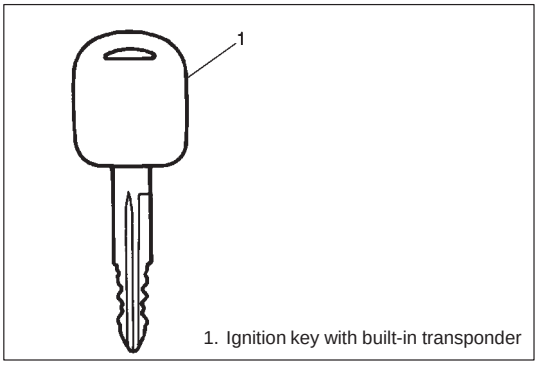
<Vehicle equipped with immobilizer indicator lamp>







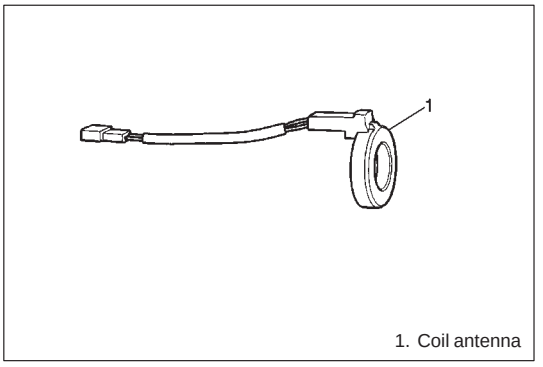
1. Coil antenna
2. Immobilizer control module
3. ECM/PCM
4. Immobilizer diagnostic coupler
4-1. Diagnostic output terminal
4-2. Ground terminal
5. Malfunction indicator lamp
6. Main relay
7. Ignition switch
8. Fuse
9. Main fuse
10. To #9-pin in data link connector
11. Immobilizer indicator lamp
12. Monitor coupler
13. To #7-pin in data link connector



1. Ignition key with built-in transponder

IGNITION KEY

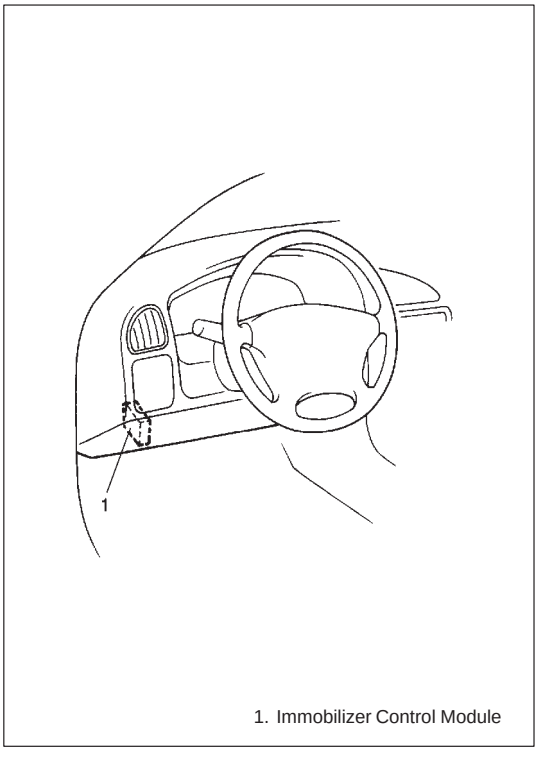
The ignition key for the immobilizer control system has a built-in transponder. Each transponder in the key has an each transmitting code (Transponder code). The code will transmitted from the key via the coil antenna to Immobilizer Control Module when the ignition switch is turned ON.



1. Coil antenna

COIL ANTENNA

The coil antenna is installed to the steering lock assembly. As it is energized by Immobilizer Control Module, it transmits the transponder code of the ignition key to Immobilizer Control Module.



1. Immobilizer Control Module

IMMOBILIZER CONTROL MODULE & ENGINE CONTROL MODULE/POWERTRAIN CONTROL MODULE (ECM/PCM)

Immobilizer Control Module:

Immobilizer Control Module is installed to the underside of the instrument panel at the driver's seat side.

As main functions, Immobilizer Control Module checks matching not only between the Transponder Code transmitted from the ignition key and that registered in Immobilizer Control Module (Up to 4 different Transponder codes can be registered.) but also between the ECM/Immobilizer Control Module code transmitted from ECM/PCM and that registered in Immobilizer Control Module. In addition, it has an on-board diagnostic system (self-diagnosis function) which is described in the next section.

ECM/PCM:

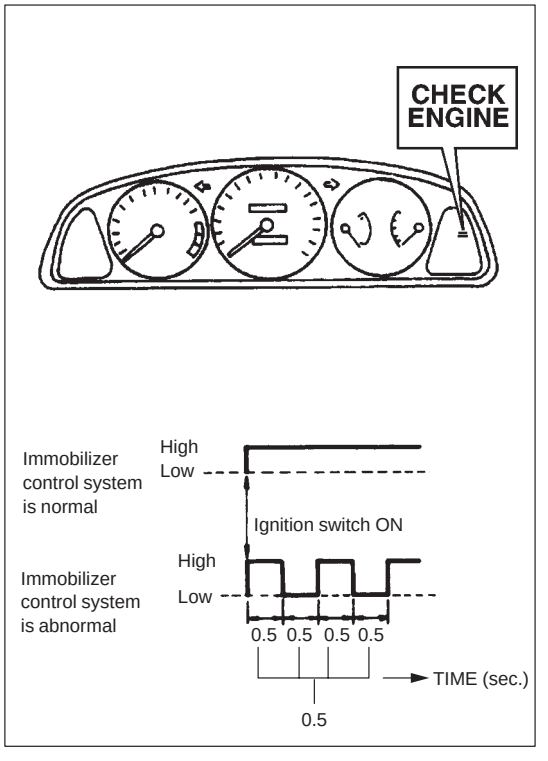
As main functions, ECM/PCM not only checks matching of ECM/Immobilizer Control Module codes but also has an on-board diagnostic system (self-diagnosis function) as described in the next section.

For installation position of ECM/PCM, refer to Section 6E1 or 6E2 in this manual.

ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION)

Immobilizer Control Module and ECM/PCM diagnose troubles which may occur in the area including the following parts when the ignition switch is ON. They indicate the diagnosis result by using following items in the manner as described below.

ECM/PCM:	○ ECM/Immobilizer Control Module code ○ Data link connector wire ○ ECM/PCM
Immobilizer Control Module:	○ Transponder code ○ Coil antenna ○ ECM/Immobilizer Control Module code ○ Data link connector wire ○ Immobilizer Control Module ○ Ignition signal

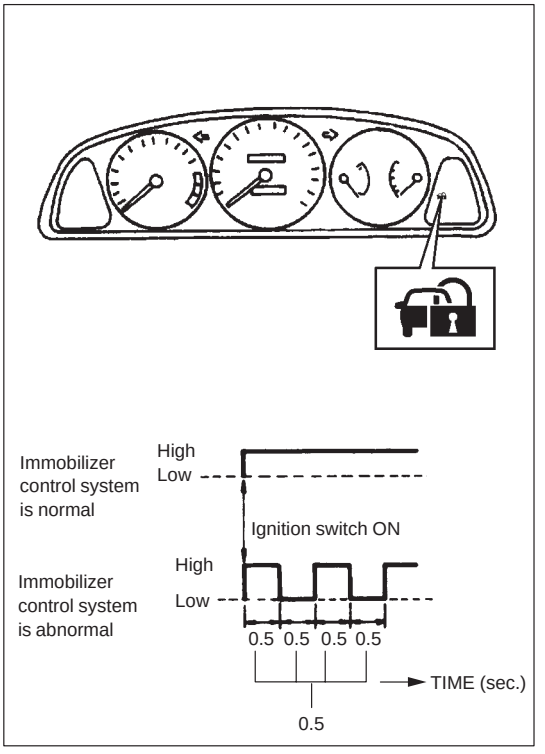


<Vehicle not equipped with immobilizer indicator lamp>

With the diagnosis switch terminal not grounded, the ignition switch turned ON (but the engine at stop) and regardless of the condition of the engine and emission control system, ECM/PCM indicates whether a trouble has occurred in the immobilizer control system or not by causing the malfunction indicator lamp to flash or turn ON. If it is ON, it means that no trouble exists in the immobilizer control system currently and if it is flashing, it means that either ECM/PCM or Immobilizer Control Module has detected some trouble in the immobilizer control system.

NOTE:

As soon as the ignition switch is turned ON, ECM/PCM and Immobilizer Control Module diagnose if a trouble has occurred in the immobilizer control system. While the diagnosis is being made, the malfunction indicator lamp stays ON and if the diagnosis result is "abnormal", it immediately changes to flashing but if the result is "normal", it remains ON. Diagnosis takes about 3 seconds at maximum.



<Vehicle equipped with immobilizer indicator lamp>

With the ignition switch turned ON (but the engine at stop) regardless of the condition of the engine and emission control system, ECM/PCM indicates whether a trouble has occurred in the immobilizer control system or not by causing the immobilizer indicator lamp to flash or turn ON.

Immobilizer indicator lamp is ON:
No trouble exists in the immobilizer control system.
Immobilizer indicator lamp is flashing:
ECM/PCM or Immobilizer Control Module has detected some trouble in the immobilizer control system.

NOTE:

As soon as the ignition switch is turned ON, ECM/PCM and Immobilizer Control Module diagnose if a trouble has occurred in the immobilizer control system. While the diagnosis is being made, the Immobilizer indicator lamp stays ON and if the diagnosis result is "abnormal", it immediately changes to flashing but if the result is "normal", it remains ON. Diagnosis takes about 3 seconds at maximum.

When ECM/PCM and Immobilizer Control Module detects a trouble which has occurred in the areas described in previous page, it stores DTC corresponding to the exact trouble area in ECM/PCM and Immobilizer Control Module memory.

DTCs stored in memory of each controller (Immobilizer Control Module and ECM/PCM) can be read by using the procedure described in "DIAGNOSTIC TROUBLE CODE CHECK (IMMOBILIZER CONTROL MODULE)" and "DIAGNOSTIC TROUBLE CODE CHECK (ECM/PCM)" in this section.

DIAGNOSIS

ECM/PCM and Immobilizer Control Module have on-board diagnostic system (a system self-diagnosis function) as described previously.
Investigate where the trouble is by referring to “DIAGNOSTIC FLOW TABLE” and “DIAGNOSTIC TROUBLE CODE TABLE” on later pages.

PRECAUTIONS IN DIAGNOSING TROUBLES

[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

ECM/PCM

<Vehicle not equipped with immobilizer indicator lamp>

○ Before identifying diagnostic trouble code indicated by malfunction indicator lamp or Suzuki scan tool, don’t disconnect couplers from ECM/PCM, battery cable from battery, ECM/PCM ground wire harness from engine.
Such disconnection will clear trouble codes for engine and emission control system stored in memory of ECM/PCM.

○ If abnormality or malfunction lies in two or more areas, malfunction indicator lamp indicates applicable codes three times each. And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.

○ When ECM/PCM detects a trouble in both engine and emission control system and immobilizer control system, malfunction indicator lamp indicates trouble codes of both systems alternately while the ignition switch is turned ON and the diagnosis terminal is grounded.

○ Take a note of diagnostic trouble code indicated first.

<Vehicle equipped with immobilizer indicator lamp>

○ Before identifying diagnostic trouble code indicated through Suzuki scan tool, don’t disconnect couplers from ECM/PCM, battery cable from battery, ECM/PCM ground wire harness from engine.
Such disconnection will clear trouble codes for engine and emission control system stored in memory of ECM/PCM.

○ Take a note of diagnostic trouble code indicated first.

Immobilizer Control Module

○ Take a note of diagnostic trouble code indicated first.

[INTERMITTENT TROUBLES]

<Vehicle not equipped with immobilizer indicator lamp>

○ There are cases where output of diagnostic output terminal, malfunction indicator lamp and/or Suzuki scan tool indicate a diagnostic trouble code representing a trouble which occurred only temporarily and has gone. In such case, it may occur that good parts are replaced unnecessarily. To prevent such accident, be sure to follow instructions given below when checking by using "Diagnostic Flow Table".

* When trouble can be identified, it is not an intermittent one: Check coil antenna, ignition key, wires and each connection and if they are all in good condition, substitute a known-good ECM/PCM and recheck.
* When trouble can not be identified but output of diagnostic output terminal, malfunction indicator lamp and/or Suzuki scan tool indicate a trouble code:
  Diagnose trouble by using that code No. and if ignition key, coil antenna, wires and each connection are all in good condition, turn OFF ignition switch and then ON.

Then check what malfunction indicator lamp, output of diagnostic output terminal and/or Suzuki scan too indicate.
Only when they indicate trouble code again, substitute a known-good ECM/PCM or Immobilizer Control Module and check again.
If they indicate not trouble code but normal code, it means that an intermittent trouble did occur and has gone. In this case, check wires and connections carefully again.

<Vehicle equipped with immobilizer indicator lamp>

○ There are cases where output of diagnostic output terminal and/or Suzuki scan tool indicates a diagnostic trouble code representing a trouble which occurred only temporarily and has gone. In such case, it may occur that good parts are replaced unnecessarily. To prevent such accident, be sure to follow instructions given below when checking by using "Diagnostic Flow Table".

* When trouble can be identified, it is not an intermittent one: Check coil antenna, ignition key, wires and each connection and if they are all in good condition, substitute a known-good ECM/PCM and recheck.
* When trouble can not be identified but output of diagnostic output terminal and/or Suzuki scan tool indicates a trouble code:
  Diagnose trouble by using that code No. and if ignition key, coil antenna, wires and each connection are all in good condition, turn OFF ignition switch and then ON.

Then check what Suzuki scan tool and/or output of diagnostic output terminal indicates.
Only when they indicate trouble code again, substitute a known-good ECM/PCM or Immobilizer Control Module and check again.
If they indicate not trouble code but normal code, it means that an intermittent trouble did occur and has gone. In this case, check wires and connections carefully again.

[NOTES ON SYSTEM CIRCUIT INSPECTION]

Refer to “Precautions for Electrical Circuit Service” and “Intermittents and Poor Connection” in Section 0A.

[Precaution after replacing ECM/PCM or Immobilizer Control Module]

- ○ When ECM/PCM was replaced, including when replaced because rechecking by using a known-good ECM/PCM was necessary during trouble diagnosis, the ECM/Immobilizer Control Module code must be registered in ECM/PCM and Immobilizer Control Module by performing procedure described in “Procedure after ECM/PCM Replacement” Section. If it is not registered, the engine would not start and accurate trouble diagnosis would not be assured.
- ○ When Immobilizer Control Module was replaced, including when replaced because rechecking by using a known-good Immobilizer Control Module was necessary during trouble diagnosis, the Transponder code and ECM/Immobilizer Control Module code must be registered in Immobilizer Control Module and ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in “Procedure after Immobilizer Control Module Replacement” Section. If they are not registered, the engine would not start and accurate trouble diagnosis would not be assured.

DIAGNOSTIC FLOW TABLE

<Vehicle not equipped with immobilizer indicator lamp>

STEP	ACTION	YES	NO
1	1) Make sure that diagnosis switch terminal in monitor coupler is not grounded by service wire. See Fig. 1. 2) Check malfunction indicator lamp while ignition switch is ON (but without starting engine). See Fig. 2. Dose malfunction indicator lamp flash?	Go to Step 3.	○If malfunction indicator lamp remains ON, go to Step 2. ○If malfunction indicator lamp remains OFF, go to "MALFUNCTION INDICATOR LAMP CHECK" in Section 6.
2	1) Using service wire, ground diagnosis switch terminal in monitor coupler. See Fig. 3. Dose malfunction indicator lamp flash?	Immobilizer control system is in good condition.	Go to "MALFUNCTION INDICATOR LAMP CHECK" in Section 6.
3	Dose malfunction indicator lamp flash as Fig. 4?	Go to Step 4.	Go to "MALFUNCTION INDICATOR LAMP CHECK" in Section 6.
4	1) Check DTC stored in immobilizer control module referring to "DIAGNOSTIC TROUBLE CODE CHECK (IMMOBILIZER CONTROL MODULE)" in this section. Is there any DTC(s)?	Go to flow table for DTC No.	Go to Step 5.
5	1) Check DTC stored in ECM/PCM referring to "DIAGNOSTIC TROUBLE CODE CHECK (ECM/PCM)" in this section. Is there any DTC(s)?	Go to flow table for DTC No.	Substitute a known-good ECM/PCM and recheck. **NOTE:** **After replacing with a known-good ECM/PCM, register ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in "Procedure after ECM/PCM Replacement" section.**

Fig. 1 for Step 1

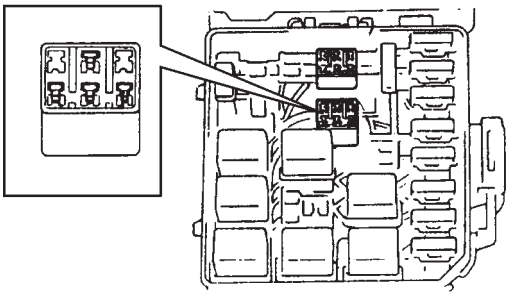


Fig. 2 for Step 1

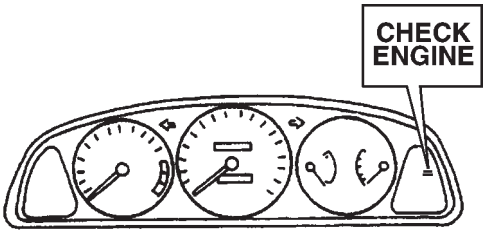
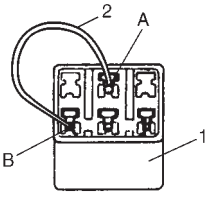


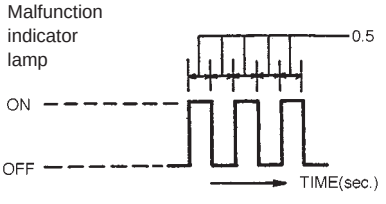
Fig. 3 for Step 2



1. Monitor coupler
2. Service wire

A: Diagnosis switch terminal
B: Ground terminal

Fig. 4 for Step 3

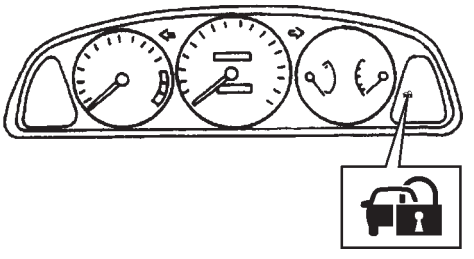


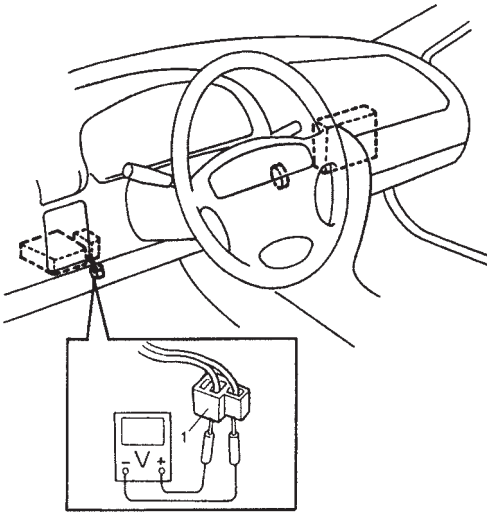
DIAGNOSTIC FLOW TABLE

<Vehicle equipped with immobilizer indicator lamp>

STEP	ACTION	YES	NO
1	1) Check immobilizer indicator lamp while ignition switch is ON (but without starting engine). See Fig. 1. Dose immobilizer indicator lamp flash?	Go to Step 3.	○If immobilizer indicator lamp remains ON, go to Step 2. ○If immobilizer indicator lamp remains OFF, go to “IMMOBILIZER INDICATOR LAMP CHECK” in this section.
2	1) Check DTC stored in ECM/PCM referring to “DIAGNOSTIC TROUBLE CODE CHECK (ECM/PCM)” in this section. Is there any DTC(s)?	Go to “IMMOBILIZER INDICATOR LAMP CHECK” in this section.	Immobilizer control system is in good condition.
3	1) Check DTC stored in immobilizer control module referring to “DIAGNOSTIC TROUBLE CODE CHECK (IMMOBILIZER CONTROL MODULE)” in this section. Is there any DTC(s)?	Go to flow table for DTC No.	Go to Step 4.
4	1) Check DTC stored in ECM/PCM referring to “DIAGNOSTIC TROUBLE CODE CHECK (ECM/PCM)” in this section. Is there any DTC(s) for immobilizer control system?	Go to flow table for DTC No.	Substitute a known-good ECM/PCM and recheck. **NOTE:** **After replacing with a known-good ECM/PCM, register ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in “Procedure after ECM/PCM Replacement” section.**

Fig. 1 for Step 1



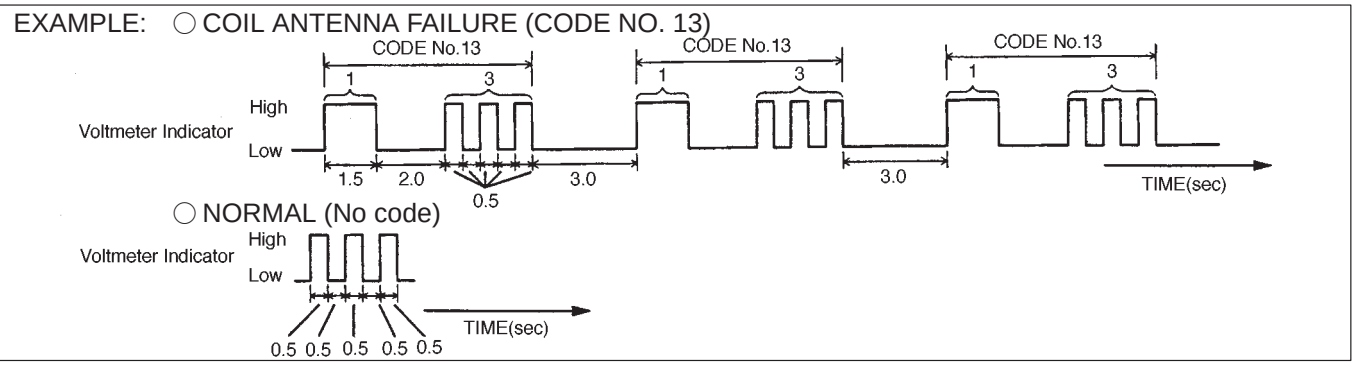


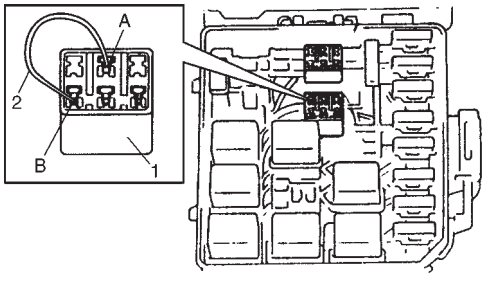
1. Immobilizer diagnostic coupler

DIAGNOSTIC TROUBLE CODE (DTC) CHECK (IMMOBILIZER CONTROL MODULE)

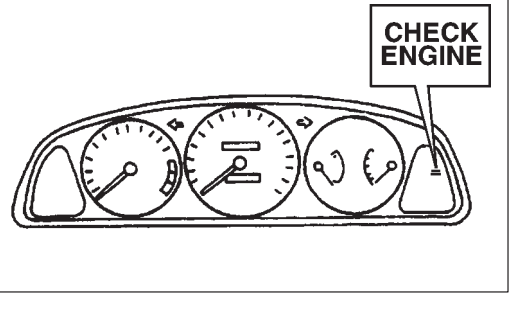
1) Using analog type voltmeter, connect positive probe to diagnostic output terminal and negative probe to ground of immobilizer diagnostic coupler with ignition switch turned ON.
2) Read deflection of voltmeter indicator which represents DTC as shown in example below and write it down. For details of DTC, refer to Immobilizer Control Module in “Diagnostic Trouble Code Table”.
   If voltmeter indicator dose not deflect, go to “Diagnostic Flow Table A”.

NOTE:
If abnormality or malfunction lies in two or more areas, voltmeter indicates applicable codes three times each.





1. Monitor coupler
2 Service wire
A: Diagnosis switch terminal
B: Ground terminal



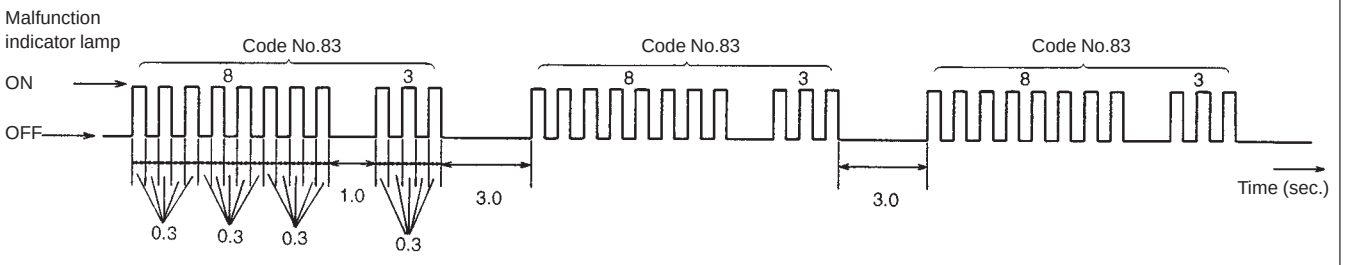
DIAGNOSTIC TROUBLE CODE (DTC) CHECK (ECM/PCM)

[Vehicle not equipped with immobilizer indicator lamp]

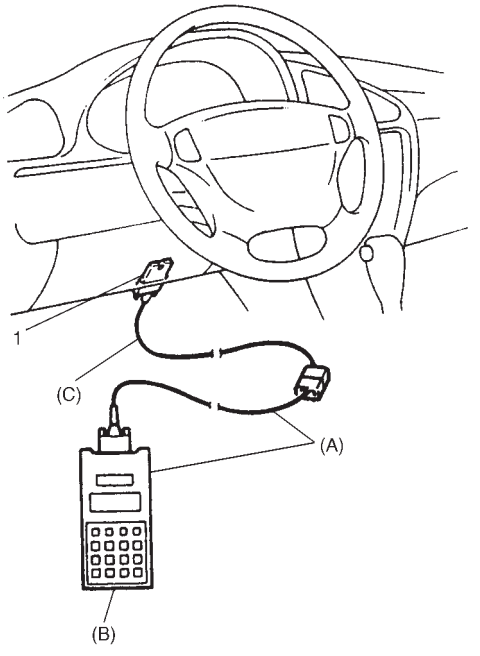
1) Using service wire, ground diagnostic switch terminal in monitor coupler.
2) Read DTC from flashing pattern of malfunction indicator lamp as shown in example below and write it down. For details of DTC, refer to ECM/PCM side in “Diagnostic Trouble Code Table”.
   If lamp remains ON, go to “Malfunction Indicator Lamp Check” in Section 6.

NOTE:
If abnormality or malfunction lies in two or more areas, malfunction indicator lamp indicates applicable codes three times each.
And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.

EXAMPLE: When serial data link wire is defective (Code No.83)



3) After completing the check, turn ignition switch OFF and disconnect service wire from monitor coupler.



1. Data link connector (DLC)

[Vehicle equipped with immobilizer indicator lamp]

1) Turn ignition switch OFF.
2) After setting cartridge to Suzuki scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

   Special Tool
   (A): 09931-76011 (Suzuki scan tool)
   (B): Mass storage cartridge
   (C): 09931-76030 (16/12 pin DLC adapter)

3) Turn ignition switch ON.
4) Read DTC according to instructions displayed on Suzuki scan tool and print it or write it down. Refer to Suzuki scan tool operator's manual for further details.

   NOTE:
   - **When reading DTC stored in ECM/PCM using Suzuki scan tool, select "ECM" from the applications menu and "SUZUKI mode" from the communication mode menu displayed on Suzuki scan tool.**
   - **If ECM/PCM detects a trouble in both engine and emission control system and immobilizer control system, Suzuki scan tool indicates trouble codes of both systems using Suzuki mode of ECM application.**

   If communication between Suzuki scan tool and ECM/PCM is not possible, check if Suzuki scan tool is communicable by connecting it to ECM/PCM in another vehicle. If communication is possible in this case, Suzuki scan tool is in good condition. Then check data link connector and serial data line (circuit) in the vehicle with which communication was not possible.
5) After completing the check, turn ignition switch OFF and disconnect Suzuki scan tool from data link connector (DLC).

DIAGNOSTIC TROUBLE CODE TABLE

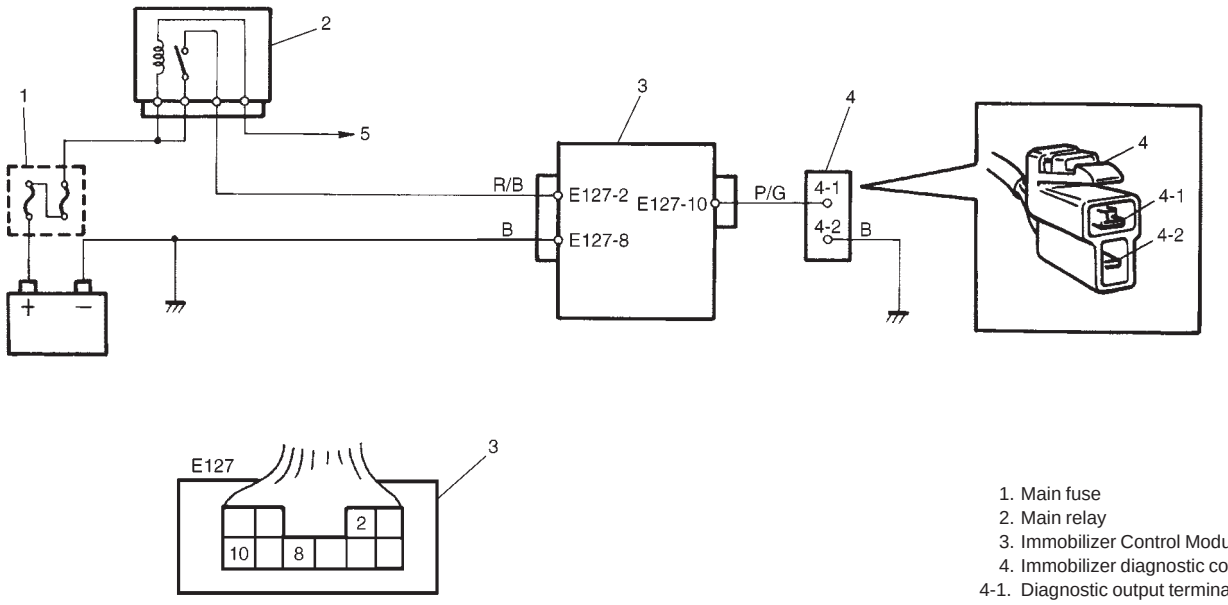
Immobilizer Control Module

DIAGNOSTIC TROUBLE CODE		DIAGNOSTIC AREA	DIAGNOSIS
NO.	VOLTMETER INDICATION		
–		Normal (No code)	This code appears when none of the other codes are identified.
11		Transponder code	Diagnose trouble according to “DIAGNOSTIC FLOW TABLE” corresponding to each code No.
31			
12		Immobilizer Control Module	
13		Coil antenna or ignition key with built-in transponder	
21		ECM/Immobilizer Control Module code	
22		Ignition switch circuit	
23		Serial data link wire	

ECM/PCM

DTC (indicated on Suzuki scan tool)	DTC (indicated by MIL)	Malfunction Indicator lamp (MIL) flashing pattern	DIAGNOSTIC AREA	DIAGNOSIS
NO DTC	12		Normal	This code appears when it is confirmed that none of other trouble codes is set for immobilizer control system or engine and emission control system.
P1623	81		ECM/Immobilizer Control Module code	Diagnose trouble according to “DIAGNOSTIC FLOW TABLE” corresponding to each code No.
P1620	84			
P1622	82		ECM/PCM	
P1621	83		Serial data link wire	

TABLE A CODE (DTC) IS NOT OUTPUTTED FROM DIAGNOSTIC OUTPUT TERMINAL OF IMMOBILIZER DIAGNOSTIC COUPLER



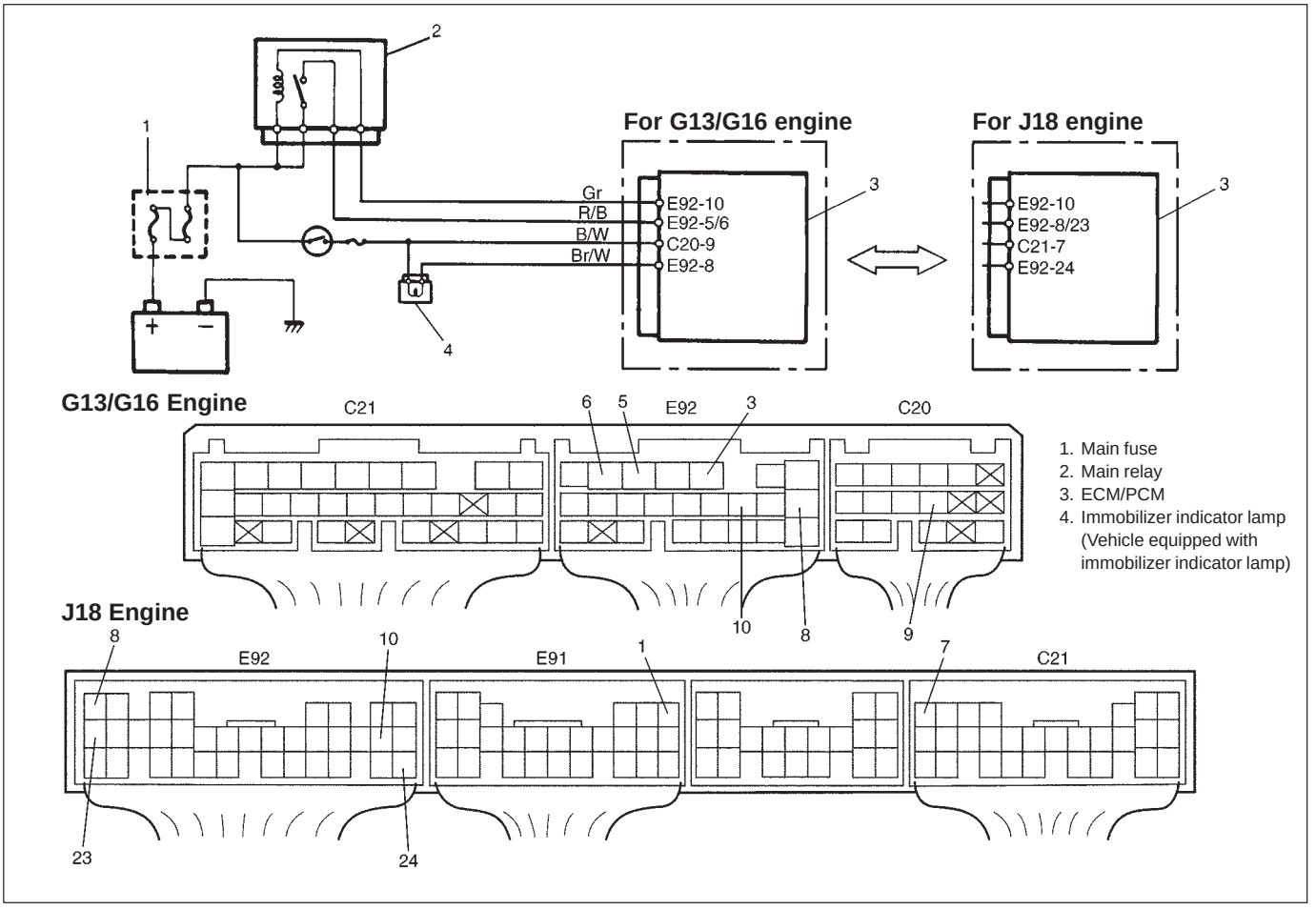
1. Main fuse
2. Main relay
3. Immobilizer Control Module
4. Immobilizer diagnostic coupler

4-1. Diagnostic output terminal
4-2. Ground terminal

5. To ECM/PCM

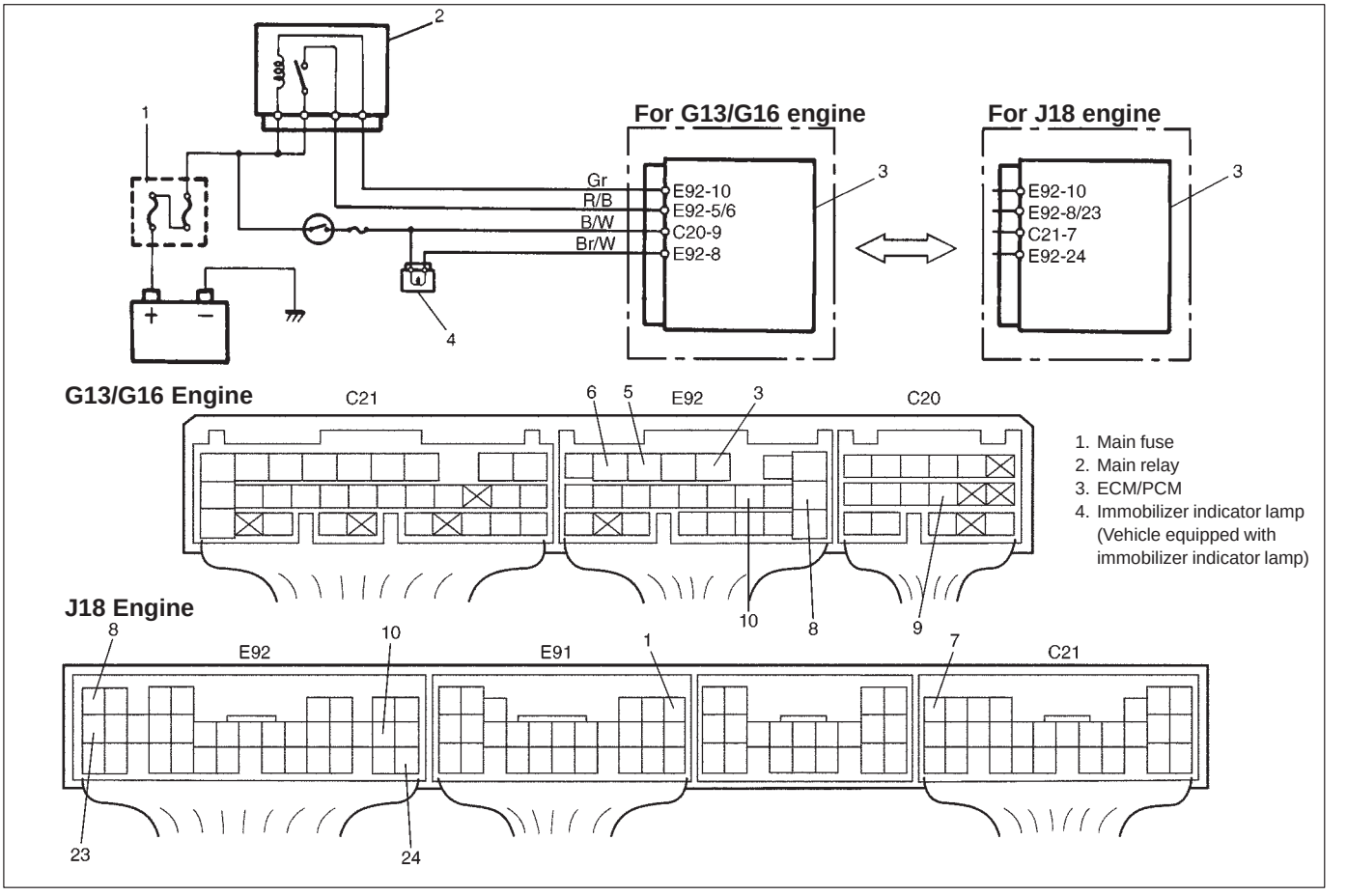
STEP	ACTION	YES	NO
1	Check voltage between E127-2 terminal and body ground with ignition switch turned ON. Is it 10 – 14V?	Go to Step 2.	"R/B" wire open.
2	1) Connect voltmeter between E127-10 terminal and body ground. 2) Does voltmeter indicator deflect?	Go to Step 3.	○Poor E127-2, E127-8 or E127-10 connection. ○"B" wire of E127-8 terminal open. ○"P/G" wire between E127-10 terminal and diagnostic output terminal of immobilizer diagnostic coupler short. If wire and connections are OK, substitute a known-good Immobilizer Control Module and recheck. **NOTE:** **After replacing with a known-good Immobilizer Control Module, register ECM/Immobilizer Control Module code in ECM/PCM and Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.**
3	1) Connect voltmeter between diagnostic output terminal of immobilizer diagnostic coupler and body ground. 2) Is it possible to read DTC by checking deflection of voltmeter indicator?	"B" wire of ground terminal for immobilizer diagnostic coupler open.	"P/G" wire between E127-10 terminal and diagnostic output terminal of immobilizer diagnostic coupler open.

TABLE B IMMOBILIZER INDICATOR LAMP CHECK (IMMOBILIZER INDICATOR LAMP DOSE NOT LIGHT AT IGNITION SWITCH ON)



STEP	ACTION	YES	NO
1	1) Turn ignition switch ON. Do other indicator/warning lights in combination meter come ON?	Go to Step 2.	"IG" fuse blown, main fuse blown, ignition switch malfunction, "B/W" circuit between "IG" fuse and combination meter or poor coupler connection at combination meter.
2	1) Turn ignition switch OFF and disconnect connectors from ECM/PCM. 2) Check for proper connection to ECM/PCM at terminal E92-8 for G13/G16 engine or E92-24 for J18 engine. 3) If OK, then using service wire, ground terminal E92-8 for G13/G16 engine or E92-24 for J18 engine in connector disconnected. Does immobilizer indicator lamp turn on at ignition switch ON?	Substitute a known-good ECM/PCM and recheck.	Bulb burned out or "Br/W" wire circuit open.

TABLE C IMMOBILIZER INDICATOR LAMP CHECK (IMMOBILIZER INDICATOR LAMP REMAINS ON AFTER ENGINE STARTS)



STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect couplers from ECM/PCM. Does immobilizer indicator lamp turn ON at ignition switch ON?	"Br/W" wire shorted to ground circuit.	Substitute a known-good ECM/PCM and recheck.

DTC11 TRANSPONDER CODE NOT MATCHED

DESCRIPTION:

○ DTC11

Immobilizer Control Module checks if Transponder code transmitted from ignition key and that registered in Immobilizer Control Module match when ignition switch is ON. If they do not, this DTC is set.

INSPECTION:

Register ignition key with built-in transponder by using Suzuki scan tool and performing following steps.

1) Register Transponder code in Immobilizer Control Module by performing procedure described in “How To Register Ignition Key”.
2) Turn ignition switch OFF, then turn it ON and check that DTC11 is not set.

DTC31 TRANSPONDER CODE NOT REGISTERED

DESCRIPTION:

Immobilizer Control Module checks if Transponder code transmitted from ignition key and that registered in Immobilizer Control Module match when ignition switch is ON. If there is no Transponder code registered in Immobilizer Control Module, this DTC is set.

INSPECTION:

Register ignition key with built-in transponder by using Suzuki scan tool and performing following steps.

1) Register Transponder code in Immobilizer Control Module by performing procedure described in “How To Register Ignition Key”.
2) Turn ignition switch OFF, then turn it ON and check that DTC31 is not set.

DTC12 FAULT IN IMMOBILIZER CONTROL MODULE

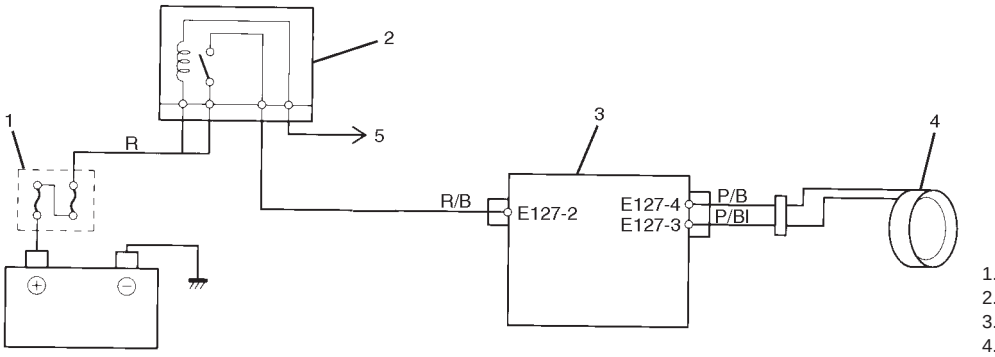
DESCRIPTION:

This DTC is set when an internal fault is detected in Immobilizer Control Module.

INSPECTION:

STEP	ACTION	YES	NO
1	1) Ignition switch OFF. 2) Disconnect connectors from Immobilizer Control Module. 3) Check for proper connection to Immobilizer Control Module at all terminals. Are they in good condition?	Substitute a known-good Immobilizer Control Module and recheck. **NOTE:** **After replacing with a known-good Immobilizer Control Module, register ECM/Immobilizer Control Module code in ECM/PCM and Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.**	Repair or replace.

DTC13 NO TRANSPONDER CODE TRANSMITTED OR COIL ANTENNA OPENED/ SHORTED



1. Main fuse
2. Main relay
3. Immobilizer Control Module
4. Coil antenna
5. To ECM/PCM

DESCRIPTION:

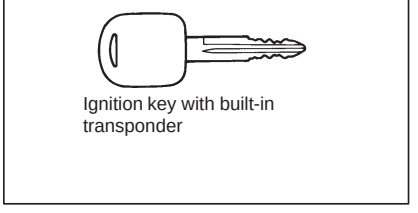
Immobilizer Control Module energizes the coil antenna when the ignition switch is ON and reads Transponder code from the ignition key. When Immobilizer Control Module cannot read Transponder code from the ignition key even when the coil antenna is energized, this DTC is set.

INSPECTION:

STEP	ACTION	YES	NO
1	Does ignition key being used have built-in transponder? (See Fig. 1)	Go to Step 2.	Replace ignition key with built-in transponder and follow “DIAGNOSTIC FLOW TABLE” again.
2	1) Disconnect coil antenna coupler with ignition switch turned OFF. 2) Is there continuity between coil antenna coupler terminals A and B? (See Fig. 2)	Go to Step 3.	Coil antenna open.
3	Measure resistance between terminals of coil antenna coupler and body ground. (See Fig. 3) Is it ∽ (infinity) I ?	Go to Step 4.	Coil antenna shorted to ground.
4	1) With coil antenna coupler disconnected, disconnect Immobilizer Control Module coupler. 2) Measure resistance between coil antenna terminals of Immobilizer Control Module coupler. (See Fig. 4) Is it ∽ (infinity) I ?	Go to Step 5.	“P/B” wire shorted to “P/Bl”wire.
5	Measure resistance between terminal E127-4 of Immobilizer Control Module coupler and body ground. (See Fig. 5) Is it ∽ (infinity) I ?	Go to Step 6.	“P/B” wire shorted to ground.
6	Measure resistance between terminal E127-3 of Immobilizer Control Module coupler and body ground. (See Fig. 6) Is it ∽ (infinity) I ?	Go to Step 7.	“P/Bl” wire shorted to ground.
7	1) Connect coil antenna coupler. 2) Is there continuity between Immobilizer Control Module coupler terminals E127-4 and E127-3? (See Fig. 7)	Go to Step 8.	○“P/B” or “P/Bl” wire open. ○Poor coil antenna-to-coupler.

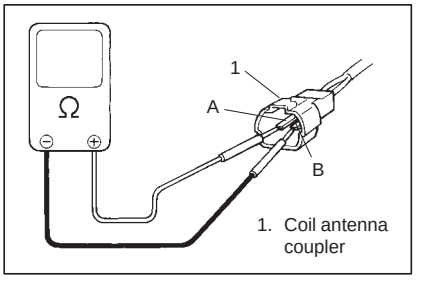
STEP	ACTION	YES	NO
8	Poor E127-4 or E127-3 connection. 1) If connections are OK, connect Immobilizer Control Module coupler and substitute a known-good coil antenna. 2) Is DTC 13 also indicated with ignition switch turned ON?	Go to Step 9.	Faulty coil antenna.
9	Is DTC 13 still indicated even when another ignition key (with built-in transponder) for that vehicle used?	Substitute a known-good Immobilizer Control Module and recheck. **NOTE:** **After replacing with a known-good Immobilizer Control Module, register ECM/Immobilizer Control Module code in ECM/PCM and Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.**	Faulty ignition key.

Fig. 1 for Step 1



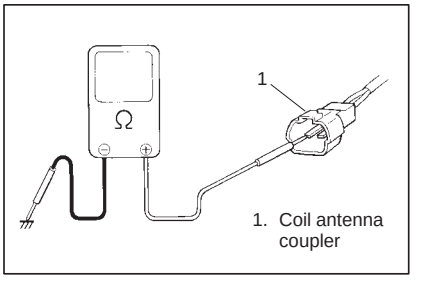
Ignition key with built-in transponder

Fig. 2 for Step 2



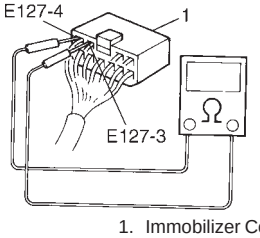
1. Coil antenna coupler

Fig. 3 for Step 3



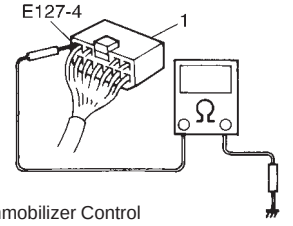
1. Coil antenna coupler

Fig. 4 for Step 4



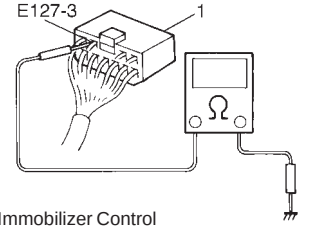
1. Immobilizer Control Module coupler

Fig. 5 for Step 5



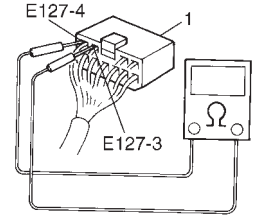
1. Immobilizer Control Module coupler

Fig. 6 for Step 6



1. Immobilizer Control Module coupler

Fig. 7 for Step 7



1. Immobilizer Control Module coupler

DTC21 ECM/IMMOBILIZER CONTROL MODULE CODE NOT MATCHED (IMMOBILIZER CONTROL MODULE SIDE)
DTC81 ECM/IMMOBILIZER CONTROL MODULE CODE NOT MATCHED (ECM/PCM SIDE) (P1623)
DTC84 ECM/IMMOBILIZER CONTROL MODULE CODE NOT REGISTERED (P1620)

DESCRIPTION:

○ DTC21

Immobilizer Control Module checks if ECM/Immobilizer Control Module code transmitted from ECM/PCM and that registered in Immobilizer Control Module match when ignition switch is ON. If they do not, this DTC is set.

○ DTC81 (P1623)

ECM/PCM checks if ECM/Immobilizer Control Module code transmitted from Immobilizer Control Module and that registered in ECM/PCM match when ignition switch is ON. If they do not, this DTC is set.

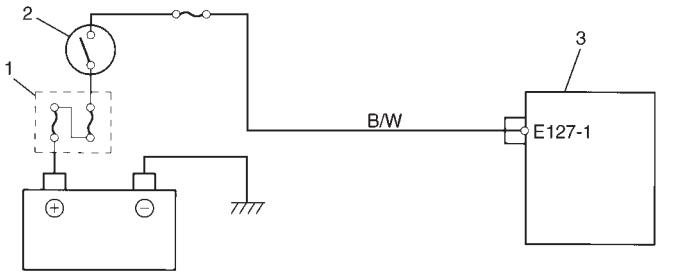
○ DTC84 (P1620)

ECM/PCM checks if code transmitted from Immobilizer Control Module and that registered in ECM/PCM match when ignition switch is ON. If there is no ECM/Immobilizer Control Module code registered in ECM/PCM, this DTC is set.

INSPECTION:

Perform procedure described in “Procedure after ECM/PCM Replacement” section.

DTC22 IGNITION SWITCH CIRCUIT OPEN/SHORT



1. Main fuse
2. Ignition switch
3. Immobilizer Control Module

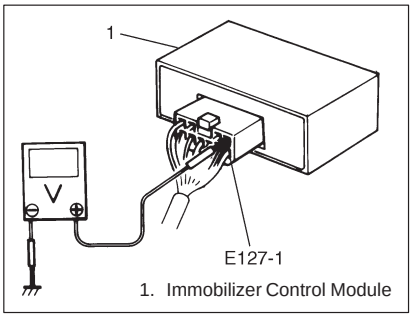
DESCRIPTION:

Immobilizer Control Module monitors ignition signal when the ignition switch is ON. This DTC is set when no ignition signal input is detected by Immobilizer Control Module.

INSPECTION:

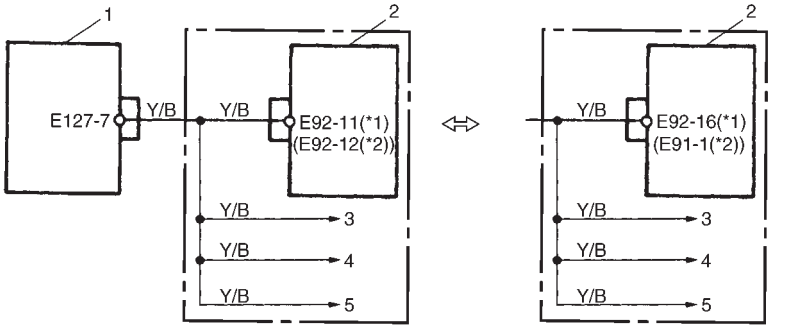
STEP	ACTION	YES	NO
1	Check voltage between Immobilizer Control Module coupler terminal E127-1 and body ground with ignition switch turned ON. (See Fig.1) Is it 10 – 14V?	Poor E127-1 terminal connection. If connection is OK, substitute a known-good Immobilizer Control Module and recheck. **NOTE:** **After replacing with a know-good Immobilizer Control Module, register ECM/Immobilizer Control Module code in ECM/PCM and Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.**	"B/W" wire open or short.

Fig. 1 for Step 1



1. Immobilizer Control Module

DTC23 NO ECM/IMMOBILIZER CONTROL MODULE CODE TRANSMITTED FROM ECM/PCM OR DATA LINK CONNECTOR WIRE OPENED/SHORTED
DTC83 (P1621) NO ECM/IMMOBILIZER CONTROL MODULE CODE TRANSMITTED FROM IMMOBILIZER CONTROL MODULE OR DATA LINK CONNECTOR WIRE OPENED/SHORTED



For G13/G16 engine **For J18 engine**

1. Immobilizer Control Module
2. ECM/PCM
3. To #9-pin in data link connector
4. To TCM (if equipped)
5. To SDM (if equipped)

(*1): Vehicle not equipped with immobilizer indicator lamp
(*2): Vehicle equipped with immobilizer indicator lamp

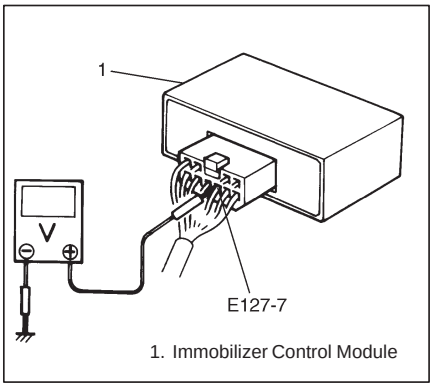
DESCRIPTION

When the ignition switch is ON, Immobilizer Control Module requests ECM/PCM and ECM/PCM requests Immobilizer Control Module to transmit ECM/Immobilizer Control Module code. If ECM/Immobilizer Control Module code is not transmitted from ECM/PCM or Immobilizer Control Module, Immobilizer Control Module sets DTC23 and ECM/PCM sets DTC83 (P1621).

INSPECTION:

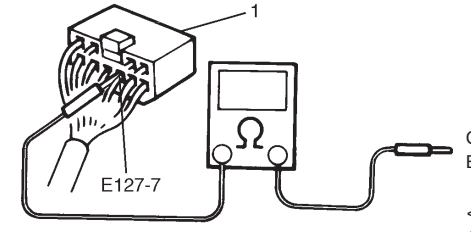
STEP	ACTION	YES	NO
1	Check voltage between Immobilizer Control Module coupler terminal E127-7 and body ground with ignition switch turned ON. Is it 4 – 5V?	Go to Step 2.	"Y/B" wire short.
2	1) Disconnect ECM/PCM coupler with ignition switch turned OFF. 2) Is there continuity between Immobilizer Control Module coupler terminal E127-7 and serial data link terminal of ECM/PCM coupler shown in Fig. 2? (For position of ECM/PCM serial data link terminal shown in Fig. 2, refer to "General Description" in this section.)	Poor E127-7 connection (Immobilizer Control Module) or Poor Data link connector terminal connection (ECM/PCM). If connections are OK, substitute a known-good ECM/PCM or Immobilizer Control Module and recheck. **NOTE :** **○After replacing with a known-good ECM/PCM, register ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in "Procedure after ECM/PCM Replacement" section.** **○After replacing with a known-good Immobilizer Control Module, register ECM/Immobilizer Control Module code in ECM/PCM and Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.**	"Y/B" wire between Immobilizer Control Module and ECM/PCM open.

Fig. 1 for step 1



1. Immobilizer Control Module

Fig. 2 for step 2



1. Immobilizer Control Module coupler disconnected

Connect to serial data link terminal below of ECM/PCM coupler disconnected

<Vehicle with immobilizer indicator lamp>
G13/G16 engine: E92-12
J18 engine: E91-1
<Vehicle without immobilizer indicator lamp>
G13/G16 engine: E92-11
J18 engine: E92-16

DTC82 (P1622) FAULT IN ENGINE CONTROL MODULE (ECM/PCM)

DESCRIPTION:

This DTC is set when an internal fault is detected in ECM/PCM.

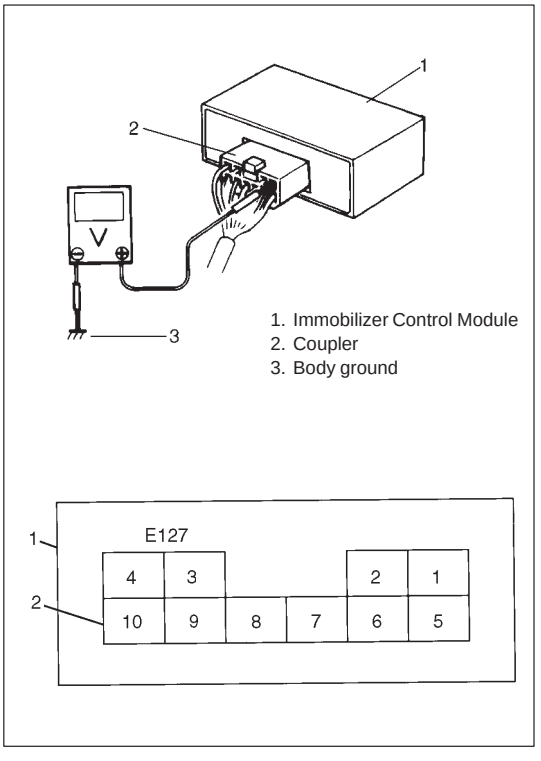
INSPECTION:

STEP	ACTION	YES	NO
1	1) Ignition switch OFF. 2) Disconnect connectors from ECM/PCM. 3) Check for proper connection to ECM/PCM at all terminals. Are they in good condition?	Substitute a known-good ECM/PCM and re-check. **NOTE:** **After replacing with a known-good ECM/PCM, register ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in "Procedure after ECM/PCM Replacement" section.**	Repair or replace.

INSPECTION OF ECM/PCM, IMMOBILIZER CONTROL MODULE AND ITS CIRCUIT

ECM/PCM, Immobilizer Control Module and its circuit can be checked at ECM/PCM wiring couplers and Immobilizer Control Module wiring coupler by measuring voltage and resistance. Described here is only inspection of Immobilizer Control Module. For inspection of ECM/PCM, refer to “Engine and Emission Control System” section in Service Manual for the vehicle being serviced.

CAUTION:
Immobilizer Control Module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to Immobilizer Control Module with coupler disconnected from it.



1. Immobilizer Control Module
2. Coupler
3. Body ground

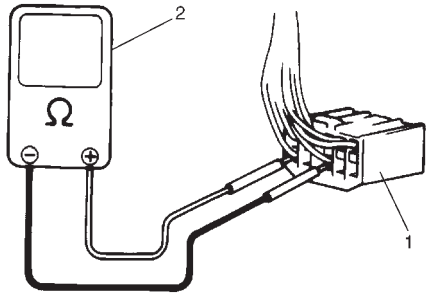
Voltage Check

1) Remove Immobilizer Control Module from body with ignition switch OFF referring to IMMOBILIZER CONTROL MODULE REMOVAL in this section.
2) Connect Immobilizer Control Module couplers to Immobilizer Control Module.
3) Check voltage at each terminal of couplers connected.

NOTE:
As each terminal voltage is affected by the battery voltage, confirm that it is 11V or more when ignition switch is ON.

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E127-1	Ignition signal	10 – 14V	Ignition switch ON
		0 – 0.8V	Ignition switch OFF
E127-2	Power source	10 – 14V	Ignition switch ON
E127-3	Coil antenna 2	0V	
E127-4	Coil antenna 1	0V	
E127-5 E127-6	Blank	–	–
E127-7	Data link connector (Serial data terminal)	4 – 5V	Ignition switch ON
E127-8	Ground	–	–
E127-9	Blank	–	–
E127-10	Diagnosis output	0 – 14V	Ignition switch ON
		0V	Ignition switch OFF

NOTE:
When measuring voltage at E127-4 and E127-3 terminals with ignition switch turned ON, be sure to turn ignition switch ON before connecting positive probe of voltmeter to E127-4 or E127-3 terminal. If it is not turned ON first, DTC13 (Diagnostic Trouble Code 13) may be indicated.



1. Immobilizer Control Module coupler disconnected
2. Ohmmeter

Resistance Check

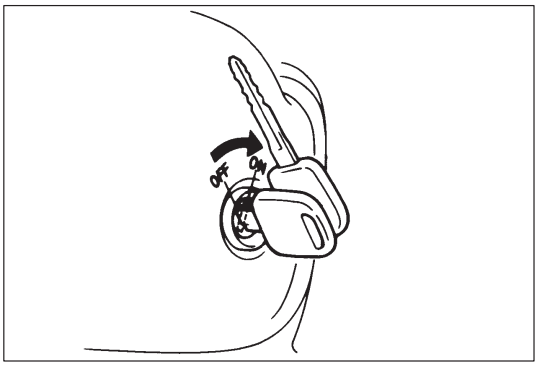
1) Disconnect Immobilizer Control Module couplers from Immobilizer Control Module with ignition switch OFF.

CAUTION:
Never touch terminals of Immobilizer Control Module itself or connect voltmeter or ohmmeter.

2) Check resistance between each terminal of couplers disconnected.

CAUTION:
- **Be sure to connect ohmmeter probe from wire harness side of coupler.**
- **Be sure to turn OFF ignition switch for this check.**
- **Resistance in table below represents that when parts temperature is 20°C (68°F).**

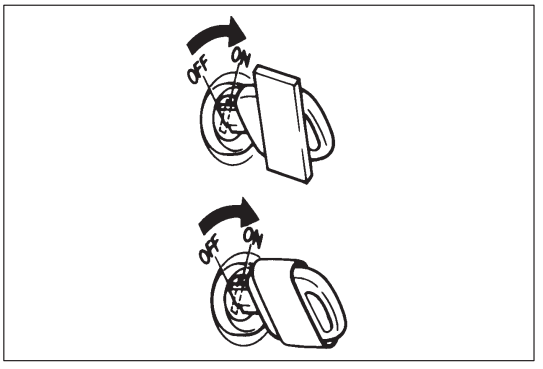
TERMINAL	CIRCUIT	NORMAL RESISTANCE	CONDITION
E127-4 – E127-3	Coil antenna	Continuity	–



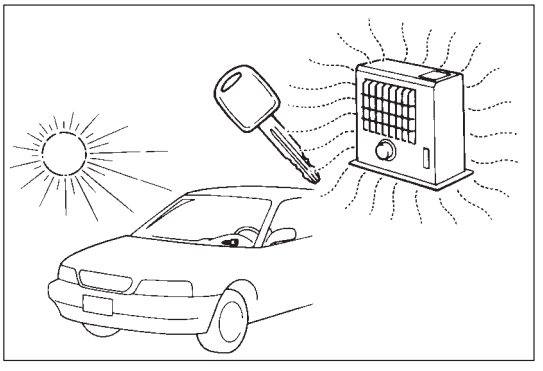
ON-VEHICLE SERVICE

Precautions in handling immobilizer control system

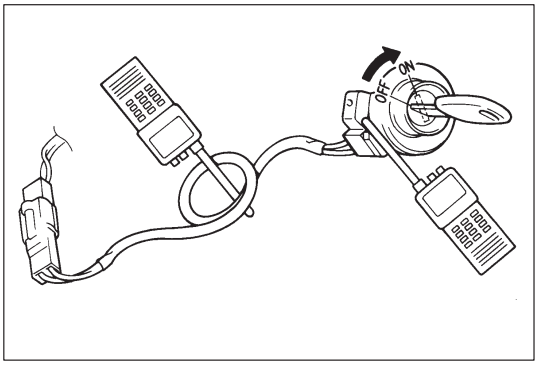
○ Don't turn ON ignition switch with ignition key for immobilizer control system put together with another one or placed quite close to another one. Or the system may detect abnormal condition and prevent engine from starting.



○ Do not turn ON ignition switch by using ignition key with any type of metal wound around its grip or in contact with it. Or the system may detect abnormal condition and prevent engine from starting.



○ Do not leave ignition key where high temperature is anticipated. High temperature will cause transponder in ignition key to be abnormal or damaged.



○ Do not turn ON ignition switch with a radio antenna placed near coil antenna or its harness to Immobilizer Control Module. Or the system may detect abnormal condition and prevent engine from starting.

IMMOBILIZER CONTROL MODULE

Removal

1) Disconnect negative (–) cable at battery.
2) Disconnect coupler.
3) Remove immobilizer control module.

Installation

Reverse removal procedure for installation

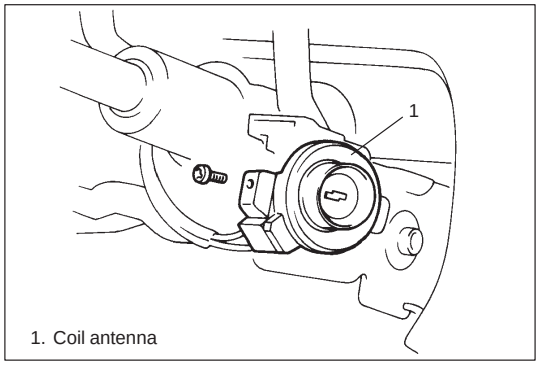
NOTE:
After replacing Immobilizer Control Module, be sure to register Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module and ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.

ENGINE CONTROL MODULE/POWER TRAIN CONTROL MODULE (ECM/PCM)

Removal and Installation

For removal and installation of ECM/PCM, refer to "Engine and Emission Control System" section in Service Manual for vehicle being serviced.

NOTE:
After replacing ECM/PCM, be sure to register ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in "Procedure after ECM/PCM Replacement" section.



1. Coil antenna

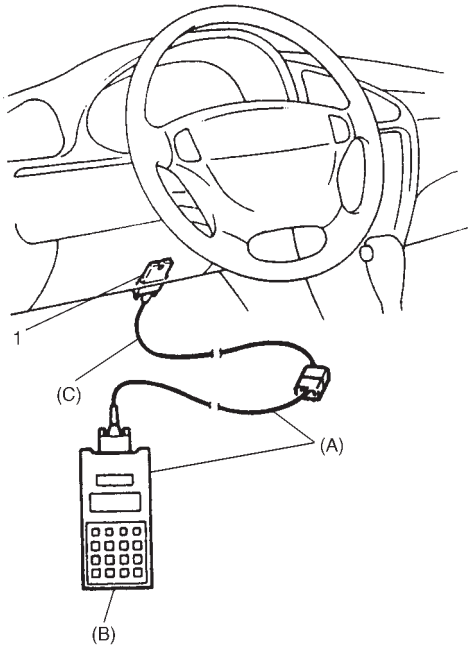
COIL ANTENNA

Removal

1) Disconnect negative (–) cable at battery.
2) Remove air bag module (if equipped), steering wheel and combination switch assembly (together with steering sensor if suspension control system is equipped).
   Refer to Section 3C (without air bag), 3C1 (with air bag) or 3G (with suspension control system).
3) Remove coil antenna.

Installation

For installation, reverse removal procedure, surely referring to Section 3C (without air bag), 3C1 (with air bag) or 3G (with suspension control system).



1. Data link connector (DLC)

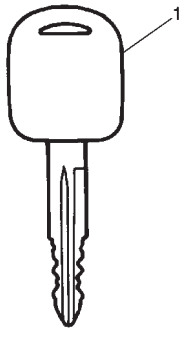
HOW TO REGISTER IGNITION KEY

Register the ignition key with a built-in transponder in Immobilizer Control Module by using the following procedure.

1) Prepare Suzuki scan tool (TECH 1A kit and cartridge for immobilizer control system).
2) With ignition switch OFF, connect Suzuki scan tool to data link connector (DLC) located on underside of instrument panel at driver's seat side.

   Special Tool
   (A): 09931-76011 (Tech 1A)
   (B): Immobilizer cartridge
   (C): 09931-76030 (16/14-pin DLC cable)

   NOTE:
   For operation procedure of Suzuki scan tool, refer to Suzuki scan tool operator's manual.



1. Ignition key with built-in transponder

3) Prepare ignition key with a built-in transponder. And then turn ignition switch ON by using it.
4) Number of Transponder codes for ignition key with a built-in transponder that can be registered in Immobilizer Control Module is limited to 4. If needed, clear all Transponder codes for ignition key with a built-in transponder that have been registered in Immobilizer Control Module by executing the "CLR. TRANS COD (CLEAR TP CODE)" command in the SELECT MODE menu by using Suzuki scan tool.

   NOTE:
   When "CLR. TRANS COD (CLEAR TP CODE)" command is executed with the malfunction indicator lamp (for vehicles not equipped with the immobilizer indicator lamp) ON or the immobilizer indicator lamp ON, it remains ON even after execution of that command is over. It will start flashing when the ignition switch is turned OFF once and then turned ON after some seconds.

5) Using Suzuki scan tool, register Transponder code in Immobilizer Control Module by executing "ENT. TRANS COD (ENT. TP CODE)" command in SELECT MODE menu.
6) [Vehicle not equipped with immobilizer indicator lamp]
   Make sure that malfunction indicator lamp lights when ignition switch is turned OFF once and then ON.
   [Vehicle equipped with immobilizer indicator lamp]
   Make sure that immobilizer indicator lamp lights when ignition switch is turned OFF once and then ON.

7) If any other Transponder code for ignition key with a built-in transponder needs to be registered, repeat above Steps 3), 5) and 6).

NOTE:
- ○ **Up to 4 Transponder codes for ignition key with a built-in transponder can be registered.**
- ○ **It is not possible to register the same Transponder code for ignition key with a built-in transponder as the one already registered in Immobilizer Control Module.**

PROCEDURE AFTER IMMOBILIZER CONTROL MODULE REPLACEMENT

When Immobilizer Control Module was replaced, including when replaced because rechecking by using a known-good Immobilizer Control Module was necessary during trouble diagnosis, register Transponder code and ECM/Immobilizer Control Module code in Immobilizer Control Module and ECM/Immobilizer Control Module code in ECM/PCM by performing following procedure.

1) Perform Steps 1) and 2) described in “How to register ignition key” section.
2) Prepare ignition key with a built-in transponder. And then turn ignition switch ON by using it.
3) Using Suzuki scan tool, clear all transponder codes registered in Immobilizer Control Module by executing “CLR. TRANS COD (CLEAR TP CODE)” command in SELECT MODE menu.

   NOTE:
   When “CLR. TRANS COD (CLEAR TP CODE)” command is executed with the malfunction indicator lamp (for vehicles not equipped with the immobilizer indicator lamp) ON or the immobilizer indicator lamp ON, it remains ON even after execution of that command is over. It will start flashing when the ignition switch is turned OFF once and then turned ON after some seconds.
4) Using Suzuki scan tool, register Transponder code in Immobilizer Control Module by executing “ENT. TRANS COD (ENT. TP CODE)” command in SELECT MODE menu.
5) Using Suzuki scan tool, register ECM/Immobilizer Control Module code in both Immobilizer Control Module and ECM/PCM by executing “RECORD ECU (RECORD ECM/PCM/ICM)” command in SELECT MODE menu.
6) [Vehicle not equipped with immobilizer indicator lamp]
   Make sure that malfunction indicator lamp lights when ignition switch is turned OFF once and then ON.
   [Vehicle equipped with immobilizer indicator lamp]
   Make sure that immobilizer indicator lamp lights when ignition switch is turned OFF once and then ON.
7) If any other Transponder code for ignition key with a built-in transponder needs to be registered, repeat above Steps 2), 4) and 6).

   NOTE:
   - ○ **Up to 4 Transponder codes for ignition key with a built-in transponder can be registered.**
   - ○ **It is not possible to register the same Transponder code for ignition key with a built-in transponder as the one already registered in Immobilizer Control Module.**

PROCEDURE AFTER ECM/PCM REPLACEMENT

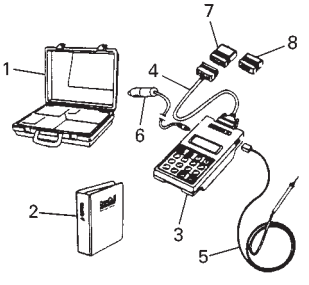
When ECM/PCM was replaced, including when replaced because rechecking by using a known-good ECM/PCM was necessary during trouble diagnosis, register ECM/Immobilizer Control Module code in ECM/PCM by performing following procedure.

1) Perform Steps 1) and 2) described in "How to register ignition key" section. And then turn ignition switch ON.
2) Using Suzuki scan tool, register ECM/Immobilizer Control Module code in ECM/PCM by executing "RECORD ECU (RECORD ECM/PCM/ICM)" command in SELECT MODE menu.

   NOTE:
   For operation procedure of Suzuki scan tool, refer to TECH1 operator's manual.

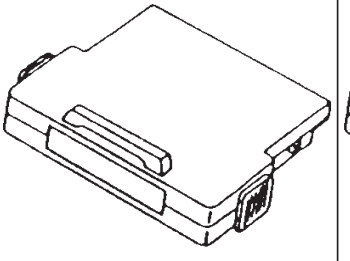
3) [Vehicle not equipped with immobilizer indicator lamp]
   Make sure that malfunction indicator lamp lights when ignition switch is turned OFF once and then ON.
   [Vehicle equipped with immobilizer indicator lamp]
   Make sure that immobilizer indicator lamp lights when ignition switch is turned OFF once and then ON.

SPECIAL TOOLS

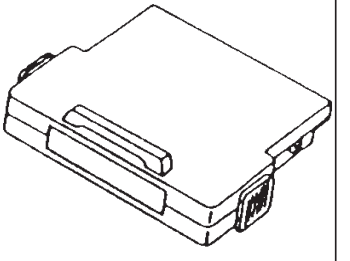


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable (14/26 pin, 09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

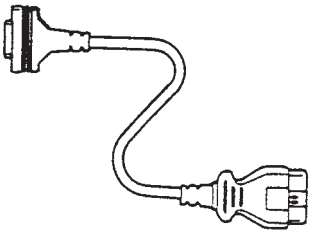
09931-76011
Suzuki scan tool (Tech 1A kit)



Immobilizer cartridge of version 1.1 or more



Mass storage cartridge of version 1.5 or more



NOTE:
Use this cable only with immobilizer cartridge of version 1.1 or more.
Use of this cable with 96 immobilizer cartridge will disable 96 immobilizer cartridge from operating properly.

09931-76030
16/14 pin DLC cable

SECTION 9

BODY SERVICE

WARNING:
For vehicles equipped with Supplemental Restraint (Air Bag) System:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

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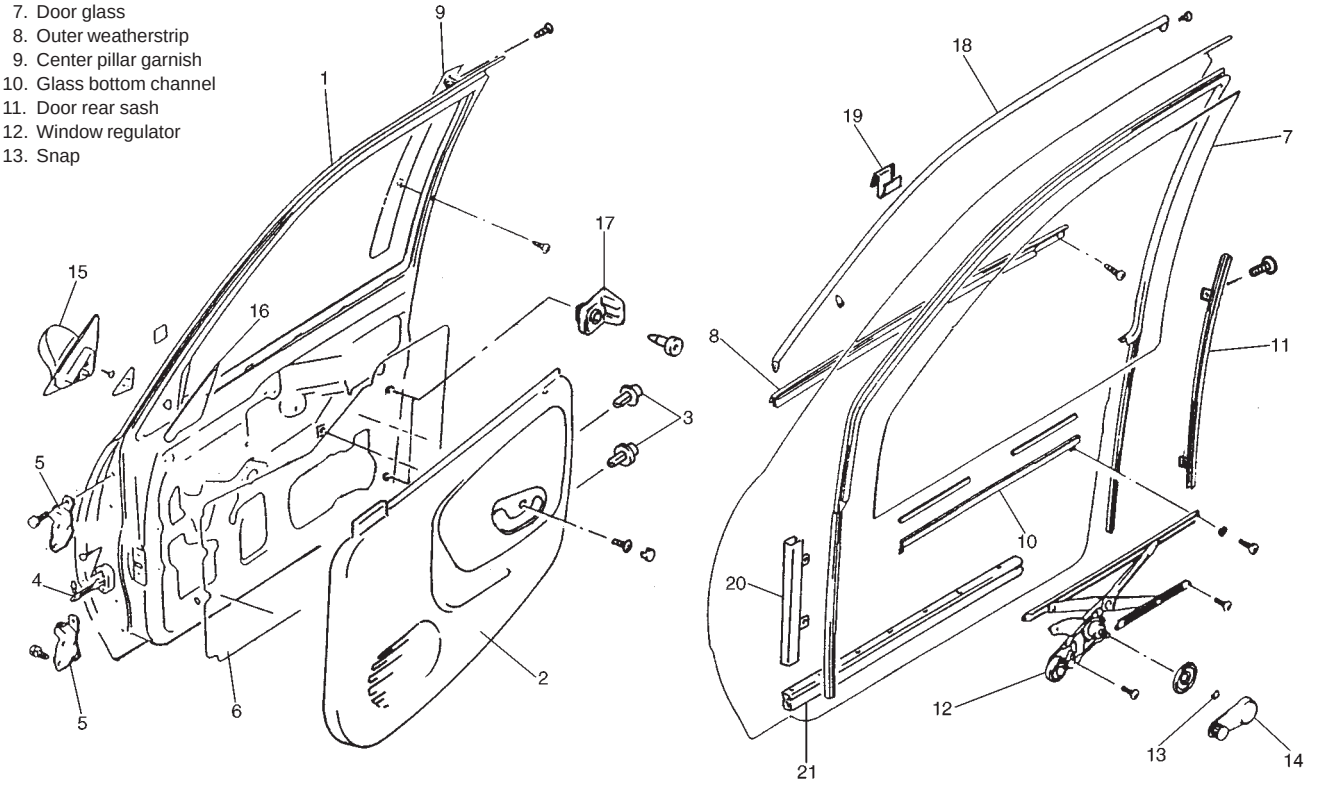
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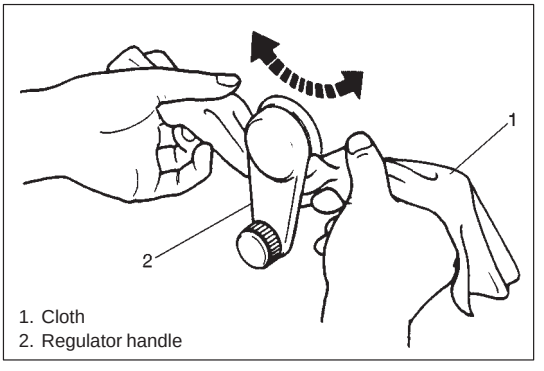
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ON-VEHICLE SERVICE

FRONT DOOR

1. Door panel
2. Door trim
3. Fastener
4. Door open stop
5. Door hinge
6. Door sealing cover
7. Door glass
8. Outer weatherstrip
9. Center pillar garnish
10. Glass bottom channel
11. Door rear sash
12. Window regulator
13. Snap
14. Window regulator handle
15. Door mirror (if equipped)
16. Door mirrors inner garnish
17. Door trim bracket
18. Door flame molding
19. Glass guide
20. Door front sash
21. Dust seal



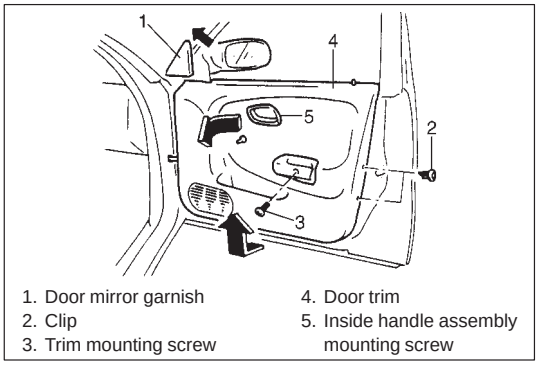


1. Cloth
2. Regulator handle

DOOR GLASS

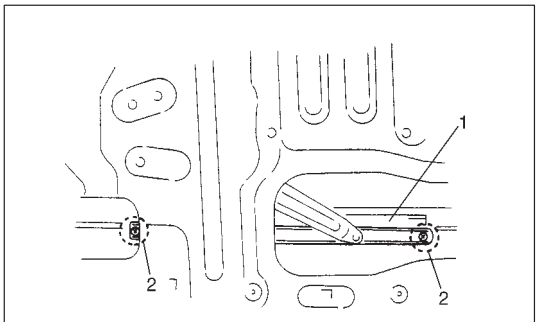
REMOVAL

1) Remove window regulator handle (if equipped).
For its removal, pull off snap by using a cloth as shown in figure.



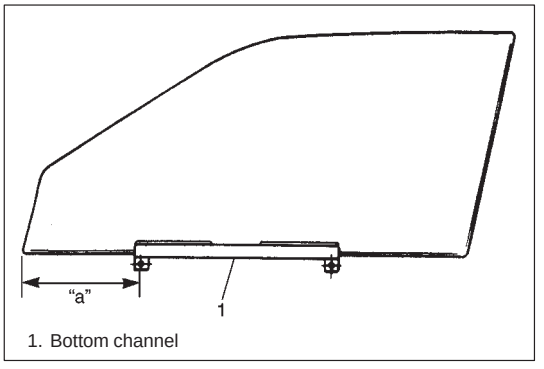
1. Door mirror garnish
2. Clip
3. Trim mounting screw
4. Door trim
5. Inside handle assembly mounting screw

2) Remove door mirror garnish, clips, and door trim mounting screw.
3) Remove inside handle assembly mounting screw, and remove inside handle assembly from door trim by sliding it forward.
4) Remove door trim.
5) Disconnect power window switch coupler (if equipped).



1. Grass bottom channel
2. Screw

6) Remove door grip stay.
7) Remove door sealing cover.
8) Remove glass bottom channel attaching screws.
9) Take out door glass together with bottom channel.
10) Detach glass from bottom channel.



1. Bottom channel

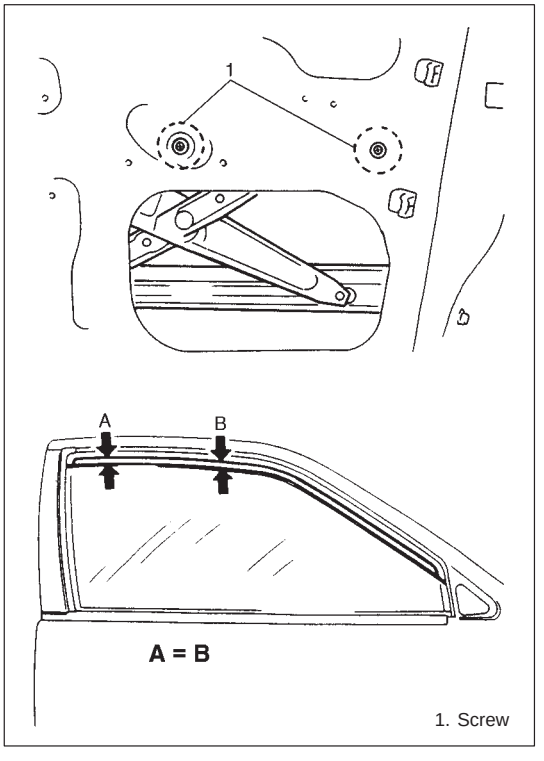
INSTALLATION

Reverse the removal procedure for installation, and then noting the following instructions.

- When installing glass to bottom channel, coat channel with soap water and tap it with a plastic hammer.
  Glass-fitted position of bottom channel is as shown in figure.

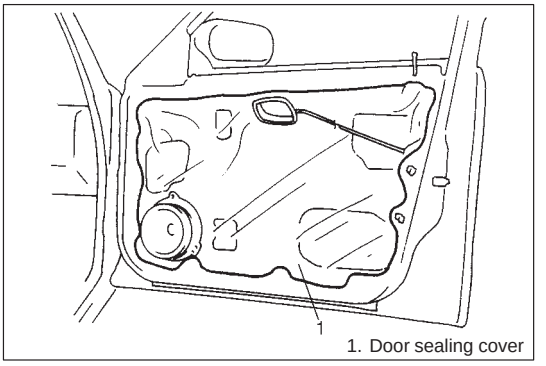
  Length "a"

Hatch-back model	**197 – 200 mm (7.75 – 7.85 in.)**
Sedan model	**232 – 236 mm (9.15 – 9.25 in.)**



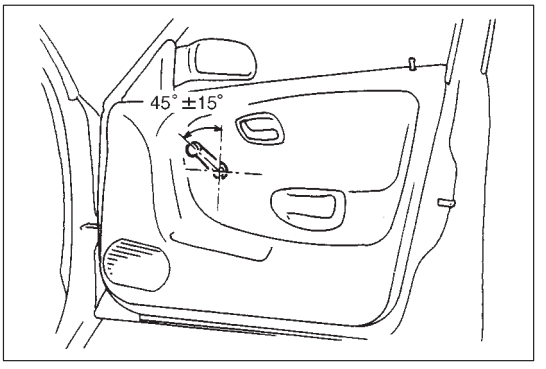
1. Screw

- Adjust equalizer of window regulator so that measurements A and B in figure are equal to each other.

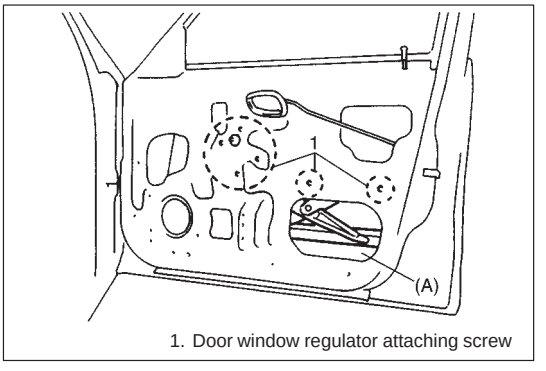


1. Door sealing cover

- Securely seal door sealing cover with adhesive.



- Install door window regulator handle so that it has a 45· angle when glass is fully closed, as illustrated left.



1. Door window regulator attaching screw

DOOR WINDOW REGULATOR

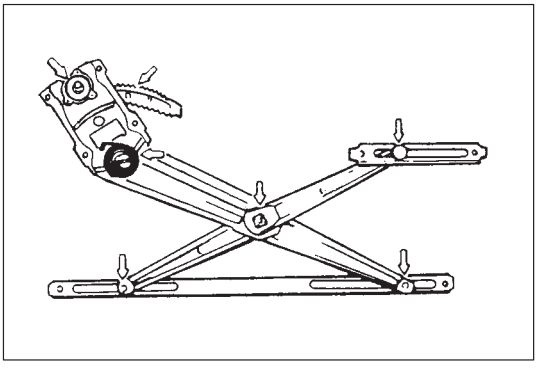
REMOVAL

1) Remove door glass referring to “FRONT DOOR” in this section.
2) Remove window regulator attaching screws (six pcs.). Then, take out regulator through hole (A).

INSPECTION

Check the following parts.

- Check gear for wear or damage.
- Check spring for weakened condition.

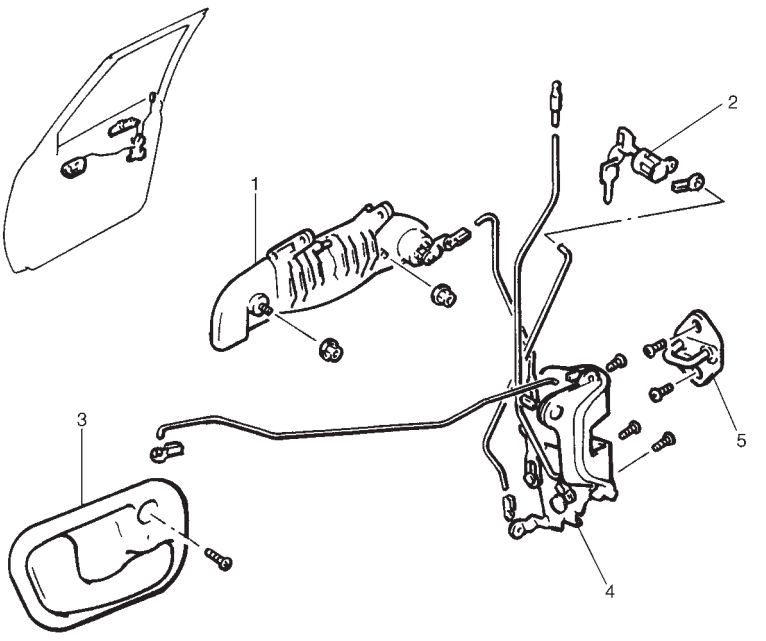


INSTALLATION

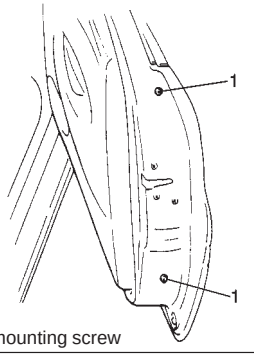
Reverse removal procedure for installation, and then noting the following instruction.

- Apply multi-purpose grease to sliding parts.

FRONT DOOR LOCK



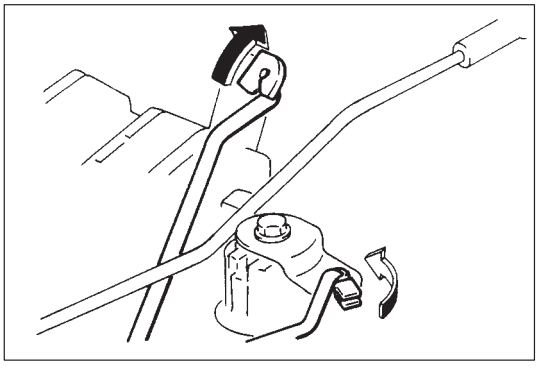
1. Outside handle
2. Lock key cylinder
3. Inside handle
4. Latch assembly
5. Latch striker



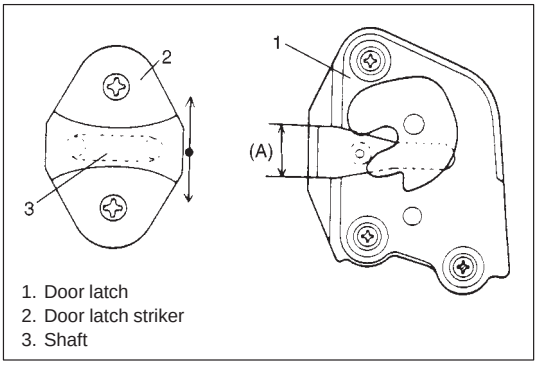
1. Rear sash mounting screw

REMOVAL

1) Removal window regulator handle (if equipped), door mirror inner garnish, door trim, power window switch (if equipped) and door sealing cover.
   For details, refer to “DOOR GLASS” in this section.
2) Remove front door rear sash.



3) After disconnecting each joint of control link, remove door inside handle, outside handle and door latch assembly.



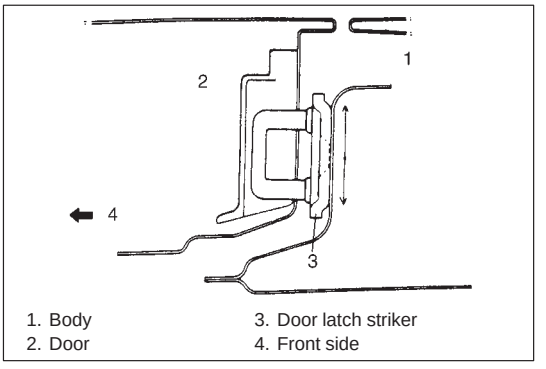
1. Door latch
2. Door latch striker
3. Shaft

INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.

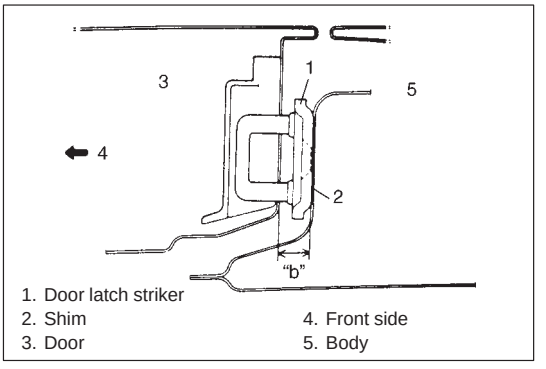
- Install door latch striker.
  Move door latch striker up and down so that its shaft approximately aligns with the center of groove (A) of door latch.

  NOTE:
  Striker should be placed level and moved vertically. Do not adjust door latch.



1. Body
2. Door
3. Door latch striker
4. Front side

- Move door latch striker sideways to adjust to 0 mm (0 in.) the door surface-to-body surface difference with door closed.

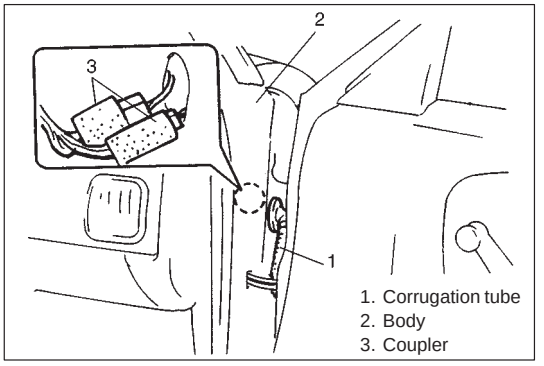


1. Door latch striker
2. Shim
3. Door
4. Front side
5. Body

- In order to correctly obtain door striker position in fore-and-aft direction, increase or decrease number of spacers inserted between body and striker to adjust it. Dimension "b" should be adjusted to specified value.

  Dimension "b": 12.6 – 14.6 mm (0.50 – 0.57 in.)

  NOTE:
  Apply oil or grease to striker joints periodically.

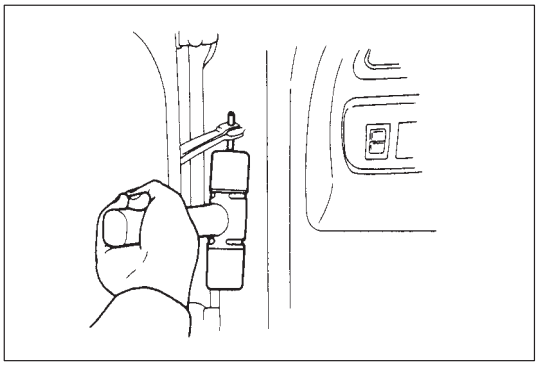


1. Corrugation tube
2. Body
3. Coupler

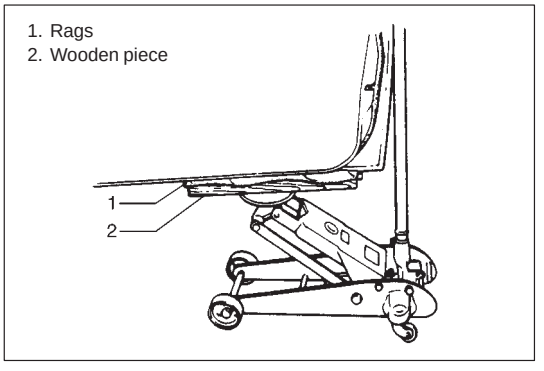
FRONT DOOR ASSEMBLY

REMOVAL

1) Disconnect door harness couplers, and remove corrugation tube from body.



2) Remove stopper pin upward by tapping it with hammer.



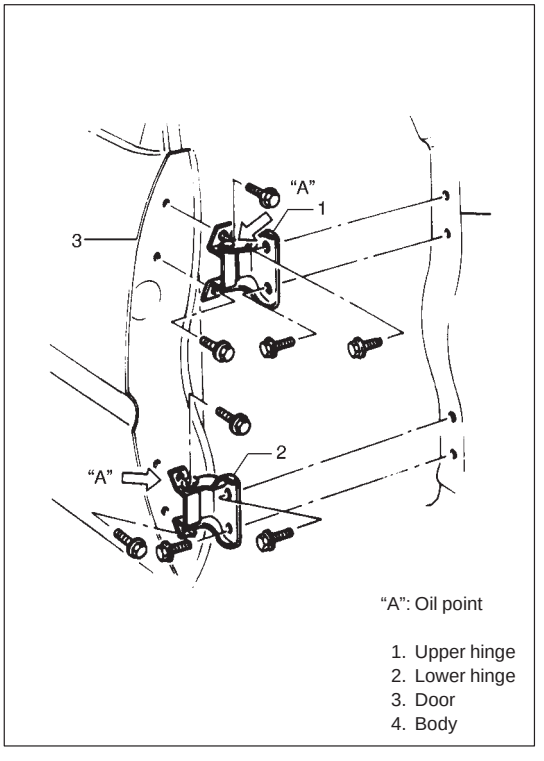
1. Rags
2. Wooden piece

3) Using a jack, support door panel with a piece of wood placed between jack and panel.
4) Remove door assembly by loosening hinge mounting bolts.

INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.

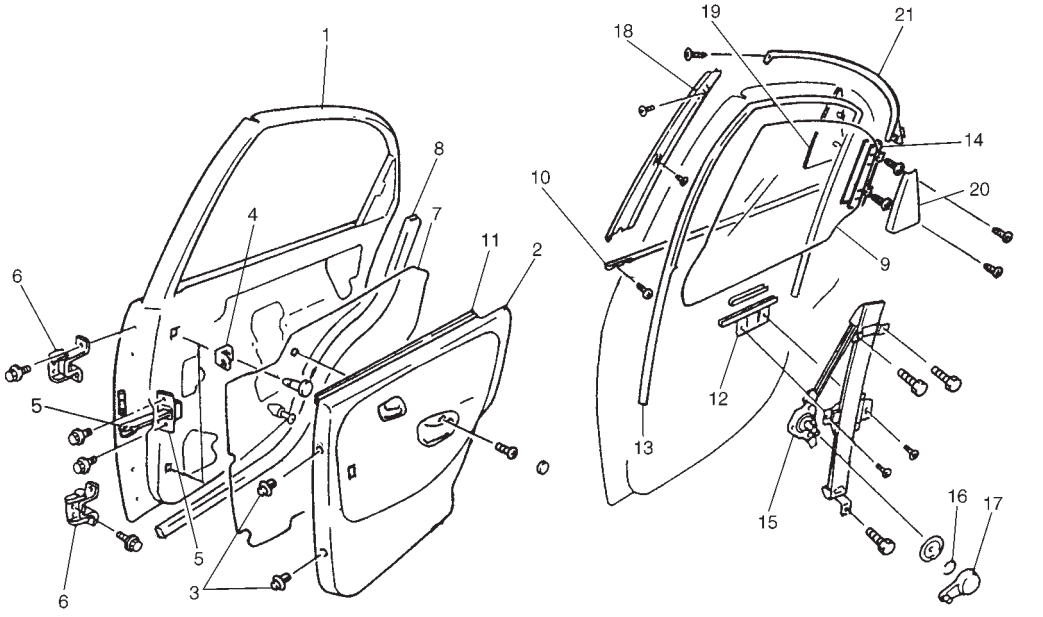
- When weatherstrip is hardened, water leak may develop. In such case, replace it with new one.
- After installing, adjust door latch striker position referring to “FRONT DOOR LOCK INSTALLATION” in this section so that door is positioned correctly.



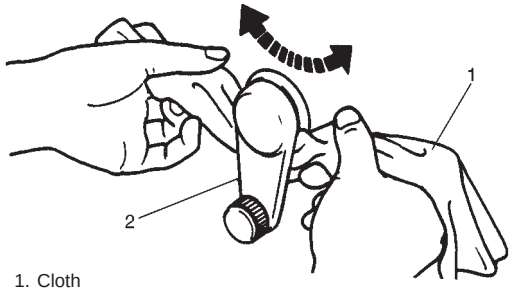
“A”: Oil point

1. Upper hinge
2. Lower hinge
3. Door
4. Body

REAR DOOR (For Sedan Model)



1. Door panel
2. Door trim
3. Fastener
4. Door trim bracket
5. Door open stop
6. Door hinge
7. Door sealing cover
8. Door dust weather strip
9. Door glass
10. Outer weatherstrip
11. Inner weatherstrip
12. Glass bottom channel
13. Rear glass run
14. Door rear sash
15. Window regulator
16. Snap
17. Window regulator handle
18. Rear door center pillar garnish
19. Rear door outer garnish
20. Rear door inner garnish
21. Rear door frame molding

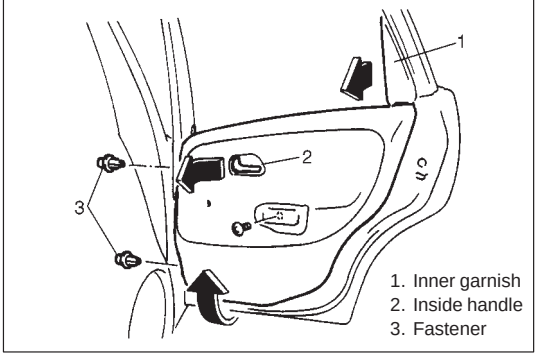


1. Cloth
2. Regulator handle

DOOR GLASS

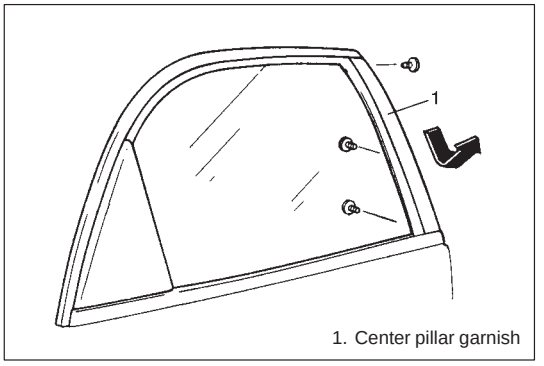
REMOVAL

1) Remove window regulator handle.
   For its removal, pull off snap by using a cloth as shown.



1. Inner garnish
2. Inside handle
3. Fastener

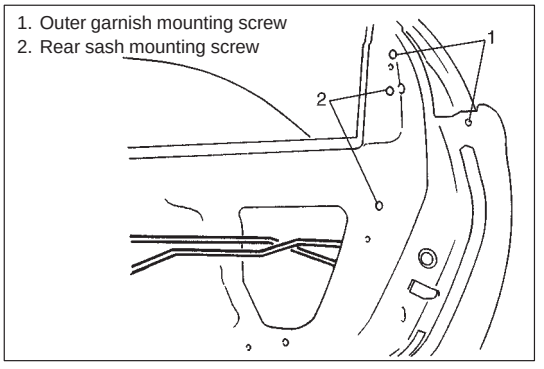
2) Remove inner garnish and clips.
3) Remove inside handle assembly mounting screw, and remove inside handle assembly from door trim by sliding it forward.
4) Remove door trim.
5) Disconnect power window switch coupler (if equipped).
6) Remove door sealing cover.



1. Center pillar garnish

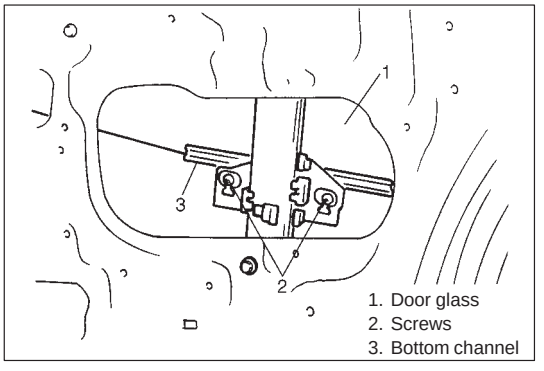
7) Remove rear door center pillar garnish.

CAUTION:
When removing center pillar garnish, slide it down first. Attempting removal without doing so will cause claws on the back of center pillar.



1. Outer garnish mounting screw
2. Rear sash mounting screw

8) Remove outer garnish.
9) Lower window fully, then remove rear sash mounting screw.



1. Door glass
2. Screws
3. Bottom channel

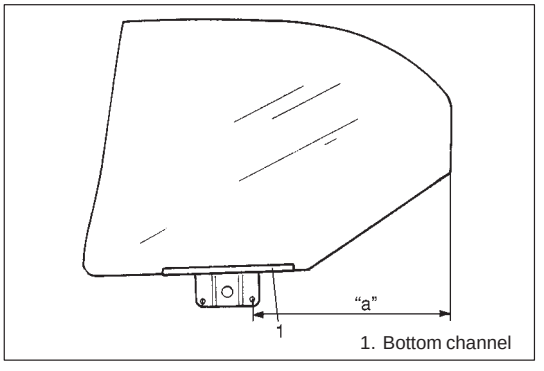
10) Remove glass fitting screws. Then, take out door glass together with bottom channel.
11) Detach glass from bottom channel.

INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.
However, be careful of following points.

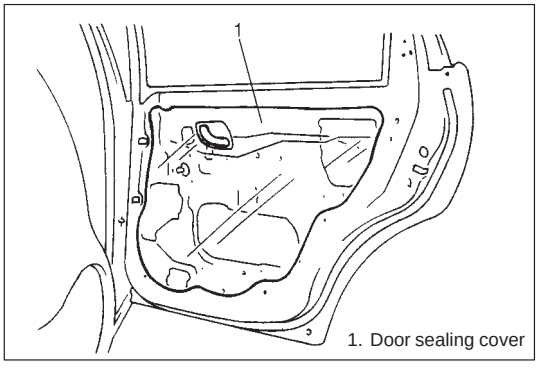
- When installing glass to bottom channel, coat channel with soap water and tap it with a plastic hammer. Glass-fitted position of bottom channel is as shown left.

  Dimension “a”: 234 – 237 mm (9.21 – 9.33 in.)

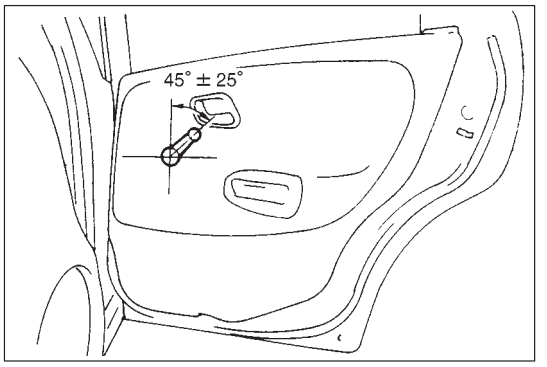


1. Bottom channel

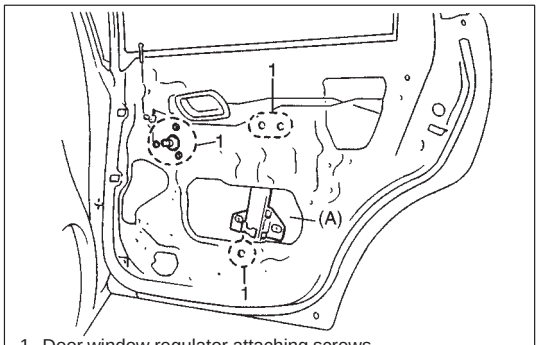
- Securely seal door sealing cover with adhesive.



1. Door sealing cover



- Install door window regulator handle so that it has a 45· angle when glass is fully closed, as illustrated left.

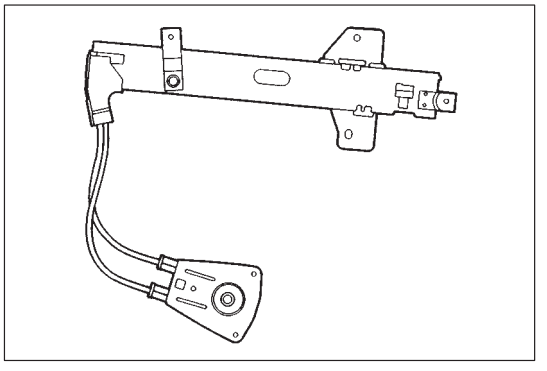


1. Door window regulator attaching screws

DOOR WINDOW REGULATOR

REMOVAL

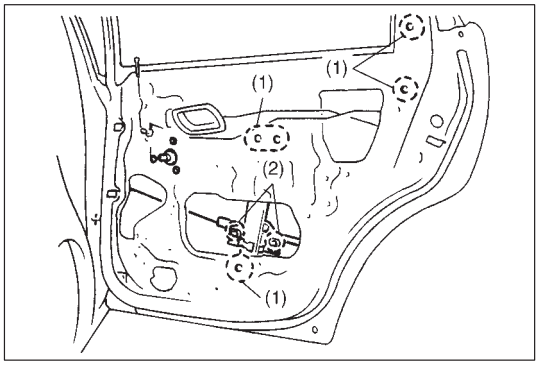
1) Remove door glass. (See previous section.)
2) Remove door window regulator attaching screws (six pcs.). Then, take out regulator through hole (A).



INSTALLATION

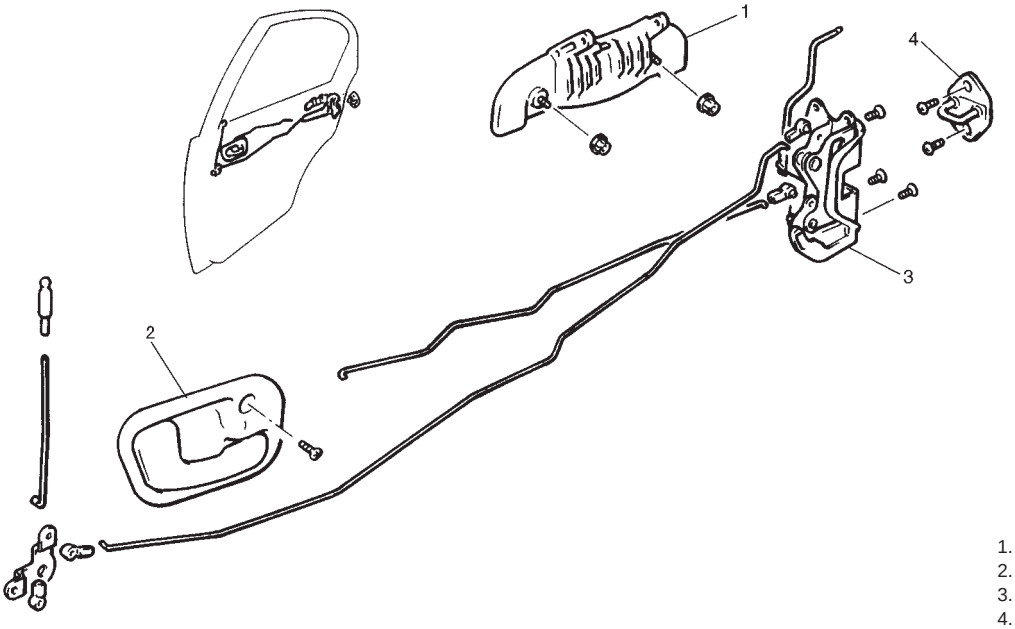
Reverse removal procedure for installation, and then noting the following instructions.

- Apply multi-purpose grease to sliding parts.

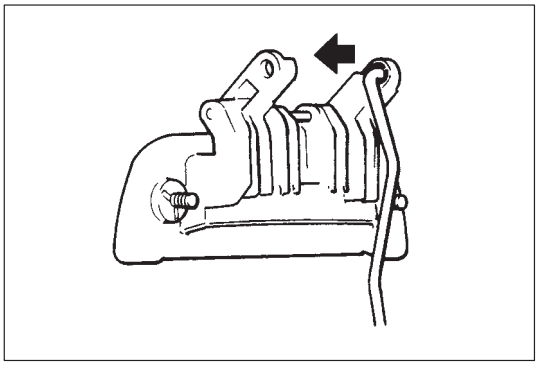


- Adjust door window regulator according to following procedure.
  a) Loosen seven screws as shown.
  b) Raise door glass fully with regulator handle.
  c) Tighten five screws (1).
  d) Lower door glass.
  e) Tighten two screws (2).

REAR DOOR LOCK



1. Outside handle
2. Inside handle
3. Latch assembly
4. Latch striker

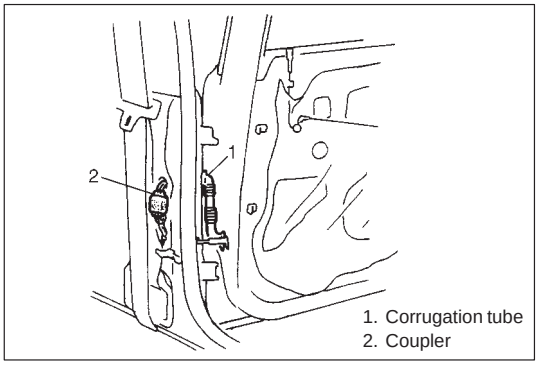


REMOVAL

1) Remove window regulator handle (if equipped), inner garnish, door trim, power window switch (if equipped) and door sealing cover.
   For details, refer to Steps 1) – 6) of "DOOR GLASS" in this section.
2) Disconnect joint of door opening control rod.
3) Remove door latch assembly with door inside handle.
4) Remove door latch assembly.

INSTALLATION

Reverse removal procedure for installation.



1. Corrugation tube
2. Coupler

REAR DOOR ASSEMBLY

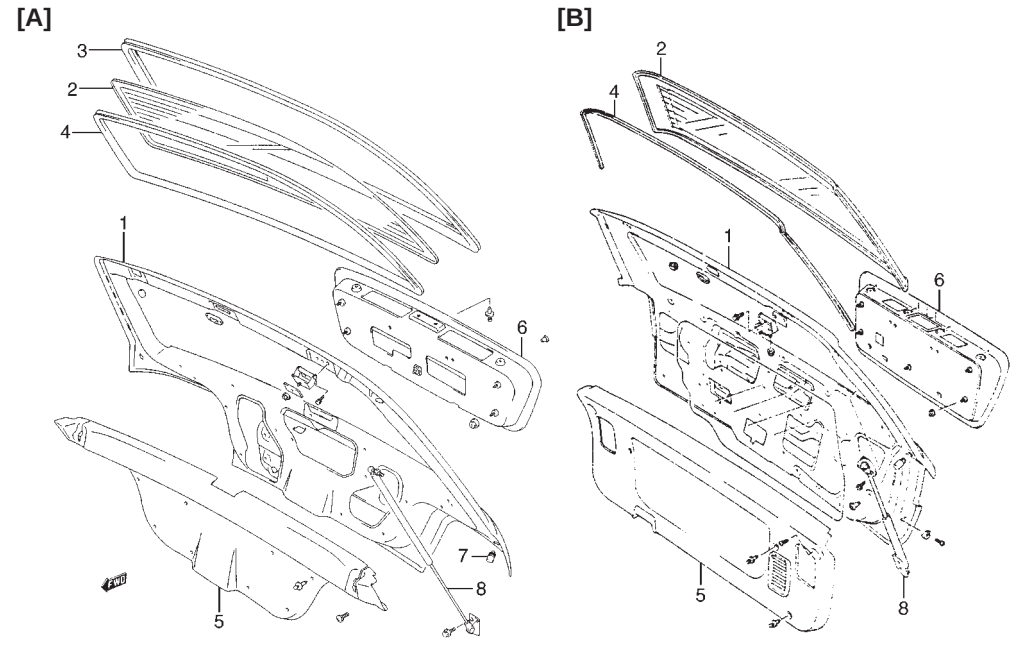
REMOVAL/INSTALLATION

Follow procedures referring to "FRONT DOOR" in this section.

NOTE:

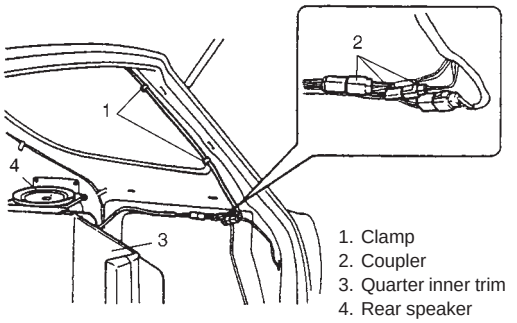
Refer to the figure for location of rear door harness coupler.

BACK DOOR (For Hatch-back and Wagon Models)



[A]: Hatch-back model
[B]: Wagon model

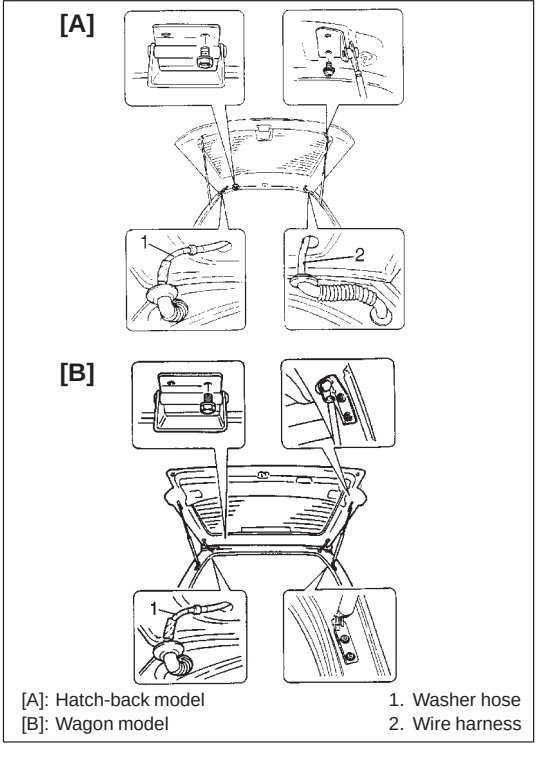
1. Back door panel
2. Back door window glass
3. Molding
4. Back door window trim
5. Back door trim
6. Back door licence garnish
7. Stopper
8. Back door balancer



1. Clamp
2. Coupler
3. Quarter inner trim
4. Rear speaker

REMOVAL

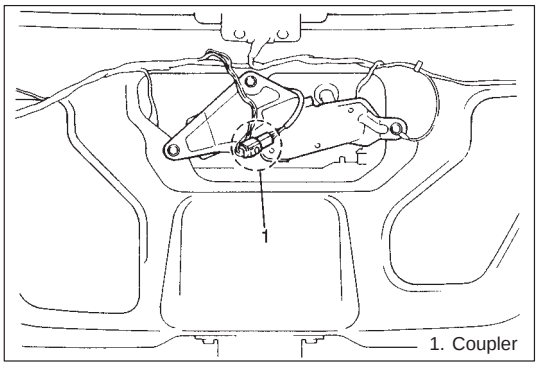
1) Remove back door trim.
2) Disconnect wire harness connector inside back door to take it out from door.



[A]: Hatch-back model
[B]: Wagon model

1. Washer hose
2. Wire harness

3) As to vehicle provided with back window washer, disconnect washer hose.
   Remove back door balancer lower (door side) fitting screws.
4) Remove door hinge bolts, and then remove door.

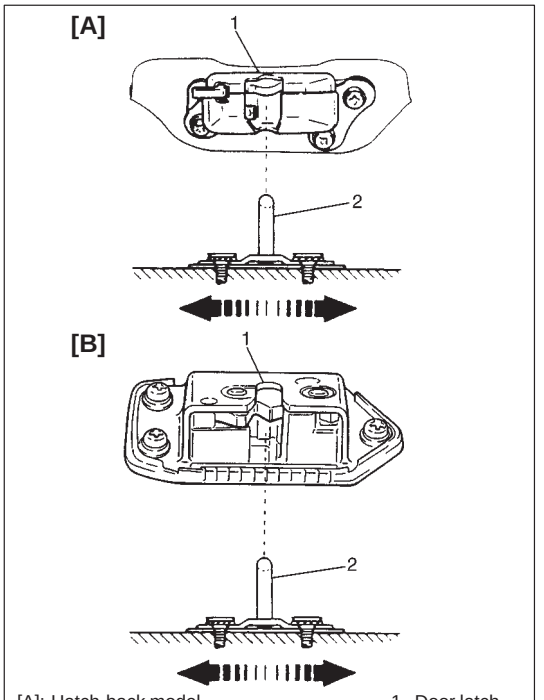


1. Coupler

INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.

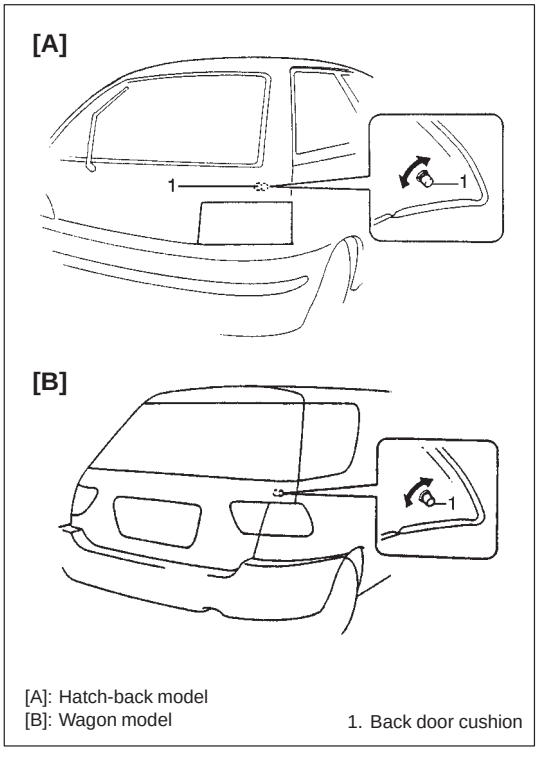
- Securely connect coupler.



[A]: Hatch-back model
[B]: Wagon model

1. Door latch
2. Striker shaft

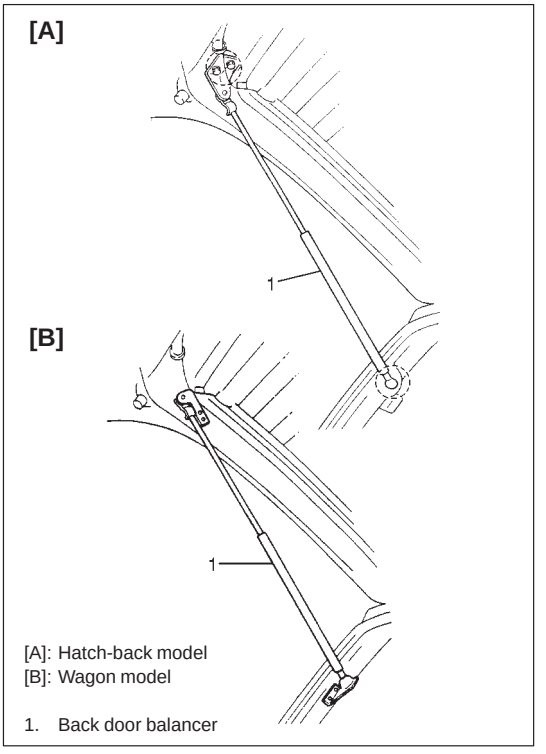
- Adjust door latch striker so that striker shaft approximately aligns with the center of groove of door latch.



[A]: Hatch-back model
[B]: Wagon model

1. Back door cushion

- Adjust door by rubber cushion.
  Rubber cushion installed at each side of back door is of screw-adjustable type. Turn cushion to adjust door for proper position.
- After installing all parts and adjusting properly, check back door for proper operation (open close and lock).



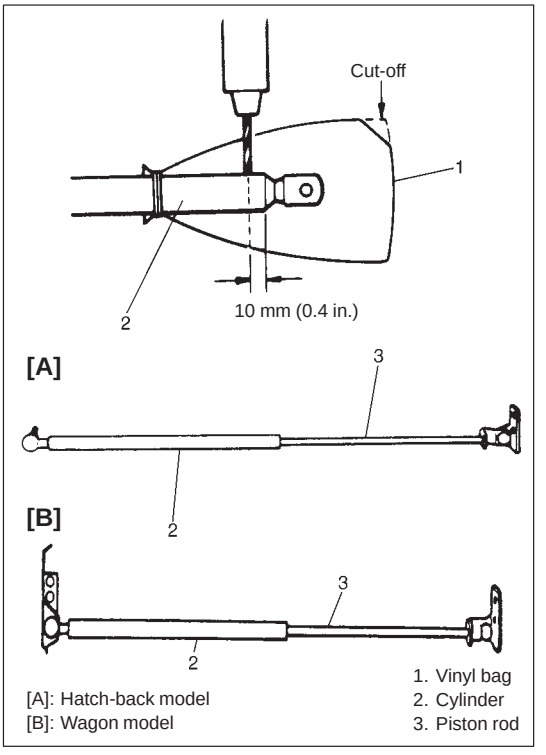
[A]: Hatch-back model
[B]: Wagon model

1. Back door balancer

BACK DOOR BALANCER

REMOVAL

1) Remove back door trim. (For hatch-back model)
2) Remove quarter window trim. (For hatch-back model)
3) Remove back door balancer (first at its door-side and next at its body-side).



[A]: Hatch-back model
[B]: Wagon model

1. Vinyl bag
2. Cylinder
3. Piston rod

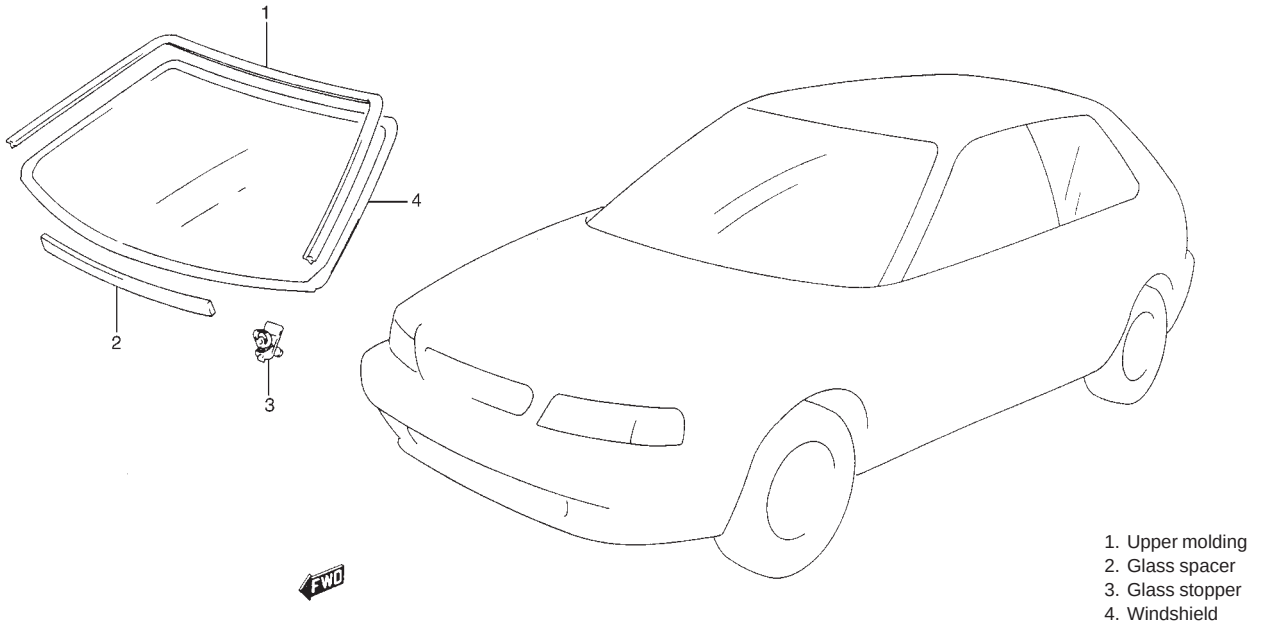
CAUTION:
Handling of Back Door Balancer (Damper)

- **Do not disassemble balancer because its cylinder is filled with gas.**
- **When discarding removed back door balancer (damper), envelop it, as illustrated with a vinyl bag. Then, use a 2 to 3 mm (0.08 – 0.12 in.) drill to make a hole, as shown, from above through vinyl bag into balancer.**
- **Handle balancer carefully. Do not scar or scratch exposed surface of its piston rod, and never allow any paint or oil to stick to its surface.**
- **Do not turn piston rod with balancer fully extended.**

INSTALLATION

Reverse removal procedure for installation.

WINDSHIELD



1. Upper molding
2. Glass spacer
3. Glass stopper
4. Windshield

The windshield is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For windshield glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.

CAUTION:

- **Described here is the glass replacement by using one component urethane adhesive to be used with primer in combination. Each adhesive has its own drying and setting time and must be handled and used in a certain specific procedure. Negligence in following such procedure or misuse of the adhesive in any way hinders its inherent adhesive property. Therefore, before the work, make sure to read carefully the instruction and description given by the maker of the adhesive to be used and be sure to follow the procedure and observe each precaution throughout the work.**
- **Should coated surface be scratched or otherwise damaged, be sure to repair damaged part, or corrosion may start from there.**

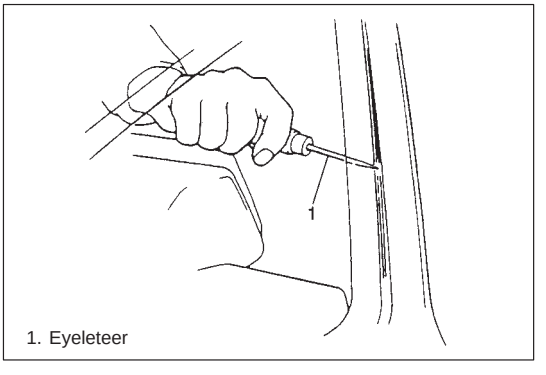
Use an adhesive of above mentioned type which has the following property.

Shearing strength: 40 kg/cm^2 (569 lb/in^2) or more

Adhesive materials and tools required for removal and installation.
- ○ One component urethane adhesive and primers used in combination (For one sheet of windshield).
  Adhesive (600 g (21.2 oz.))
  Primer for glass (20 g (0.7 oz.))
  Primer for body (20 g (0.7 oz.))
  Primer for urethane (molding) (20 g (0.70 oz.))
- ○ Eyeleteer
- ○ Piano string
- ○ Brush for primer application (3 pcs)
- ○ Knife
- ○ Rubber sucker grip
- ○ Sealant gun (for filling adhesive)
- ○ Putty spatula (for correcting adhered parts)

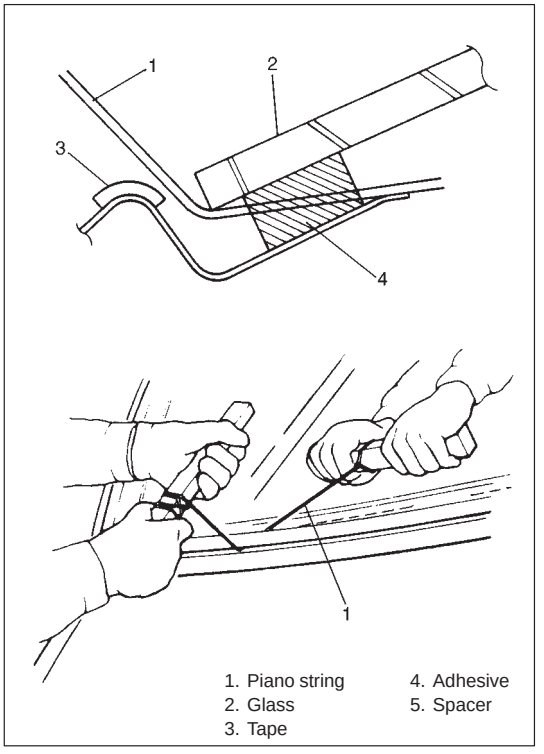
REMOVAL

1) Clean both inside and outside of glass and around it.
2) Remove wiper arms, garnish and spacers.
3) Remove roof molding and windshield upper molding.
4) Using tape, cover body surface around glass to prevent any damage.
5) Remove rear view mirror, sunvisor, and front pillar trims (right and left).
6) Remove instrument panel referring to “INSTRUMENT PANEL” in this section.
7) Remove roof lining referring to “ROOF LINING” in this section.



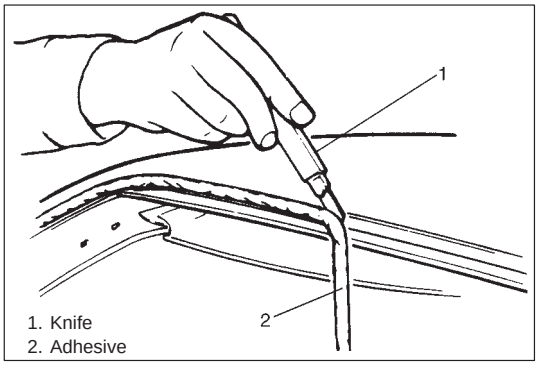
1. Eyeleteer

8) Drill hole with eyeleteer through adhesive and let piano string through it.



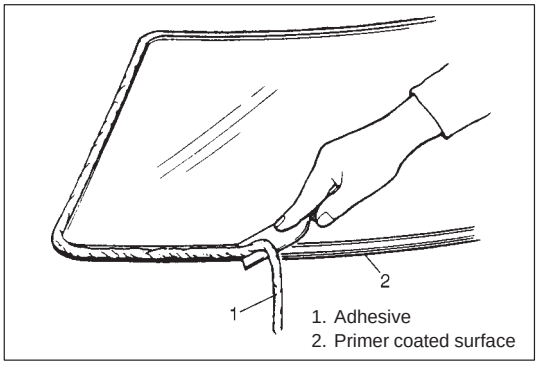
9) Cut adhesive all around glass with piano string.

NOTE:
Use piano string as close to glass as possible so as to prevent damage to body.

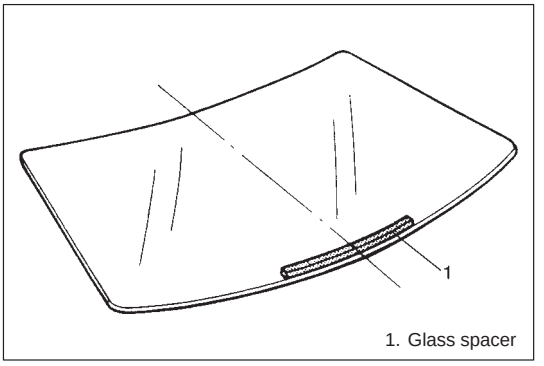


10) Using knife, smooth adhesive remaining on body side so that it is 1 – 2 mm (0.039 – 0.079 in.) thick all around.

NOTE:
Before using knife, clean it with alcohol or the like to remove oil from it.



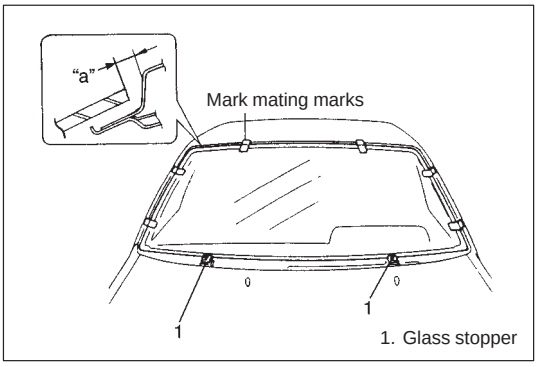
11) When re-using glass, remove adhesive from glass leaving 2 – 3 mm (0.08 – 0.12 in.) thickness. Use care not to damage primer coated surface.



1. Glass spacer

INSTALLATION

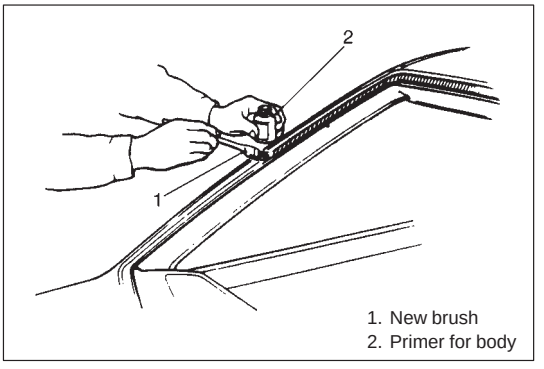
1) Using cleaning solvent, clean window frame (body) where glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Install spacers (2 pcs) to lower side of window frame (body).
3) Peel paper from one side of new glass spacer and attach that lower side to windshield glass.



1. Glass stopper

4) To determine installing position of glass to body, position glass against body so that clearance between upper end of glass and body is about 6.5 mm (0.256 in.) and clearances between each side end (right & left) of glass and body are even. Then mark mating marks on glass and body as shown in figure. Upper clearance can be adjusted by moving stoppers position.

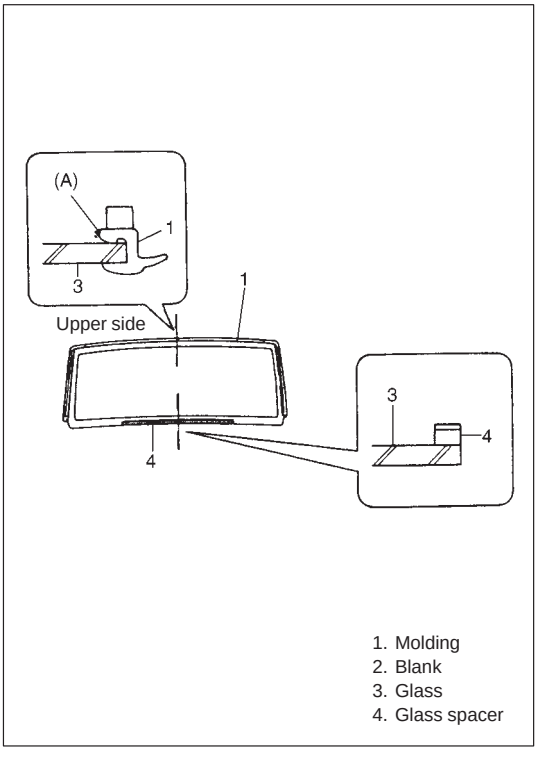
Clearance "a": 6.5 mm (0.256 in.)



1. New brush
2. Primer for body

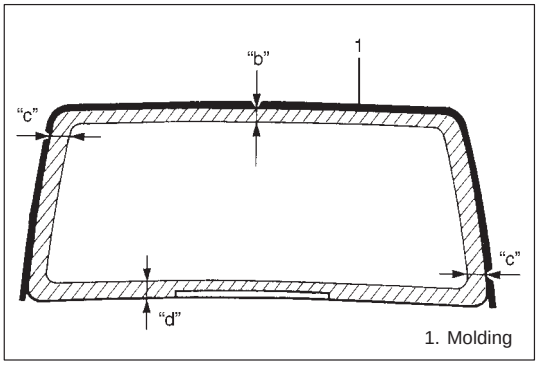
5) Using new brush, apply sufficient amount of primer for body along body surface where windshield glass is to be adhered.

NOTE:
Be sure to refer to maker's instruction for proper handling and drying time.



1. Molding
2. Blank
3. Glass
4. Glass spacer

6) Install upper molding to glass. Warming molding for over half an hour at 35 °C (95 °F) temperature will facilitate work.
7) Clean glass surface to be adhered to body with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.
8) Clean molding surface (A) with clean cloth as shown.

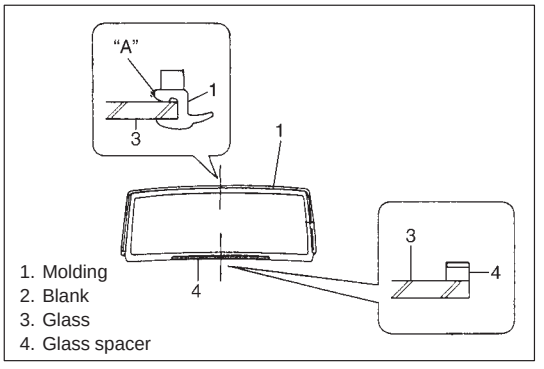


1. Molding

9) Using new brush, apply sufficient amount of primer for glass along glass surface to be adhered to body.

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

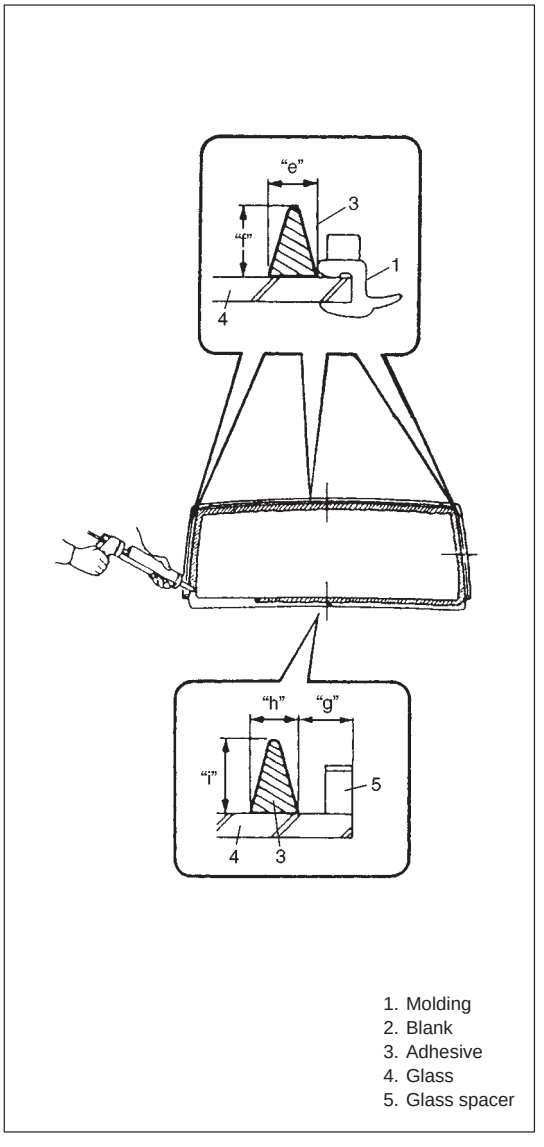
Width "b": Approximately 15 mm (0.59 in.)
"c": Approximately 13 mm (0.51 in.)
"d": Approximately 27 mm (1.06 in.)



1. Molding
2. Blank
3. Glass
4. Glass spacer

10) Using new brush, apply sufficient amount of primer for molding (Urethane) to surface "A" as shown in figure.

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**



1. Molding
2. Blank
3. Adhesive
4. Glass
5. Glass spacer

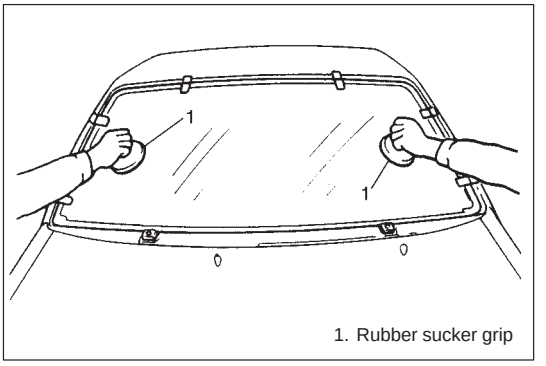
11) Apply adhesive referring to figure.

NOTE:
- **Start from bottom side of glass.**
- **Be careful not to damage primer.**
- **Height of adhesive applied to lower side should be higher than that of other three sides.**

Upper, right and left sides
Width "e" : Approximately 11 mm (0.43 in.)
Height "f" : Approximately 17 mm (0.67 in.)

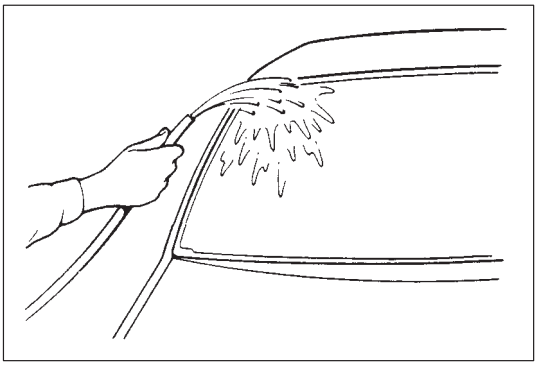
Lower side
Distance "g" : Approximately 11 mm (0.43 in.)
Width "h" : Approximately 12 mm (0.47 in.)
Height "i" : Approximately 24 mm (0.94 in.)

- **Press glass against body quickly after adhesive is applied.**
- **Use of rubber sucker grip is helpful to hold and carry glass after adhesive is applied.**



1. Rubber sucker grip

12) Peel remaining paper from molding and dam.
13) Holding rubber sucker grips, place glass onto body by aligning mating marks marked in step 5) and press it.
14) Attach roof molding.



15) Check for water leakage by running water from hose over window. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

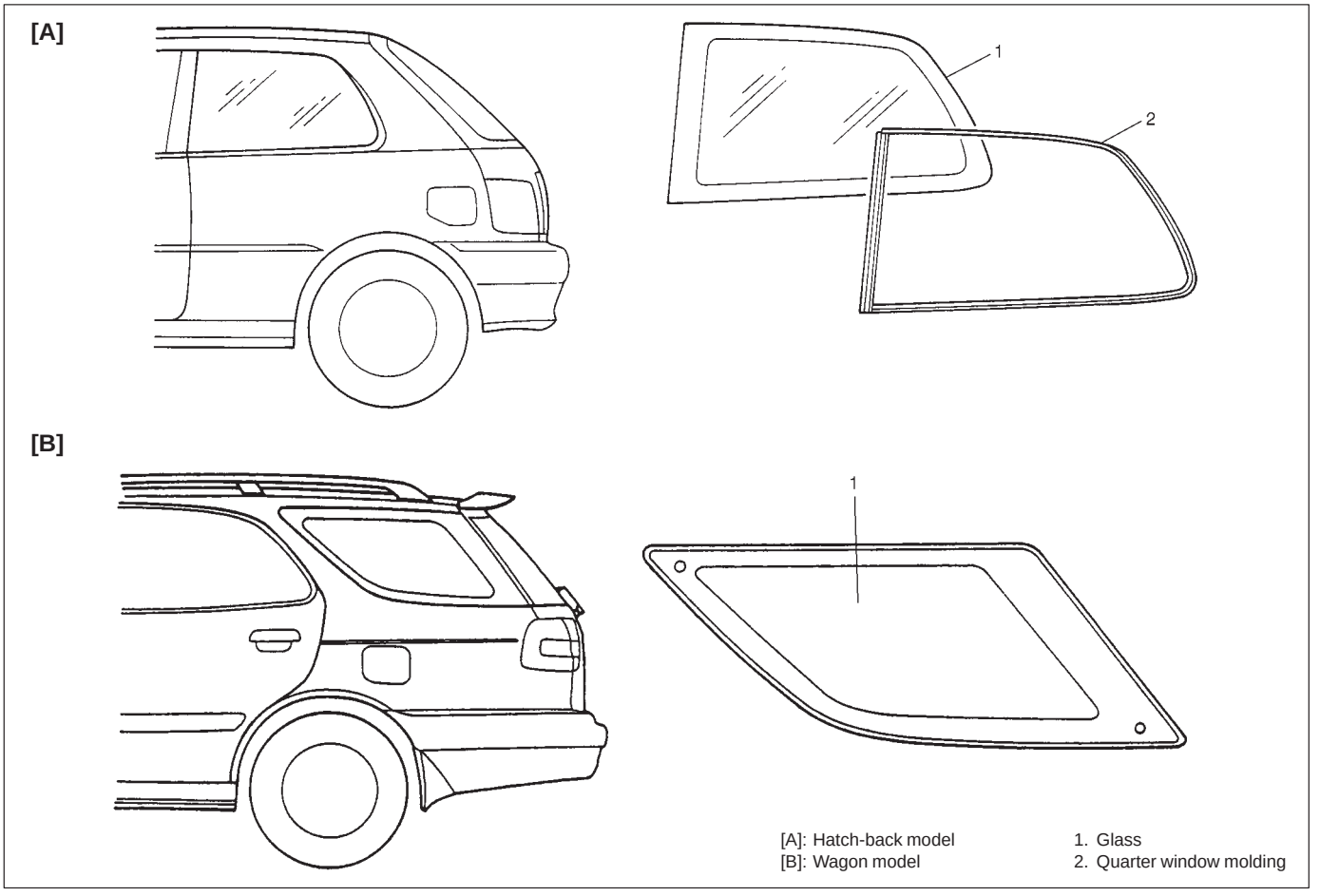
NOTE:
- **Do not use high pressure water.**
- **Do not blow compressed air directly at adhesive applied part when drying.**
- **Do not use infrared lamp or the like for drying.**

CAUTION:
Upon completion of installation, note the following.
- **Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.**
- **If molding is not securely in place, hold it down with a tape until adhesive is completely set.**
- **Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.**
- **Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.**

16) Install rear view mirror, roof molding, front pillar trims, sunvisor, air ventilator garnish and wipers.

REAR QUARTER WINDOW (For Hatch-back and Wagon Models)

The rear quarter window is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For window glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.



[A]: Hatch-back model
[B]: Wagon model

1. Glass
2. Quarter window molding

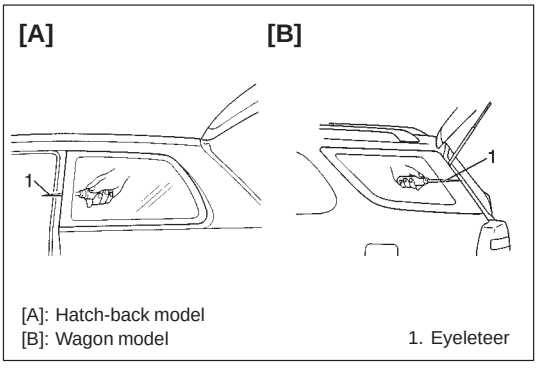
CAUTION:
Described here is the glass replacement by using one component urethane adhesive to be used with primer in combination. Each adhesive has its own drying and setting time and must be handled and used in a certain specific procedure. Negligence in following such procedure or misuse of the adhesive in any way hinders its inherent adhesive property. Therefore, before the work, make sure to read carefully the instruction and description given by the maker of the adhesive to be used and be sure to follow the procedure and observe each precaution throughout the work.

Use an adhesive of above mentioned type which has the following property.

Separating strength (Peeling): 15 – 20 kg/10 mm (width) or more (83.8 – 112 lb/in. (width))
Shearing strength: 30 kg/cm^2 (427 lb/in^2) or more (For hatch-back model)
40 kg/cm^2 (569 lb/in^2) or more (For Wagon model)

Adhesive materials and tools required for removal and installation.

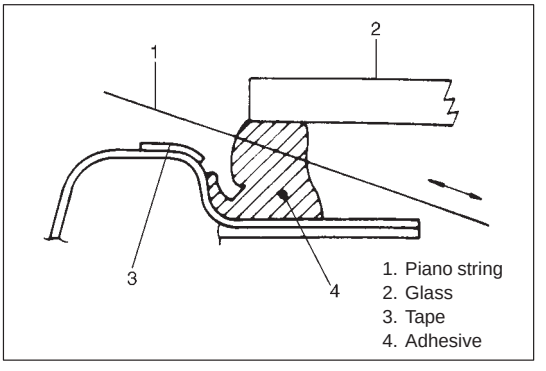
- One component urethane adhesive and primers used in combination (For one sheet of window glass).
  Adhesive (120 g (4.3 oz.) for hatch-back model)
  (220g (7.8 oz.) for Wagon model)
  Primer for glass (20 g (0.7 oz.))
  Primer for body (20 g (0.7 oz.))
  Primer for urethane (molding) (20 g (0.7 oz.) for hatch-back model)
- Eyeleteer
- Piano string
- Brush for primer application (3 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)



[A]: Hatch-back model
[B]: Wagon model
1. Eyeleteer

REMOVAL

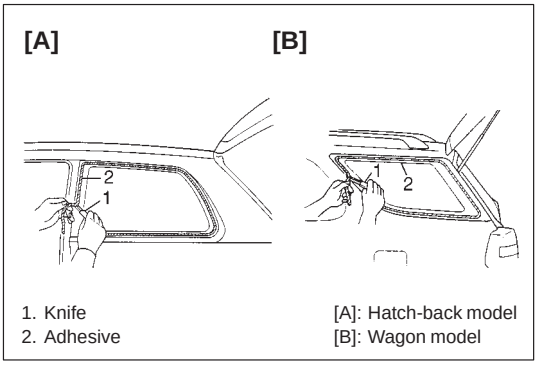
1) Cut molding all around quarter glass with knife.
2) Using a tape, cover body surface around quarter window glass to prevent any damage.
3) Remove quarter window trim.
4) Drill a hole with an eyeleteer through adhesive and let a piano string through it.



1. Piano string
2. Glass
3. Tape
4. Adhesive

5) Cut adhesive all around quarter glass with piano string.

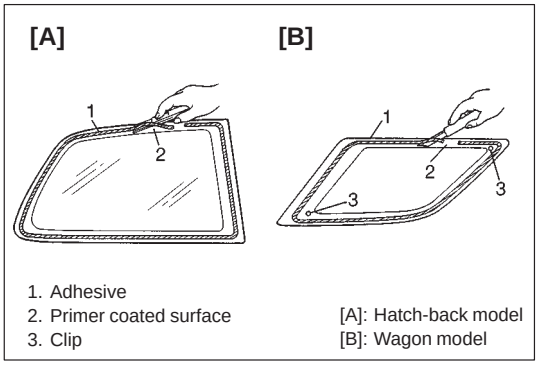
NOTE:
Use piano string as close to glass as possible so as to prevent damage to body.



1. Knife
2. Adhesive

[A]: Hatch-back model
[B]: Wagon model

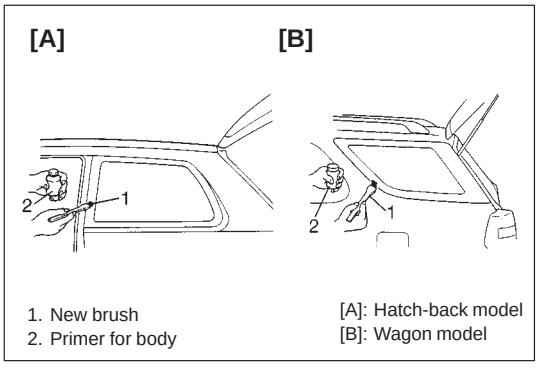
6) Using a knife, smooth adhesive remaining on body side so that it is 2 – 3 mm thick all around.
7) Where adhesive dam will be attached, remove adhesive until painted surface is exposed and clean.



1. Adhesive
2. Primer coated surface
3. Clip

[A]: Hatch-back model
[B]: Wagon model

8) When re-using glass, remove adhesive from glass, using care not to damage primer coated surface.



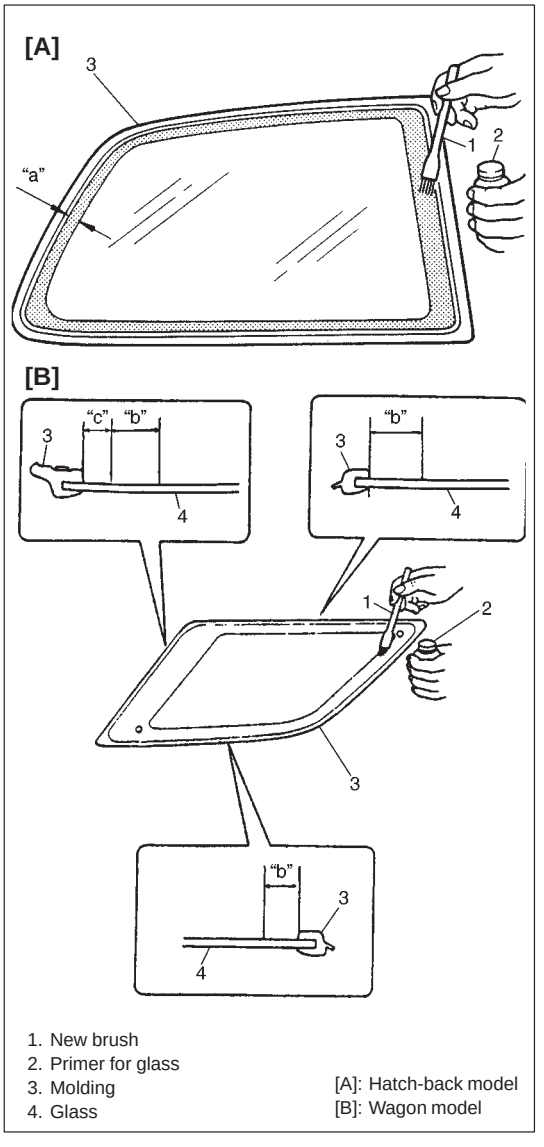
1. New brush
2. Primer for body

[A]: Hatch-back model
[B]: Wagon model

INSTALLATION

1) Using cleaning solvent, clean window opening edge where window glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Using a new brush, apply sufficient amount of primer for body along body surface where window is to be adhered.

NOTE:
Be sure to refer to maker's instruction for proper handling and drying time.



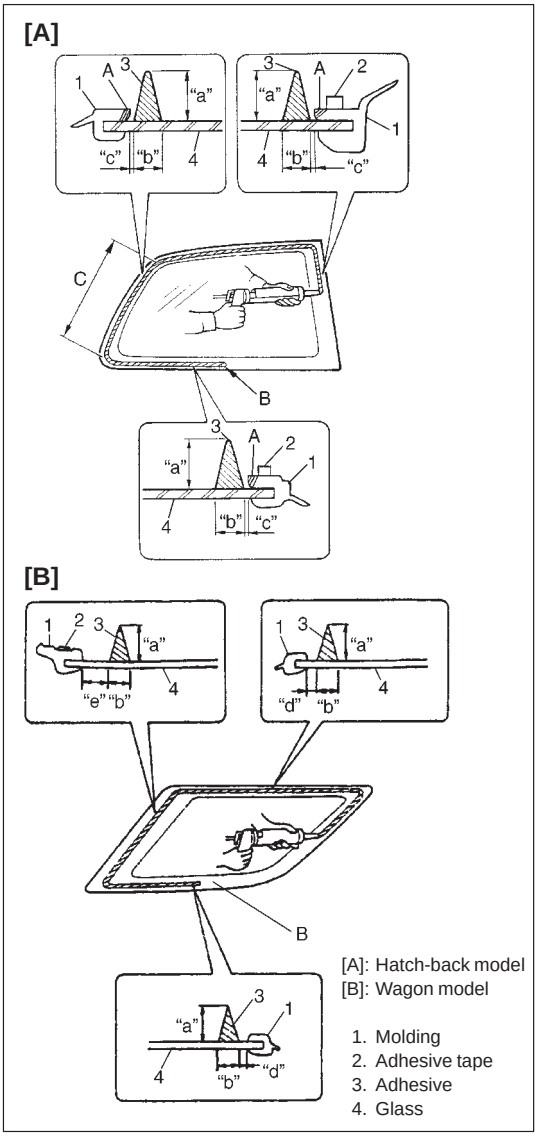
1. New brush
2. Primer for glass
3. Molding
4. Glass

[A]: Hatch-back model
[B]: Wagon model

3) Clean glass surface to be adhered to window with clean cloth. If unleaded gasoline is used, let it dry for more than 10 minutes.
4) Attach glass into new molding. (For hatch-back model)
5) Clean molding surface "A" with clean cloth.
Refer to figure on Step 7).
6) Using a new brush, apply sufficient amount of primer for glass along glass surface to be adhered to window.

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

Width "a": Approximately 18 mm (0.7 in.)
"b": Approximately 16 mm (0.63 in.)
"c": Approximately 7 mm (0.28 in.)



[A]: Hatch-back model
[B]: Wagon model

1. Molding
2. Adhesive tape
3. Adhesive
4. Glass

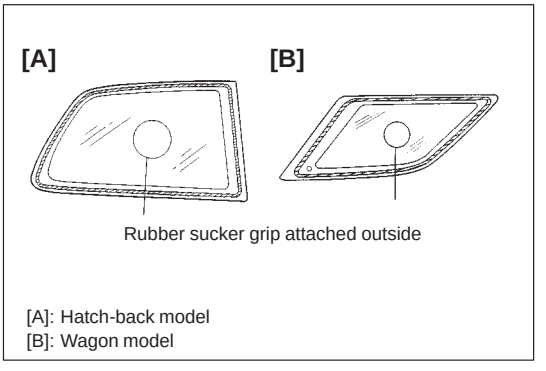
7) Using new brush, apply sufficient amount of primer for molding (urethane) to surface "A" as shown in figure.
8) Apply adhesive as shown.

NOTE:

- **Start from bottom side "B" of glass.**
- **As for rear side "C" of glass, apply adhesive so that shape of the adhesive applied part matches shape of primer coated part of body (as in step 2)).**

Height "a" : Approximately 16 mm (0.63 in.)
Width "b" : Approximately 9 mm (0.35 in.)
Width "c" : Approximately 2 mm (0.08 in.)
Width "d" : Approximately 3.5 mm (0.14 in.)
Width "e" : Approximately 9.5 mm (0.37 in.)

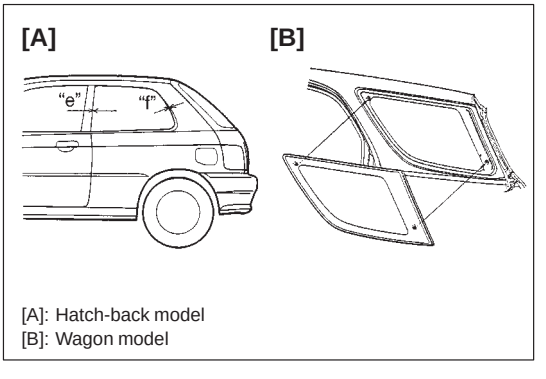
9) Peel remaining paper from molding.



Rubber sucker grip attached outside

[A]: Hatch-back model
[B]: Wagon model

10) Attach rubber sucker grip to outside of glass.
Use of a rubber sucker grip is helpful to hold and carry glass after adhesive is applied.

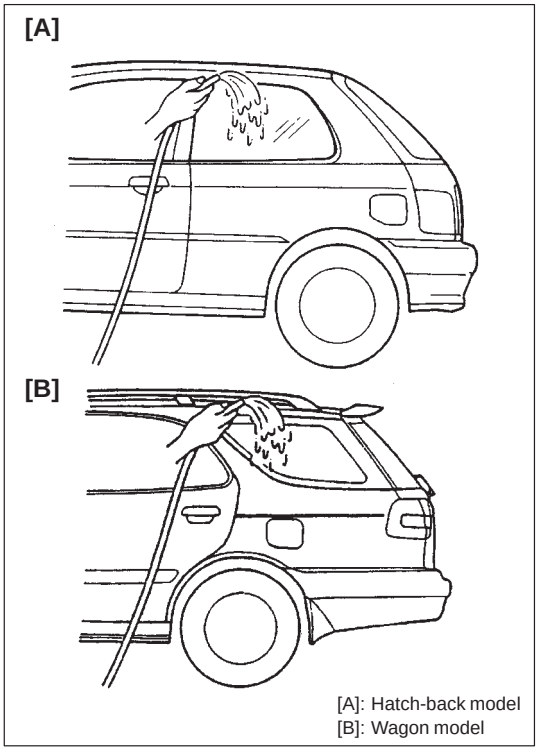


[A]: Hatch-back model
[B]: Wagon model

11) **For Hatch-back model:**
Press glass against body so that clearance "e" and "f" as shown below.

Clearance:"e": approximately 4.6 mm (0.20 in.)
Clearance:"f" : approximately 5.5 mm (0.25 in.)

For Wagon model:
Press glass against body so that clip hole in body matches with clip position on glass.



[A]: Hatch-back model
[B]: Wagon model

12) Check for water leakage by running water from hose over window. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

NOTE:

- **Do not use high pressure water.**
- **Do not blow compressed air directly at adhesive applied part when drying.**
- **Do not use an infrared lamp or the like for drying.**

CAUTION:

Upon completion of installation, note the following.

- **Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.**
- **Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.**
- **Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.**

BACK WINDOW (For Sedan Model)

Back window glass is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For back window glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.

CAUTION:
- **Described here is the glass replacement by using one component urethane adhesive to be used with primer in combination. Each adhesive has its own drying and setting time and must be handled and used in a certain specific procedure. Negligence in the following such procedure or misuse of the adhesive in any way hinders its inherent adhesive property. Therefore, before the work, make sure to read carefully the instruction and description given by the maker of the adhesive to be used and be sure to follow the procedure and observe each precaution throughout the work.**
- **Should coated surface be scratched or otherwise damaged, be sure to repair damaged part, or corrosion may start from there.**

Use an adhesive of above mentioned type which has the following property.

Shearing strength: 40 kg/cm^2 (569 lb/in^2) or more

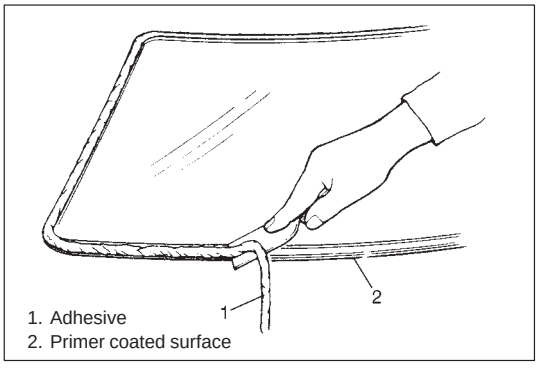
Adhesive materials and tools required for removal and installation.
- One component urethane adhesive and primers used in combination (For one sheet of window glass).
  Adhesive (260 g (9.2 oz.))
  Primer for glass (20 g (0.7 oz.))
  Primer for body (20 g (0.7 oz.))
  Primer for urethane (molding) (20 g (0.7 oz.))
- Eyeleteer
- Piano string
- Brush for primer application (3 pcs.)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

NOTE:
Wear gloves when removing and installing glass.
Use care not to cause damage to heating wire for defroster (if equipped).

REMOVAL

1) Clean both inside and outside of glass and around it.
2) Remove lower molding and roof molding.
3) Remove upper molding by cutting with knife.
4) Using tape, cover body surface around back window glass to prevent any damage.
5) Remove high mounted stop lamp, then remove rear seat-belt anchor bolt, rear pillar inner trim and partition trim.
6) Drill hole with eyeleteer through adhesive and let piano string through it.
7) Cut adhesive all around glass with piano string referring to "WINDSHIELD" in this section.

NOTE:
Use piano string as close to glass as possible so as to prevent damage to body.

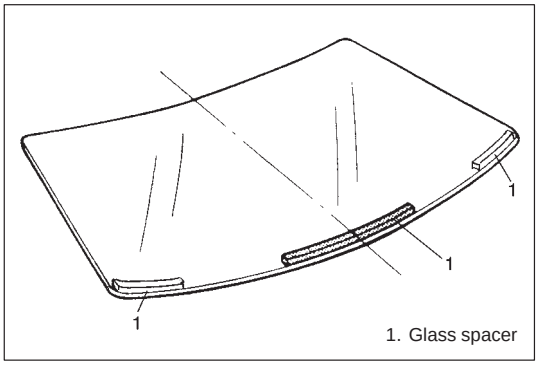


1. Adhesive
2. Primer coated surface

8) Using knife, smooth adhesive remaining on body side so that it is 1 – 2 mm (0.039 – 0.079 in.) thick all around.

NOTE:
Before using knife, clean it with alcohol or the like to remove oil from it.

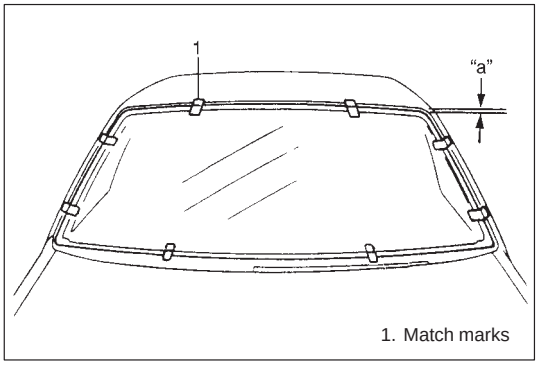
9) When re-using glass, remove adhesive from glass leaving 2 – 3 mm (0.08 – 0.12 in.) in thickness. Use care not to damage primer coated surface.



1. Glass spacer

INSTALLATION

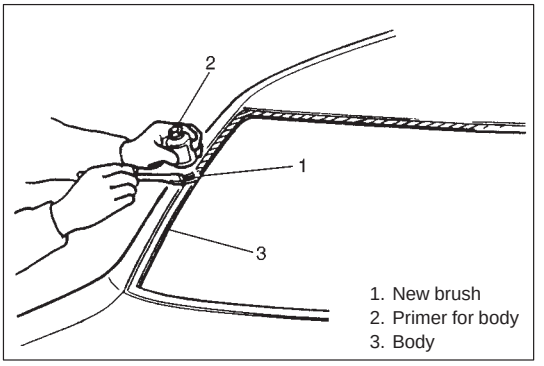
1) Using cleaning solvent, clean window edge where window glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Peel paper from one side of new glass spacers and attach that lower side to windshield glass.
3) Install new back window upper molding to glass. (Don't peel off paper of molding at this stage). Warming moldings for over half an hour at 35 °C (95 °F) temperature will facilitate work.



1. Match marks

4) To determine installing position of glass to body, position glass against body so that clearance between upper end to glass and body is specified value below and clearances between each side end (right & left) of glass and body are even. Then mark matchmarks on glass and body as shown.

Clearance "a": Approximately 6.6 mm (0.26 in.)

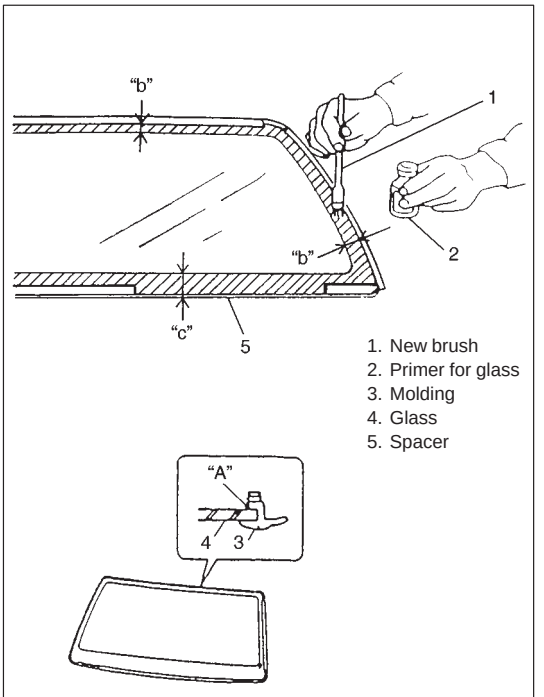


1. New brush
2. Primer for body
3. Body

5) Using new brush, apply sufficient amount of primer for body along body surface where window is to be adhered.

NOTE:
Be sure to refer to maker's instruction for proper handling and drying time.

6) Clean glass surface to be adhered to window with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.



1. New brush
2. Primer for glass
3. Molding
4. Glass
5. Spacer

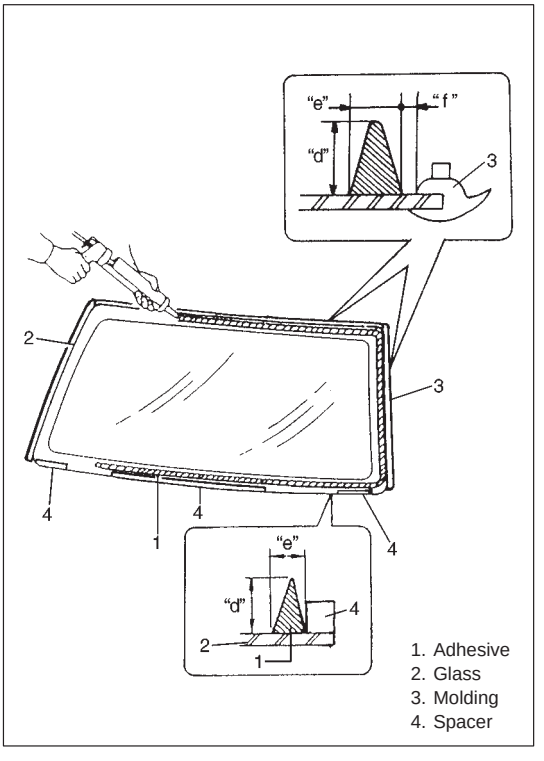
7) Clean molding surface "A" with clean cloth. (Refer to figure.)
8) Using new brush, apply sufficient amount of primer for glass along glass surface to be adhered to window.

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

Clearance "b": Approximately 13 mm (0.50 in.)
"c": Approximately 16 mm (0.60 in.)

9) Using new brush, apply sufficient amount of primer for molding (Urethane) to surface "A" as shown in figure.

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

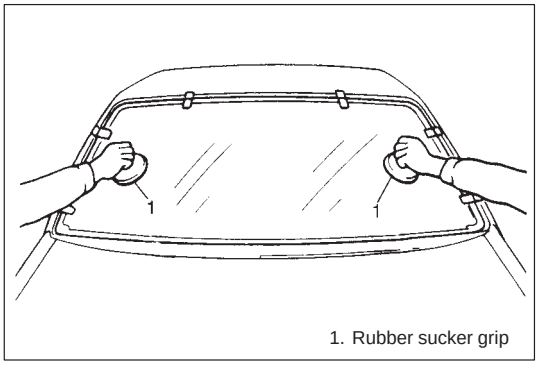


1. Adhesive
2. Glass
3. Molding
4. Spacer

10) Apply adhesive as shown left.

NOTE:
- **Start from bottom side of glass.**
- **Height of applied adhesive should exceed that of molding.**
- **Adhesive should be applied evenly especially in height.**
- **Be careful not to damage primer.**
- **Press glass against body quickly after adhesive is applied.**
- **Use of rubber sucker grips is helpful to hold and carry glass after adhesive is applied.**

Height "d" : Approximately 14 mm (0.55 in.)
Width "e" : Approximately 7 mm (0.28 in.)
Dimension "f" : Approximately 2 mm (0.08 in.)



1. Rubber sucker grip

11) Peel paper from moldings.
12) Holding rubber sucker grips, place glass onto body by aligning mating matchmarks in Step 4) and press it.
13) Remove matchmarks.
14) Install new back window lower moldings.
15) Check for water leakage by pouring water over window through a hose. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

NOTE:
- **Do not use high pressure water.**
- **Do not blow compressed air directly at adhesive applied part when drying.**
- **Do not use an infrared lamp or the like for drying.**

CAUTION:
Upon completion of installation, note the following.
- **Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.**
- **If molding is not securely in place, hold it down with a tape until adhesive is completely set.**
- **Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.**
- **Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.**

BACK DOOR GLASS (For Hatch-back and Wagon Models)

Back door glass is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For back door glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.

CAUTION:
Described here is the glass replacement by using one component urethane adhesive to be used with primer in combination. Each adhesive has its own drying and setting time and must be handled and used in a certain specific procedure. Negligence in the following such procedure or misuse of the adhesive in any way hinders its inherent adhesive property. Therefore, before the work, make sure to read carefully the instruction and description given by the maker of the adhesive to be used and be sure to follow the procedure and observe each precaution throughout the work.

Use an adhesive of above mentioned type which has the following property.

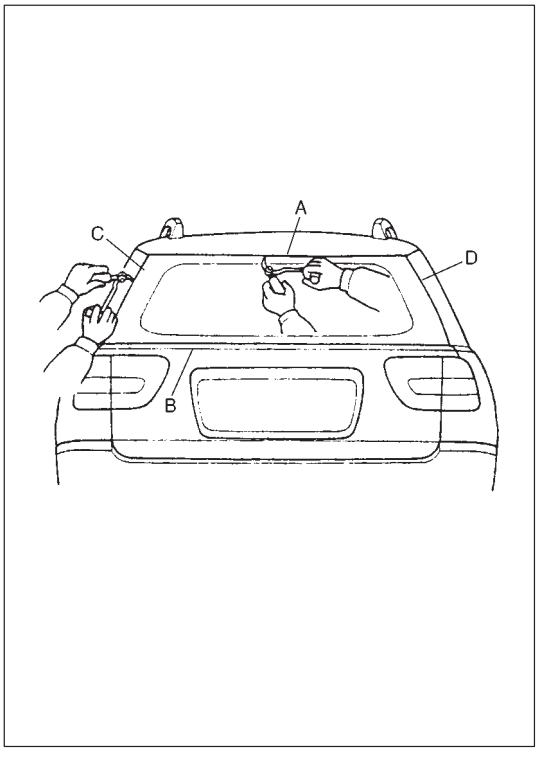
Shearing strength: 40 kg/cm^2 (569 lb/in^2) or more

Adhesive materials and tools required for removal and installation.

- One component urethane adhesive and primers used incombination (For one sheet of window glass).
- Adhesive (250 g (8.8 oz.))
- Primer for glass (20 g (0.7 oz.))
- Primer for body (20 g (0.7 oz.))
- Primer for urethane (molding) (20 g (0.70 oz.))
- Eyeleteer
- Piano string
- Brush for primer application (3 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

REMOVAL

1) Clean both inside and outside of glass and around it.
2) Remove wiper arm.
3) Remove molding by cutting with knife. (For hatch-back model)
4) Using tape, cover body surface around back door glass to prevent any damage.
5) Remove back door trim, rear wiper motor assembly (for hatch-back model), defogger coupler and high mounted stop lamp.

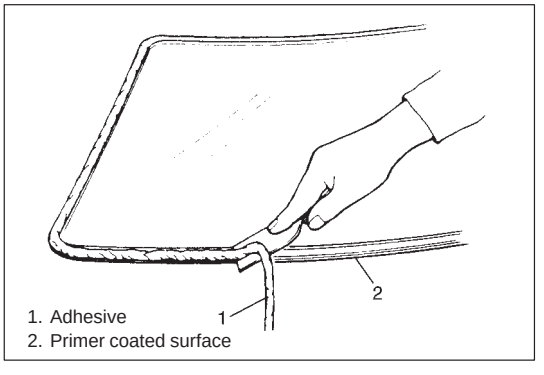


6) For hatch-back model: Remove back door window trim, and drill hole with eyeleteer through adhesive and let piano string through it.
7) For hatch-back model: Cut adhesive all round glass with piano string (refer to windshield section).

NOTE:
Use piano string as close to glass as possible so as to prevent damage to body.

For Wagon model:
Cut adhesive by using a windshield removing knife or the like.

CAUTION:
- **To prevent body from being scratched, cut as closely to glass as possible.**
- **Cut adhesive of "A" and "B" from inside of glass and "C" and "D" from outside of glass.**
- **As adhesive of "B" has a positioning pin at its center, avoid it when cutting adhesive.**
- **Avoid dam rubber when cutting adhesive of "C" and "D".**



1. Adhesive
2. Primer coated surface

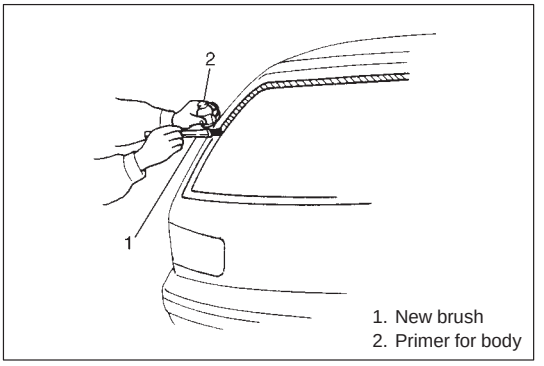
8) Using knife, smooth adhesive remaining on body side so that it is 1 – 2 mm (0.039 – 0.079 in.) thick all around.

NOTE:
Before using knife, clean it with alcohol or the like to remove oil from it.

9) When re-using glass, remove adhesive from glass, using care not to damage primer coated surface.

INSTALLATION

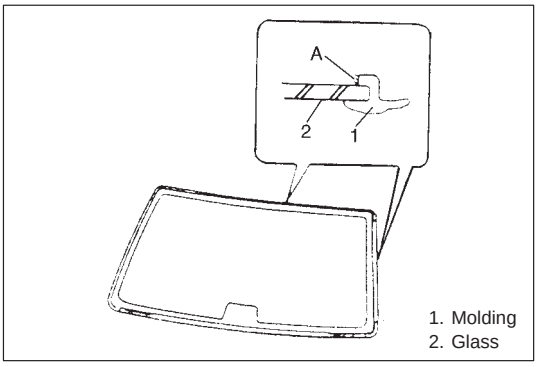
1) Using cleaning solvent, clean window edge where window glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Install new back door window trim to window (Don't peel off paper of trim at this stage).



1. New brush
2. Primer for body

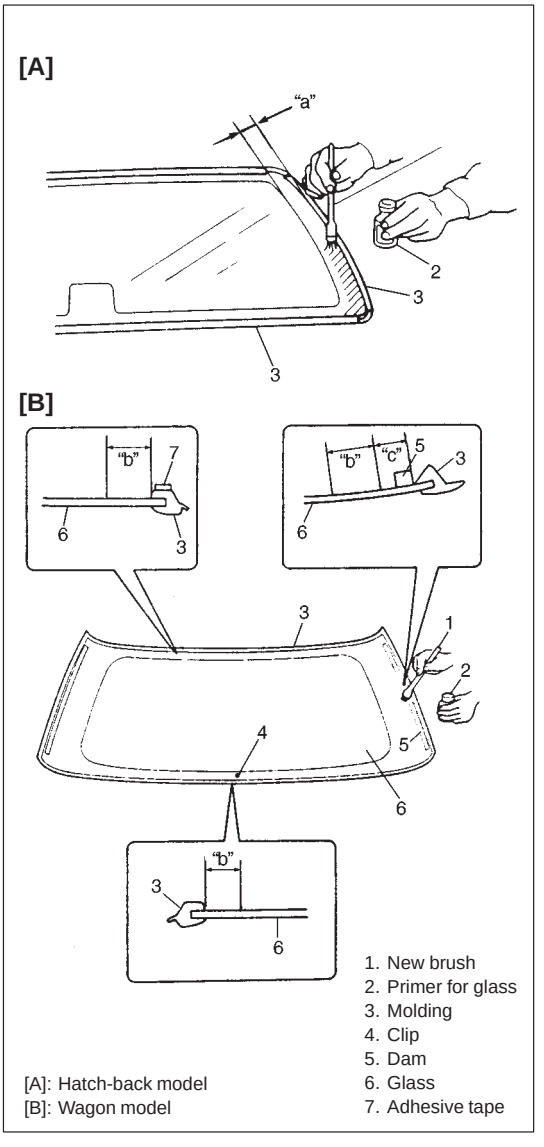
3) Using new brush, apply sufficient amount of primer for body along body surface where window is to be adhered.

NOTE:
Be sure to refer to maker's instruction for proper handling and drying time.



1. Molding
2. Glass

4) Clean glass surface to be adhered to window with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.
5) Install moldings to glass (Don't peel off paper of molding at this stage). Warming moldings for over half an hour at 35 °C (95 °F) temperature will facilitate work.(For hatch-back model)
6) Clean molding surface A with clean cloth. (Refer to left figure.) (For hatch-back model)



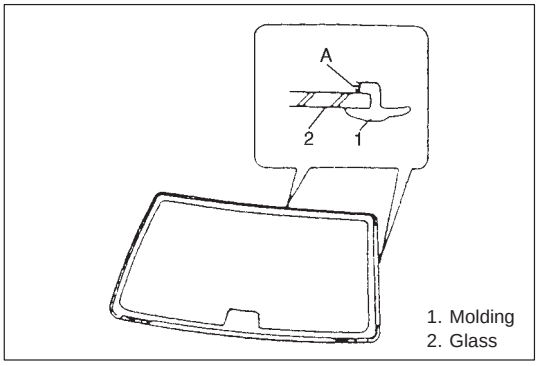
1. New brush
2. Primer for glass
3. Molding
4. Clip
5. Dam
6. Glass
7. Adhesive tape

[A]: Hatch-back model
[B]: Wagon model

7) Using new brush, apply sufficient amount of primer for glass along glass surface to be adhered to window.

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

Width "a": Approximately 13 mm (0.51 in.)
"b": Approximately 16 mm (0.63 in.)
"c": Approximately 14 mm (0.55 in.)



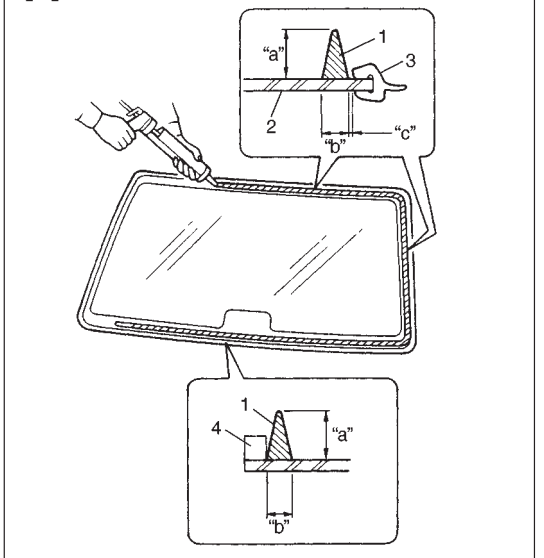
1. Molding
2. Glass

8) Using new brush, apply sufficient amount of primer for molding (Urethane) to surface A as shown in figure. (For hatch-back model)

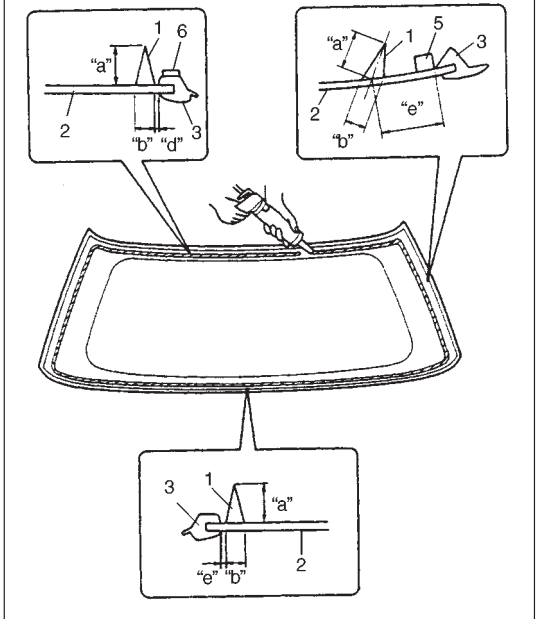
NOTE:

- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

[A]



[B]



1. Adhesive
2. Glass
3. Molding
4. Spacer
5. Dam
6. Adhesive tape

[A]: Hatch-back model
[B]: Wagon model

9) Apply adhesive along upper and lower molding as shown.

NOTE:

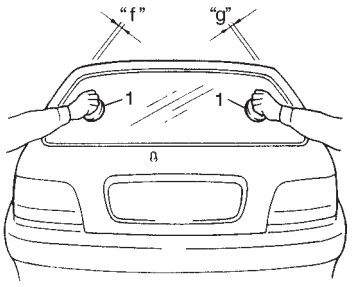
- **Start from bottom side of glass.**
- **Height of applied adhesive should exceed that of trim and molding.**
- **Adhesive should be applied evenly especially in height.**

Height "a" : Approximately 14 mm (0.55 in.)
Width "b" : Approximately 7 mm (0.28 in.)
Dimension "c" : Approximately 5 mm (0.20 in.)
: Approximately 3 mm (0.12 in.)
"d" : Approximately 1.5 mm (0.06 in.)
"e" : Approximately 22 mm (0.87 in.)

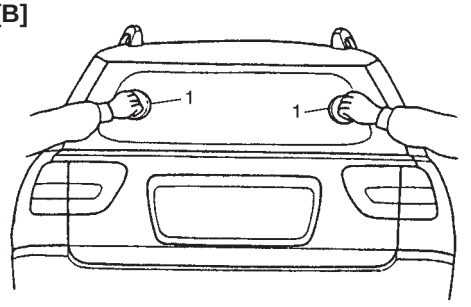
- **Be careful not to damage primer.**
- **Press glass against body quickly after adhesive is applied.**
- **Use of rubber sucker grips is helpful to hold and carry glass after adhesive is applied.**

10) Peel paper from moldings and window trim.

[A]



[B]



[A]: Hatch-back model
[B]: Wagon model
1. Rubber sucker grip

11) For hatch-back model:
Holding rubber sucker grips, press glass against door so that clearances "f" and "g" become even.

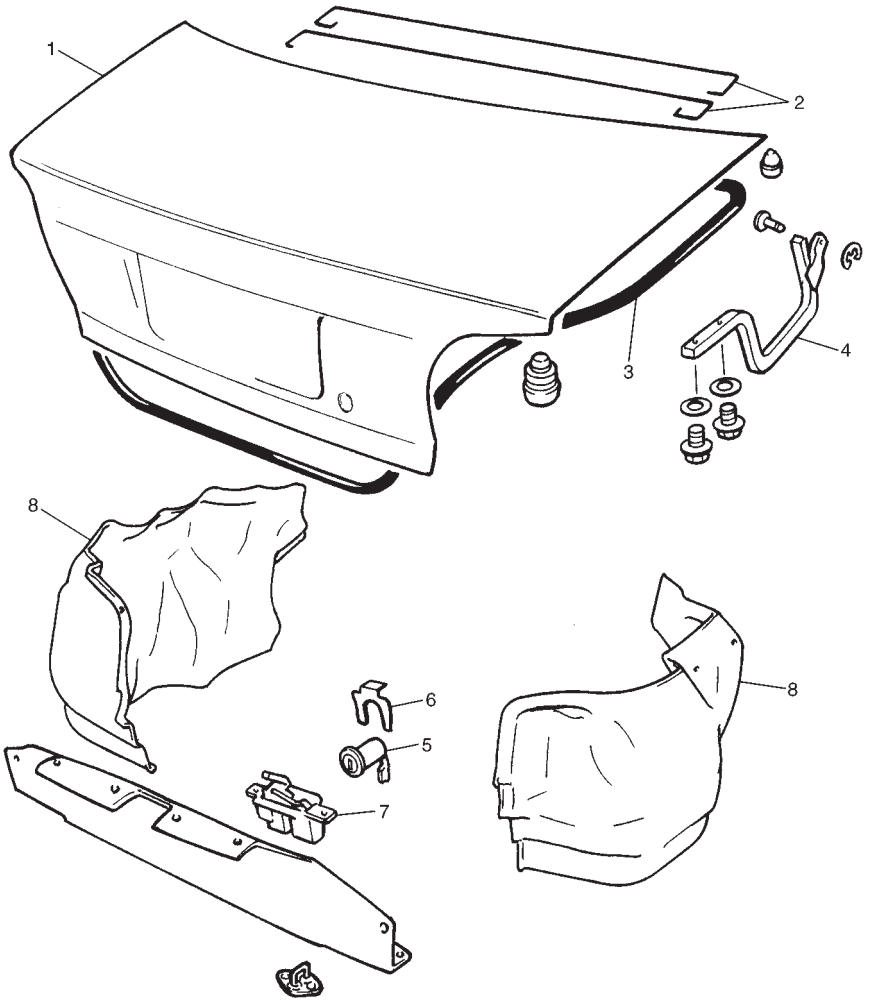
For wagon model:
Press glass against body so that clip hole in body matches with clip position on glass.

12) Check for water leakage by running water from hose over window. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

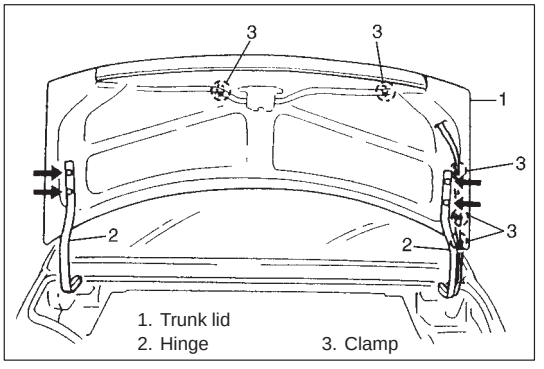
NOTE:
- **Do not use high pressure water.**
- **Do not blow compressed air directly at adhesive applied part when drying.**
- **Do not use an infrared lamp or the like for drying.**

CAUTION:
Upon completion of installation, note the following.
- **Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.**
- **If molding is not securely in place, hold it down with a tape until adhesive is completely set.**
- **Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.**
- **Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.**

TRUNK LID (For Sedan Model)



1. Trunk lid panel
2. Torsion bar
3. Weatherstrip
4. Hinge
5. Key cylinder
6. Retainer
7. Latch
8. Trunk room side trim

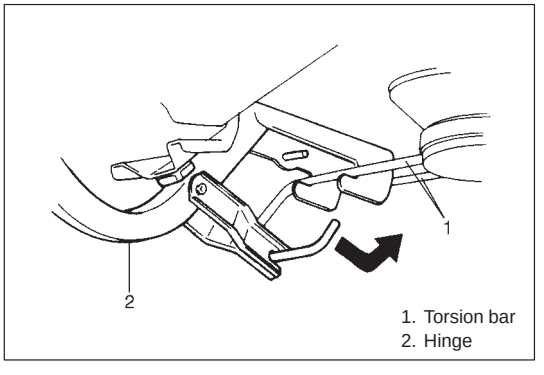


1. Trunk lid
2. Hinge
3. Clamp

REMOVAL

1) Remove trunk lid opener wire and trunk room harness from trunk lid panel.
2) Remove trunk lid attaching bolts, and trunk lid.

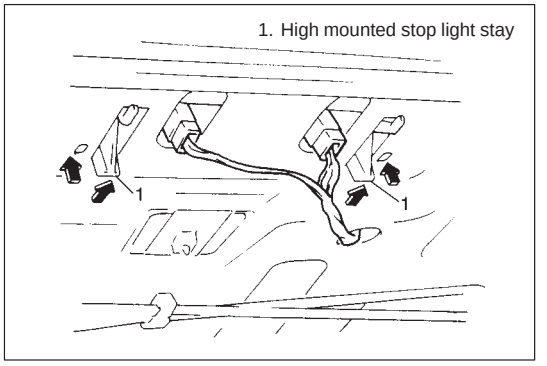
NOTE:
Handle removed trunk lid carefully. Dropping it can cause damage to itself and vehicle body.



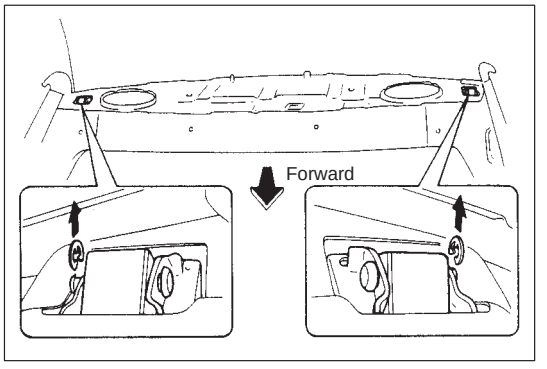
1. Torsion bar
2. Hinge

3) Remove torsion bars.

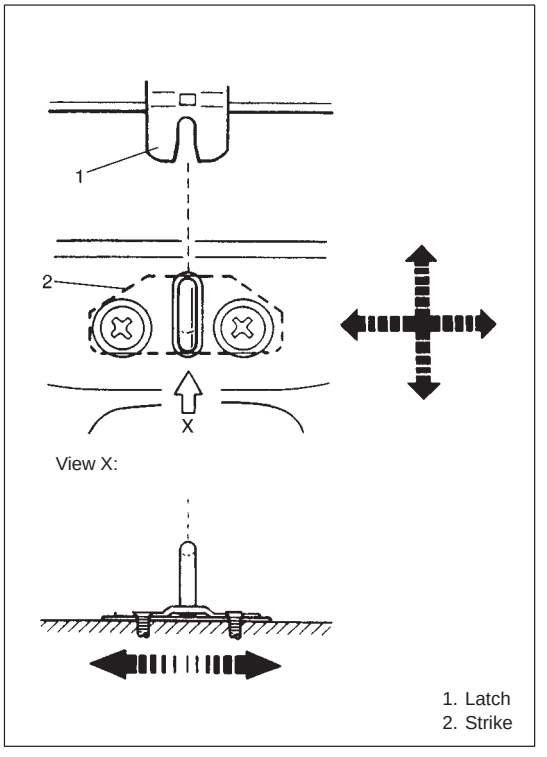
WARNING:
When removing torsion bar, be careful for its repulsion.



4) Fold rear seat back forward.
5) Remove high mounted stop light, then remove partition trim.



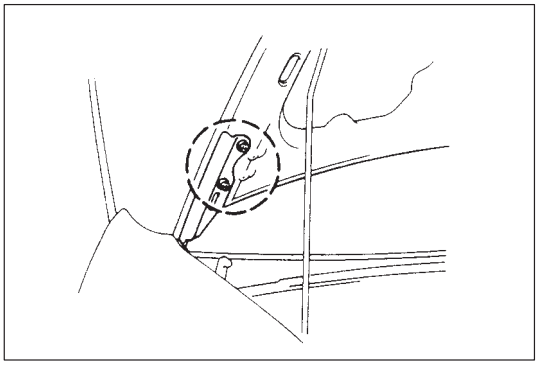
6) Remove hinge attaching pins and take out trunk lid hinges.



INSTALLATION

Reverse removal procedure for installation, and then noting the following instruction.

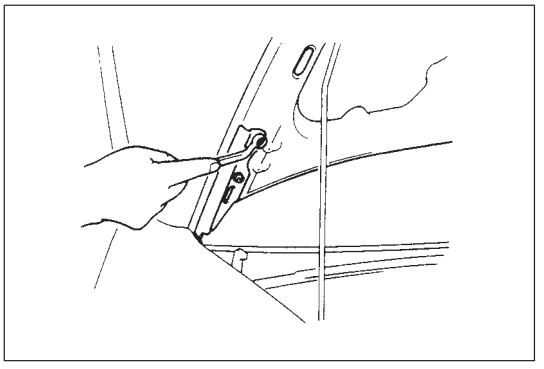
- Adjust trunk lid latch striker so that striker shaft approximately aligns with the center of groove of trunk lid latch.



HOOD

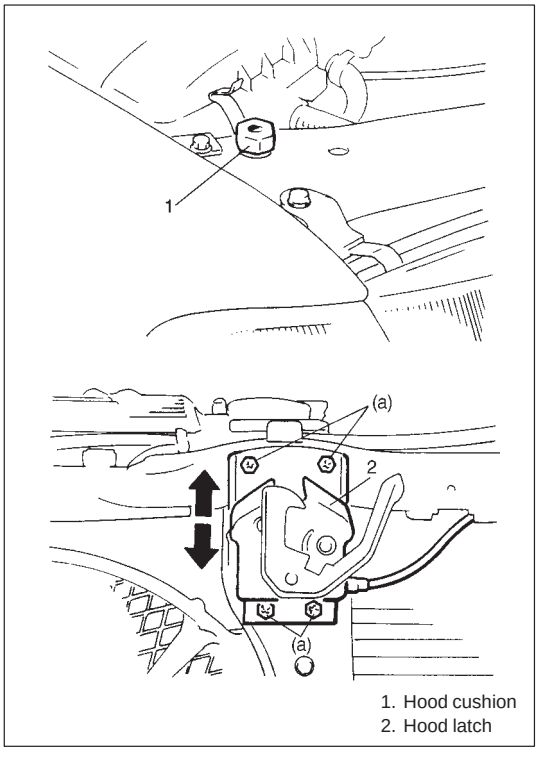
REMOVAL

Remove four mounting bolts to detach hood.



ADJUSTMENT

1) Fore-and-aft and right-and-left adjustment
   Slacken four mounting bolts for adjustment.



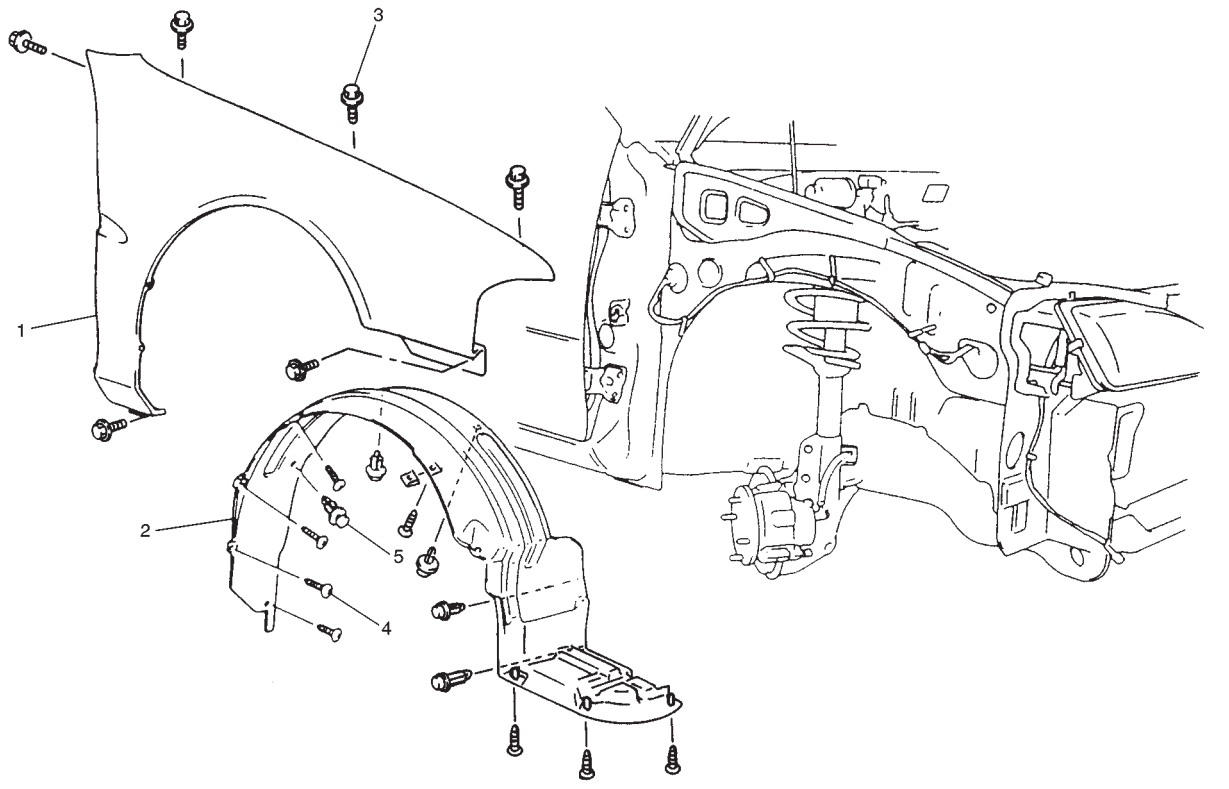
1. Hood cushion
2. Hood latch

2) Vertical adjustment
   If only one side (right or left) of hood is not level with front fender, make it level by tightening or loosening hood cushion.

> **WARNING:**
> **If hood latch does not work smoothly, lubricate it using care not to put oil onto hood latch mounting bolt.**

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

FRONT FENDER



1. Front fender
2. Front fender lining
3. Fender bolt
4. Lining screw
5. Lining fastener

REMOVAL

1) Remove front bumper assembly referring to “BUMPERS” in this section.
2) Remove front fender.

INSTALLATION

Reverse removal procedure for installation.

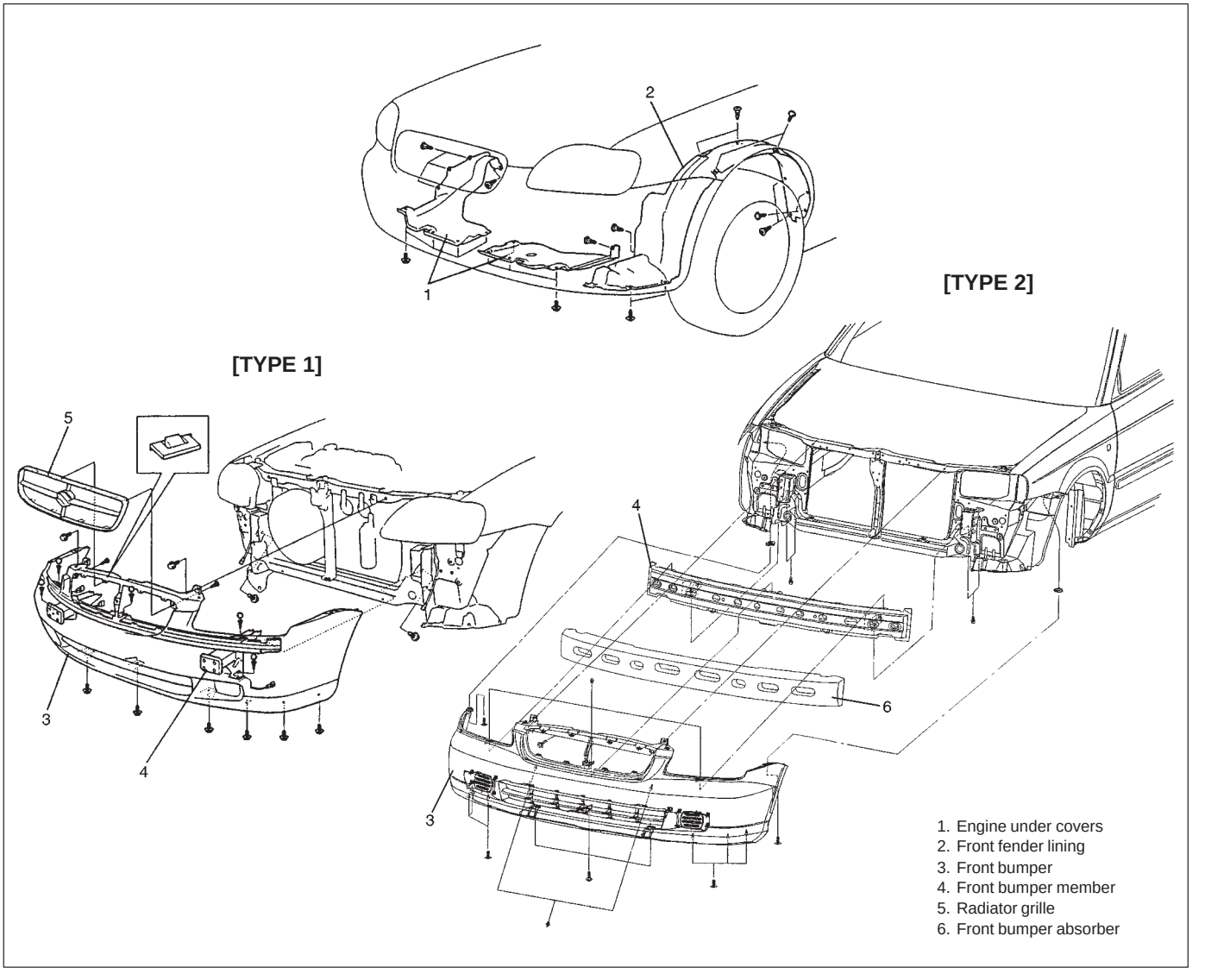
NOTE:

If paint on fender bolt is peeled off, be sure to apply paint again.

BUMPERS

NOTE:
Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.
Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

FRONT BUMPER



REMOVAL

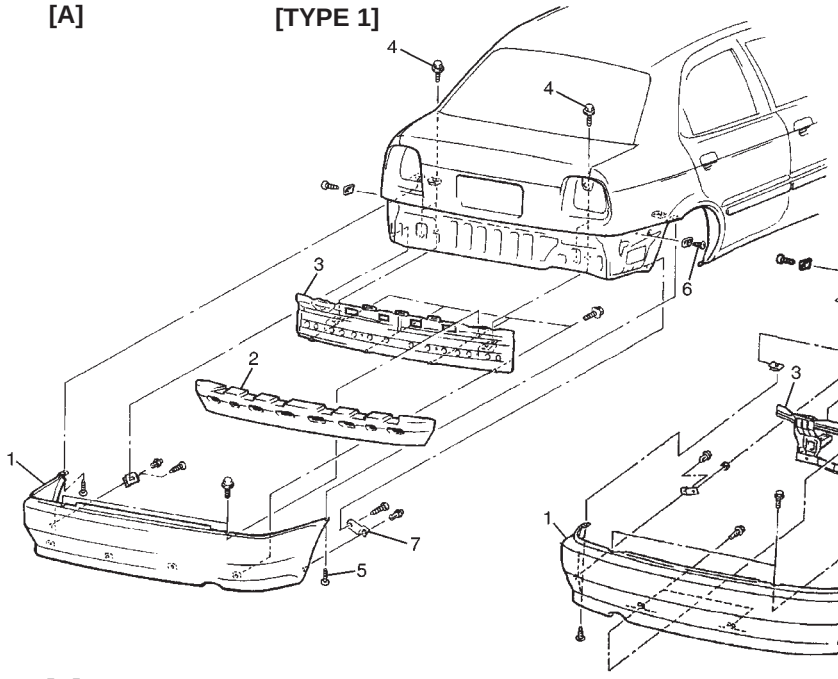
1) Remove engine under covers and front fender linings.
2) Remove front bumper together with bumper member.
3) Remove radiator grille as necessary.

INSTALLATION

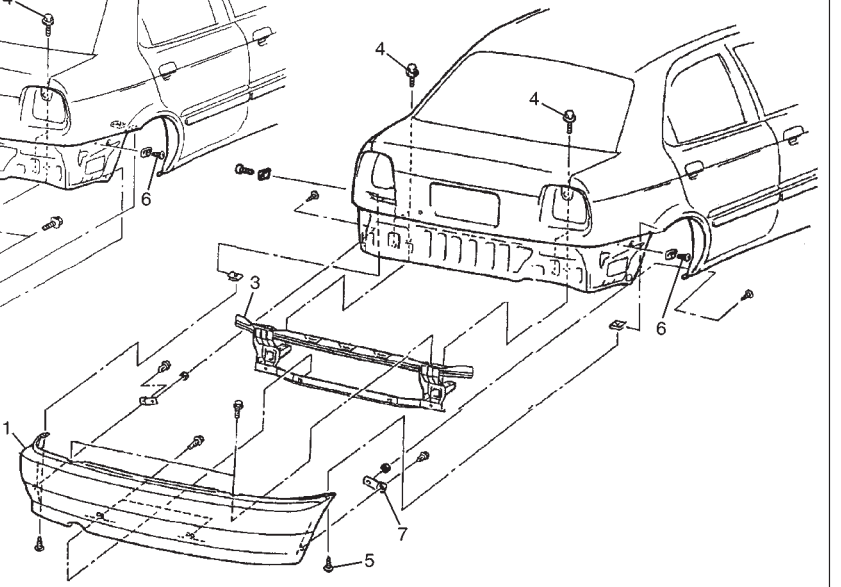
Reverse removal procedure for installation.

REAR BUMPER

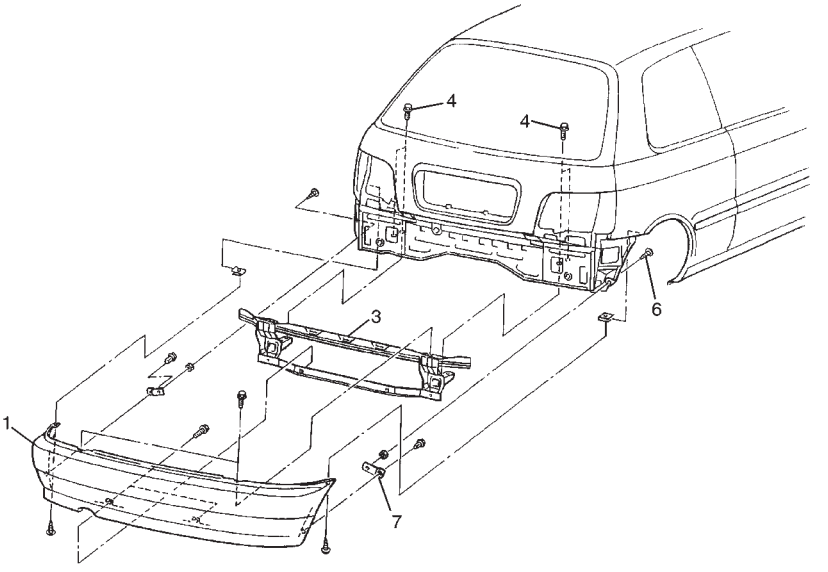
[A] [TYPE 1]



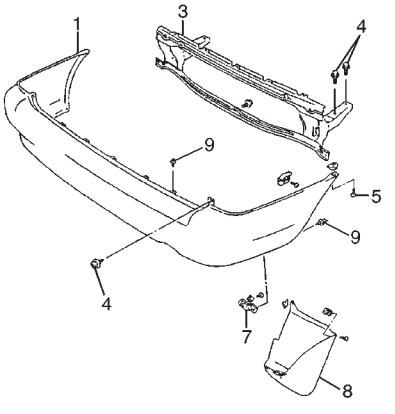
[TYPE 2]



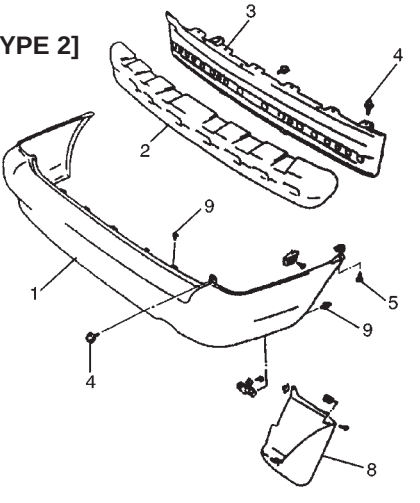
[B]



[C] [TYPE 1]

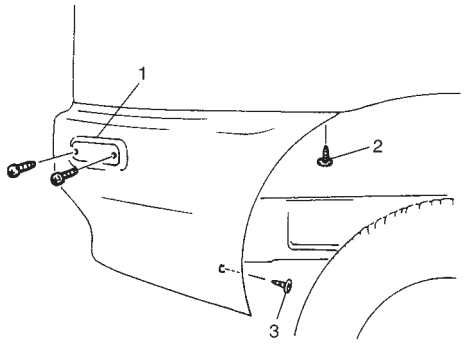


[TYPE 2]



[A]: Sedan model
[B]: Hatch-back model
[C]: Wagon model

1. Rear bumper
2. Bumper absorber (if equipped)
3. Bumper member
4. Bumper bolt
5. Bumper side screw
6. Bumper side holder
7. Bumper side bracket
8. Mudflap
9. Bumper clip

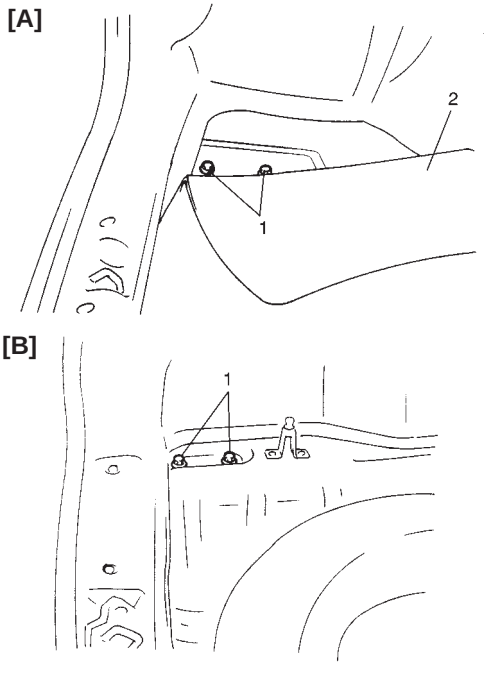


1. Side marker light (if equipped)
2. Bumper side screw
3. Bumper side bracket mounting screw

REMOVAL

Sedan and Hatch-back models

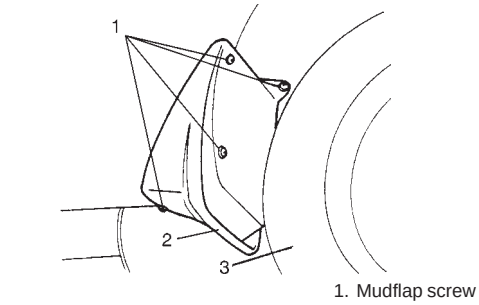
1) Remove side marker light (If equipped).
2) Remove bumper side screws and bumper side bracket mounting screw.
3) Raise up and hold spare tire cover with carpet, and take out tool boxes (hatch-back model only).



[A]: Sedan model
[B]: Hatch-back model

1. Bumper bolt
2. Luggage floor carpet

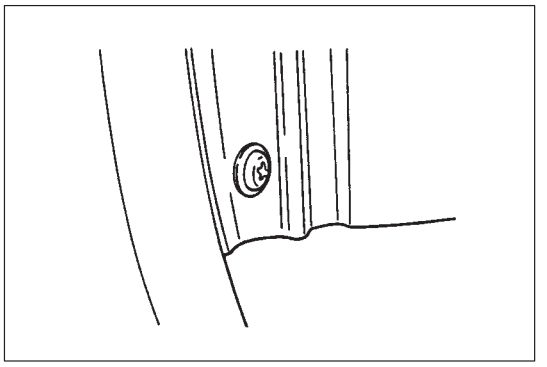
4) Remove bumper bolt.
5) Remove bumper assembly.
6) Remove bumper.



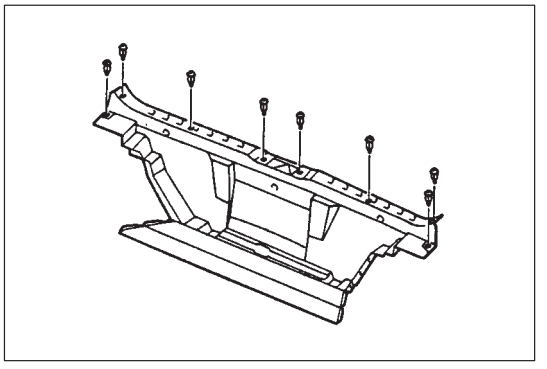
1. Mudflap screw
2. Mudflap
3. Tire

Wagon model

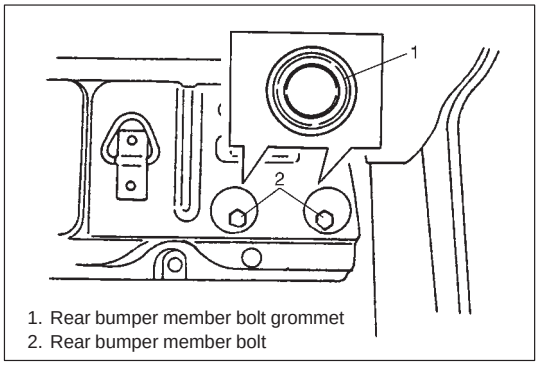
1) Remove mudflap screws and then mudflaps (if equipped).



2) Remove bumper bolts and bumper side screws as shown in figure.



3) Raise up and hold tire cover under box and spare tire cover with carpet, and remove back panel trim.



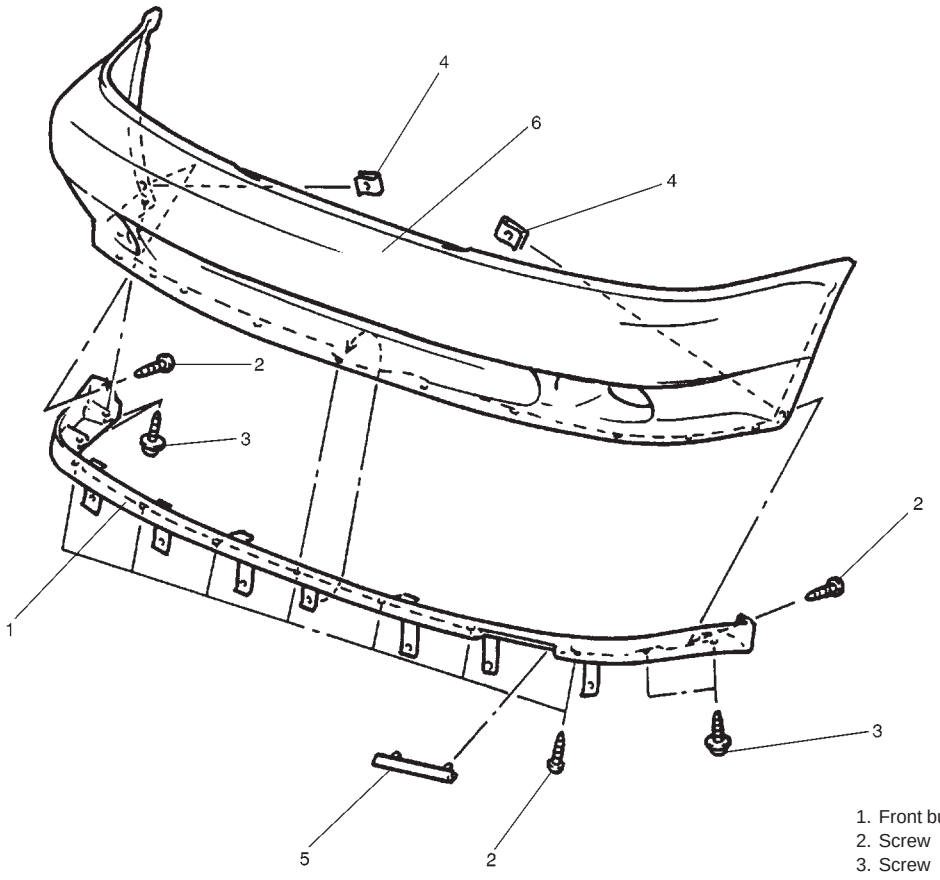
1. Rear bumper member bolt grommet
2. Rear bumper member bolt

4) Remove rear bumper member bolt after removing rear bumper member bolt grommet.
5) Remove rear bumper assembly.
6) Remove rear bumper from rear bumper member.

INSTALLATION

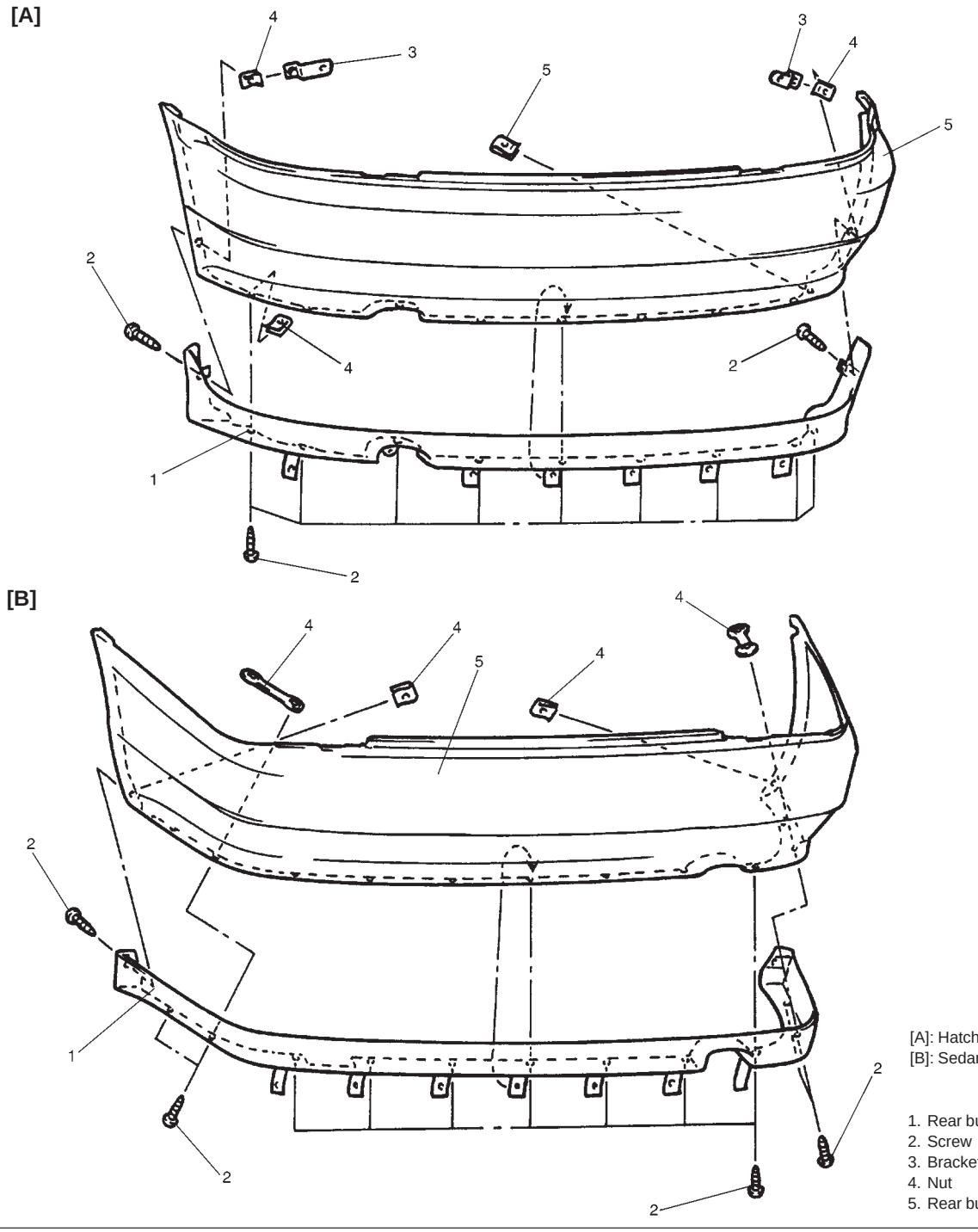
Reverse removal procedure for installation.

FRONT BUMPER LOWER EXTENSION (IF EQUIPPED)

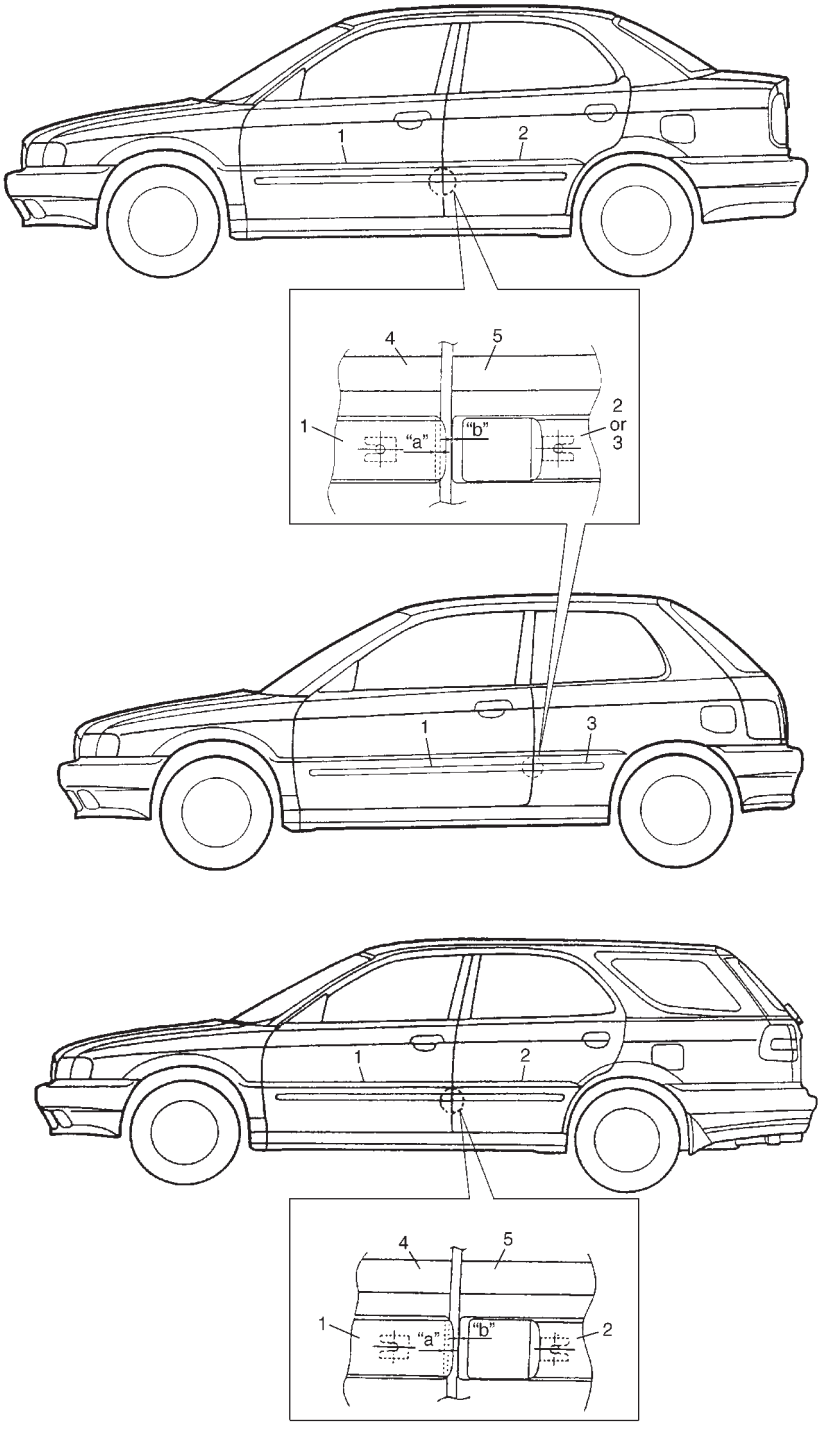


1. Front bumper lower extension
2. Screw
3. Screw
4. Nut
5. Front bumper extension cap
6. Front bumper

REAR BUMPER LOWER EXTENSION (IF EQUIPPED)



SIDE MOLDINGS



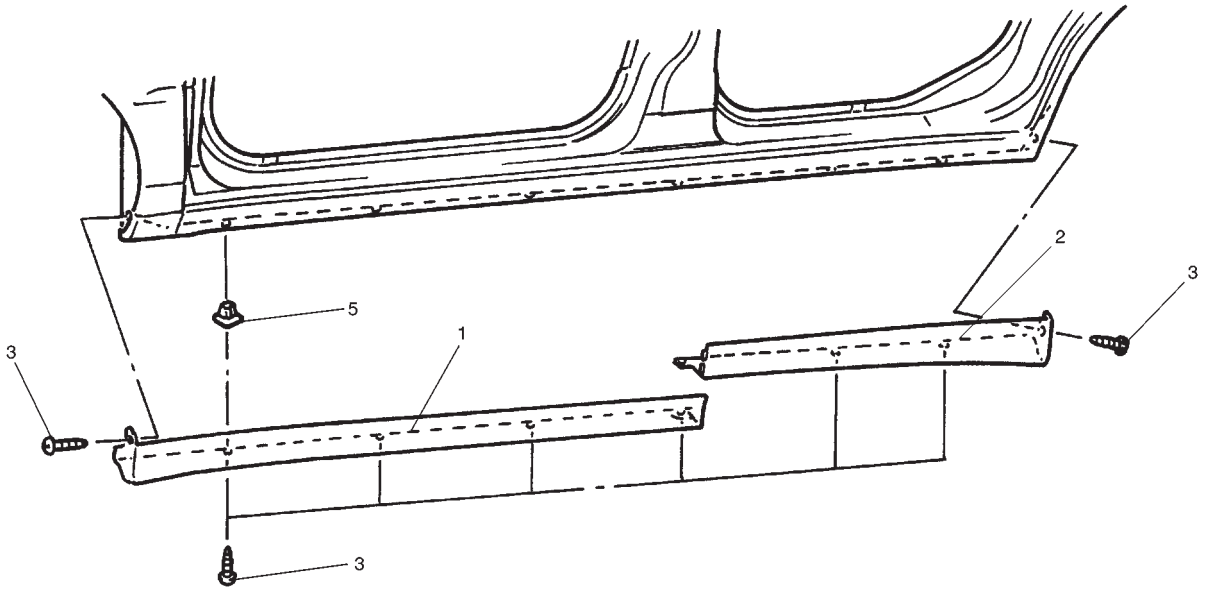
1. Front door molding
2. Rear door molding
3. Quarter outer molding
4. Front door outer R/L
5. Front door outer panel

INSTALLATION

1) Bonding surfaces should be cleaned thoroughly.
2) Follow illustrated bonding positions to install side moldings.
3) If adequate adhesive force is not available, use urethane adhesive.

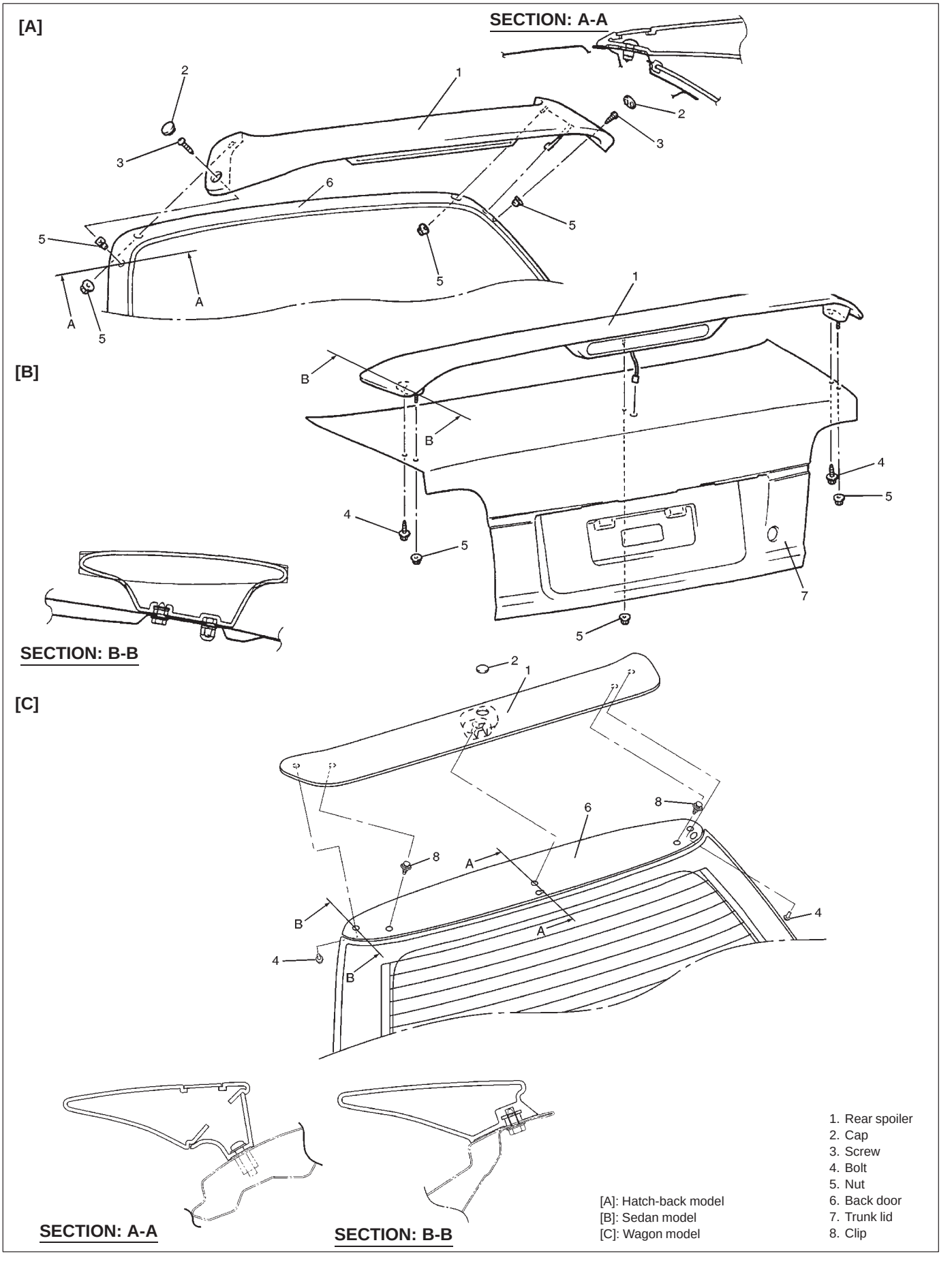
Clearance "a": 2 – 3 mm (0.04 – 0.07 in.)
"b": 0 – 1 mm (0 – 0.04 in.)

SPLASH GUARD

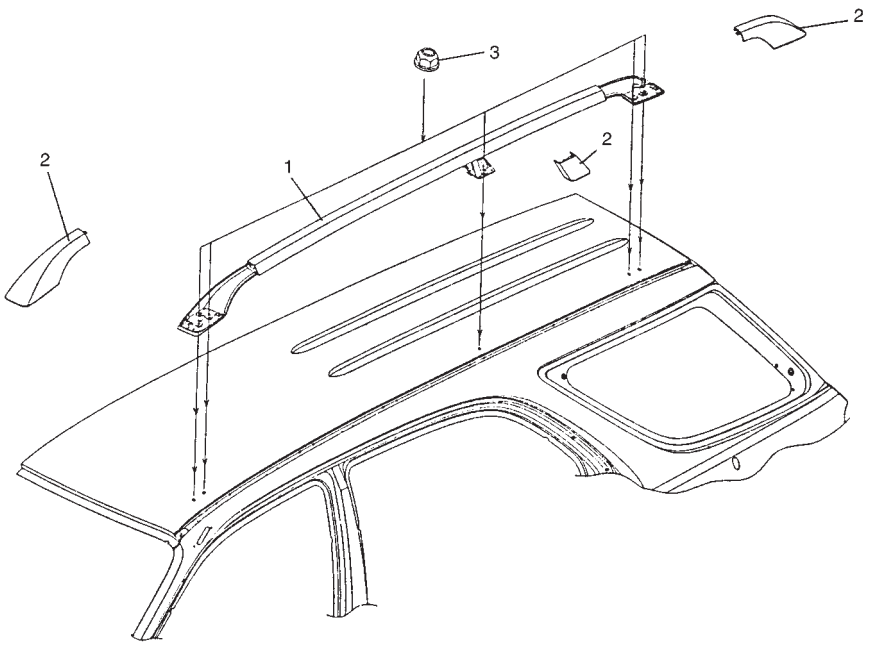


1. Splash guard front
2. Splash guard rear
3. Screw
4. Nut
5. Nut

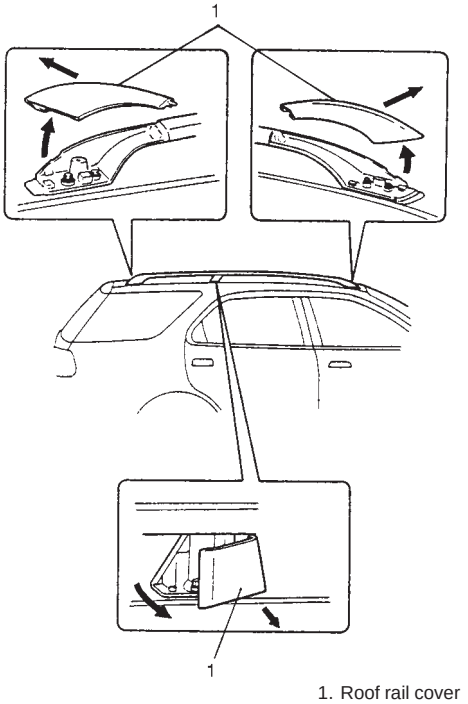
REAR SPOILER (IF EQUIPPED)



ROOF RAIL



1. Roof rail assembly
2. Roof rail cover
3. Roof rail installing nut



1. Roof rail cover

REMOVAL

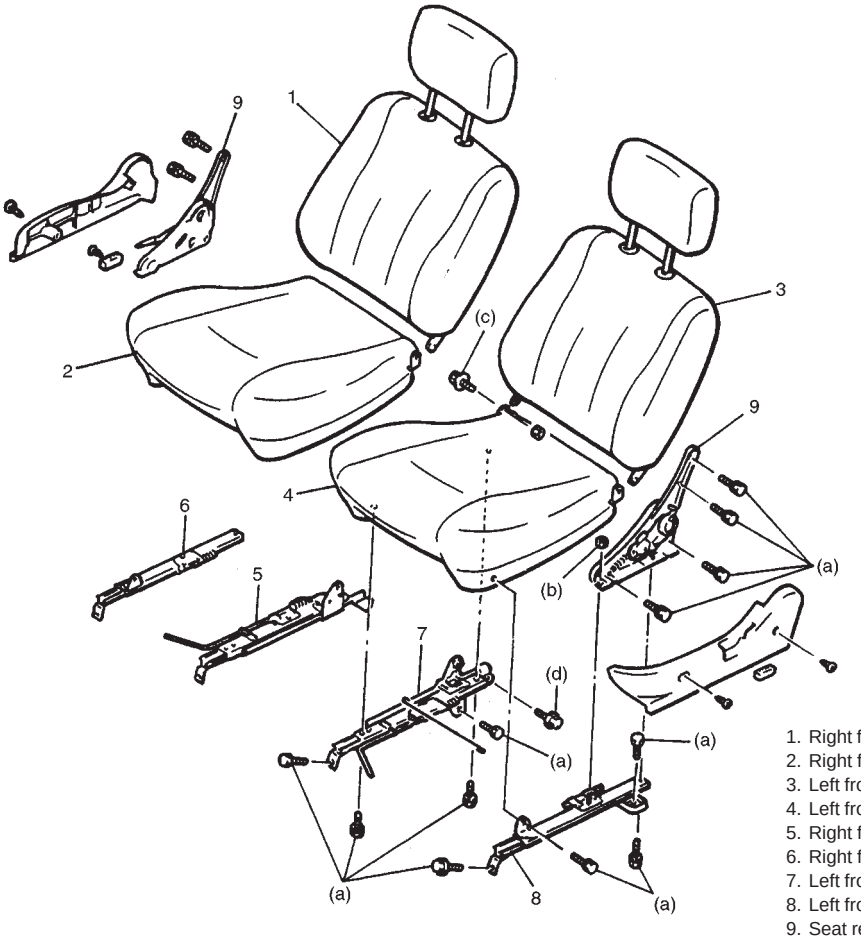
1) Remove roof rail cover as shown in figure.
2) Remove roof rail installing nuts.
3) Remove roof rail assembly.

INSTALLATION

Reverse removal procedure for installation.

SEATS

FRONT SEAT



1. Right front seatback assembly
2. Right front seat cushion assembly
3. Left front seatback assembly
4. Left front seat cushion assembly
5. Right front seat inside adjuster
6. Right front seat outside adjuster
7. Left front seat inside adjuster
8. Left front seat outside adjuster
9. Seat reclining control assembly

REMOVAL

1) Remove five Seat rail mounting bolts. Then, remove seat assembly with seat rail.
2) Disassemble and repair seat as necessary.

INSTALLATION

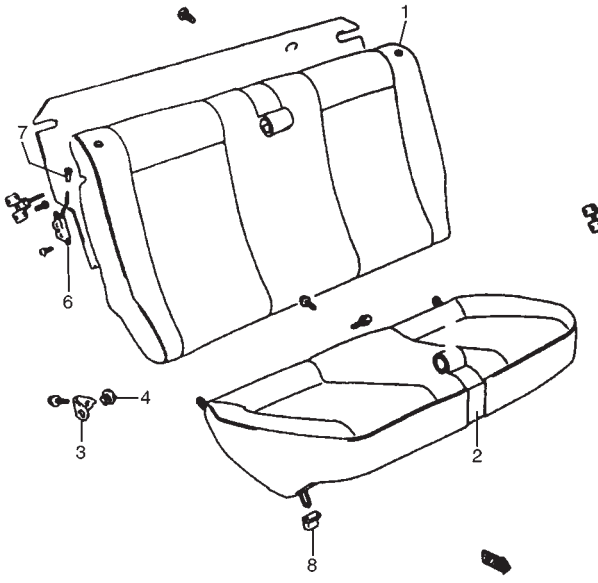
Reverse removal procedure to install front seat.
Torque it to specifications, as given below.

Tightening Torque

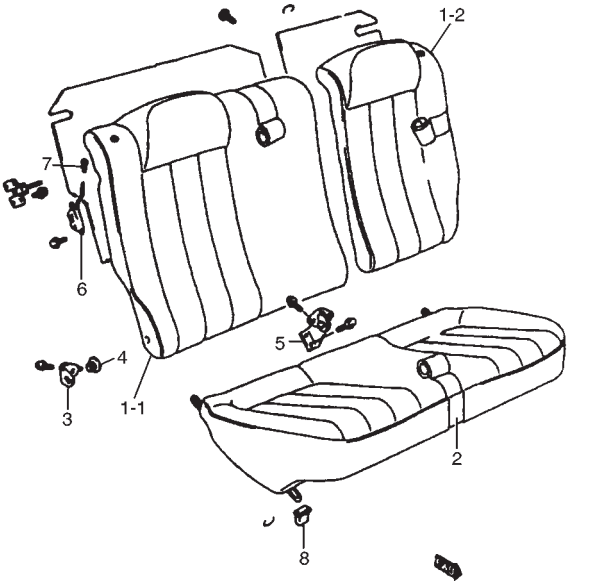
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)
(b): 15 N·m (1.5 kg-m, 10.0 lb-ft)
(C): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)
(d): 40 N·m (4.0 kg-m, 29.0 lb-ft)

REAR SEAT

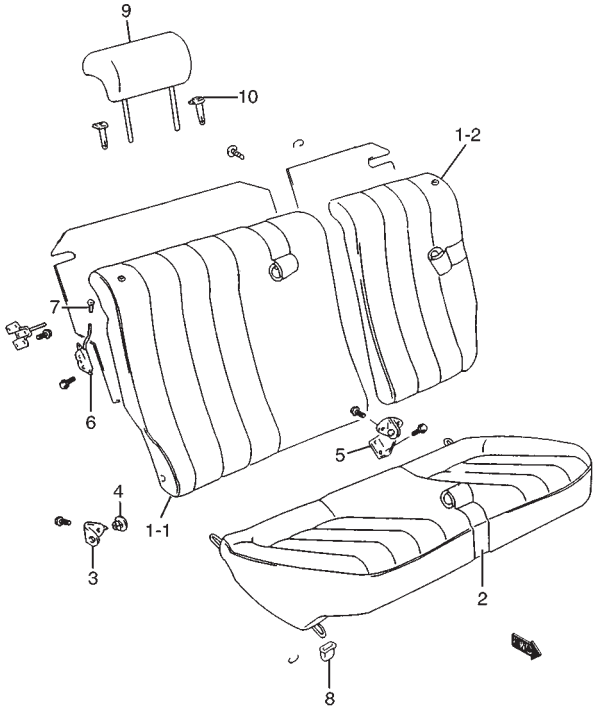
[A]



[B]



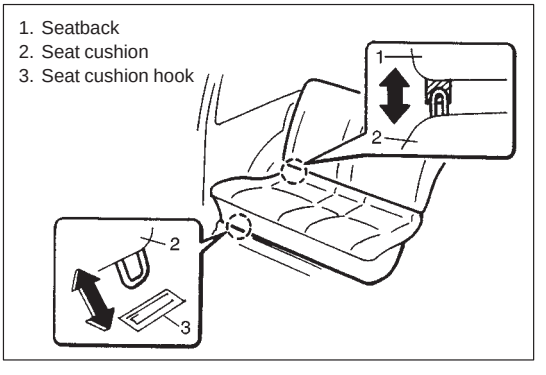
[C]



[A] : Bench type
[B] [C] : Separate type

1. Rear seatback (for bench type)
1-1. Right rear seatback (for separate type)
1-2. Left rear seatback (for separate type)
2. Rear seat cushion
3. Rear seatback hinge
4. Rear seat hinge case
5. Rear seatback center hinge (for separate type)
6. Seatback lock
7. Seatback lock knob
8. Rear seat cushion hook
9. Headrestraint
10. Headrestraint guide

1. Seatback
2. Seat cushion
3. Seat cushion hook



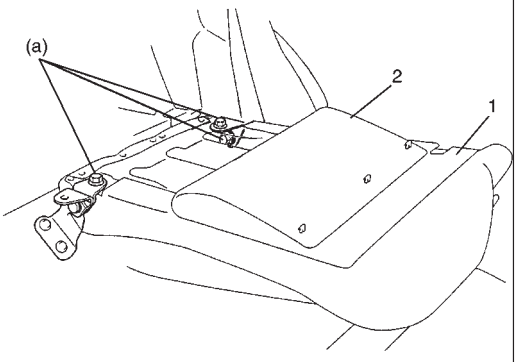
REAR SEAT CUSHION

REMOVAL

Raise the front portion of seat cushion to remove rear seat cushion.

INSTALLATION

Reverse removal procedure for installation.



1. Rear seatback
2. Rear seatback carpet

REAR SEATBACK

REMOVAL

1) Remove rear seatback carpet.
2) Remove seatback by removing its fitting bolts.

CAUTION:
Do not get on seat back when it is pushed down, or its hinge may get deformed.

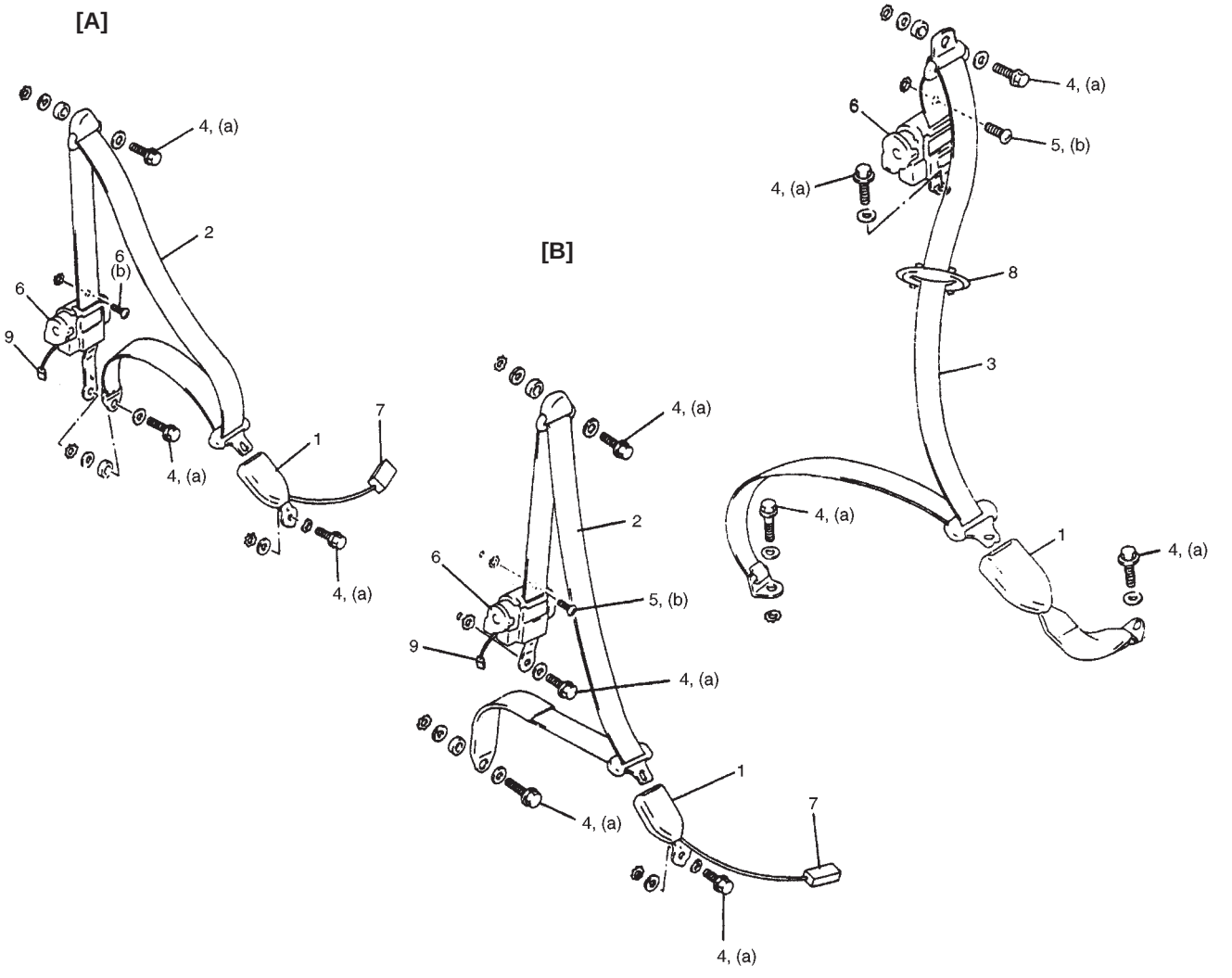
INSTALLATION

Reverse removal procedure for installation.

Tightening torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

SEAT BELTS

WARNING:
For vehicles equipped with a seat belt pretensioner
(To check whether the vehicle is equipped with a seat belt pretensioner or not, refer to the Owner's Manual.)
The procedures in this section must be followed in the order listed to disable the air bag system temporarily and prevent false diagnostic trouble codes from setting.
Failure to follow procedures could result in possible activation of the air bag system, personal injury or otherwise unneeded air bag system repairs.



[A]: Sedan model
[B]: Hatch-back model

Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)
(b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

1. Buckle
2. Front seat belt
3. Rear seat belt
4. Anchor bolt
5. Screw
6. Retractor assembly
7. Front seat adjuster
8. Seat belt coupler (if equipped)
9. Rear seat bell bezel
10. Pretensioner coupler (if equipped)

DESCRIPTION

All seat belts (for driver's and passenger's seat) are provided with an Emergency Locking Retractor (ELR). and some seat belts for driver's and passenger's seat are provided with a pretensioner as an optional function unit.

ELR: Locks the seat belt (to prevent the webbing from being pulled out of the retractor any further) as soon as any one of the following specified conditions is detected.
The conditions are the speed at which the webbing is pulled out of the retractor, acceleration or deceleration of the vehicle speed and inclination.

Pretensioner: it operates in linkage with air bag system in addition to the above described ELR. The pretensioner takes up the sag of the seat belt in occurrence of a front collision with a impact larger than a certain set value, there by enhancing restraint performance.
For more information, refer to SECTION 9J "Air Bag System."

WARNING:
If replacing seat belt is necessary, replace buckle and ELR (or webbing) together as a set. This is for the reason of ensuring locking of tongue plate with buckle.
If these parts are replaced individually, such a locking condition may become unreliable. For this reason, Suzuki will supply only the spare buckle and ELR (or webbing) in a set part.

SERVICING SEAT BELTS

Before servicing or replacing seat belts, refer to the following precautionary items.

- Seat belts should be normal relative to strap retractor and buckle portions.
- Keep sharp edges and damaging objects away from belts.
- Avoid bending or damaging any portion of belt buckle or latch plate.
- Do not bleach or dye belt webbing. (Use only mild soap and lukewarm water to clean it.)
- When installing a seat belt anchor bolt and nut, start bolt and nut by hand to prevent cross-threading.
- Do not attempt any repairs on retractor mechanisms or retractor covers. Replace defective assemblies with new replacement parts.
- Keep belts dry and clean at all times.
- If there exist any parts in question, replace such parts.
- Replace belts whose webbing is cut or otherwise damaged.
- Do not put anything into trim panel opening which seat belt webbing passes through.

REMOVAL AND INSTALLATION

Refer to figure on previous page to remove and install front and rear seat belts.

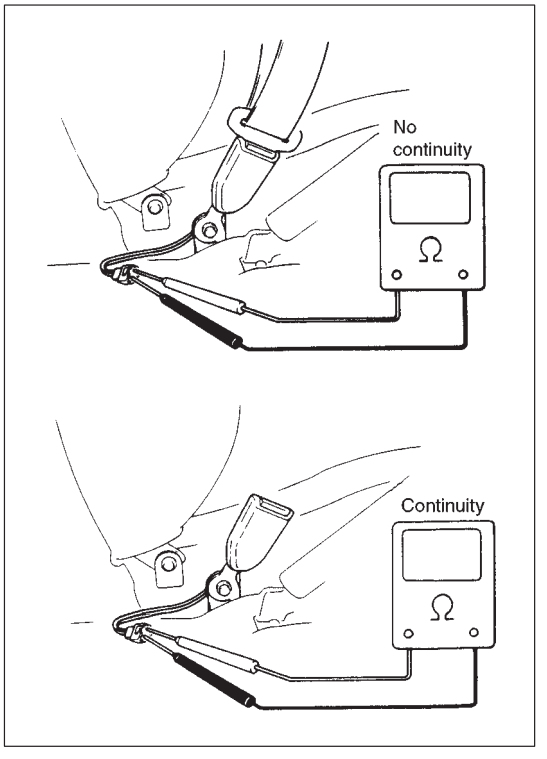
NOTE:
Be sure to tighten seat belt anchor bolts to specified torque below.
Seat belt anchor bolt and nut should have an unified fine thread (7/16 – 20 UNF). Under no circumstances should any different sized or metric screw threads be used.

Tightening Torque
(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)
(b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

INSPECTION

Seat belts and attaching parts can affect the vital components and systems of a vehicle.
Therefore, they should be inspected carefully and replaced with genuine parts only.

1) Seat belt
   Its webbing or strap should be free from damage.
2) Retractor
   It should lock webbing when pulled quickly.
   The front seat belt retractor should pass the above inspection and should lock webbing even when tilted (approximately 15°) toward the fore and aft or right and left directions.
3) Anchor bolt
   Anchor bolts should be torqued to specification.
4) Belt latch
   It should be secure when latched.



5) Warning system
   Check driver's seat belt strap switch.

   For the details of seat belt warning system, refer to "BODY ELECTRICAL SYSTEM" in Section 8.

SEAT BELT PRETENSIONER (IF EQUIPPED)

The pretensioner is incorporated in retractor assembly and controlled by SDM as one df air bag system components. It will be activated at the same time as the air bag when an impact at the front of vehicle exceeds the specified value.
When servicing seat belt (retractor assembly) with pretensioner, be sure to observe all WARNINGS and CAUTIONS. Refer to “PRECAUTIONS” later in Section 9J.

CAUTION:
Do not reuse the seat belt pretensioner (retractor assembly) that has operated but replace it with a new one as an assembly. For checking procedure of its operation, refer to SECTION 9J.

DIAGNOSIS

For diagnosis of the seat belt pretensioner, refer to Section 9J.

INSPECTION AND REPAIR REQUIRED AFTER ACCIDENT

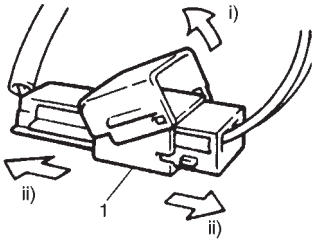
After an accident, whether the seat belt pretensioner has been activated or not, be sure to perform checks, inspections and repairs described under “REPAIRS AND INSPECTIONS REQUIRED AFTER ACCIDENT” in Section 9J.

PRECAUTIONS

For precaution of the seat belt pretensioner, refer to Section 9J.

ON-VEHICLE SERVICE

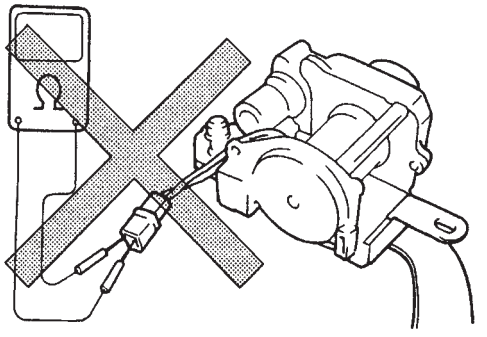
WARNING:
- **Never attempt to disassemble or repair the seat belt pretensioner (retractor assembly). If any abnormality is found, be sure to replace it with new one as an assembly.**
- **Be sure to read “PRECAUTIONS” in Section 9J before starting to work and observe every precaution during work. Neglecting them may result in personal injury or unactivation of the seat belt pretensioner when necessary.**



i) Release locking of lock lever.
ii) After unlocked, disconnect connector.
1. Seat belt pretensioner connector

REMOVAL

1) Disconnect negative battery cable from battery.
2) Disable air bag system. Refer to “DISABLING AIR BAG SYSTEM” in Section 9J.
3) Disconnect Yellow connector for seat belt pretensioner.
4) Remove front seat belts with pretensioner from the vehicle referring to “SEAT BELTS” in this section.



INSPECTION

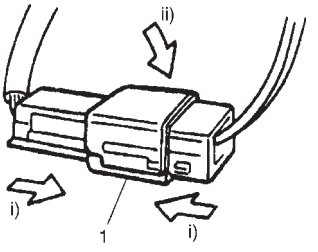
When checking seat belt with pretensioner, use the following check items in addition to those specified for seat belt without pretensioner referring to “SEAT BELTS” in this section.

WARNING:
Never measure resistance of pretensioner or disassemble it. Otherwise, personal injury may result.

CAUTION:
If seat belt pretensioner (retractor assembly) was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.

Check retractor assembly with seat belt pretensioner appearance visually for following symptoms and if any one of them is applicable, replace it with a new one as an assembly.

- Pretensioner has activated.
- There is a crack in seat belt pretensioner (retractor assembly).
- Wire harness or connector is damaged.
- Seat belt pretensioner (retractor assembly) is damaged or a strong impact (e.g., dropping) was applied to it.

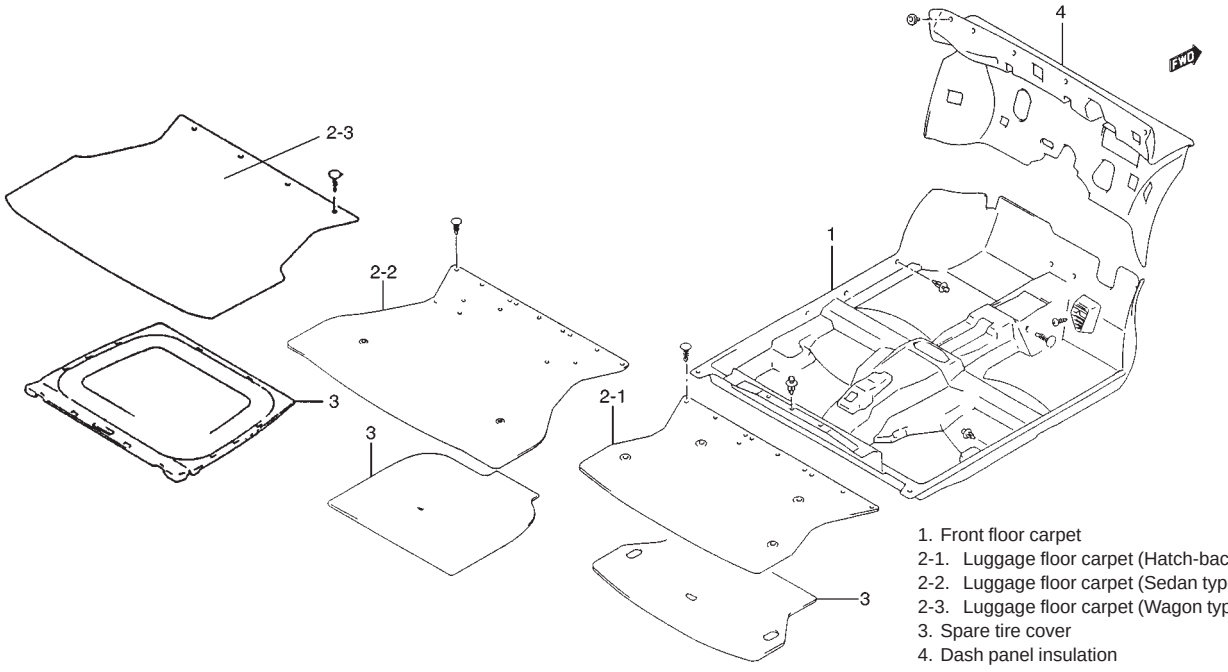


i) Connect connector.
ii) Lock connector with lock lever.
1. Seat belt pretensioner connector

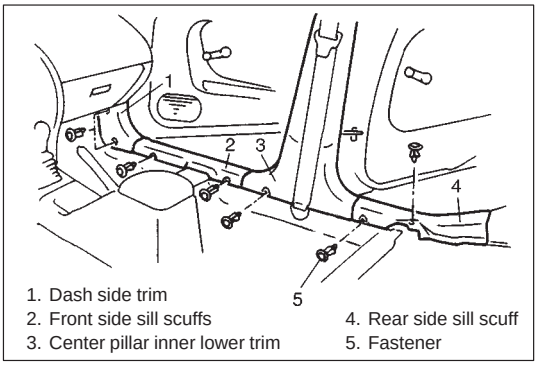
INSTALLATION

1) Install front seat belts with pretensioner referring to “SEAT BELTS” in this section to the vehicle.
2) Connect Yellow connector for seat belt pretensioner securely and fit seat belt pretensioner connector onto body.
3) Connect negative battery cable to battery.
4) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in Section 9J.

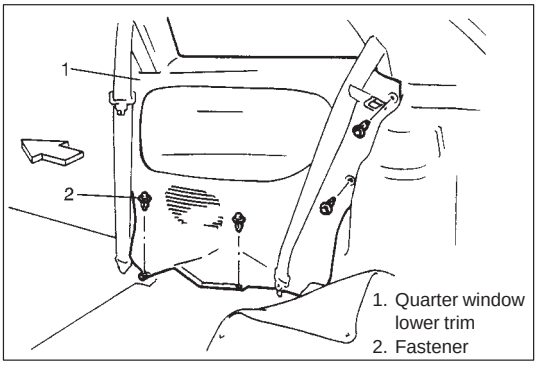
FLOOR CARPET



1. Front floor carpet
2-1. Luggage floor carpet (Hatch-back type)
2-2. Luggage floor carpet (Sedan type)
2-3. Luggage floor carpet (Wagon type)
3. Spare tire cover
4. Dash panel insulation



1. Dash side trim
2. Front side sill scuffs
3. Center pillar inner lower trim
4. Rear side sill scuff
5. Fastener



1. Quarter window lower trim
2. Fastener

FRONT FLOOR CARPET

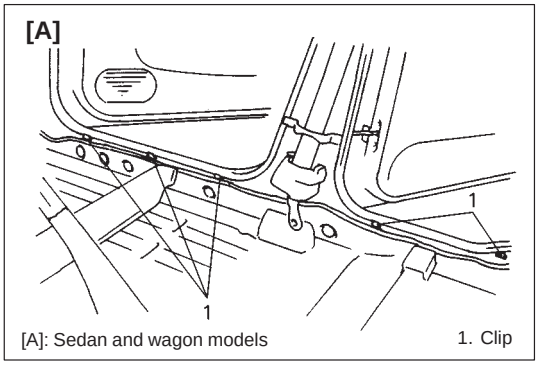
REMOVAL

1) Remove front seat and rear seat cushions.
2) Remove front seat belt anchorage bolt.
3) Remove dash side trims, front side sill scuffs.

4) **Sedan and wagon models:**
   Remove center pillar inner lower trims and rear side sill scuffs.

   Hatch-back model:
   Remove rear seat back and quarter window inner lower trims.

5) Remove parking brake lever cover, console box, console box front extension and cruise controller (if equipped).
6) Remove front floor carpet.



[A]: Sedan and wagon models
1. Clip

INSTALLATION

Reverse removal procedure for installation, and then noting the following instructions.

- Be sure to install clip to side sill before installing side sill scuff.
- When tightening seat belt anchor bolt, refer to “SEAT BELTS” in this section for tightening torque.

LUGGAGE FLOOR CARPET

Luggage floor carpet is fixed to floor with clips.

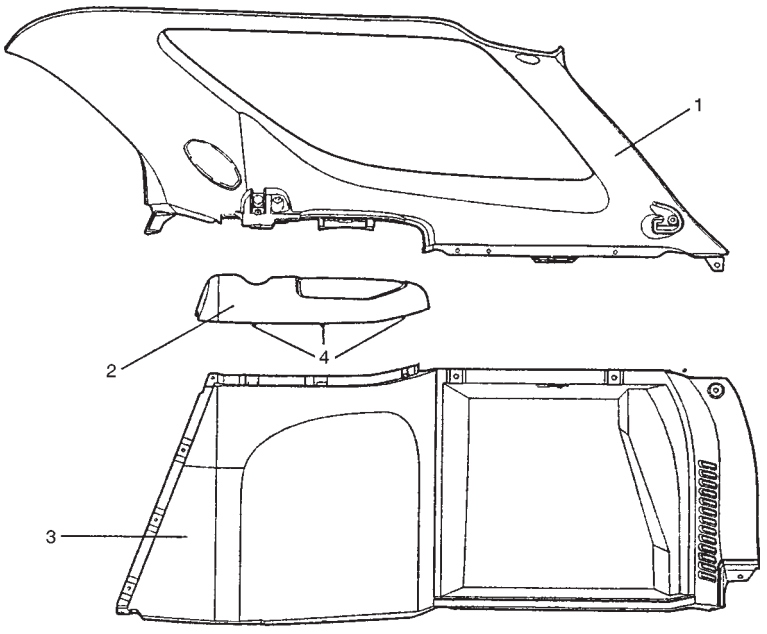
REMOVAL

Detach clips, using care not to pull up carpet with force and break clips.

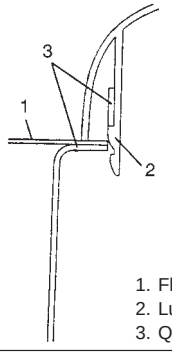
INSTALLATION

Reverse removal sequence to install luggage floor carpet.

REAR SPEAKER COVER



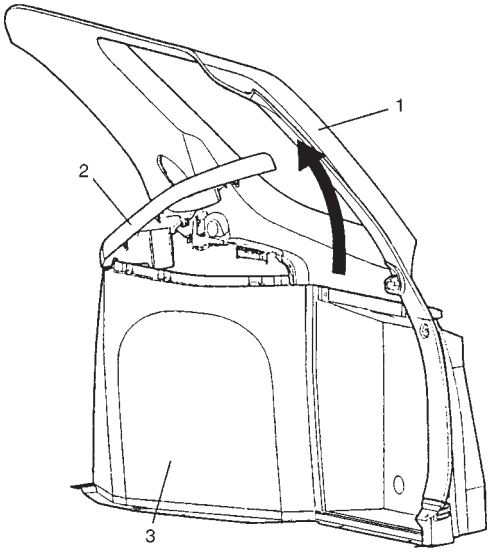
1. Quarter window trim
2. Rear speaker cover
3. Quarter inner trim
4. Lug



1. Flat tip screw driver
2. Lug
3. Quarter inner trim

REMOVAL

1) Remove rear speaker cover from quarter trim by pushing its catching lugs (at 3 locations) with flat tip screwdriver or the like.
2) Lift up rear end of speaker cover and remove it from quarter glass trim.



1. Quarter window trim
2. Rear speaker cover
3. Quarter inner trim

INSTALLATION

Reverse removal procedure for installation.

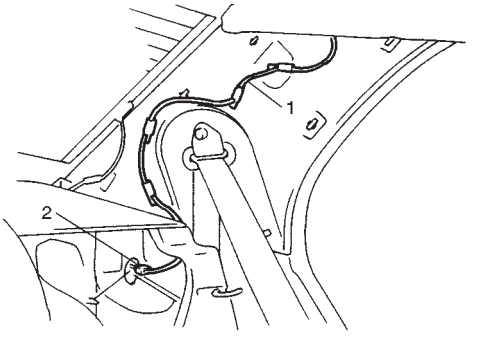
ROOF LINING

REMOVAL

Sedan model

1) Remove sunvisor assembly.
2) Remove rear view mirror.
3) Remove assist grips.
4) Remove upper side of door weatherstrips.
5) Remove front and rear pillar trims.
6) Remove center pillar inner upper trim.
7) Remove partition front trim, left. And disconnect dome light harness coupler.
8) Remove roof lining with dome light.
9) Remove dome light.

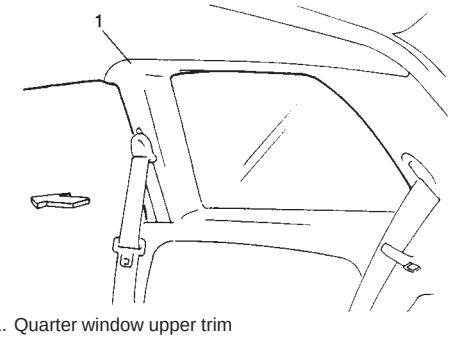
NOTE:
Two-side bondable tape used for securing head lining in place should be cleaned with solvent.



1. Dome light harness
2. Dome light harness connector

Hatch-back model

1) Remove sunvisor assembly.
2) Remove rear view mirror and dome light.
3) Remove assist grip.
4) Remove upper side of door weatherstrips.
5) Remove front pillar trims and quarter window upper trim.
6) Remove upper side of back door weatherstrip.
7) Remove roof lining.

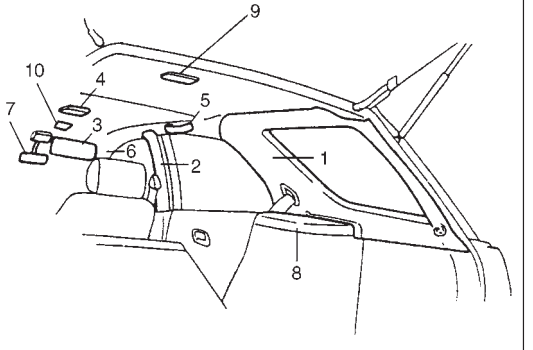


1. Quarter window upper trim

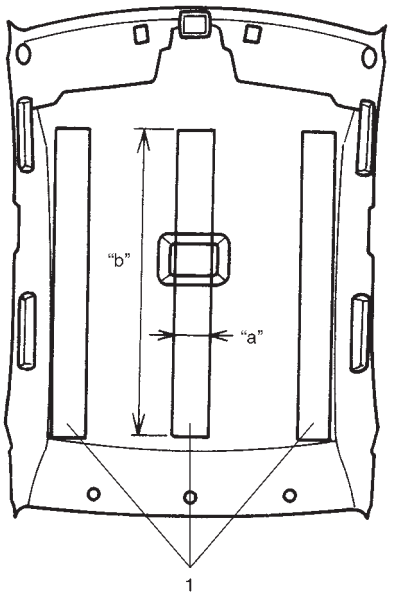
Wagon model

1) Remove sunvisor assembly.
2) Remove dome light.
3) Remove rear view mirror.
4) Remove sliding roof weatherstrip.
5) Remove assist grips.
6) Remove sliding roof switch cover and then sliding roof switch screw.
7) Remove rear speaker covers. (Refer to REAR SPEAKER.)
8) Remove upper side of door weatherstrips.
9) Remove front pillar trims.
10) Remove center pillar inner upper trim after removing seat belt anchor bolt.
11) Remove quarter window trims after removing quarter inner trims.
12) Remove roof lining, disconnecting luggage light coupler.

NOTE:
Tow-side bondable tape used for securing roof lining in place should be cleaned with solvent.



1. Quarter window trim
2. Center pillar inner upper trim
3. Sunvisor assembly
4. Dome light
5. Assist grip
6. Front pillar trim
7. Rear view mirror
8. Rear speaker cover
9. Luggage light
10. Sliding roof switch



1. Two-side bondable tape

INSTALLATION

1) Attach two-side bondable tape at roof lining.

   Dimension

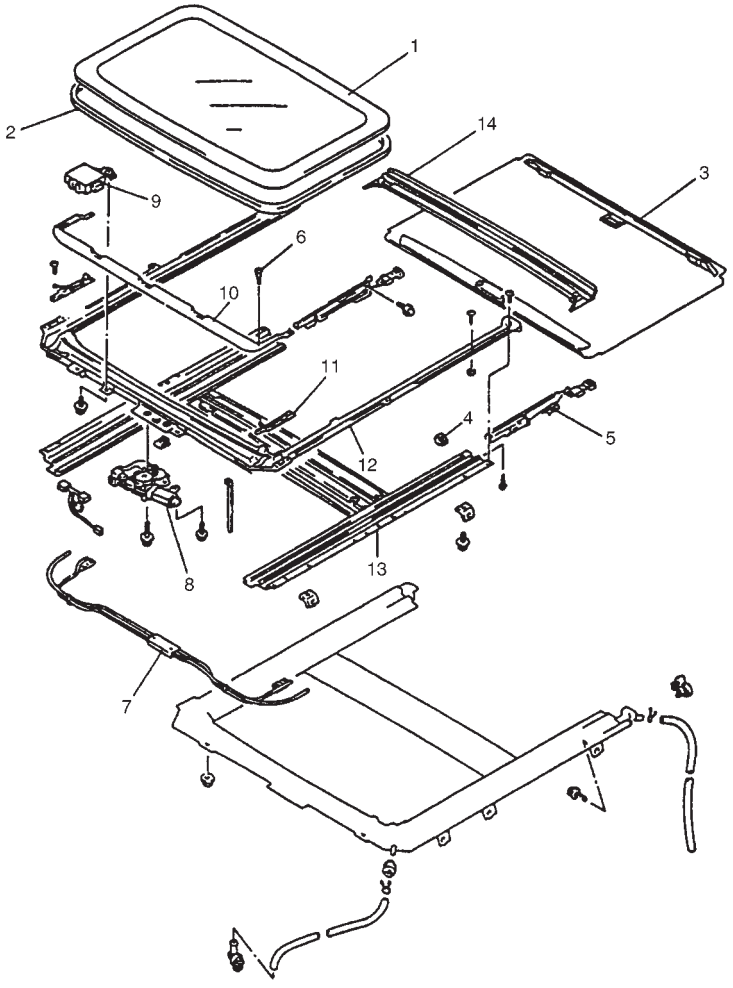
   "a": about 75 mm (3.0 in.)

   "b": Sedan model about 800 mm (31.5 in.)

   Hatch-back model about 750 mm (30.0 in.)

2) Fasten dome light and luggage light (Wagon model only) harness lead wire on roof lining (without Hatch-back model).
3) With clips installation holes in roof lining positioned properly.
4) Fix front and rear end of roof lining with clips and attach roof lining to roof securely.
5) Install the following parts:
   - Sunvisor assembly
   - Rear view mirror
   - Dome light
   - Assist grip
   - Door weatherstrips
   - Front and rear pillar trims, center pillar inner upper trim
   - Sliding roof switch (if equipped)

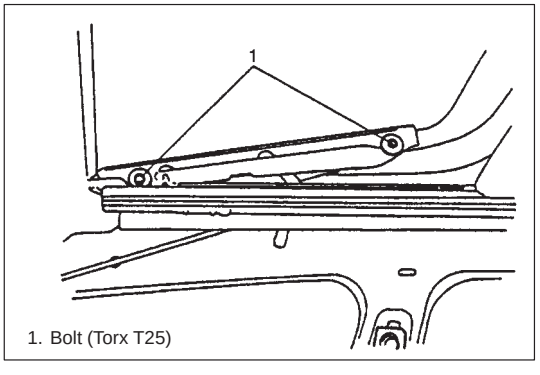
SLIDING ROOF



1. Sliding roof glass
2. Sliding roof weatherstrip
3. Sunshade trim
4. Sunshade trim stopper
5. Sliding roof drive cable
6. Sliding roof drive cable stopper
7. Sliding roof drive cable guide
8. Sliding roof drive gear assembly
9. Control relay
10. Sliding roof deflector
11. Sliding roof guide block
12. Sliding roof housing
13. Sliding roof rail
14. Roof drip rear channel

REMOVAL

NOTE:
If slidIng roof is not positioned properly in relation with fully closed position of drive gear, it will not operate properly even though its functional parts are all In good condition. To ensure proper positioning, when removing drive gear assembly, be sure to close slIding roof completely before removal.

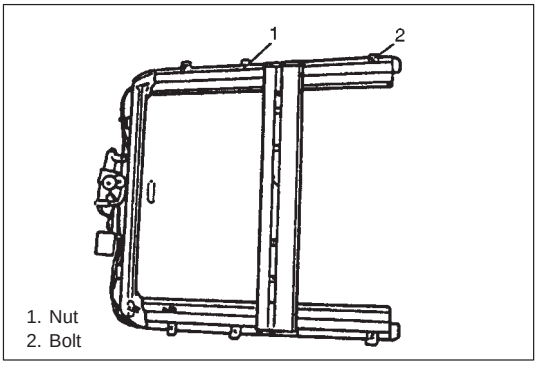


1. Bolt (Torx T25)

1) Remove sliding roof weatherstrip.
2) Remove roof lining. Refer to “ROOF LINING” in this section.
3) Remove sliding roof glass by removing bolts (torx).

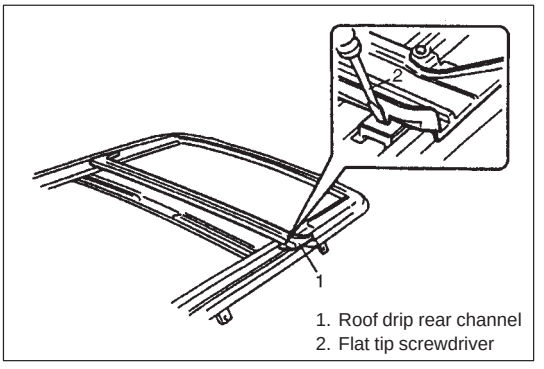
CAUTION:
After removing sliding roof glass, do not turn ON sliding roof switch so as not to drive sliding roof drive gear assembly.

4) Disconnect drain hose.



1. Nut
2. Bolt

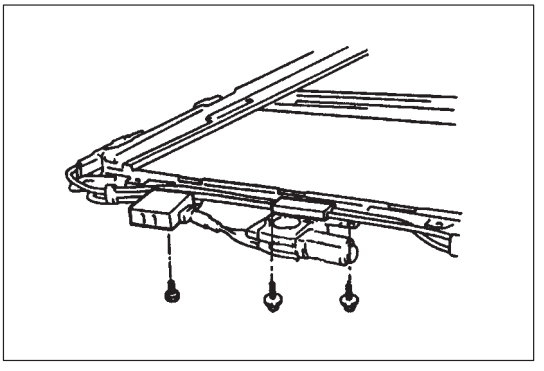
5) Remove control relay and disconnect lead wire coupler of sliding roof drive gear assembly.
6) Remove sliding roof assembly and take it outside from front seat side.



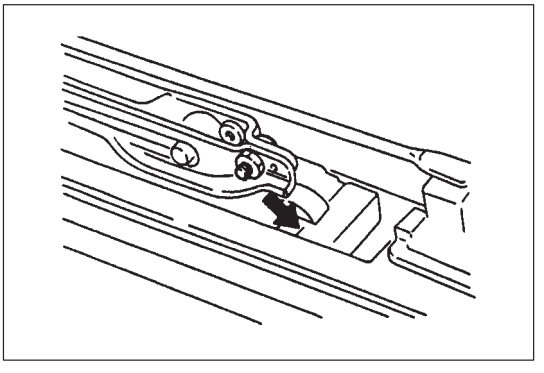
1. Roof drip rear channel
2. Flat tip screwdriver

DISASSEMBLY

1) Remove sunshade trim stopper.
2) Pull out sunshade trim by sliding it.
3) Remove roof drip rear channel by pushing claw as shown in figure.

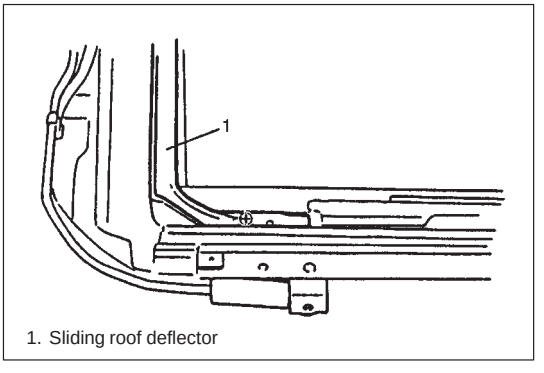


4) Remove sliding roof drive gear assembly and control relay.



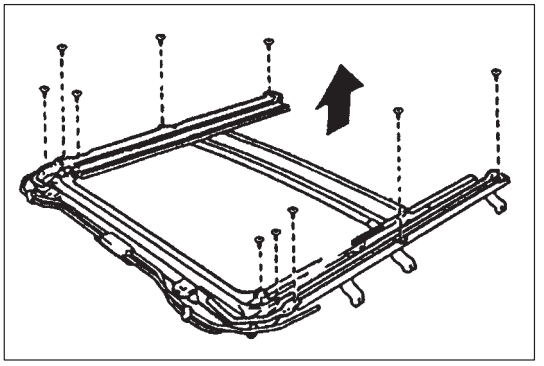
5) Move link to rearward while folding it in such way that resin part of sliding roof drive cable will pass through rail.

CAUTION:
When moving it, apply force to arrow marked part (where sliding roof drive cable is installed).

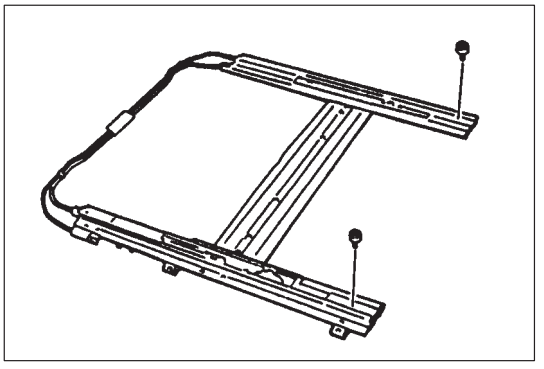


1. Sliding roof deflector

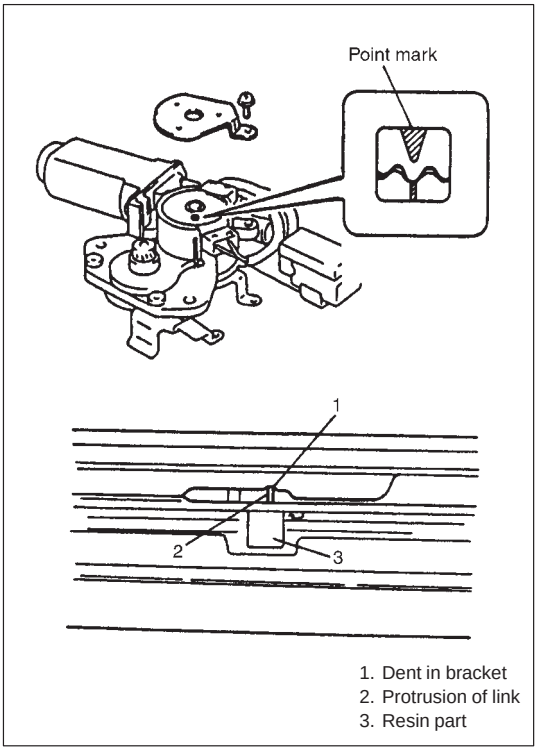
6) Remove sliding roof deflector.



7) Remove sliding roof housing panel.



8) Remove sliding roof guide rail stopper.
9) Pull off sliding roof drive cable from the back.

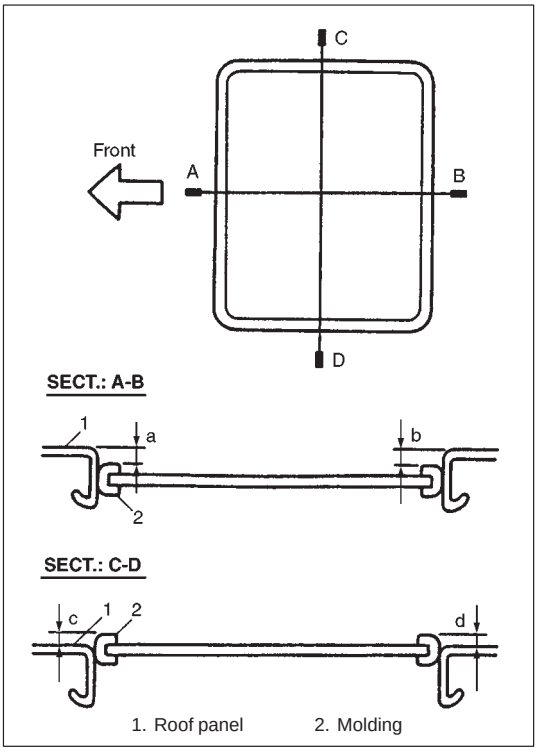


1. Dent in bracket
2. Protrusion of link
3. Resin part

ASSEMBLY

Reverse disassembly procedure for assembly, and then observing the following caution.

CAUTION:
Match protrusion of link and dent in bracket for completely closed position of sliding roof drive cable and match marks on cams for completely closed position of sliding roof drive gear assembly and then install sliding roof drive gear assembly.



1. Roof panel 2. Molding

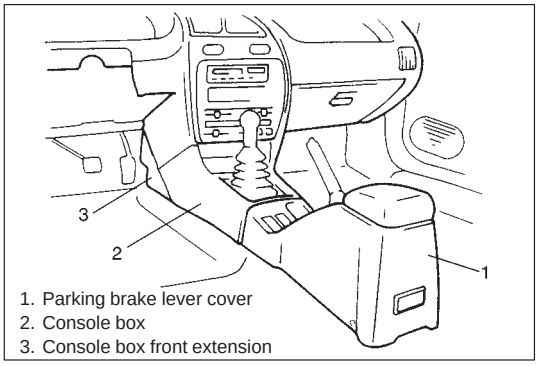
ADJUSTING SUNROOF GLASS

1) Loosen sunroof glass fixing screws (4 pieces) and move sunroof glass up and down 2 or 3 times. In this way, sunroof glass can be positioned in both vertical and horizontal directions by elasticity of sliding roof weather strip.
2) Position sunroof glass by such dimensions with respect to roof panel surface as specified below.

Dimension: "a" : 0.1 mm (0.0039 in.) (Sedan model)
: about 1.75 mm (0.069 in.) (Wagon model)
"b" : 0.5 mm (0.0197 in.) (Sedan model)
: about 1.75 mm (0.069 in.) (Wagon model)
"c" : 1.1 mm (0.0433 in.) (Sedan model)
: about 1.75 mm (0.069 in.) (Wagon model)
"d" : 1.1mm (0.0433 in.) (Sedan model)
: about 1.75 mm (0.069 in.) (Wagon model)

3) After installing all parts and adjusting properly, check sunroof for proper operation (open, close and lock).

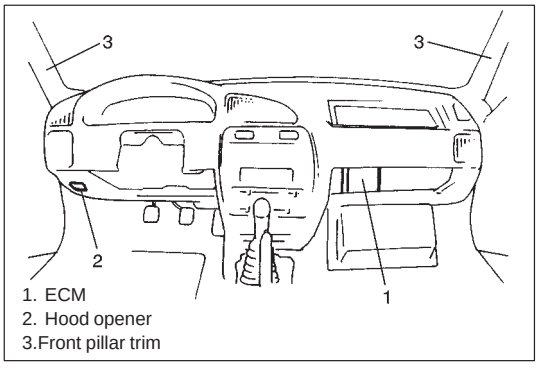
INSTRUMENT PANEL



1. Parking brake lever cover
2. Console box
3. Console box front extension

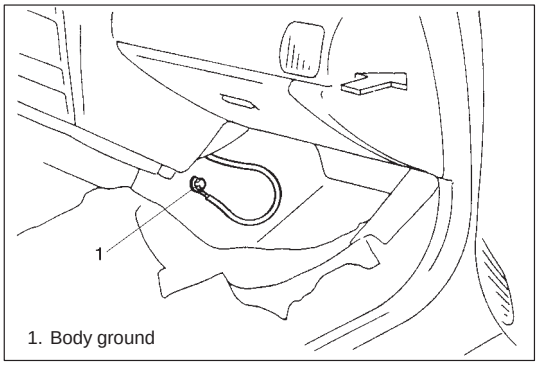
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Remove parking brake lever cover.
3) Remove console box front extension.
4) Remove console box and cigarette lighter coupler.



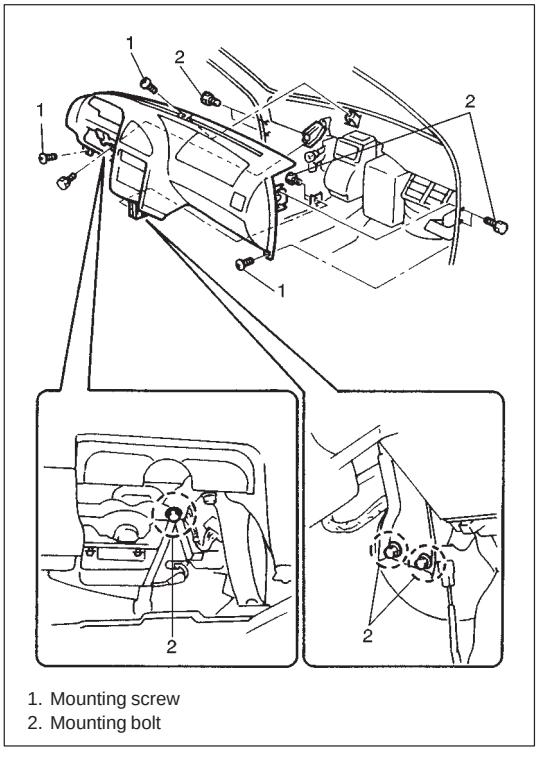
1. ECM
2. Hood opener
3.Front pillar trim

5) Disconnect wires and cables from heater and blower unit. Refer to “HEATER AND VENTILATION” in Section 1A.
6) Remove steering column assembly. Refer to “AIR BAG STEERING WHEEL AND COLUMN” in Section 3C1.
7) Remove ECM.
8) Remove engine hood opener.
9) Remove front pillar trim.



1. Body ground

10) Disconnect wires and couplers from instrument panel. Refer to “AIR BAG SYSTEM” in Section 9J.
11) Remove body ground at floor center.



1. Mounting screw
2. Mounting bolt

12) Remove instrument panel mounting screw and bolt.
13) Remove instrument panel.

KEY CODING

KEY USAGE AND IDENTIFICATION

Key is used for ignition, door and trunk lock cylinder. Keys are cut on both edges to make them reversible.

Key identification is obtained from six character key code stamped on key code tag. Using this key code, key code cutting combination can be determined from a code list (available to owners of key cutting equipment from suppliers).
If key codes are not available from records or tags, key code can be obtained from the right hand door lock cylinder (if lock has not been replaced). Lock cylinders supplied by the factory as service parts are unmarked.
If original key is available, key code cutting combination can be determined by laying key.

IGNITION SWITCH LOCK CYLINDER

Removal/Installation

Refer to “AIR BAG STEERING WHEEL AND COLUMN” in Section 3C1.

ELECTRICAL DIAGNOSIS

For ignition switch electrical troubleshooting, refer to “BODY ELECTRICAL SYSTEM” in Section 8.

ANTI-CORROSION TREATMENT

Steel sheets used for vehicles are provided with corrosion resistance on its either side or both sides as rust proof treatment. These corrosion resistance steel sheet materials are called one or two-side galvanized steel sheets. They are selected for their rust protection property and further given various types of treatment depending on where they are used as described below.

- Steel sheets are treated with cathodic electroprimer which is excellent in corrosion resistance.
- Rust proof wax coatings are applied to door, front hood and side sill insides where moisture is liable to stay.
- Vinyl coating or asphalt coating is applied to body underside and wheel housing inside.
- Chip resistant material is applied to side sill and door outside bottom areas to protect painted surface from damage due to flying stones.
- Sealer is applied to door hem, engine compartment steel sheet-to-steel sheet joint, and the like portions to prevent water penetration which results in rust occurrence.

When replacing panel or repairing collision damage, leaving related area untreated as it is in any operation which does disturb any rust proof treatment described above will allow corrosion in that area. Therefore, it is important in any repair operation to properly recoat surface of related area.

Accordingly, it is the essential function of any repair operation to correctly recoat the related surfaces of the relevant area.

All metal panels are coated with metal conditioners and primer coating during vehicle production. Following repair and/or replacement parts installation, every accessible bare metal surface should be cleaned and coated with rust proof primer. Perform this operation prior to application of sealer, rust proof wax coating and chip resistant material.

Sealer is applied to specific joints of a vehicle during production. It prevents dust from entering vehicle and serves also as an anticorrosive barrier. Sealer is applied to door and hood hem areas and between panels as well. Correct and reseal originally- sealed joints if damaged. Reseal attaching joints of a new replacement panel and reseal hem area of a replacement door or hood.

Use a quality sealer to seal flanged joints, overlap joints and seams. Sealer must have flexible characteristics and paintability after it's applied to repair areas.

For sealer to fill open joints, use caulking material. Select a sealer according to place and purpose of a specific use. Observe manufacturer's labelstated instructions when using sealer.

In many cases, repaired places require color painting. If so, follow ordinary techniques specified for finish preparation, color painting and undercoating build-up.

Rust proof wax, a penetrative compound, is applied to metal-to-metal surfaces (door, front hood and side sill insides) where it is difficult to use ordinary undercoating material for coating. Therefore, when selecting rust proof wax, it may be one of such penetrative type.

During undercoating (vinyl coating or asphalt coating) application, care should be taken that sealer is not applied to engine-related parts and shock absorber mounting or rotating parts. The following undercoating, make sure that body drain holes are kept open.

Anticorrosive materials.

1) Clean and prepare metal surface.
2) Apply primer.
3) Apply sealer (all joints sealed originally).
4) Apply chip-resistant material (side sill and door outside bottom areas).
5) Apply color in areas where color is required such as hem flanges, exposed joints and under body components.
6) Apply anticorrosive compound (penetrative wax).
7) Apply undercoating (rust proof material).

If original galvanization or other anticorrosive material on interior and underbody panel surfaces is burnt during welding or heating operation, affected surfaces must be cleaned.
Burnt residues should be removed carefully when affected area is in box-type construction or in such shape as to limit access to interior surfaces. Generally, following method works out satisfactorily in removing such residues.

NOTE:
Standard shop practices, particularly eye protection, should be followed during performance of above-listed operations to avoid personal injury.

Scrape any accessible area. If affected area is enclosed by sheet metals and a standard putty knife or scraper cannot reach there, try to use a more flexible scraper. Compressed air can remove most residues and is useful in cleaning enclosed areas. However, this type of operation absolutely requires eye protection.

METAL REPLACEMENT PARTS FINISHING

Metal replacement parts (or assemblies) are coated with electro-deposition primer. For proper adhesion of paint, the following finish process (refinish steps) becomes necessary.

1) Use wax or grease-removing solvent to clean each part.
2) Use a wet or dry sand-paper (No.400) to polish panel lightly. Do not polish it forcibly to produce any scratch. Clean each part again.
3) If factory-applied primer coating is cut through to bare metal, apply metal conditioner to bare metal exposed to open air. As for the method of use of the metal conditioner, follow directions on its container.
4) Apply primer-surfacer to the part completely dry before starting sand-paper polishing. As for drying time, follow directions advised on primer-surfacer container.
5) Use a wet or dry sand-paper (No.400) and water to polish panel lightly.
6) Wash part again.
7) Apply color coating to part.
8) Different paints demand different drying methods. Hence, follow directions advised on pertinent paint container.
9) When lacquer coating (quick-drying paint coating) is applied, dry coated surface and polish it with compound.
   In the case of melamine or acrylic coating, compound polishing can be omitted after drying.
l0) In the case of lacquer coating, wax should not be applied to coated surface until surface has dried completely (for approximately 2 months).

Before replacing exterior parts or assemblies, check paint conditions of all covered or hidden interior surfaces. If any rust scale is found at these places, proceed as follows:

1) Use a proper wire brush, adhesive or liquid rust removing agent to remove rust. As for method of use, follow directions advised for respective materials.
2) If necessary, wash parts with detergent, rinse, and dry them.
3) Before installing exterior body parts, apply anticorrosive compound to all cleaned surfaces of exterior body parts. Also, apply anticorrosive compound to inner surfaces of exterior body parts to be installed.

PLASTIC PARTS FINISHING

Paintable plastic parts are ABS plastic parts.

Painting

Rigid or hard ABS plastic needs no primer coating.

General acrylic lacquers can be painted properly over hard ABS plastic in terms of adherence.

1) Use cleaning solvent for paint finish to wash each part.
2) Apply conventional acrylic color lacquer to part surface.
3) Follow lacquer directions for required drying time. (Proper drying temperature range is 60 – 70 °C.)

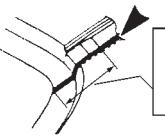
Reference

Plastic parts employ not only ABS (Acrylonitrile Butadiene Styrene) plastic but also polypropylene, vinyl, or the like plastic. Burning test method to identify ABS plastic is described below.

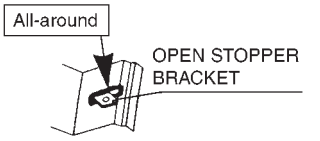
1) Use a sharp blade to cut off a plastic sliver from the part at its hidden backside.
2) Hold sliver with pincers and set it on fire.
3) Carefully observe condition of the burning plastic.
4) ABS plastic must raise readily distinguishable black smoke while burning with its residue suspended in air temporarily.
5) Polypropylene must raise no readily distinguishable smoke while burning.

SEALANT APPLICATION AREAS

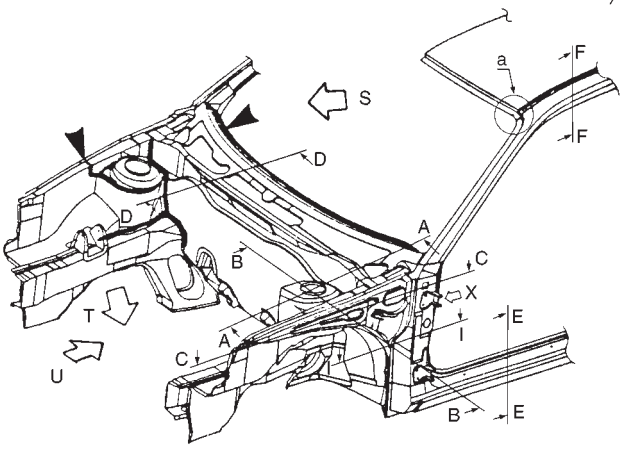
: Sealant application areas

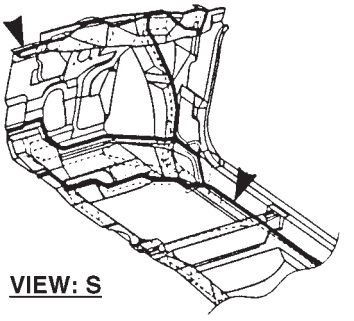


DETAIL: a

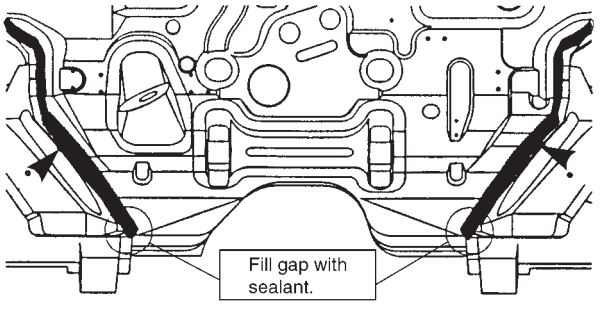


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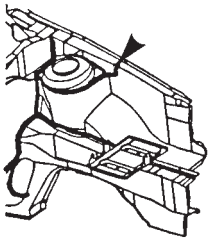




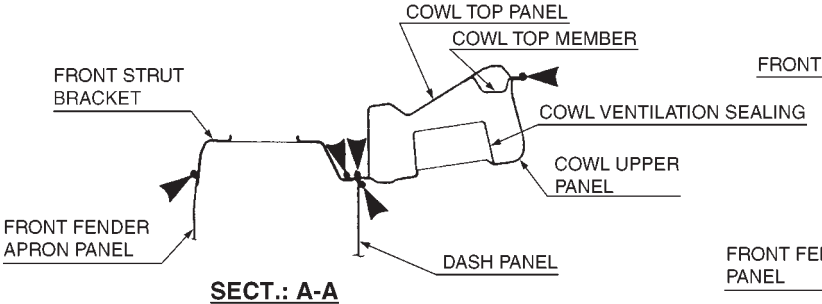
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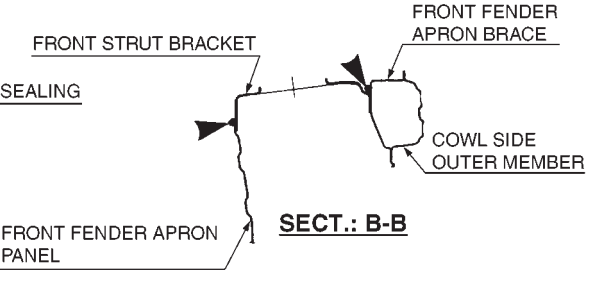
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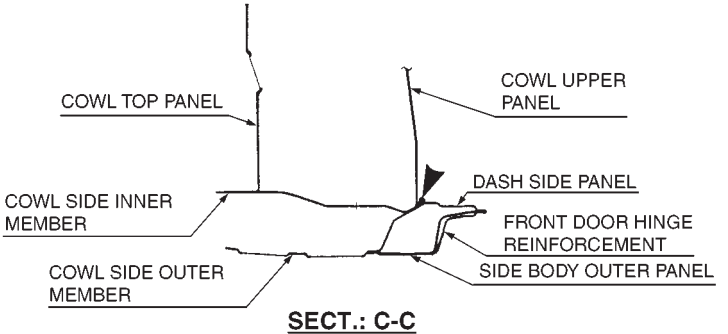
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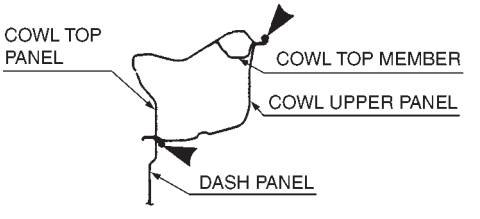
SECT.: A-A



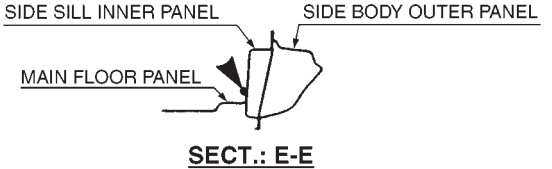
SECT.: B-B



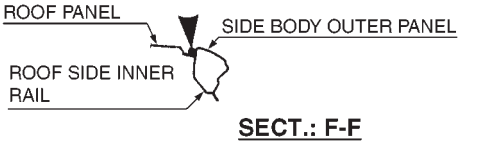
SECT.: C-C



SECT.: D-D

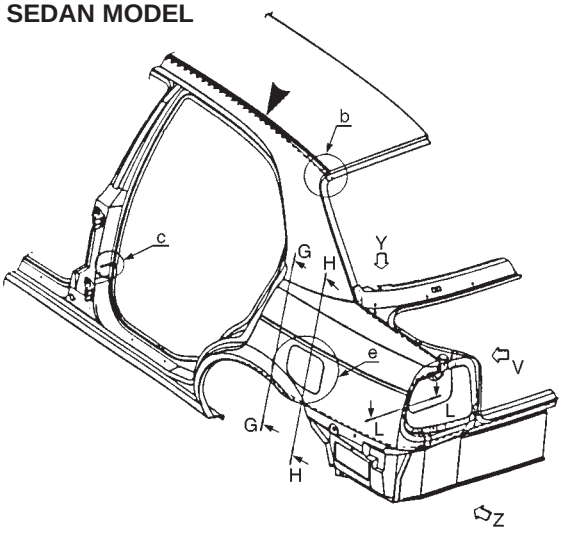


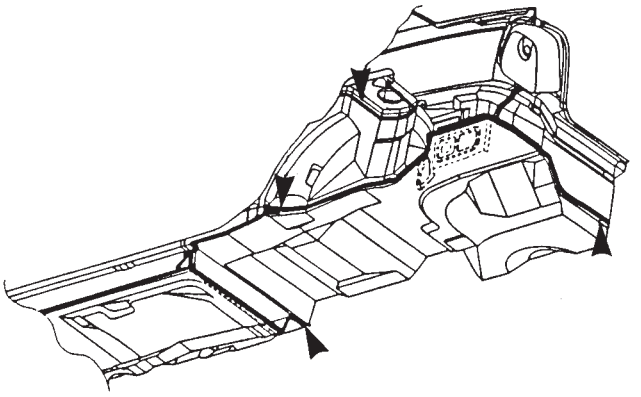
SECT.: E-E

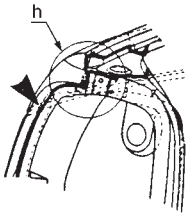


SECT.: F-F

SEDAN MODEL

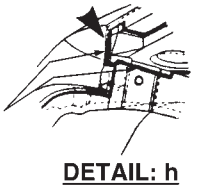




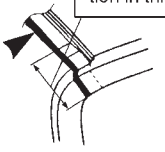


VIEW: V

Smooth out sealant with a brush in one direction.

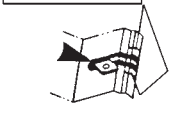


DETAIL: h



Wipe off excess sealant after application in this section.

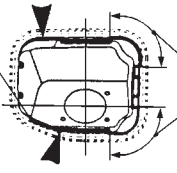
DETAIL: b



Wipe off excess sealant after application in this section.

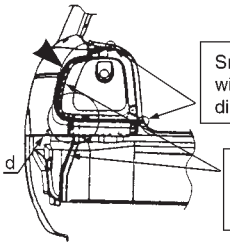
DETAIL: c

Smooth out sealant with a brush in one direction.



Wipe off excess sealant after application.

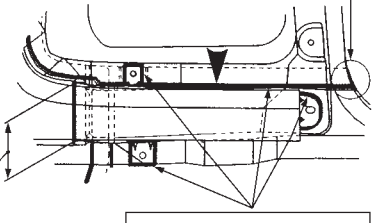
DETAIL: e



Smooth out sealant with a brush in one direction.

Smooth out sealant with a brush in one direction.

VIEW: Z

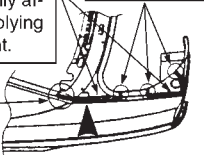


Wipe off the flange section only after applying sealant.

Wipe off excess sealant after application in this section.

Smooth out sealant with a brush in one direction.

DETAIL: d

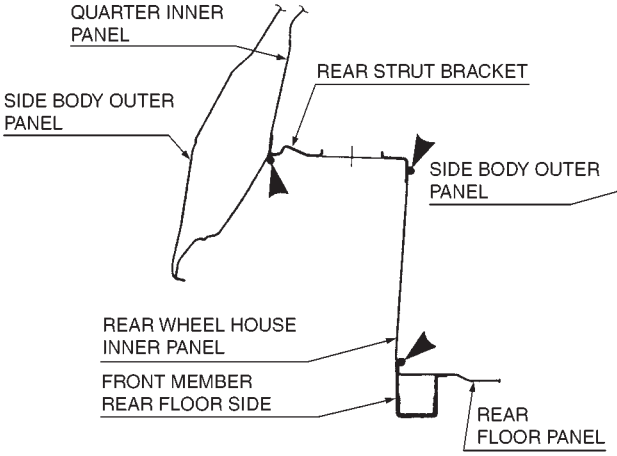


Wipe off the flange section only after applying sealant.

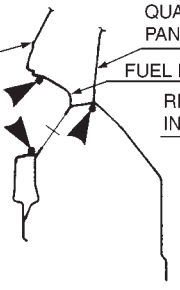
Wipe off the flange section only after applying sealant.

Wipe off excess sealant after application.

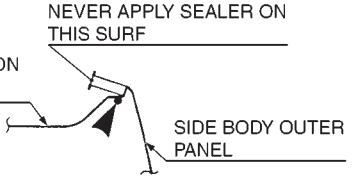
VIEW: Y



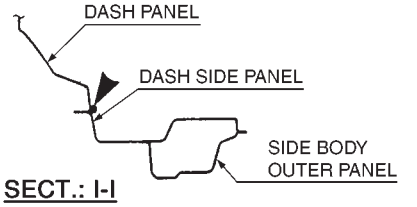
SECT.: G-G



SECT.: H-H



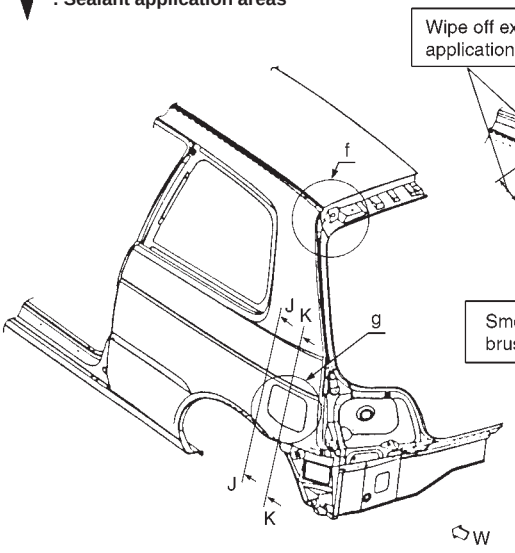
SECT.: L-L

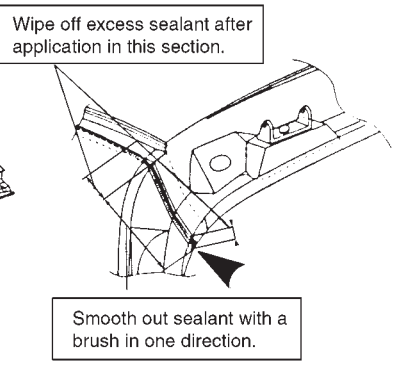


SECT.: I-I

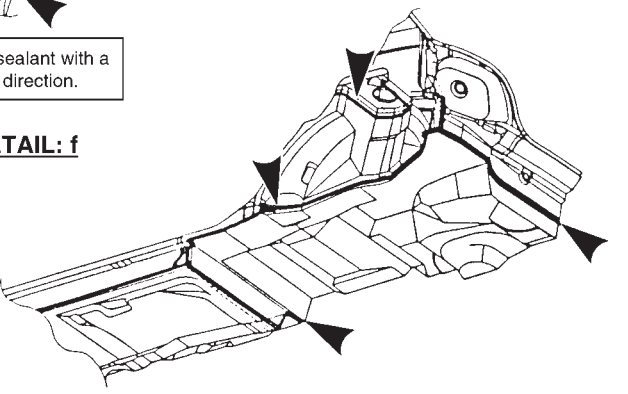
HATCH-BACK MODEL

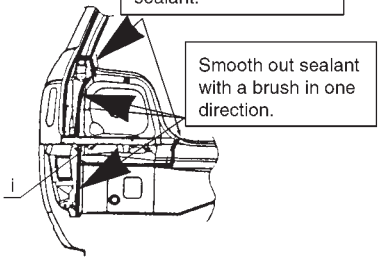
: Sealant application areas



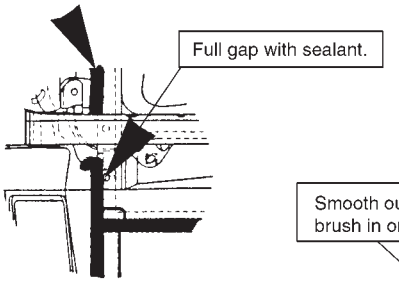


DETAIL: f

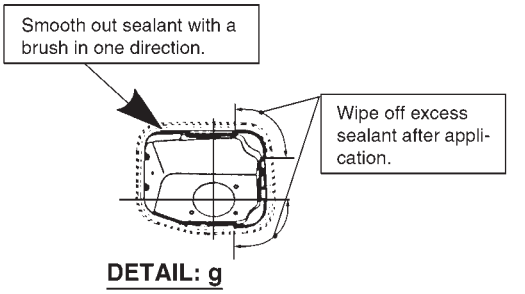




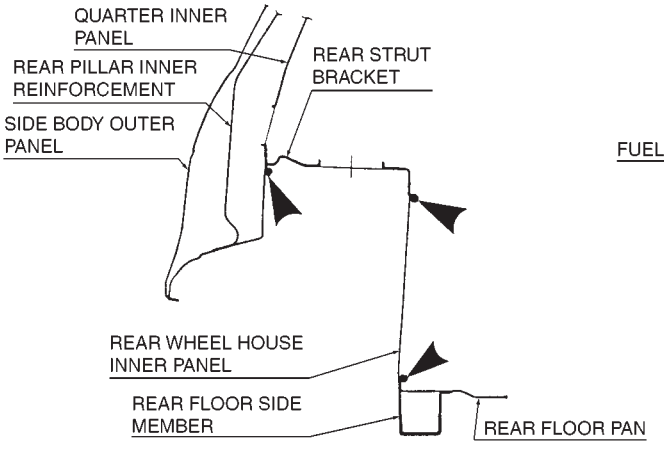
VIEW: W



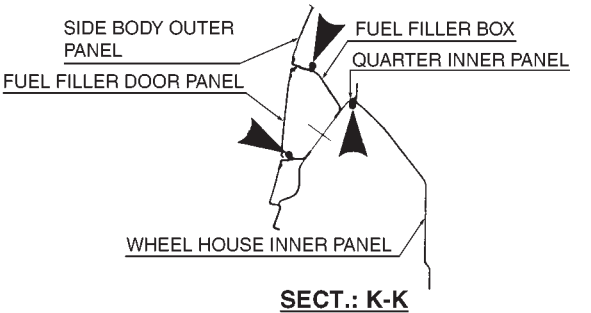
DETAIL: i



DETAIL: g

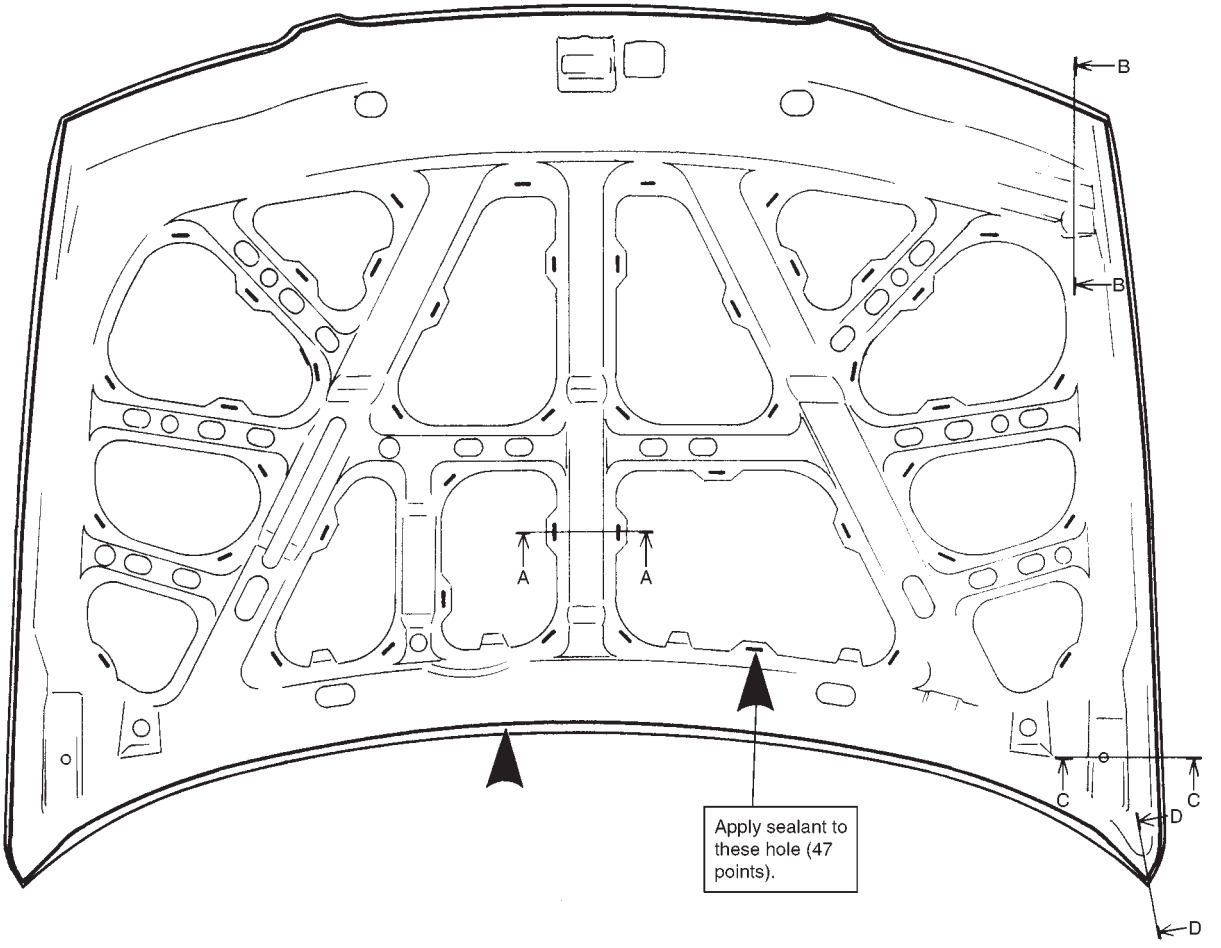


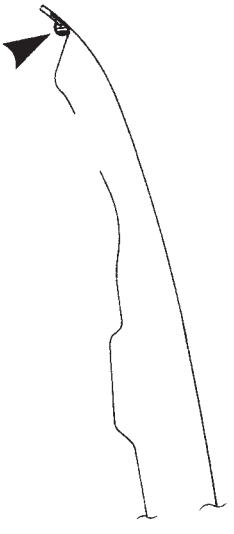
SECT.: J-J



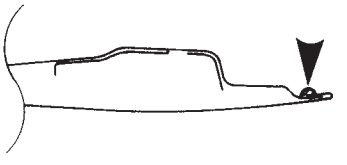
SECT.: K-K

FRONT HOOD





SECT.: B-B



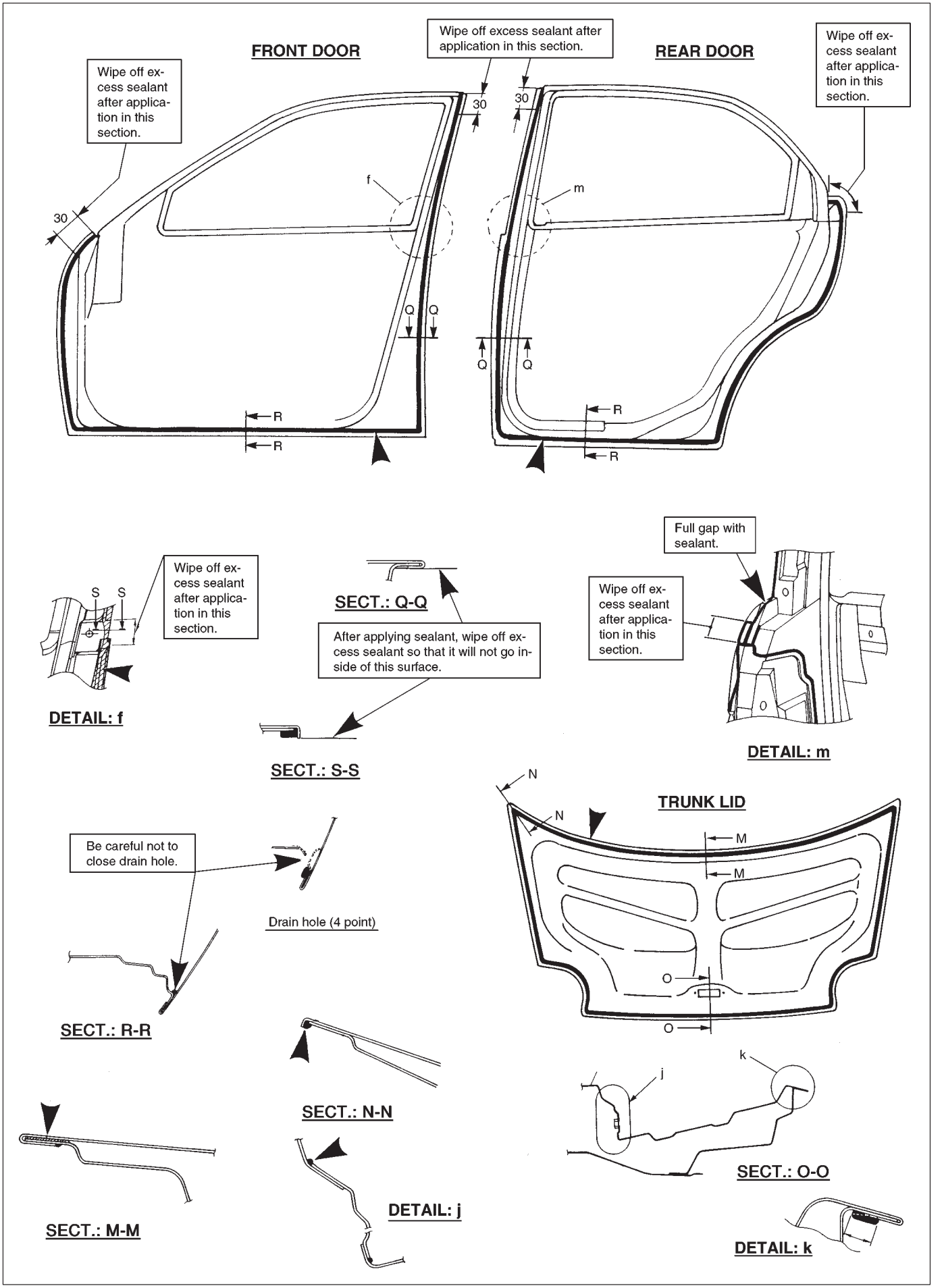
SECT.: C-C



SECT.: A-A

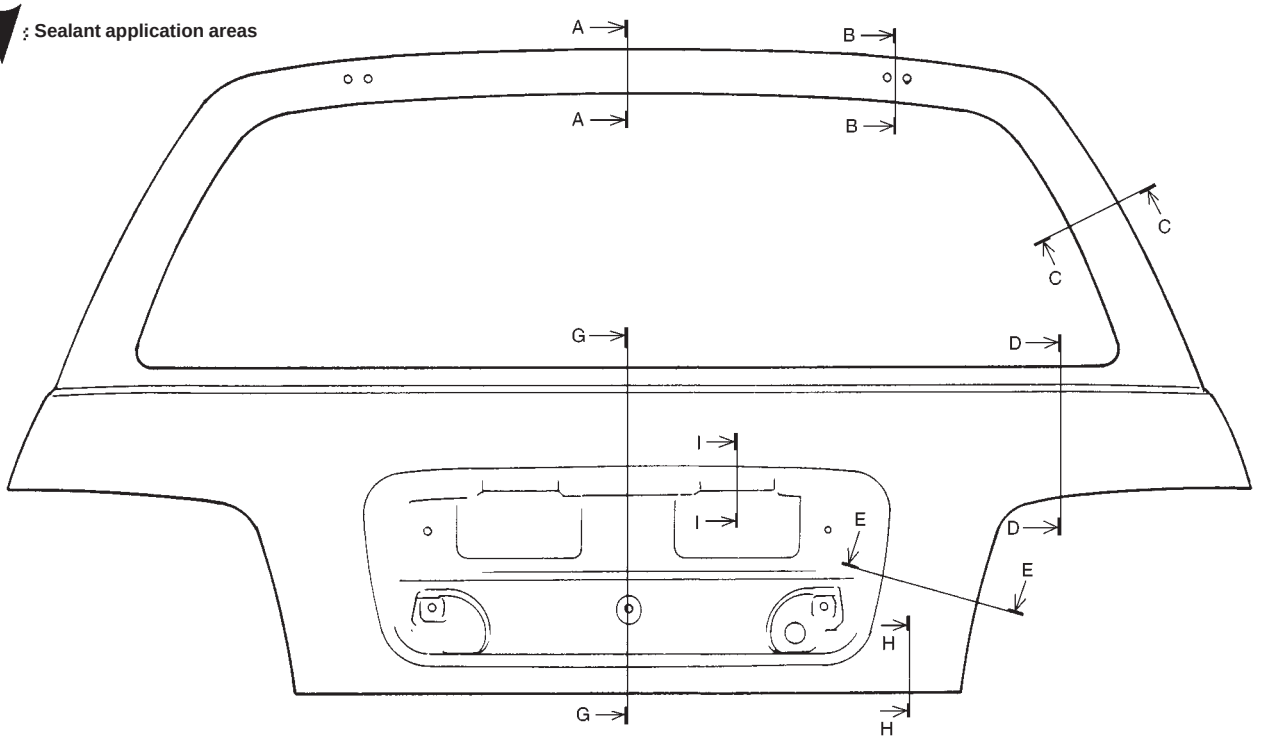


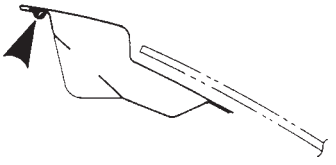
SECT.: D-D


FRONT DOOR
Wipe off excess sealant after application in this section.
REAR DOOR
Wipe off excess sealant after application in this section.
Wipe off excess sealant after application in this section.
30
30
30
f
m
Q
Q
Q
Q
R
R
R
R
S
S
Wipe off excess sealant after application in this section.
DETAIL: f
SECT.: Q-Q
After applying sealant, wipe off excess sealant so that it will not go inside of this surface.
SECT.: S-S
Full gap with sealant.
Wipe off excess sealant after application in this section.
DETAIL: m
N
N
TRUNK LID
M
M
O
O
Be careful not to close drain hole.
Drain hole (4 point)
SECT.: R-R
SECT.: N-N
k
j
SECT.: O-O
SECT.: M-M
DETAIL: j
DETAIL: k

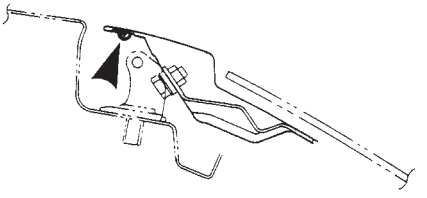
BACK DOOR (HATCH-BACK MODEL)

: Sealant application areas

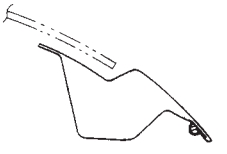




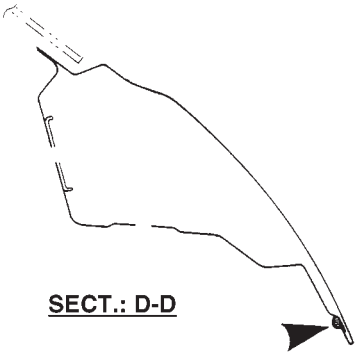
SECT.: A-A



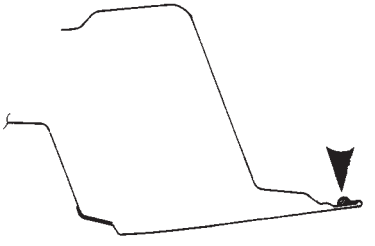
SECT.: B-B



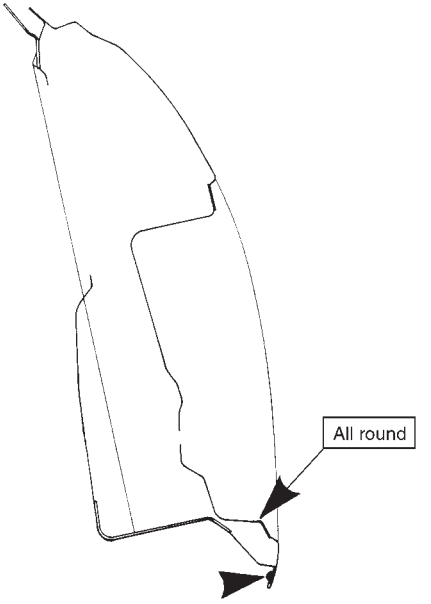
SECT.: C-C



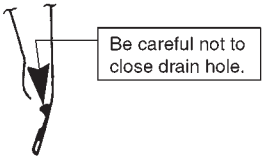
SECT.: D-D



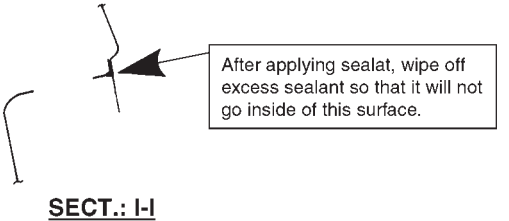
SECT.: E-E



SECT.: G-G



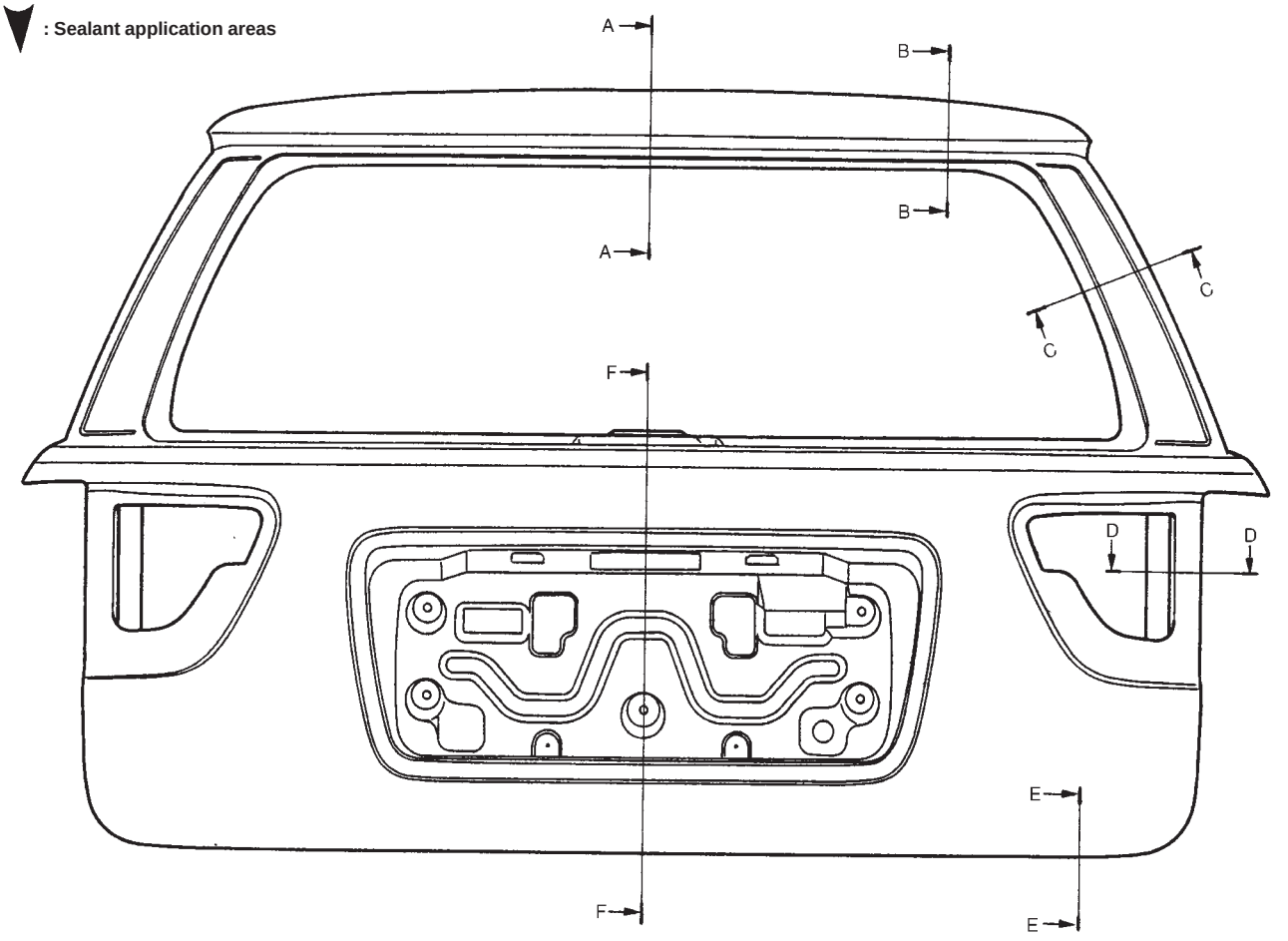
SECT.: H-H



SECT.: I-I

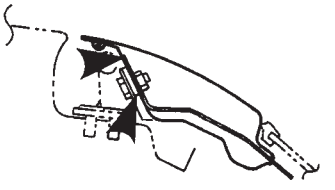
BACK DOOR (WAGON MODEL)

: Sealant application areas

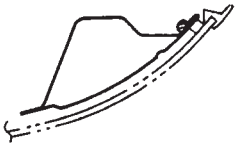




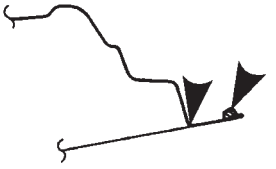
SECT.: A-A



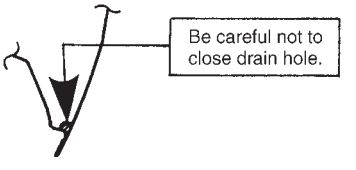
SECT.: B-B



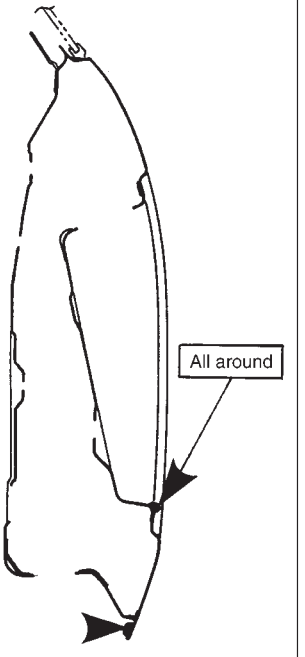
SECT.: C-C



SECT.: D-D

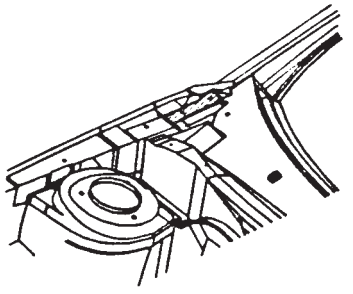


SECT.: E-E

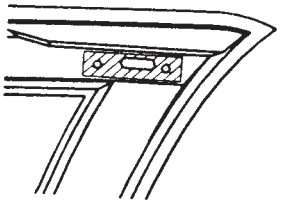


SECT.: F-F

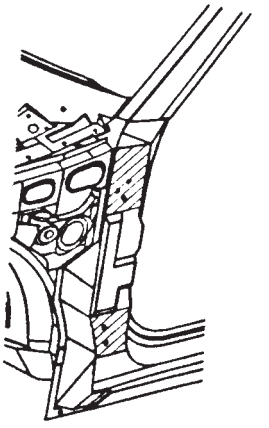
: Apply sealant to shaded area.



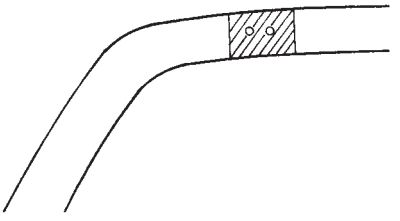
COWL TOP



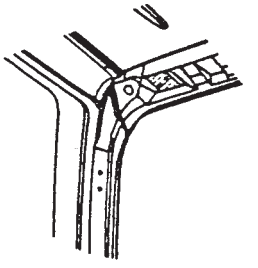
FRONT HOOD



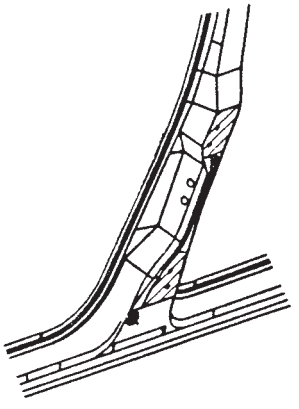
FRONT PILLAR



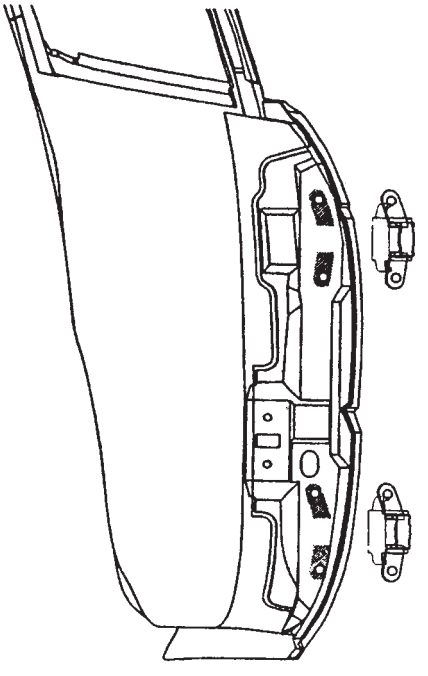
BACK DOOR HINGE (HATCH-BACK MODEL)



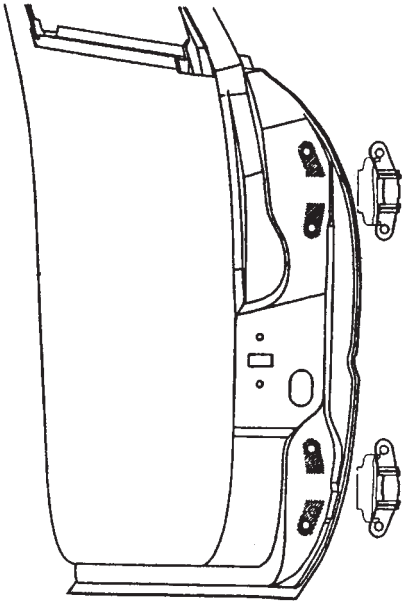
BACK DOOR (WAGON MODEL)



CENTER PILLAR



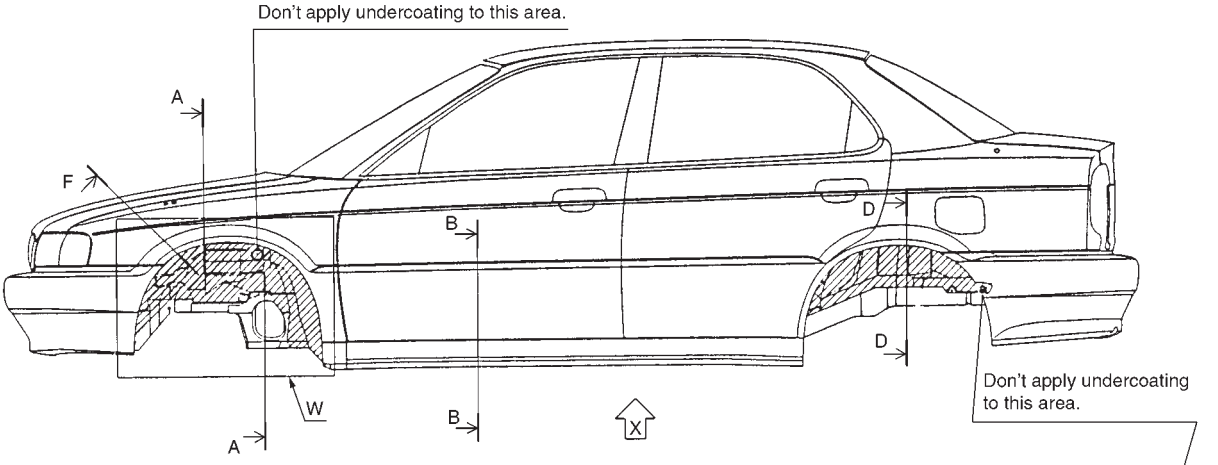
REAR DOOR

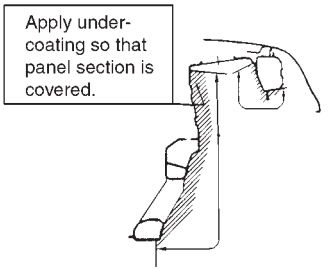


FRONT DOOR

UNDERCOATING APPLICATION AREAS

///// : **Apply undercoating to shaded area. (Over 400l m)**





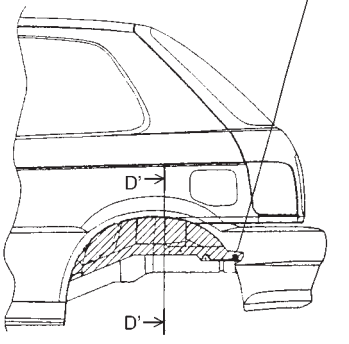
SECT.: A-A

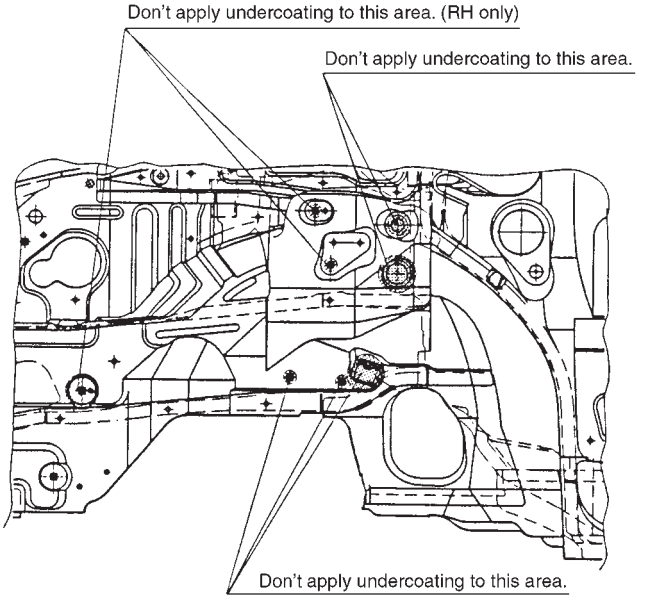


SECT.: B-B

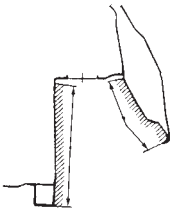


SECT.: F-F

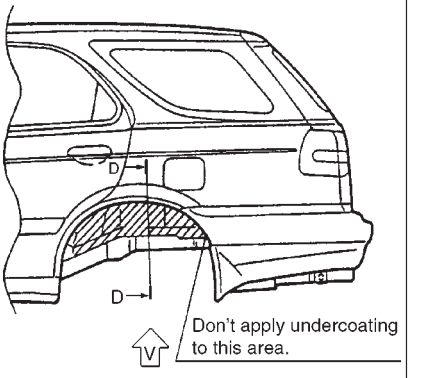


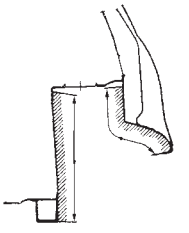


DETAIL: W



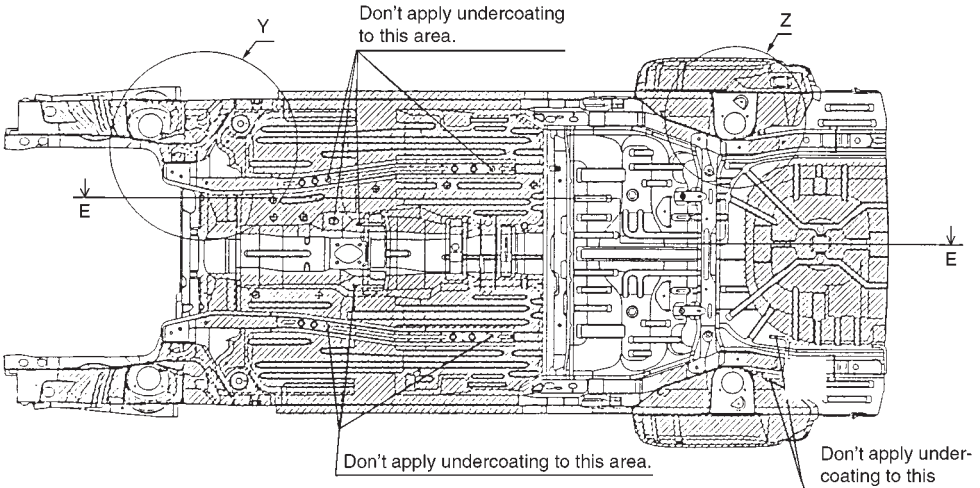
SECT.: D-D



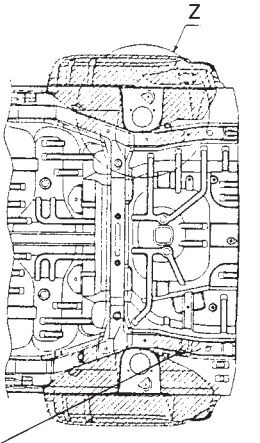


SECT.: D'-D'

SEDAN MODEL



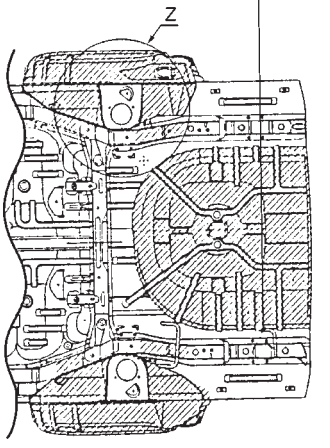
HATCH-BACK MODEL



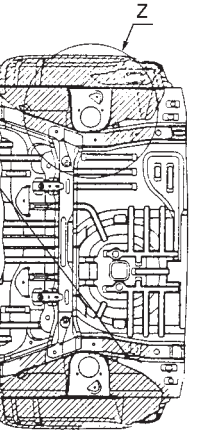
VIEW: V (2WD model)

Don't apply undercoating to this area.

WAGON MODEL



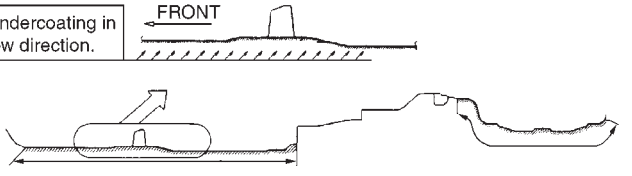
VIEW: V



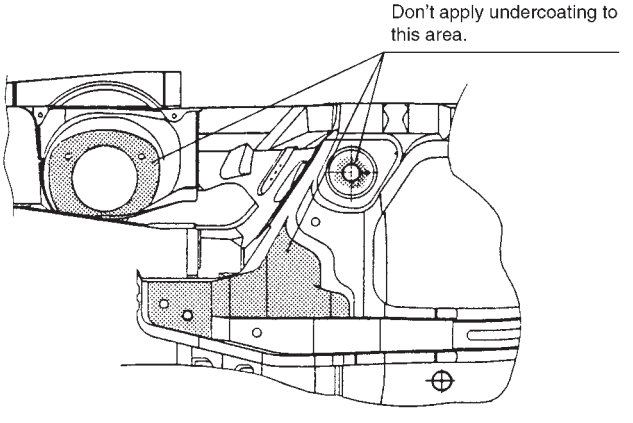
VIEW: V (4WD model)

VIEW: X

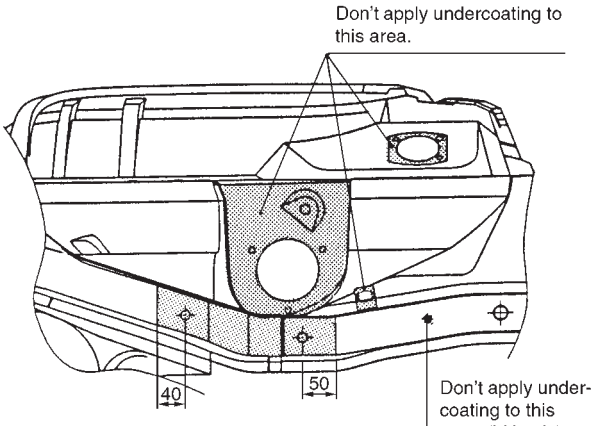
Apply undercoating in the arrow direction.



SECT.: E-E

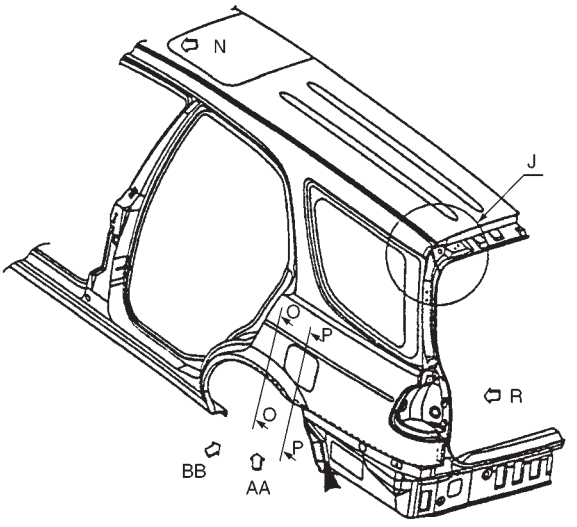


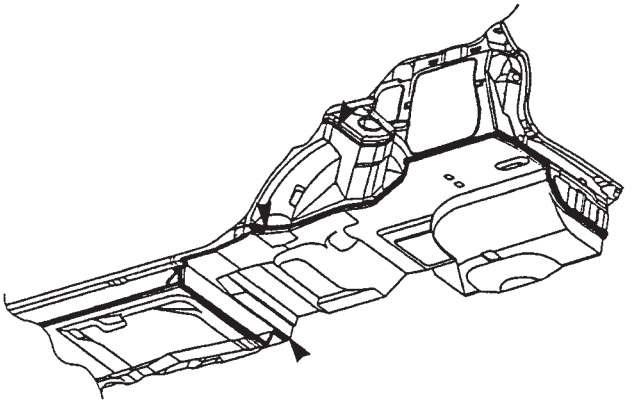
DETAIL: Y

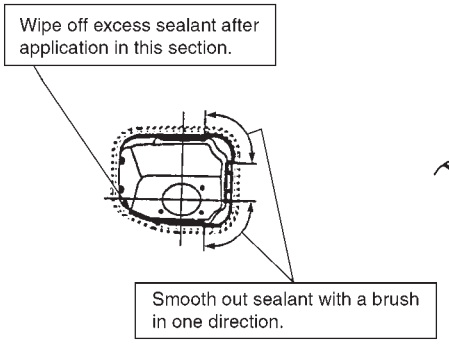


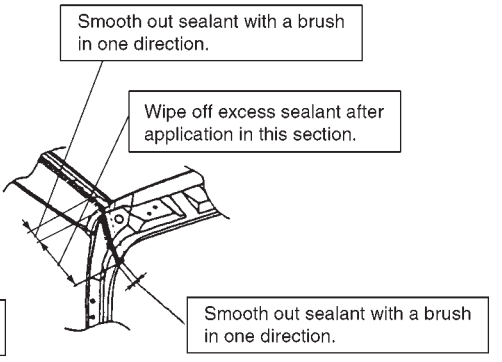
DETAIL: Z

WAGON MODEL

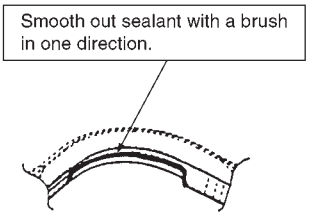




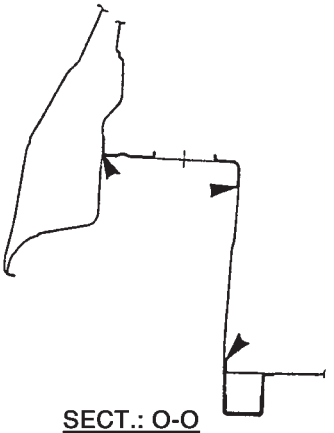




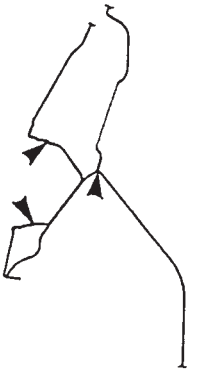
DETAIL: J



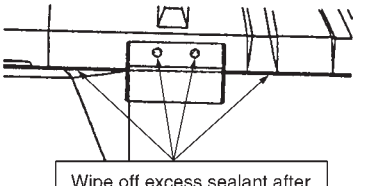
VIEW: N



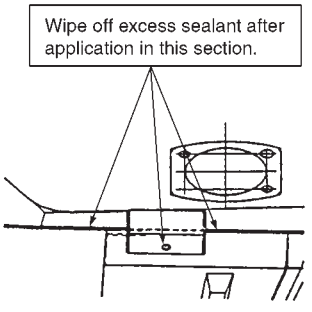
SECT.: O-O



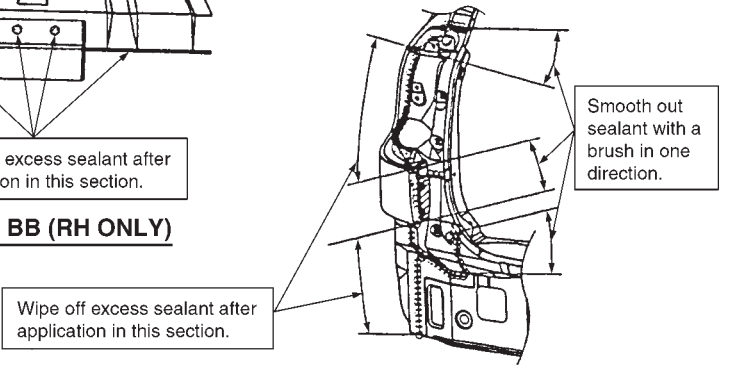
SECT.: P-P



VIEW: BB (RH ONLY)



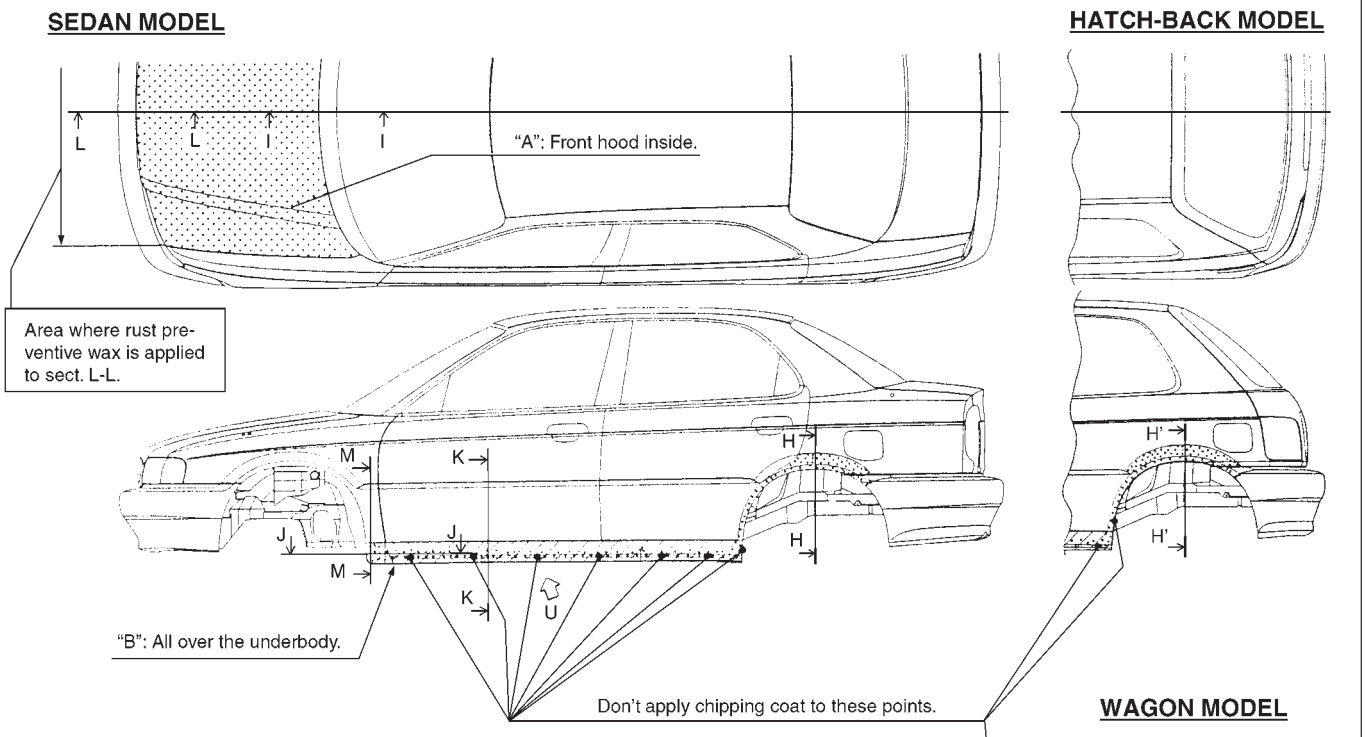
VIEW: AA (LH ONLY)

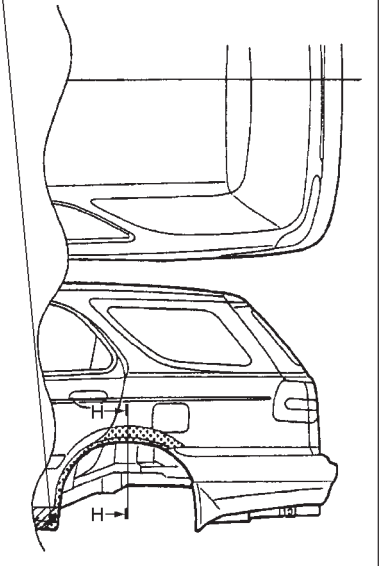


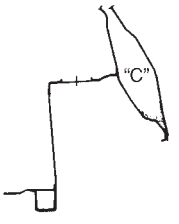
VIEW: R

ANTI-CORROSION COMPOUND AND CHIP RESISTANT MATERIAL APPLICATION AREAS

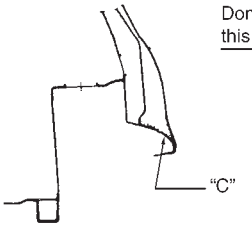
////// : Apply chipping coat.
⁝⁝⁝ : Apply rust preventive wax.
"A": Engine room coat wax.
"B": Underbody coat wax.
"C": Cabity wax.



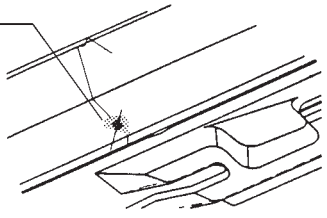




SECT.: H-H



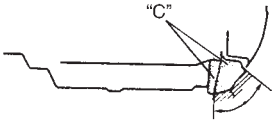
SECT.: H'-H'



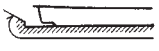
VIEW: U



SECT.: I-I



SECT.: K-K



SECT.: J-J



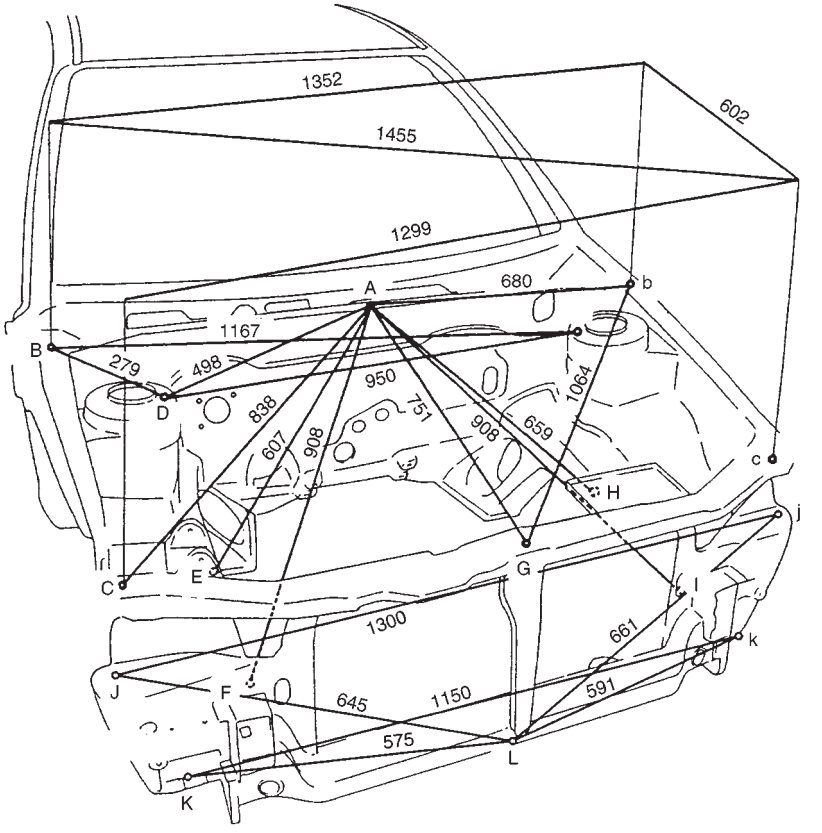
SECT.: L-L

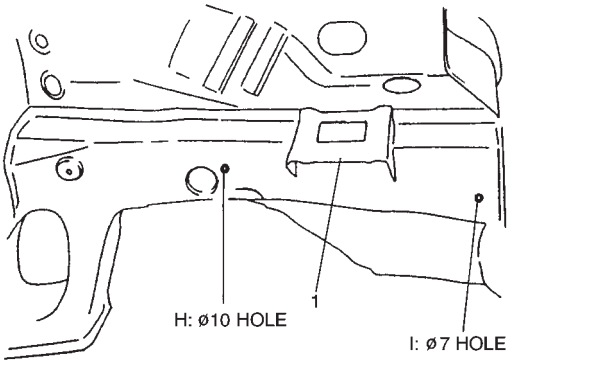


SECT.: M-M

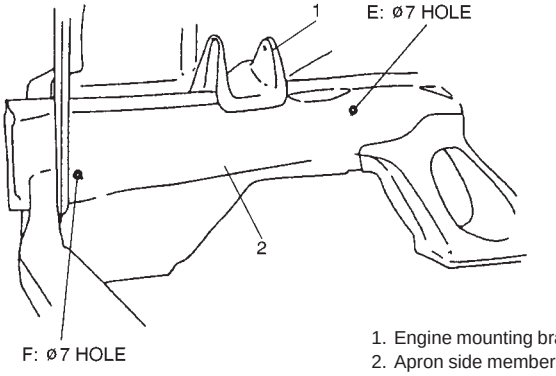
BODY DIMENSIONS

SEDAN MODEL



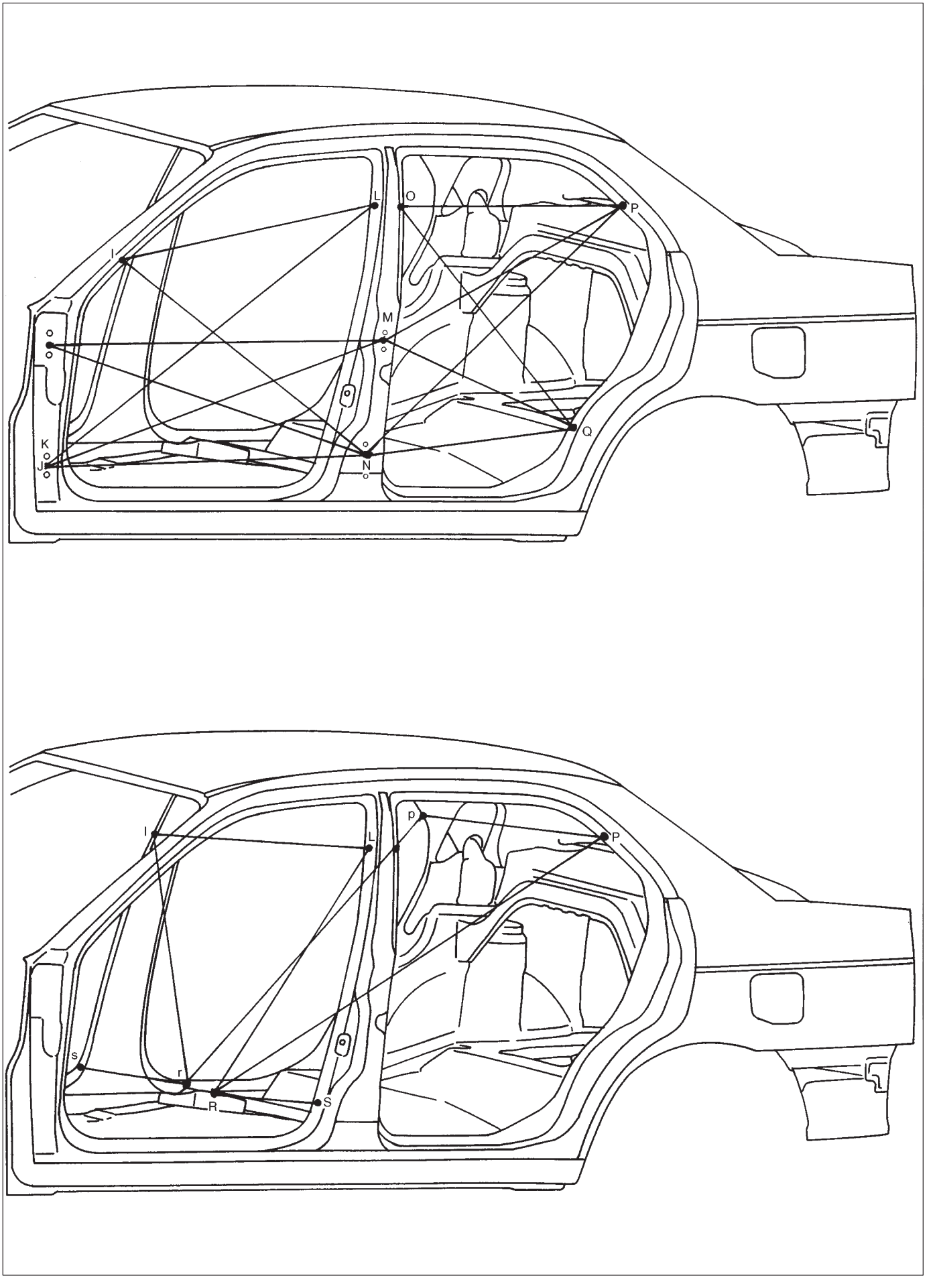


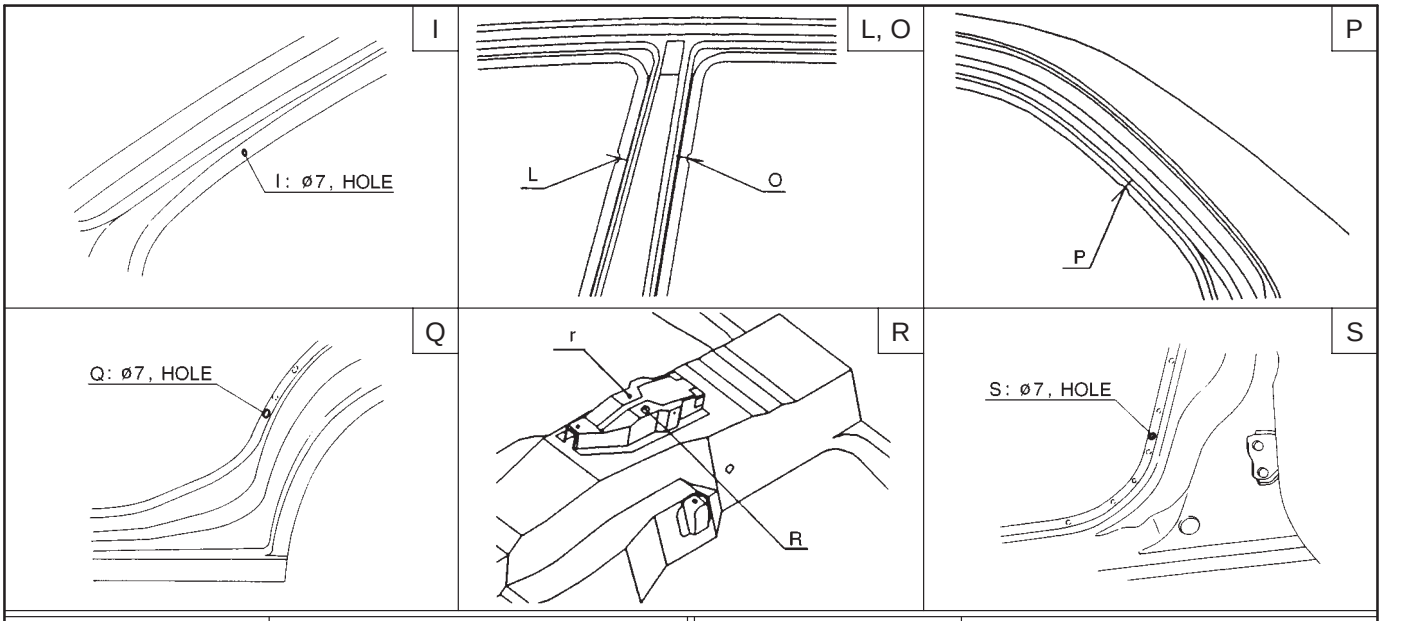
1. Battery bracket



1. Engine mounting bracket
2. Apron side member

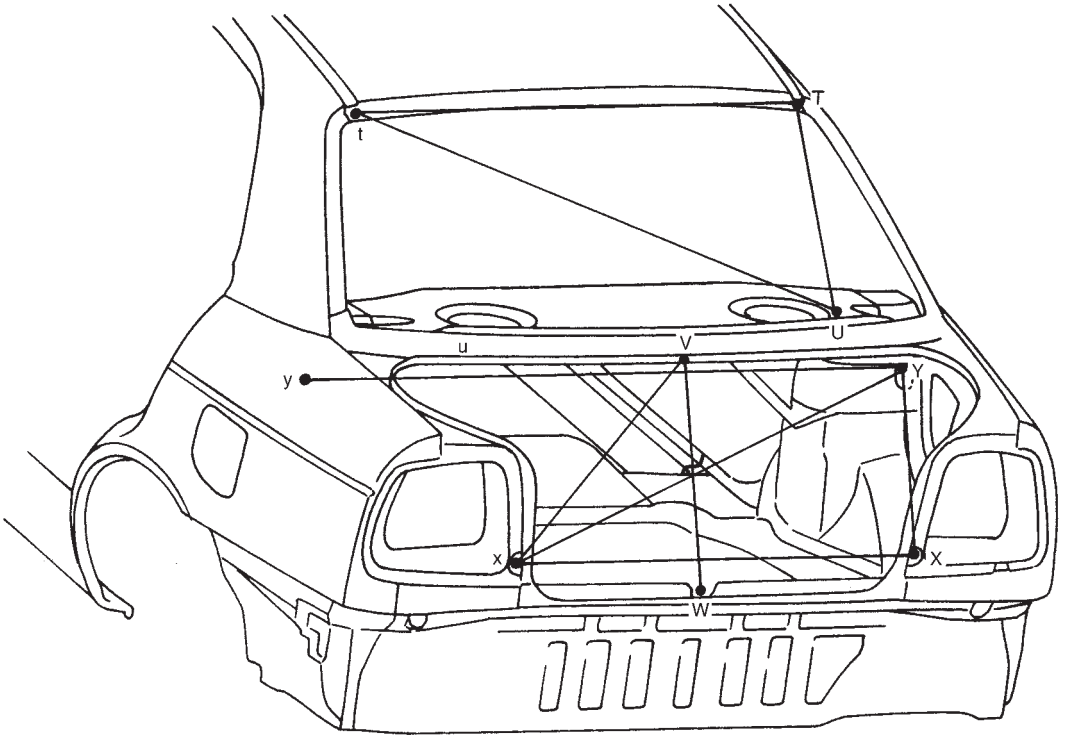
MEASUREMENT POSITION	LENGTH mm (in.)	MEASUREMENT POSITION	LENGTH mm (in.)
A – b	680 (26.77)	b – c	602 (23.70)
A – C	838 (32.99)	B – d	1167 (45.94)
A – D	498 (19.61)	C – c	1299 (51.41)
A – E	607 (23.90)	D – d	950 (37.40)
A – F	908 (35.75)	G – b	1064 (41.89)
A – G	751 (29.57)	J – j	1300 (51.18)
A – H	659 (25.94)	J – L	645 (25.39)
A – I	908 (35.75)	K – k	1150 (45.28)
B – b	1352 (53.23)	K – L	575 (22.64)
B – c	1455 (57.28)	L – j	661 (26.02)
B – D	279 (10.98)	L – k	591 (23.27)

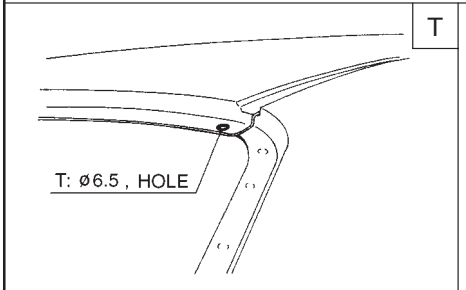

L
O
P
I
M
K
J
N
Q
I
p
L
P
s
r
R
S

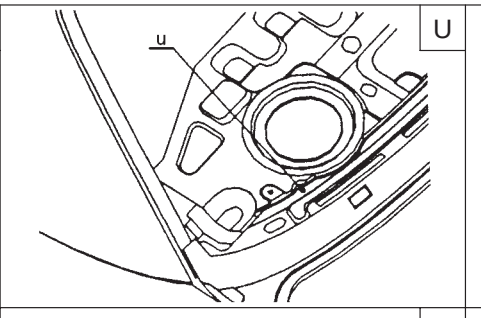


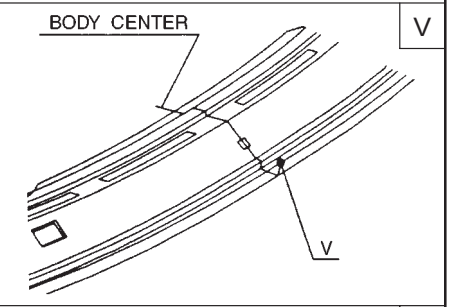
MEASUREMENT POSITION	LENGTH mm (in.)
I – L	833 (32.80)
I – N	941 (37.05)
J – M	1046 (41.18)
J – N	1081 (42.56)
K – L	1316 (51.81)
K – M	1102 (43.39)
K – N	1037 (40.83)
O – P	685 (26.97)
O – Q	821 (32.32)

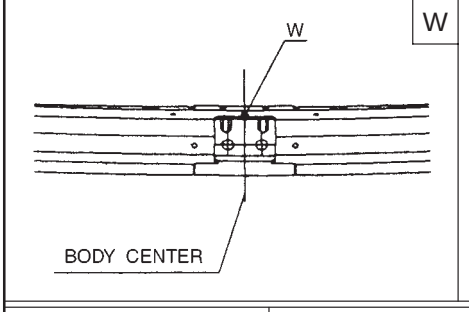
MEASUREMENT POSITION	LENGTH mm (in.)
M – P	923 (36.34)
M – Q	708 (27.87)
N – P	1104 (43.46)
N – Q	673 (26.50)
R – L	966 (38.03)
R – P	1332 (52.44)
R – S	691 (27.20)
r – I	948 (37.32)
r – p	1320 (51.97)
r – s	661 (26.02)

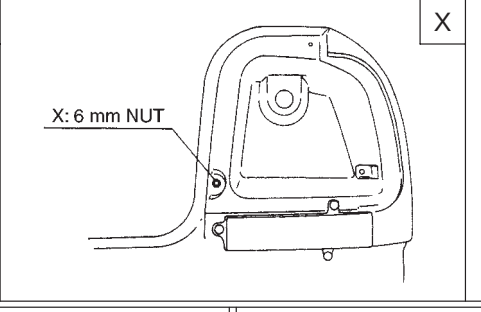


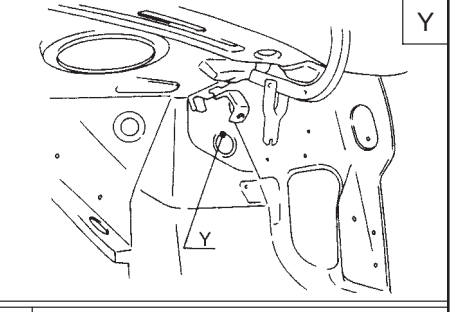








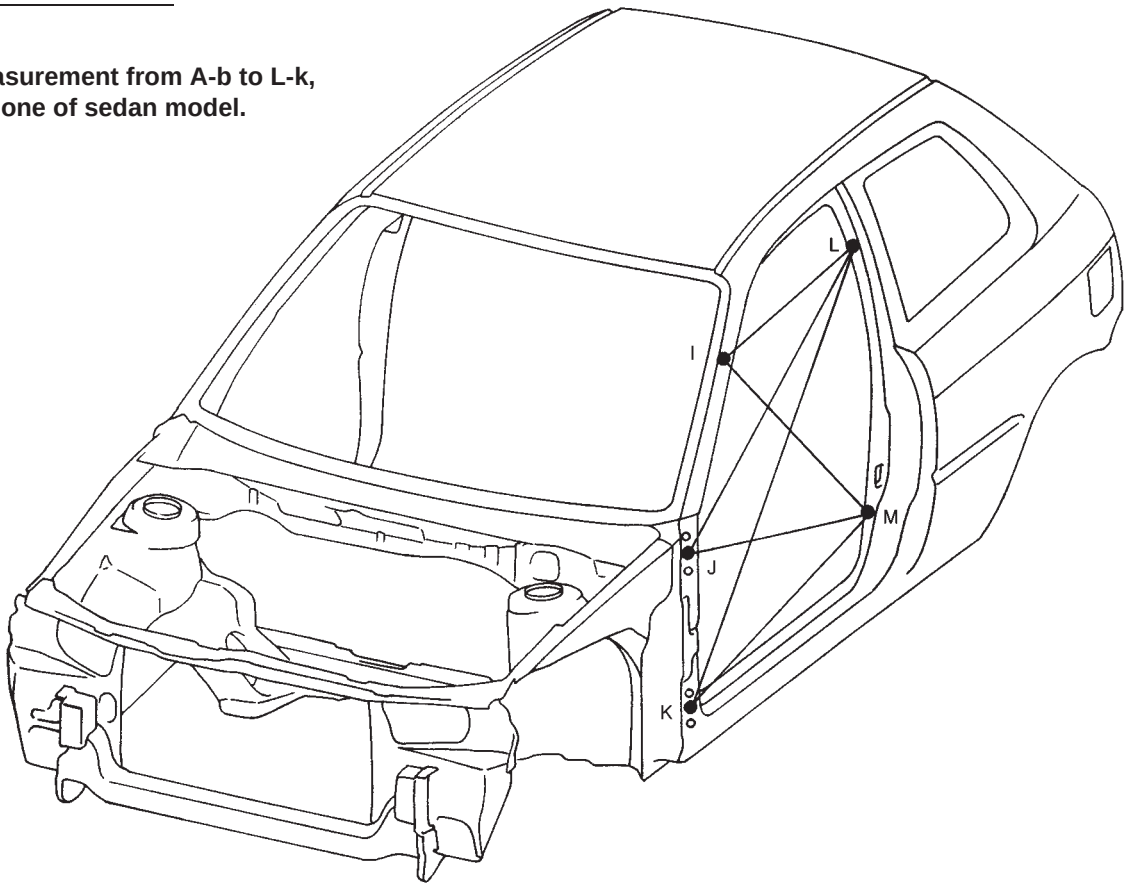


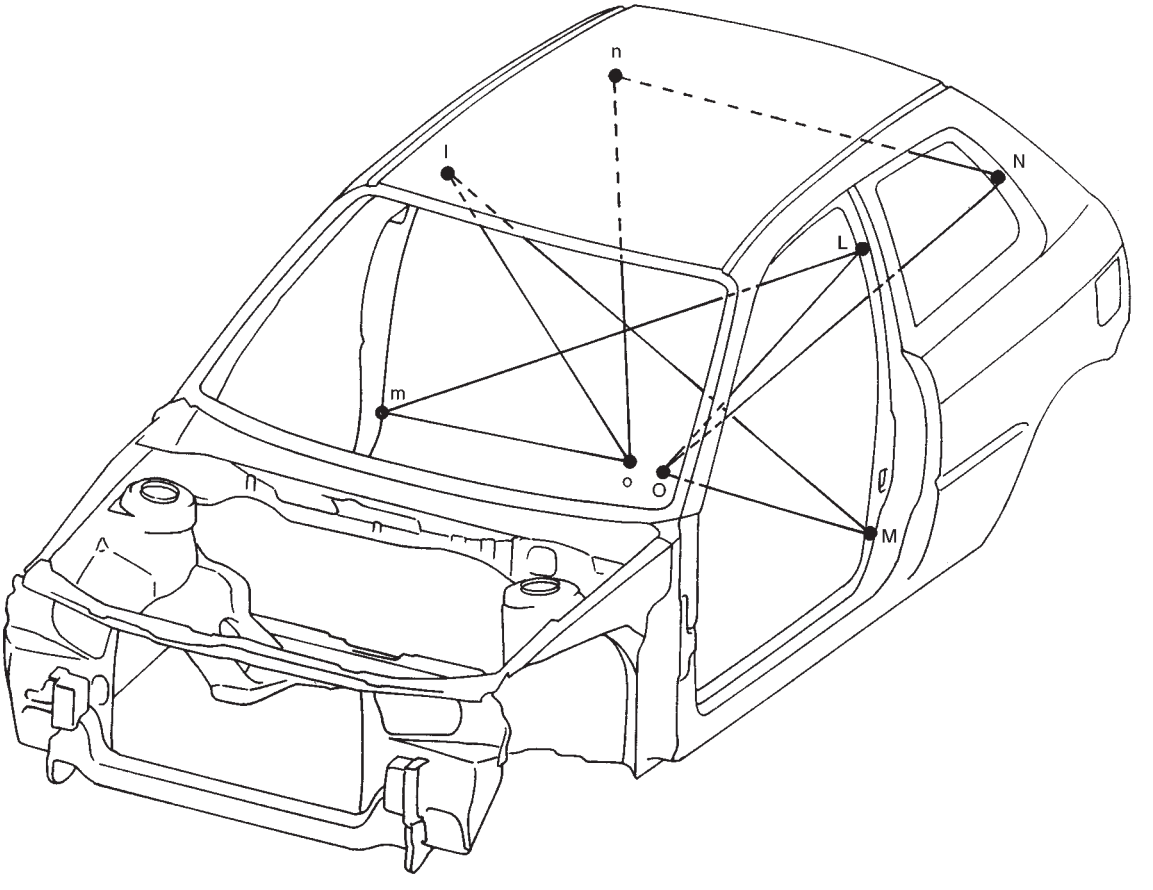


MEASUREMENT POSITION	LENGTH mm (in.)	MEASUREMENT POSITION	LENGTH mm (in.)
T – t	898 (35.35)	X – x	825 (32.48)
T – U	514 (20.24)	Y – X	694 (27.32)
t – U	991 (39.02)	Y – x	1247 (49.09)
V – x	1046 (41.18)	Y – y	1300 (51.18)
V – W	458 (18.03)		

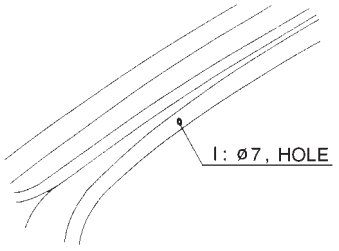
HATCH-BACK MODEL

NOTE:
For measurement from A-b to L-k, refer to one of sedan model.

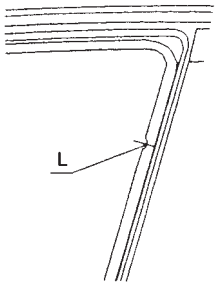




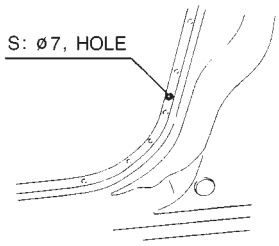
I



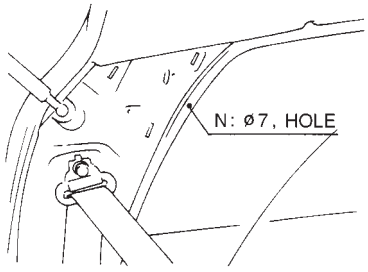
L



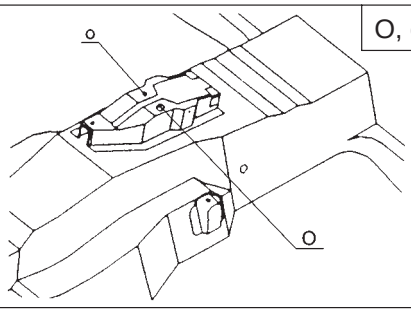
M



N



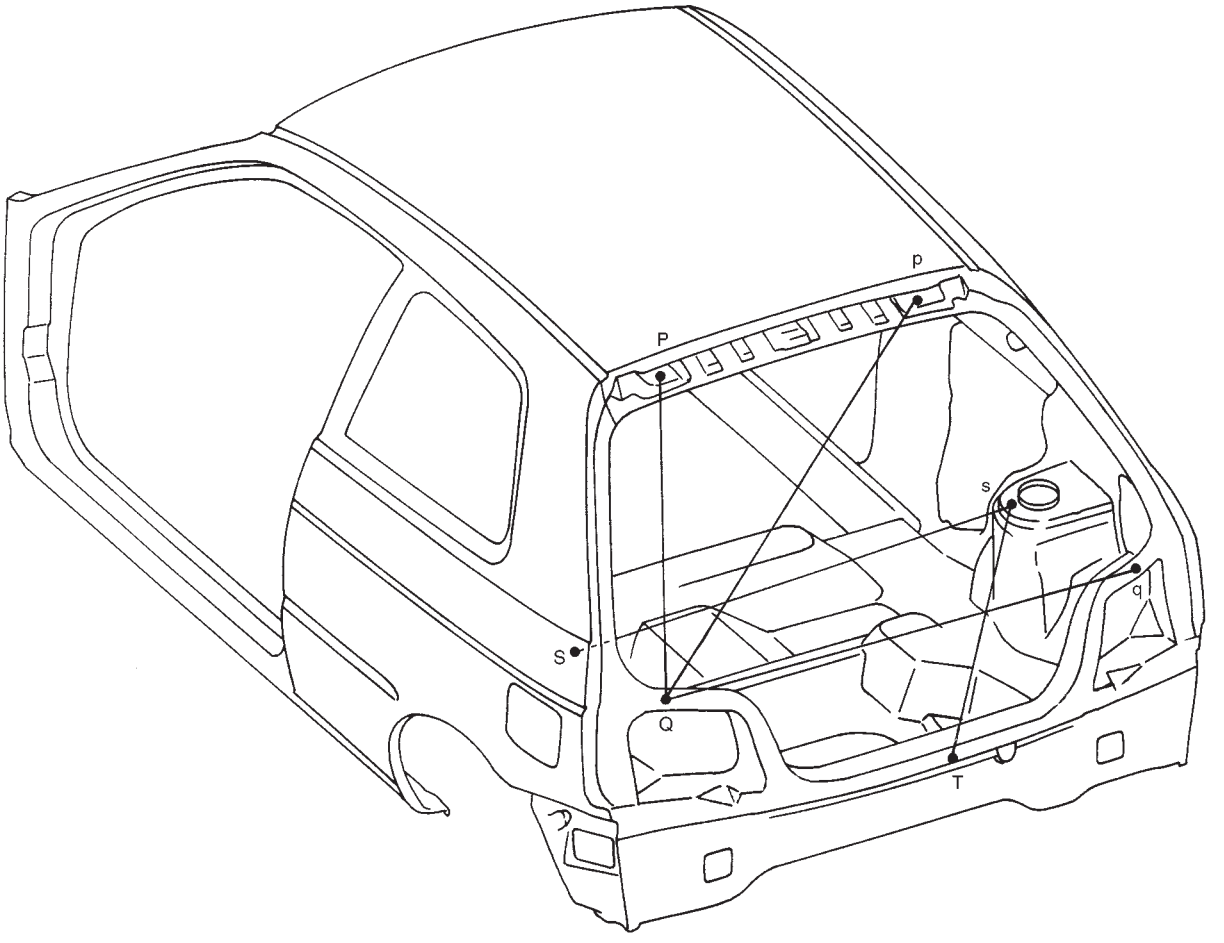
O, o



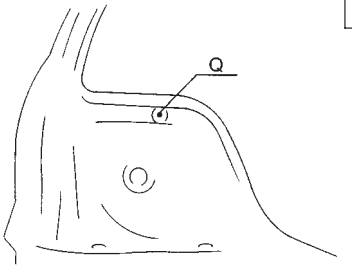
–

MEASUREMENT POSITION	LENGTH mm (in.)
I – L	665 (26.18)
I – M	870 (34.25)
J – L	1268 (49.92)
J – M	1179 (46.42)
K – L	1411 (55.55)
K – M	1172 (46.14)
L – m	1418 (55.83)

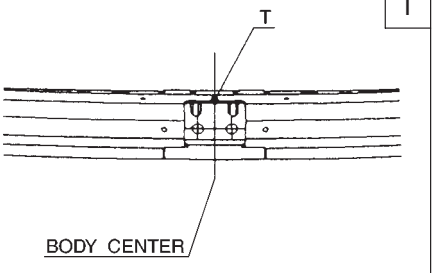
MEASUREMENT POSITION	LENGTH mm (in.)
L – O	998 (39.29)
I – M	1418 (55.83)
I – o	980 (38.58)
m – I	1418 (55.83)
m – o	722 (28.43)
N – n	1226 (48.27)
N – O	1319 (51.93)
n – o	1306 (51.42)



Q



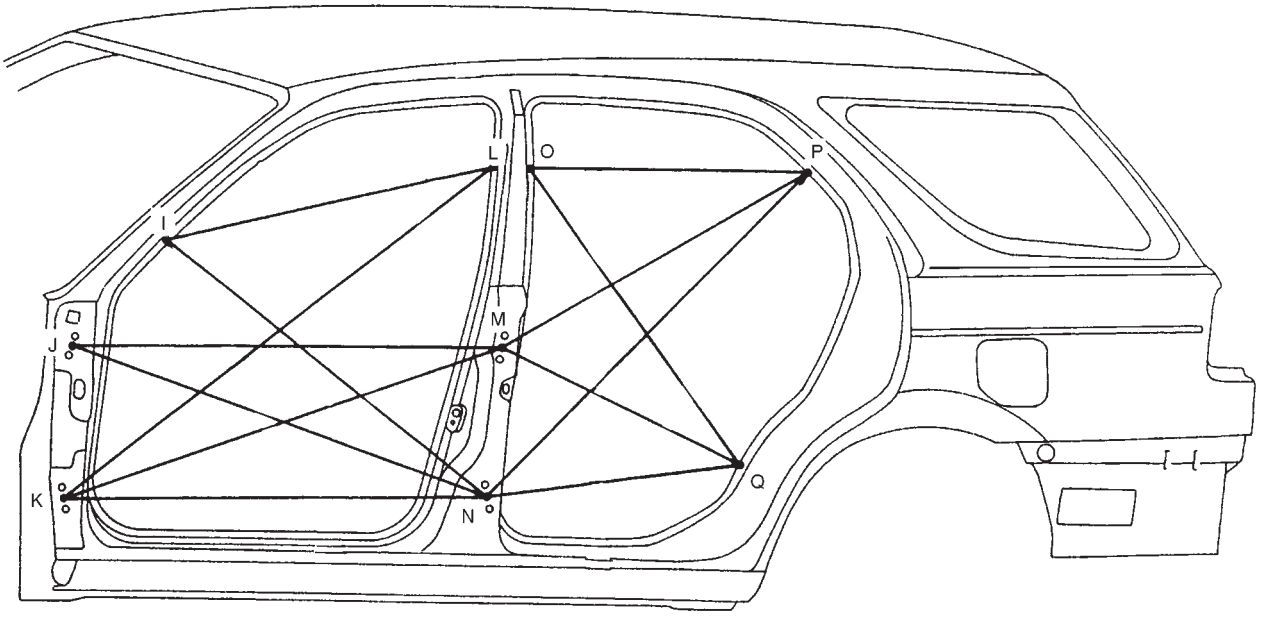
T

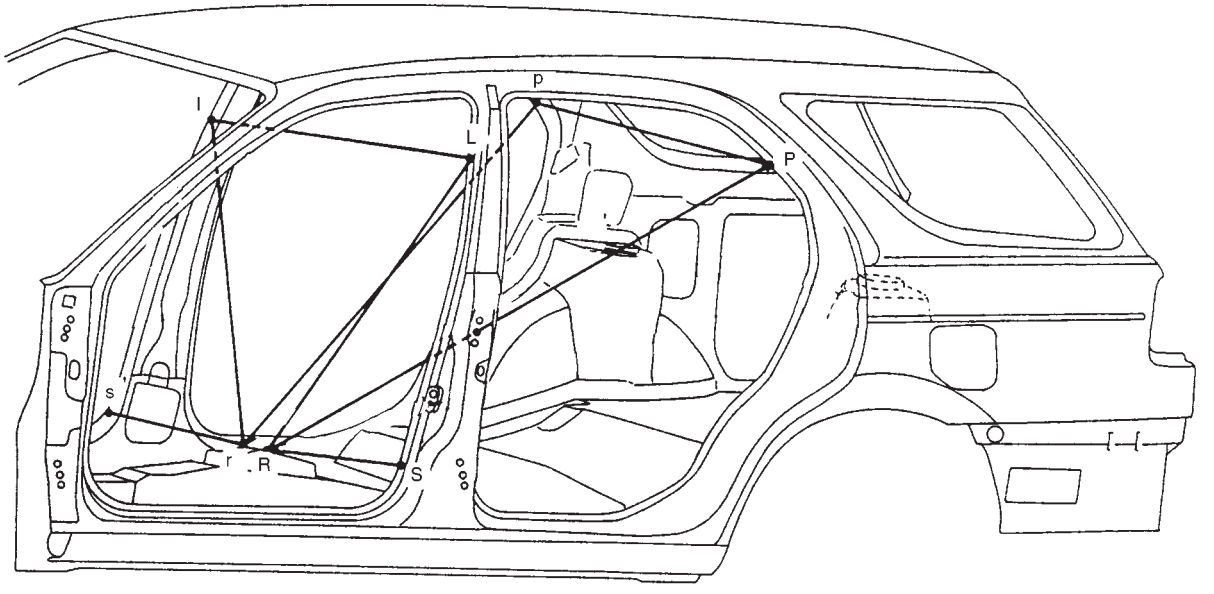


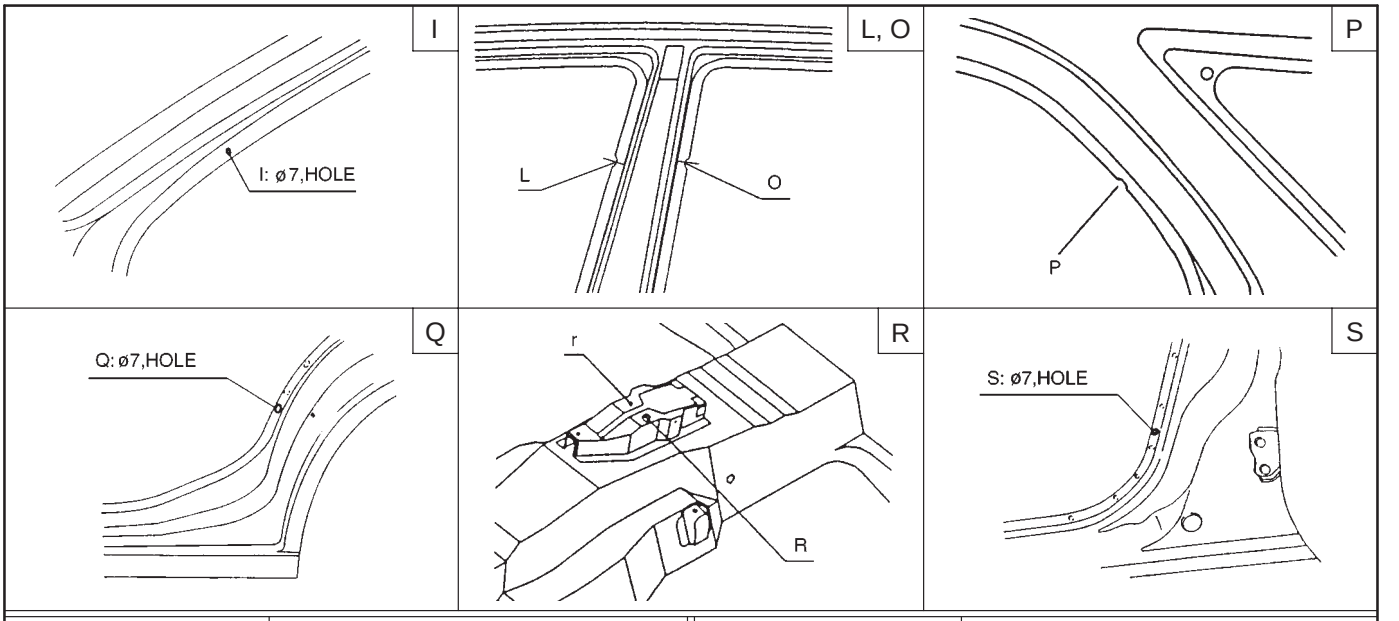
–

MEASUREMENT POSITION	LENGTH mm (in.)
P – Q	729 (28.70)
p – Q	1096 (43.15)
Q – q	1031 (40.59)
S – s	988 (38.90)
T – s	659 (25.94)

WAGON MODEL

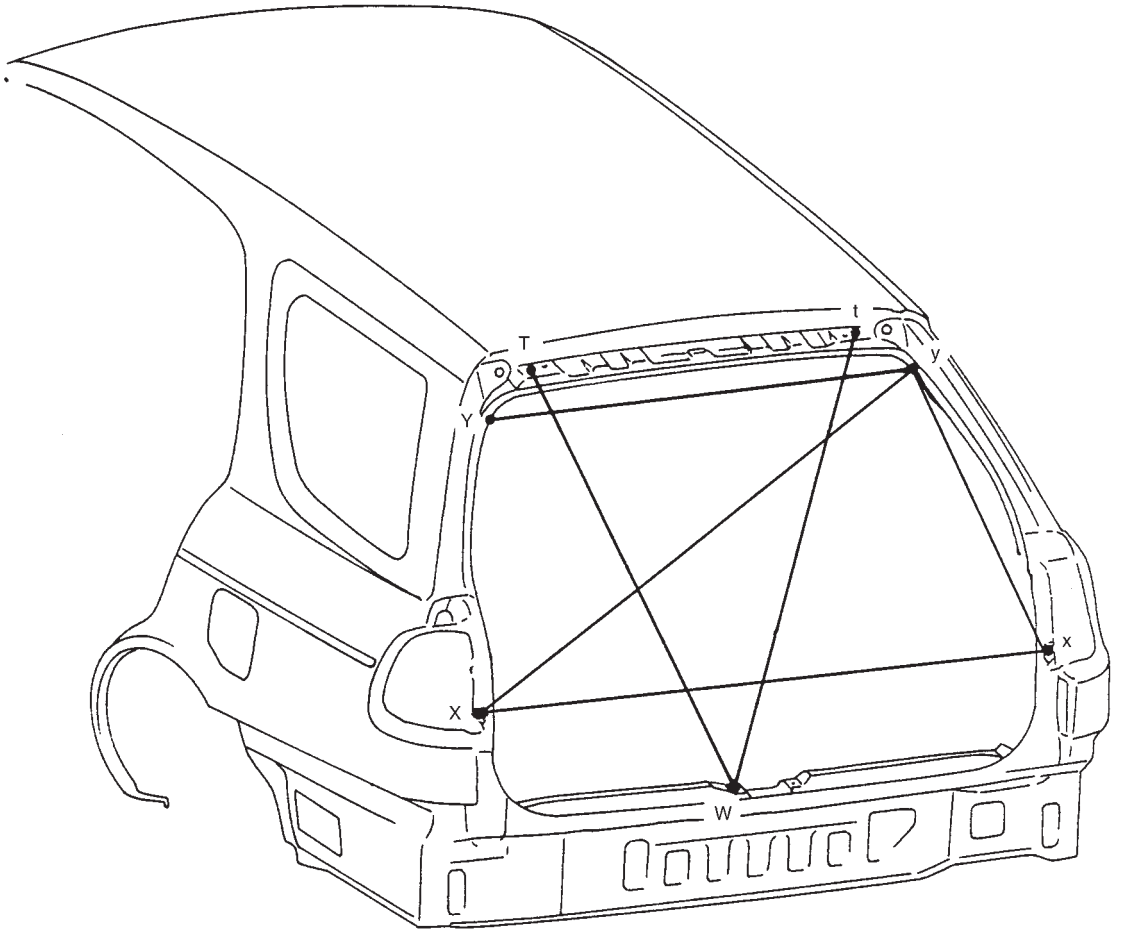




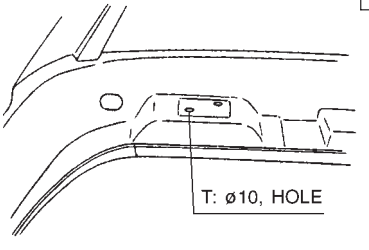


MEASUREMENT POSITION	LENGTH mm (in.)
I – L	833 (32.80)
I – N	941 (37.05)
J – M	1048 (41.26)
J – N	1081 (42.56)
K – L	1316 (51.81)
K – M	1102 (43.39)
K – N	1032 (40.63)
O – P	685 (26.97)
O – Q	821 (32.32)

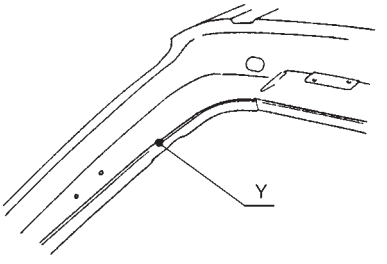
MEASUREMENT POSITION	LENGTH mm (in.)
M – P	923 (36.34)
M – Q	708 (27.87)
N – P	1104 (43.46)
N – Q	673 (26.50)
R – L	966 (38.03)
R – P	1332 (52.44)
R – S	691 (27.20)
r – l	948 (37.32)
r – p	1317 (51.85)
r – s	661 (26.02)



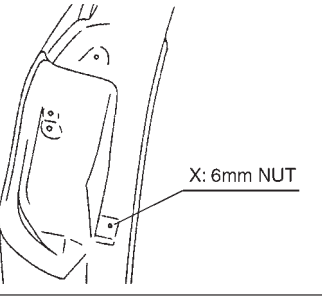
T



Y



X



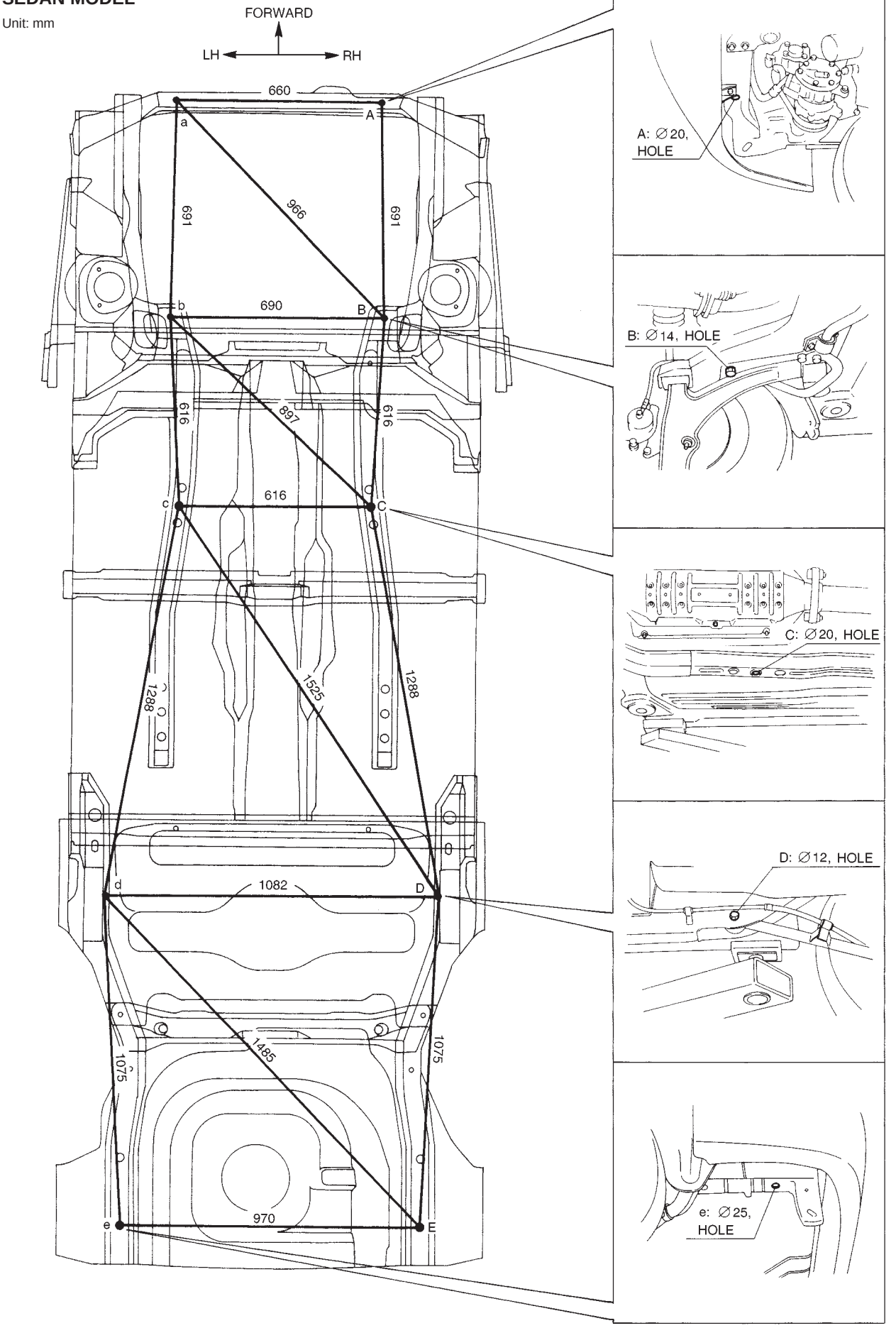
MEASUREMENT POSITION	LENGTH mm (in.)	MEASUREMENT POSITION	LENGTH mm (in.)
T – W	871 (34.29)	y – X	1183 (46.57)
t – W	923 (36.34)	Y – y	907 (35.71)
X – x	1186 (46.69)	y – x	570 (22.44)

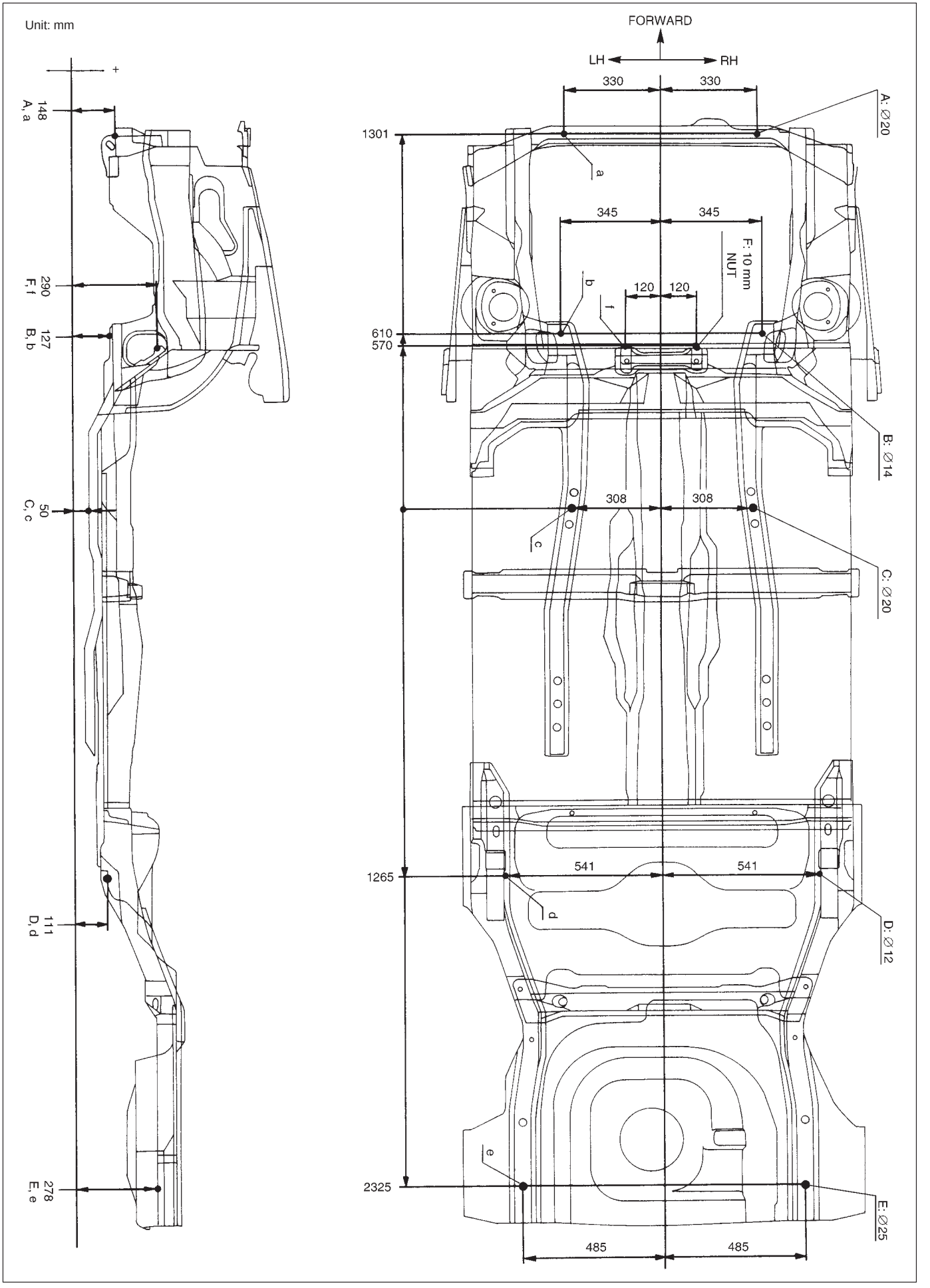
UNDERBODY DIMENSIONS

Each underbody component affects strength of vehicle itself as well as wheel alignment (toe-in, camber, caster). It is essential, therefore, to check underbody carefully and perform welding properly, if necessary for its correction or replacement. When damage is found in sealing or rust proof treatment, it is mandatory to correct it properly. For sealing and rust proof treatment, refer to “ANTI-CORROSION TREATMENT” in this section.

SEDAN MODEL

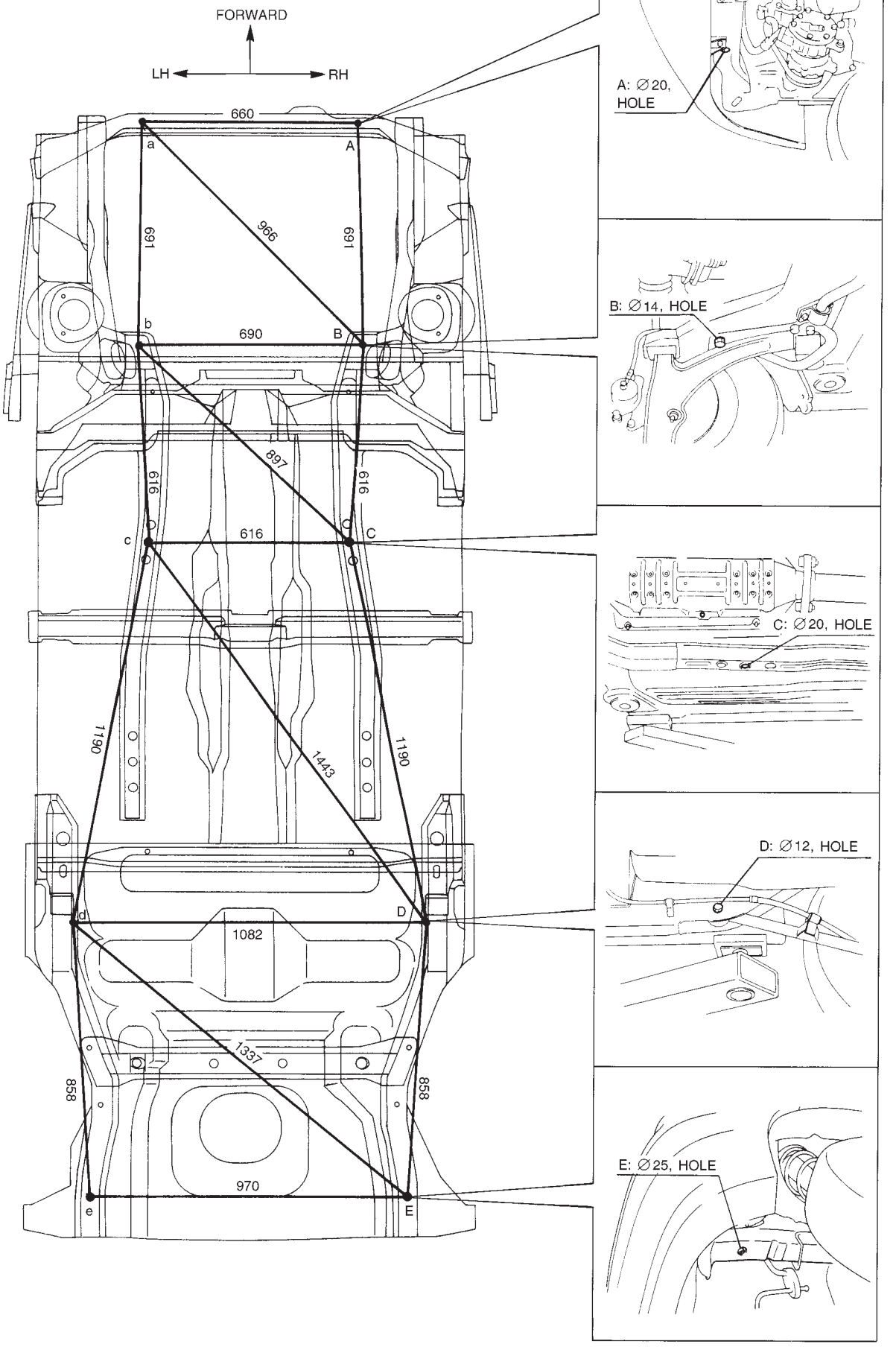
Unit: mm



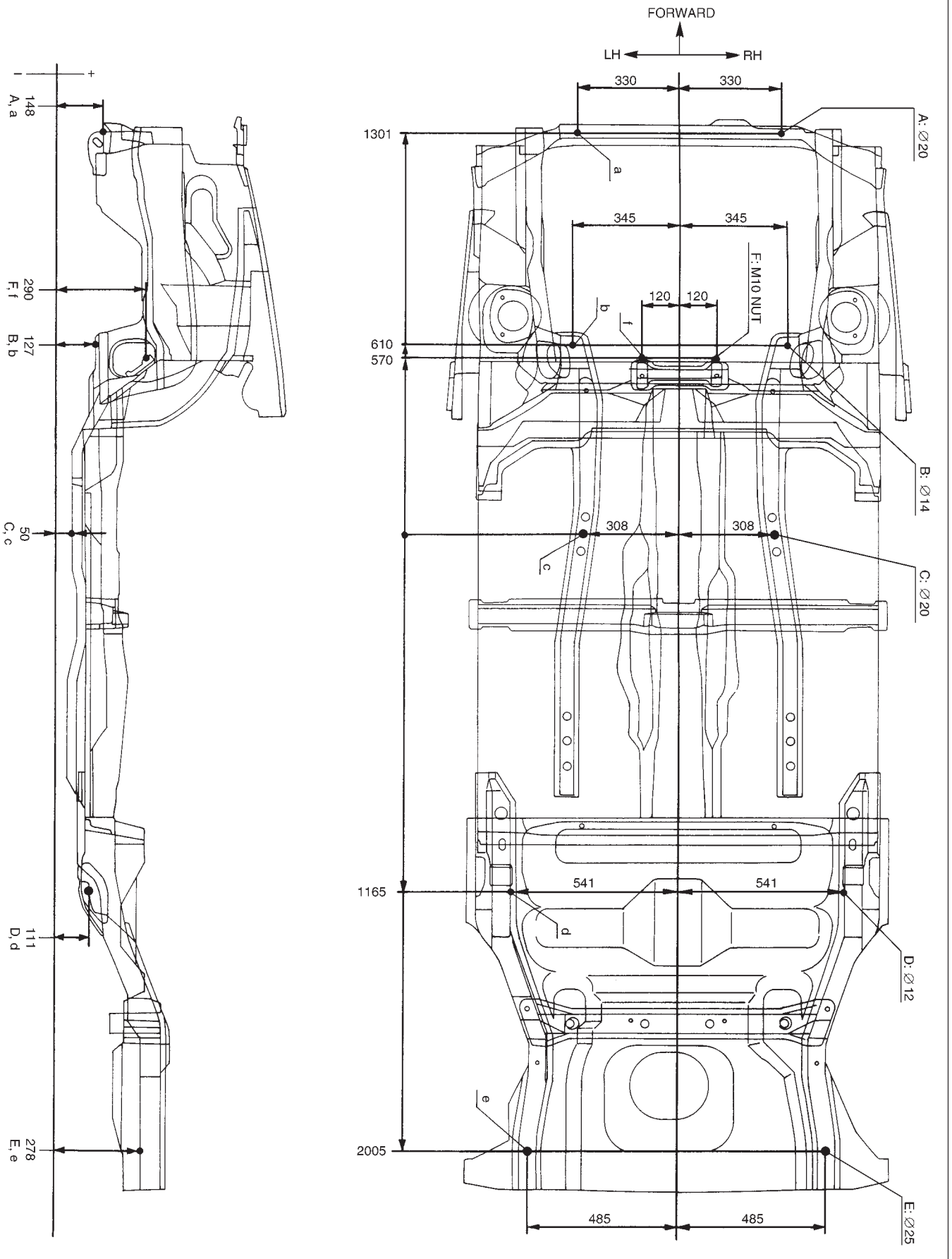

Unit: mm
FORWARD
LH
RH
330
330
345
345
120
120
F: 10 mm NUT
1301
610
570
308
308
1265
541
541
2325
485
485
148
A, a
290
F, f
127
B, b
50
C, c
111
D, d
278
E, e
A: ∅20
B: ∅14
C: ∅20
D: ∅12
E: ∅25

HATCH-BACK MODEL

Unit: mm

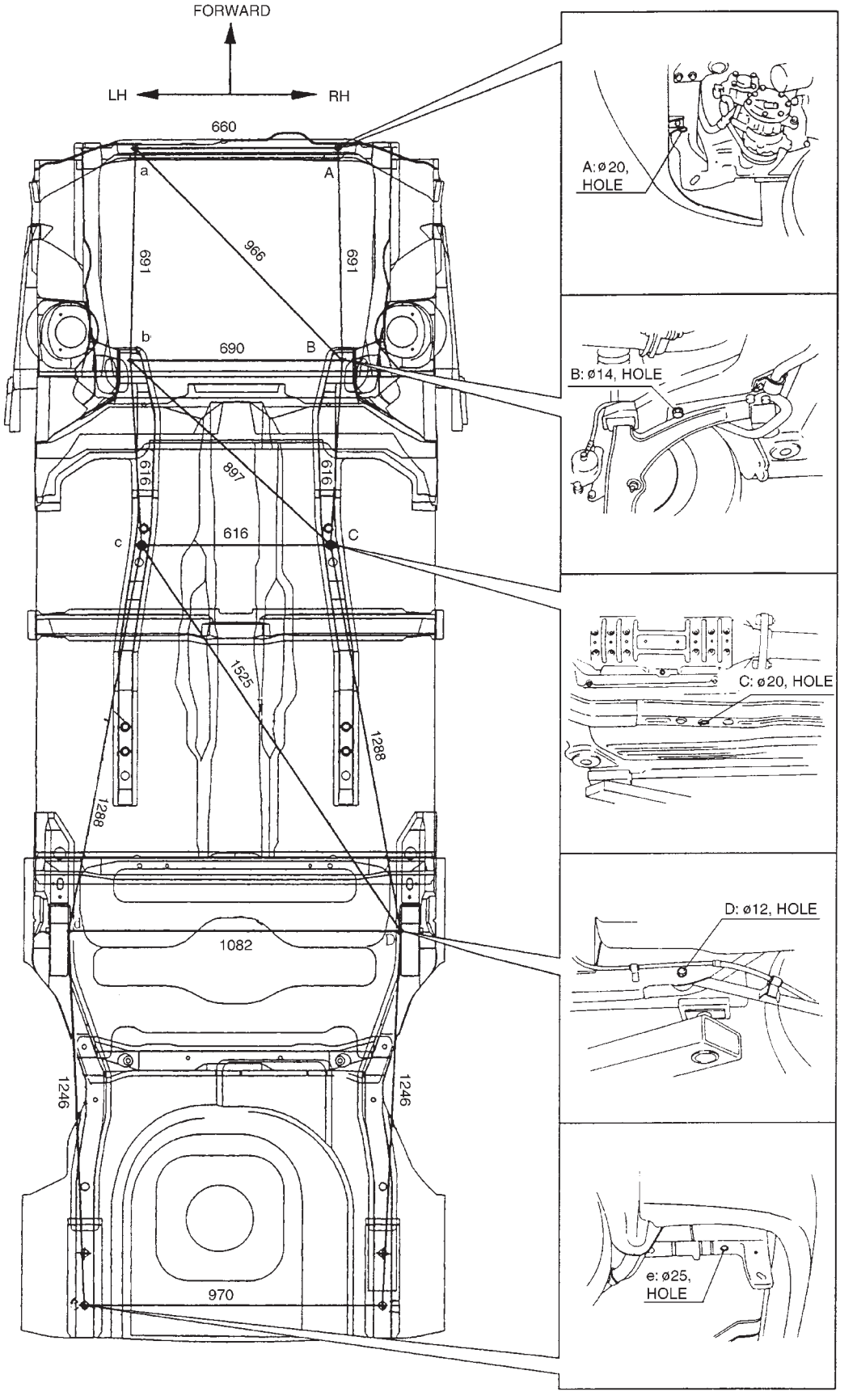


Unit: mm

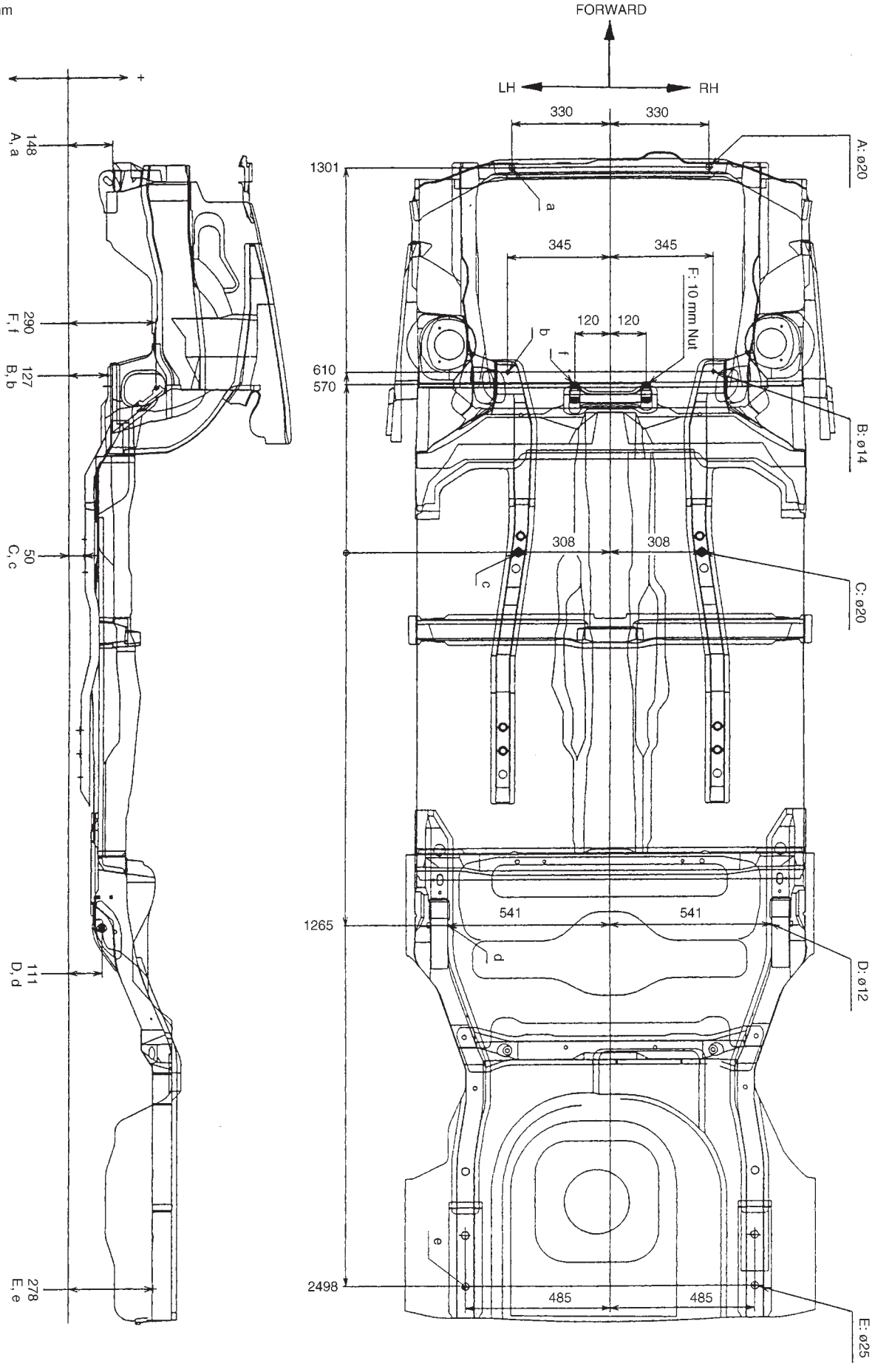

FORWARD
LH
RH
330
330
345
345
120
120
F: M10 NUT
1301
610
570
308
308
1165
541
541
2005
485
485
A: ∅20
B: ∅14
C: ∅20
D: ∅12
E: ∅25
148
A, a
290
F, f
127
B, b
50
C, c
111
D, d
278
E, e

WAGON MODEL

Unit: mm



Unit: mm


FORWARD
LH
RH
330
330
345
345
120
120
F: 10 mm Nut
1301
610
570
1265
2498
308
308
541
541
485
485
148
A, a
290
F, f
127
B, b
50
C, c
111
D, d
278
E, e
A: ø20
B: ø14
C: ø20
D: ø12
E: ø25

SECTION 9J

AIR BAG SYSTEM

WARNING:
Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and CAUTIONS in this section and Precautions, Air Bag System Components and Wiring Location View in this section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintended activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.

CAUTION:
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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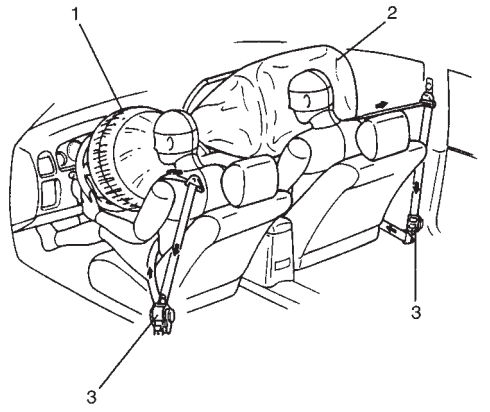
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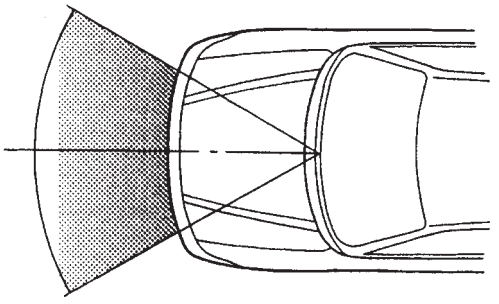
SPECIAL TOOL 9J-103



1. Driver side air bag
2. Passenger side air bag
3. Seat belt pretensioner (if equipped)

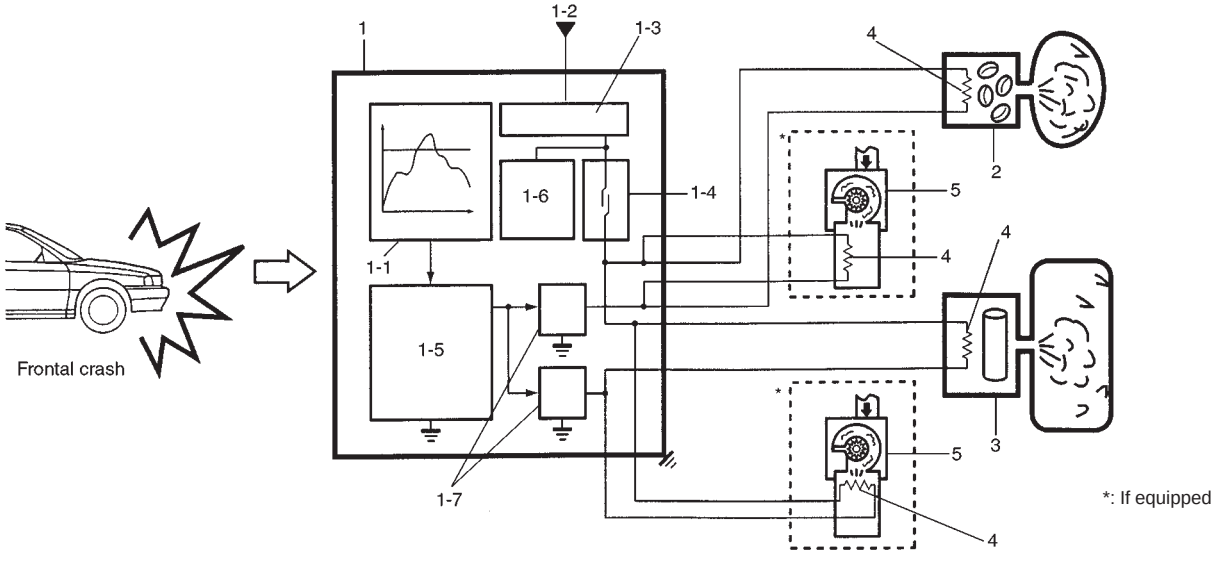
GENERAL DESCRIPTION

With the air bag system which includes air bags for both the driver's and passenger's sides as well as the seat belt pretensioners (if equipped), the sag of the seat belt is taken up, the driver air bag (inflator) module is deployed from the center of the steering column and the passenger air bag (inflator) module from the top of the instrument panel in front of the front passenger seat in occurrence of a front collision with an impact larger than a certain set value to supplement protection offered by the driver and front passenger seat belts.



The air bag system is designed to activate only in severe frontal collisions. It is not designed to activate in rear impacts, side impacts, rollovers, or minor frontal collisions, since it would offer no protection in those types of accidents.

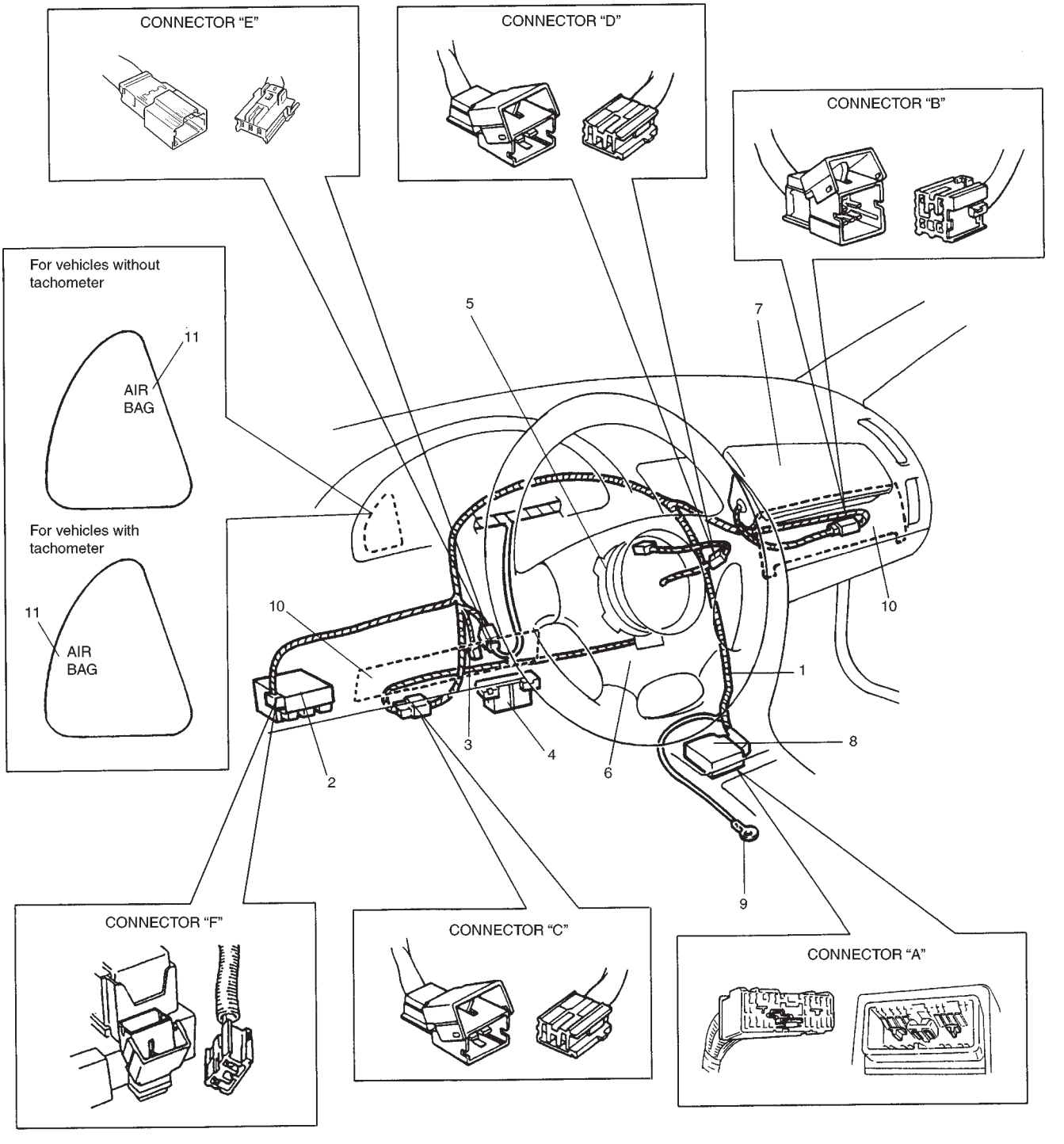
OPERATION OF AIR BAG SYSTEM AT COLLISION



1. SDM
1-1. Sensor
1-2. Power source
1-3. Voltage converter
1-4. Safing sensor
1-5. Micro-controller
1-6. Energy reserve circuit
1-7. Ignition driver circuit
2. Driver air bag
3. Passenger air bag
4. Squib circuit
5. Seat belt pretensioner (if equipped)

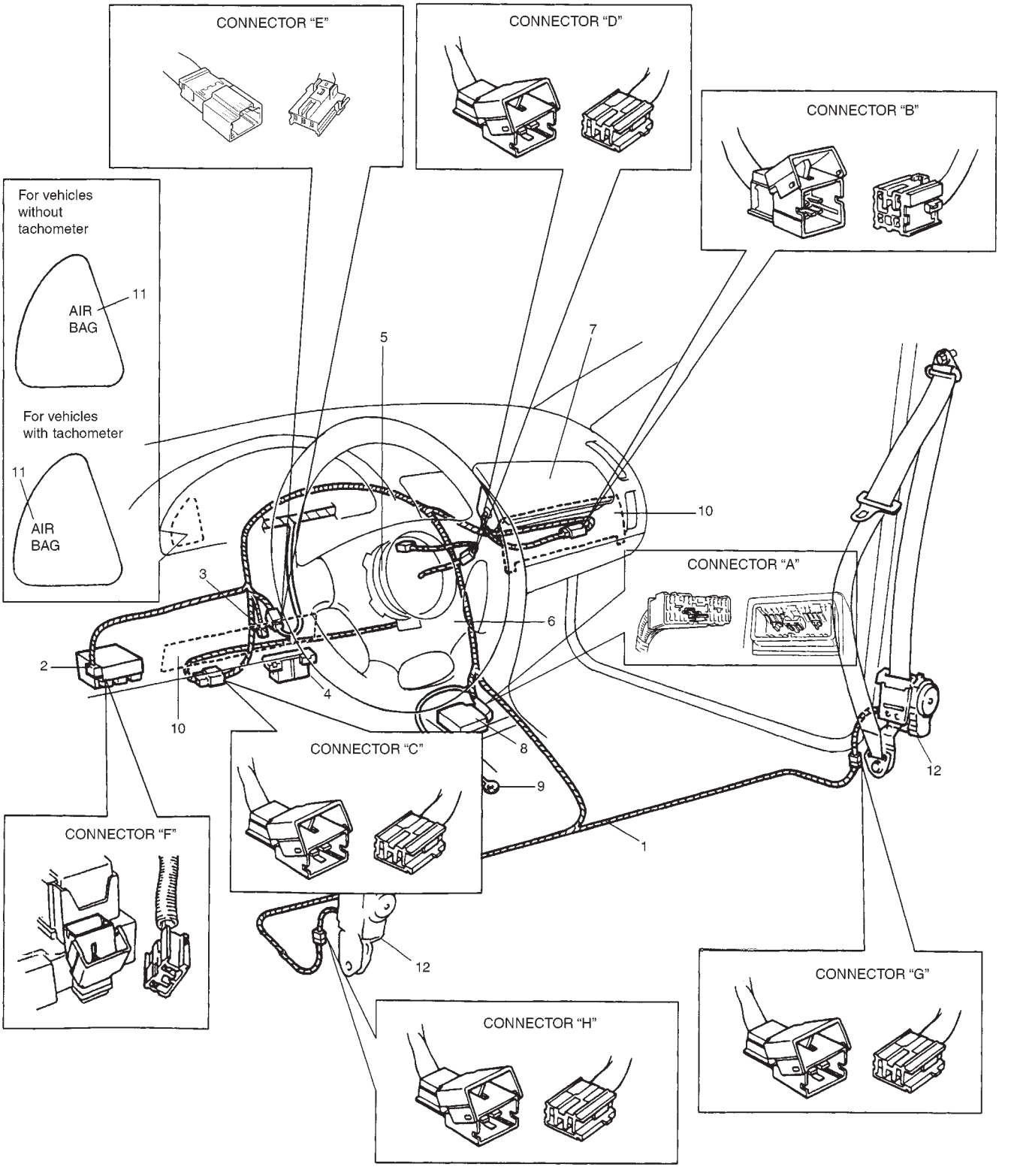
SYSTEM COMPONENTS AND WIRING LOCATION VIEW AND CONNECTORS

For vehicle without seat belt pretensioner



1. Air bag harness
2. J/B
3. "AIR BAG" monitor coupler
4. DLC
5. Contact coil assembly
6. Driver air bag (Inflator) module
7. Passenger air bag (inflator) module
8. SDM
9. Ground for air bag system
10. Knee bolster (it equipped)
11. "AIR BAG" warning lamp in combination meter

For vehicle with seat belt pretensioner

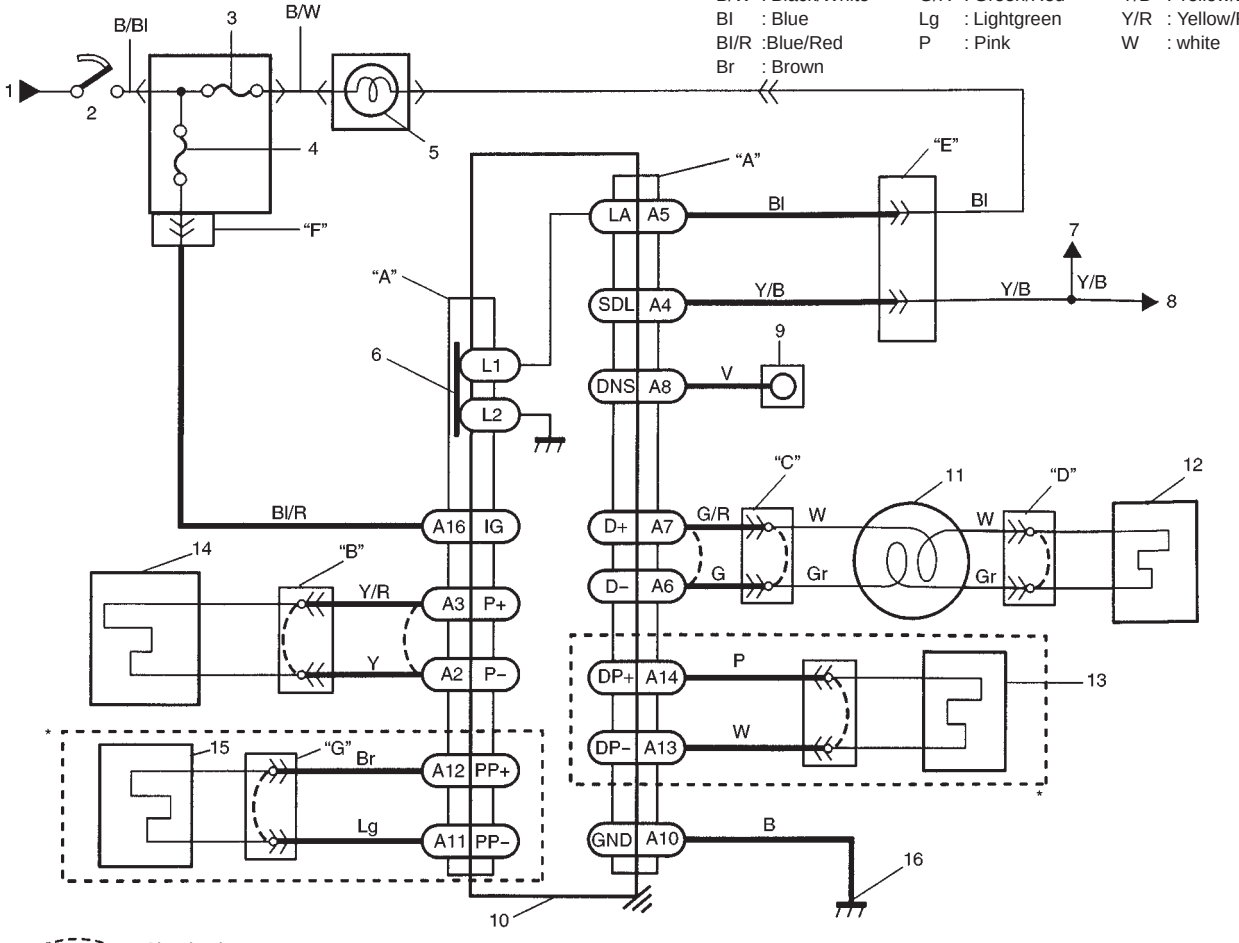


1. Air bag harness
2. J/B
3. "AIR BAG" monitor coupler
4. DLC
5. Contact coil assembly
6. Driver air bag (Inflator) module
7. Passenger air bag (inflator) module
8. SDM
9. Ground for air bag system
10. Knee bolster (it equipped)
11. "AIR BAG" warning lamp in combination meter
12. Seat belt pretensioner (if equipped)

SYSTEM WIRING DIAGRAM

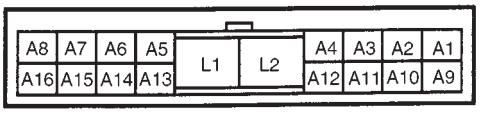
WIRE HARNESS COLOR

B	: Black	G	: Green	V	: Violet
B/Bl	: Black/Blue	Gr	: Gray	Y	: Yellow
B/W	: Black/White	G/R	: Green/Red	Y/B	: Yellow/Black
Bl	: Blue	Lg	: Lightgreen	Y/R	: Yellow/Red
Bl/R	:Blue/Red	P	: Pink	W	: white
Br	: Brown				



"A" ∽ "H" : connector
*: If equipped

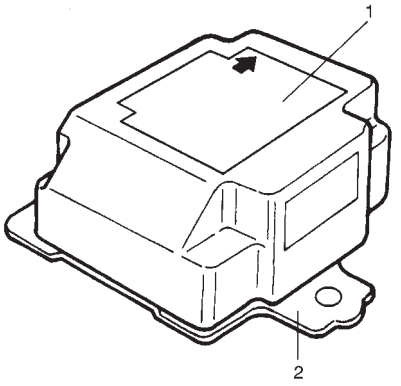
TERMINAL ARRANGEMENT OF SDM (VIEWED FROM HARNESS SIDE)



CONNECTOR "A" (SDM connector)

TERMINAL	CIRCUIT	
A1	————	
A2	Passenger air bag (inflator) module	Low
A3		High
A4	Data link connector (DLC)	
A5	"AIR BAG" warning lamp	
A6	Driver air bag (inflator) module	Low
A7		High
A8	Diagnosis switch	
A9	————	
A10	Ground	
A11	Passenger pretensioner (if equipped)	Low
A12		High
A13	Driver pretensioner (if equipped)	Low
A14		High
A15	————	
A16	Ignition switch (power source)	

1. From main fuse
2. Ignition switch
3. "IG" fuse in J/B
4. "AIR BAG" fuse in J/B
5. "AIR BAG" warning lamp in combination meter
6. Connection detection pin
7. To ECM (PCM), TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)
8. To data link connector (DLC)
9. "AIR BAG" monitor coupler
10. SDM
11. Contact coil assembly
12. Driver air bag (inflator) module
13. Driver seat belt pretensioner (if equipped)
14. Passenger air bag (Inflator) module
15. Passenger seat belt pretensioner (if equipped)
16. Ground for air bag system



1. SDM
2. SDM plate

COMPONENTS DESCRIPTION

SDM (SENSING AND DIAGNOSTIC MODULE)

WARNING:
○ During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).
○ Be sure to read "PRECAUTIONS" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

CAUTION:
After detecting one time of such collision as to meet deployment conditions, the SDM must not be used.
Refer to "DIAGNOSIS" when checking the SDM.

The Sensing and Diagnostic Module (SDM) is designed to perform the following functions in the air bag system:

○ Energy Reserve
– The SDM maintains a reserve energy supply to provide deployment energy after ignition voltage is lost in a frontal crash.

○ Frontal Crash Detection
– The SDM monitors vehicle velocity changes to detect frontal crashes which are severe enough to warrant deployment.

○ Air Bag Deployment
– When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the air bag (inflator) modules to deploy the air bags.

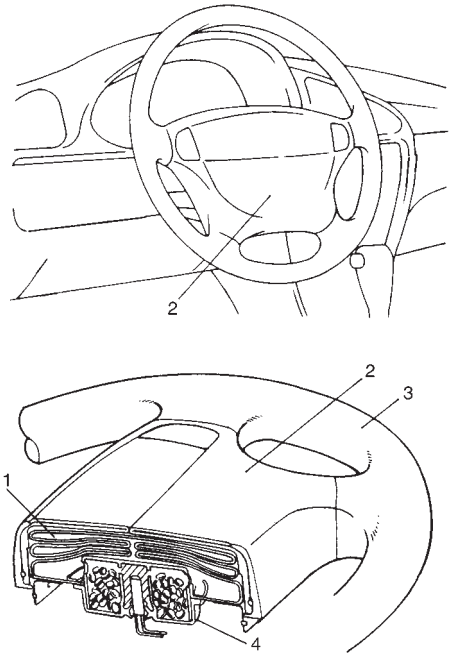
○ Seat Belt Pretensioner Activation (if equipped)
– When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the seat belt pretensioners to activate them.

○ Malfunction Detection
– The SDM performs diagnostic monitoring of the air bag system electrical components and sets a DTC when a malfunction is detected.

○ Malfunction Diagnosis
– ○ The SDM provides air bag diagnostic trouble codes by flashing "AIR BAG" warning lamp when on-board diagnosis function is used.
○ The SDM displays air bag diagnostic trouble codes and system status information through the use of special tool (SUZUKI scan tool).

○ "AIR BAG" Warning Lamp Control
– The light is turned ON to warn the driver of occurrence of a trouble and made to turn ON to check the burned bulb of "AIR BAG" warning lamp.

○ Communication with SUZUKI scan tool
– ○ DTC display to DTC clear.
○ In response to the output request from SUZUKI scan tool, DTC recorded in the memory, System ID, each initiator circuit resistance and power source voltage as recognized by SDM at the time of the output request are provided.



1. Inflatable bag
2. Trim cover
3. Steering wheel
4. Inflator

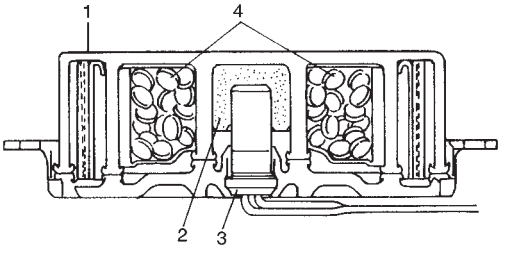
DRIVER AIR BAG (INFLATOR) MODULE

WARNING:

- **Never attempt to disassemble or repair the driver air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.**
- **Be sure to read "SERVICE PRECAUTIONS" and "HANDLING PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.**

The driver air bag (inflator) module consists of an inflatable bag, an inflator and a trim cover, and is mounted to the center of the steering wheel.

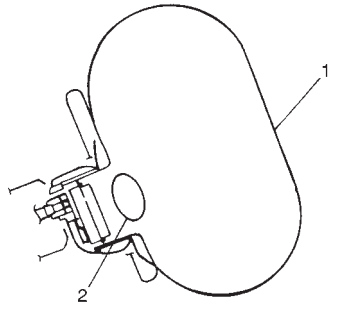
The driver inflatable bag is made of nylon material and coated with neoprene only on its inside surface.



1. Inflator
2. Ignition compound
3. Squib circuit
4. Gas generant

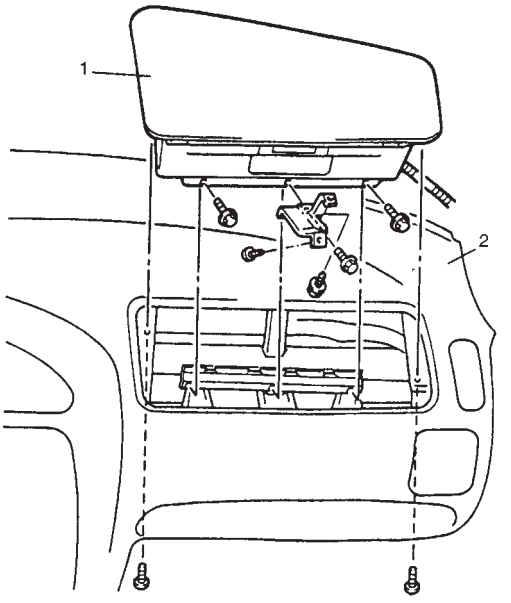
The driver inflator consists of a squib circuit, an ignition compound and a gas generant.

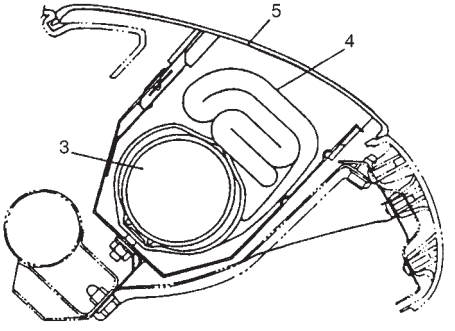
When a collision occurs, the deployment current from SDM flows through the squib circuit to ignite the ignition compound by which the gas generant ignites instantly.
As the gas generant burns, a large amount of nitrogen gas is generated and deploys the inflatable bag quickly.

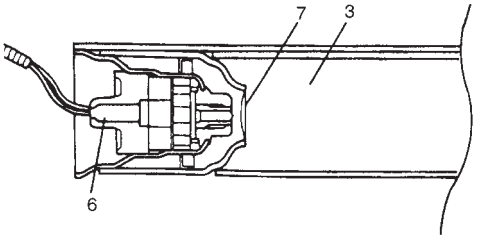


1. Inflatable bag
2. Hole

When the inflatable bag deploys, its expansion force causes the trim cover.
Nitrogen gas in the inflatable bag is let out through two exhaust holes in the back of the bag at the right and left.







1. Passenger air bag (inflator) module
2. Instrument panel
3. Inflator gas tank
4. Inflatable bag
5. Trim cover
6. Initiator
7. Burst disk

PASSENGER AIR BAG (INFLATOR) MODULE

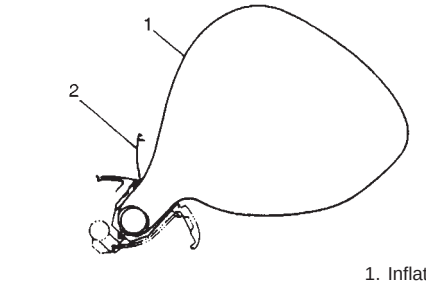
WARNING:

- **Never attempt to disassemble or repair the passenger air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.**
- **When handling it, be sure to read "SERVICE PRECAUTION" under "ON-VEHICLE SERVICE" and observe each instruction.**

The passenger air bag (inflator) module consists of an inflatable bag, an inflator and a trim cover, and is mounted above the glove box in the instrument panel on the passenger side.

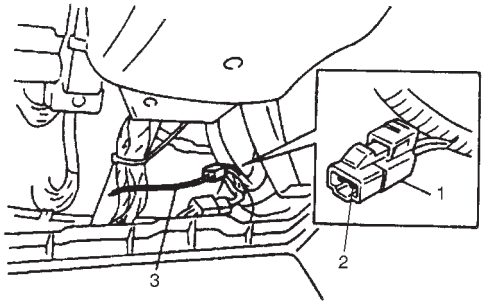
The passenger inflator consists of initiator, burst disk and inflator gas tank.

When the vehicle is in a frontal crash of sufficient force, the SDM causes current to flow through the passenger deployment loop. Current passing through the initiator causes a chemical reaction to occur. This chemical reaction generates pressure, depressing a burst disk which releases the stored gas rapidly inflating the air bag.



1. Inflatable bag
2. Trim cover

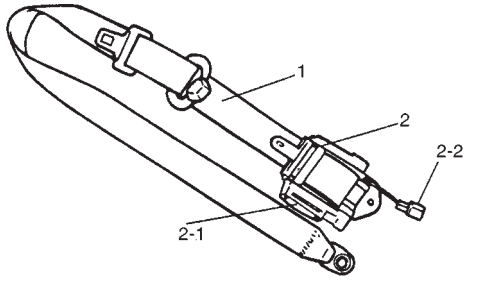
Once deployment starts, expansion force of the inflatable bag forces the trim cover and move up.



1. Monitor coupler
2. Diagnosis switch terminal
3. Service wire

"AIR BAG" MONITOR COUPLER

"AIR BAG" monitor coupler has a diagnosis switch terminal.
When this terminal is grounded, the "AIR BAG" warning lamp flashes to indicate the diagnostic trouble code.
(For details of diagnostic trouble code, refer to "DIAGNOSTIC TROUBLE CODE TABLE" in this section.)



1. Webbing
2. Retractor assembly
2–1. Seat belt pretensioner
2–2. Seat belt pretensioner connector

SEAT BELT PRETENSIONER (IF EQUIPPED)

WARNING:

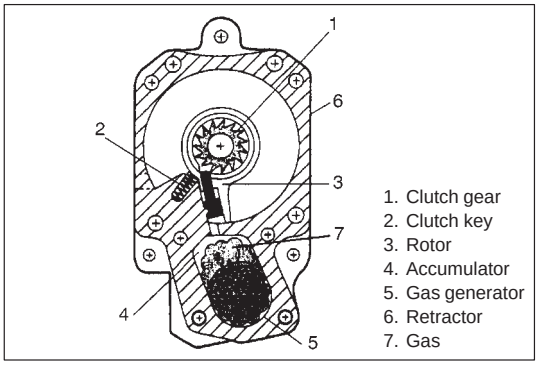
- **Never attempt to disassemble or repair the seat belt pretensioner (retractor assembly). If any abnormality is found, be sure to replace it with new one as an assembly.**
- **Be sure to read "PRECAUTIONS" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.**

Some seat belts of the driver and front passenger seats are provided with a pretensioner as an optional function unit. The pretensioner is incorporated in retractor assembly. It will be activated at the same time as the air bag when an impact at the front of vehicle exceeds the specified value.

OPERATION OF SEAT BELT PRETENSIONER AT COLLISION

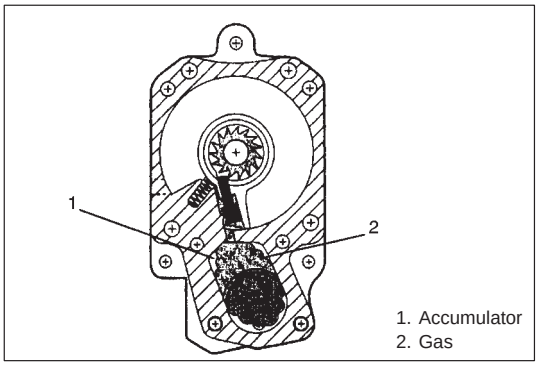
The seat belt pretensioner operates in the order as described below.

1) When SDM senses an impact exceeding the specified value, it supplies ignition current to the initiator circuit of the seat belt pretensioner and the air bag (inflator) module.



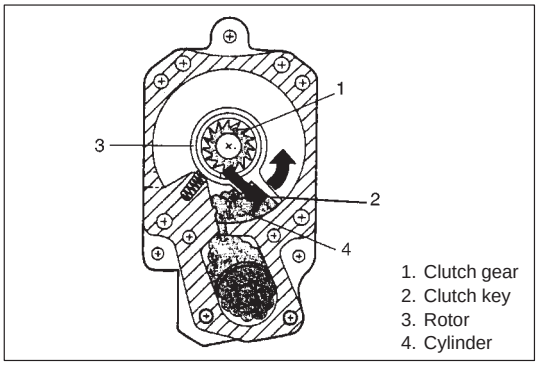
1. Clutch gear
2. Clutch key
3. Rotor
4. Accumulator
5. Gas generator
6. Retractor
7. Gas

2) The ignition current causes gas generator to generate highly pressurized gas.



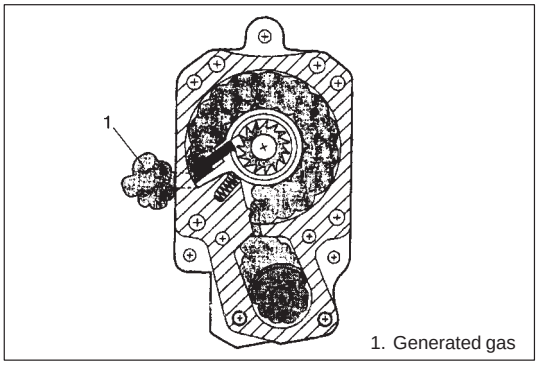
1. Accumulator
2. Gas

3) The gas increases the pressure in accumulator.



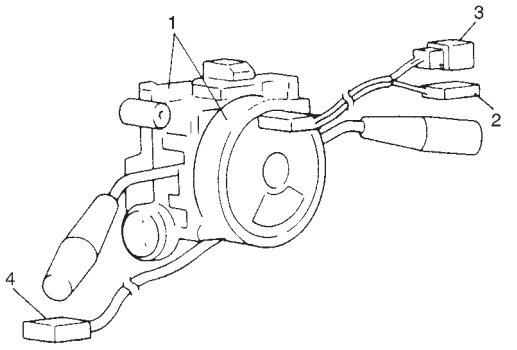
1. Clutch gear
2. Clutch key
3. Rotor
4. Cylinder

4) The pressure pushes out clutch key which then becomes engaged with clutch gear.
5) The generated gas increases the pressure in the cylinder as well.
6) The pressure causes the clutch gear and rotor to rotate as one unit. Then the drum meshed with rotor also rotates and thereby rolls in the webbing.



1. Generated gas

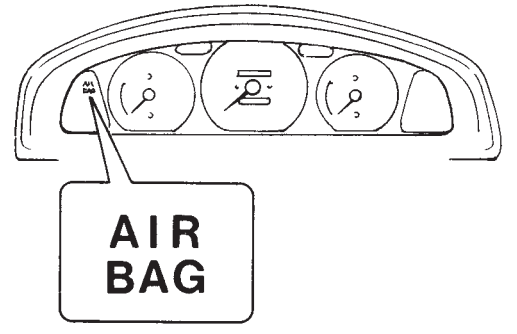
7) When gas pressure force to turn the rotor and tensile force applied to the webbing become balanced, retracting webbing stops. While the rotor is turning, generated gas (nitrogen gas) is exhausted from retractor assembly.
8) The driver and front passenger move forward due to inertia force and seat belts are pulled out.
9) ELR operates to lock seat belts.



1. Contact coil and combination switch assembly
2. To horn
3. Connector to driver air bag (inflator) module
4. Connector to air bag harness

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

The contact coil assembly consists of three current carrying coils; two for the deployment loop and one for the horn circuit. The contact coil assembly is combined with the combination switch assembly and mounted together on the steering column, allowing rotation of the steering wheel while maintaining continuous contact of the driver deployment loop to the driver air bag (inflator) module.



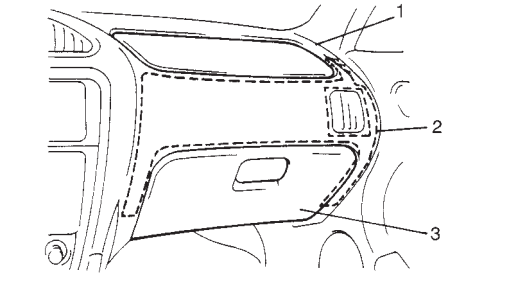
"AIR BAG" WARNING LAMP

The "AIR BAG" warning lamp is located in the combination meter and controlled by SDM.

The "AIR BAG" warning lamp is used in the air bag system to do the following:

- ○ Verify lamp and SDM operation by flashing six times when the ignition switch is first turned "ON."
- ○ Warn the vehicle driver of air bag electrical system malfunctions which could potentially affect the operation of the air bag system. These malfunctions could result in undeployment in case of a frontal crash or deployment for conditions less severe than intended.

The "AIR BAG" warning lamp is the key to driver notification of air bag system malfunctions. For proper lamp operation, refer to the "AIR BAG DIAGNOSTIC SYSTEM CHECK" in this section.



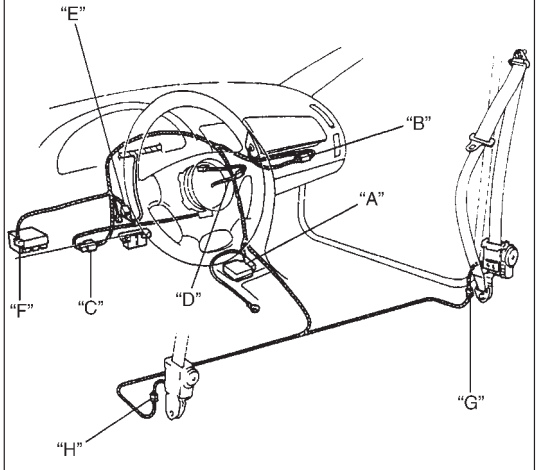
1. Instrument panel
2. Passenger knee bolster panel
3. Glove box

KNEE BOLSTER

The knee bolster is used to absorb energy and control the forward movement of front passenger during a frontal crash, by limiting leg movement.

STEERING COLUMN

The steering column is energy absorbing and is designed to compress in a frontal crash to decrease the chance of injury to the driver.



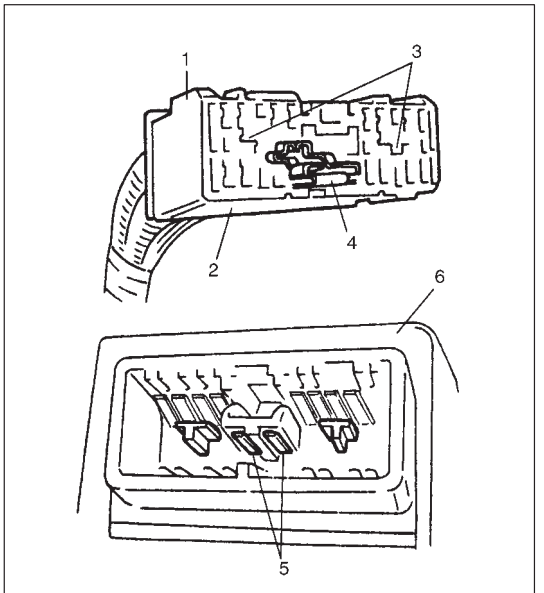
"A" : SDM connector
"B" : Passenger air bag connector
"C" : Contact coil connector
"D" : Driver air bag connector
"E" : Lamp and DLC connector
"F" : Ignition connector
"G" : Passenger pretensioner connector (if equipped)
"H" : Driver pretensioner connector (if equipped)

AIR BAG WIRE HARNESS AND CONNECTORS

CAUTION:
When an open in wire harness, damaged wire harness, connector or terminals is found, replace wire harness, connectors and terminals as an assembly.

The air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

Each connector has a terminal lock mechanism (operated by the terminal retainer), connectors "A", "B", "C", "D" and "F" have a short mechanism (operated by shorting bar), connectors "B", "C", "D" and "F" have a connector lock mechanism (operated by connector lock lever) and connector "A" has electrical connection check mechanism (operated by connection detection pin).



1. SDM connector
2. Terminal retainer
3. Shorting bar
4. Connection detection pin
5. Diagnosis terminal
6. SDM

"A": SDM connector

Terminal retainer (Terminal position assurance: TPA):

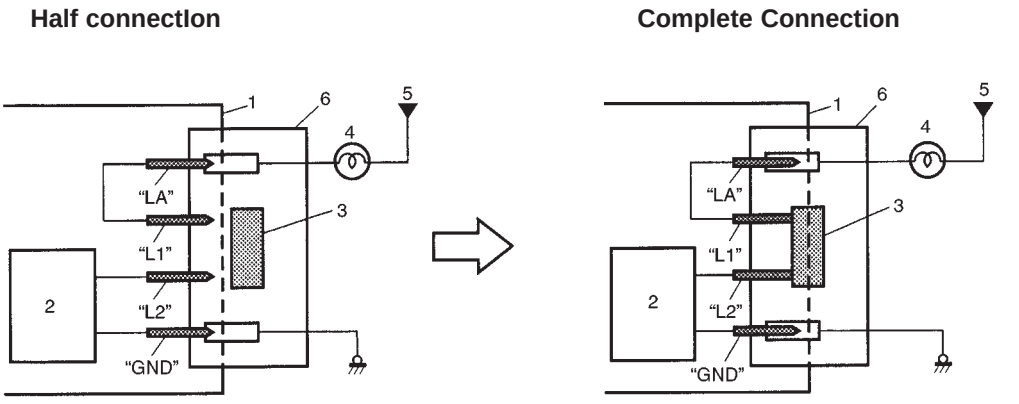
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

Shorting bar:

Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

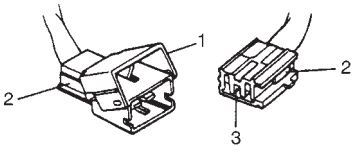
Electrical connection check mechanism:

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.

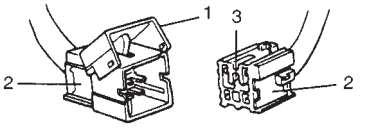


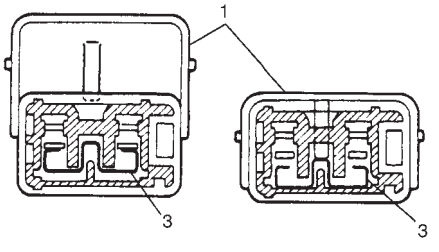
1. SDM
2. "AIR BAG" warning lamp driver circuit
3. Connection detection pin
4. "AIR BAG" warning lamp
5. From ignition switch
6. SDM connector

"C", "D", "G" and "H" connector



"B" connector





Short state (Improperly fitted or disconnected)

Short cancelled state (Properly fitted)

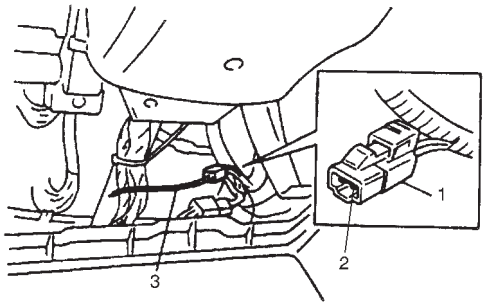
1. Connector lock lever
2. Terminal retainer
3. Shorting bar

"B" : Passenger air bag connector
"C" : Contact coil connector
"D" : Driver air bag connector
"F" : Ignition connector
"G" : Passenger pretensioner connector (if equipped)
"H" : Driver pretensioner connector (if equipped)

Terminal retainer (Terminal position assurance: TPA):
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

Shorting bar:
Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

Connector lock lever:
Functions of the connector lock lever are: to connect connectors securely, to cancel shorts and to lock connectors against disconnection.



1. Monitor coupler
2. Diagnosis switch terminal
3. Service wire

DIAGNOSIS SWITCH TERMINAL

When diagnosis switch terminal is grounded, diagnosis signal is fed to SDM and SDM outputs DTC (diagnostic trouble code). This code is indicated by flashing “AIR BAG” warning lamp in combination meter.

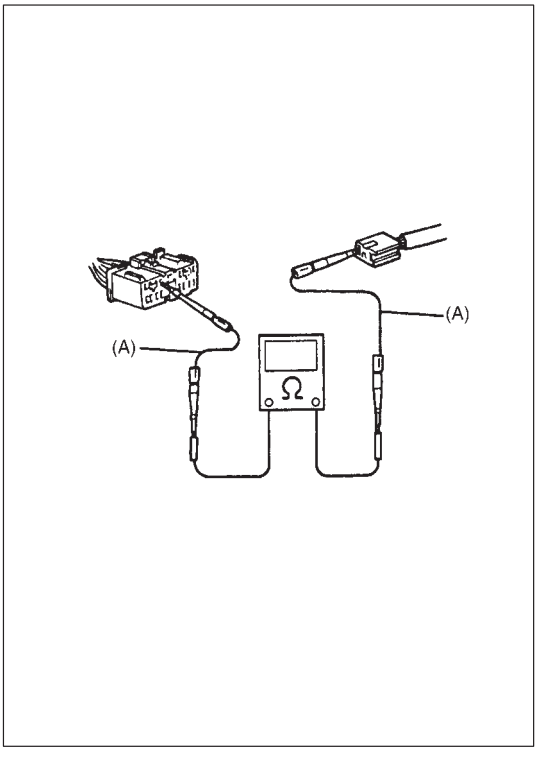
(For details of DTC (diagnostic trouble code), refer to “DIAGNOSTIC TROUBLE CODE TABLE” in this section.)

DIAGNOSIS

USE OF SPECIAL TOOL

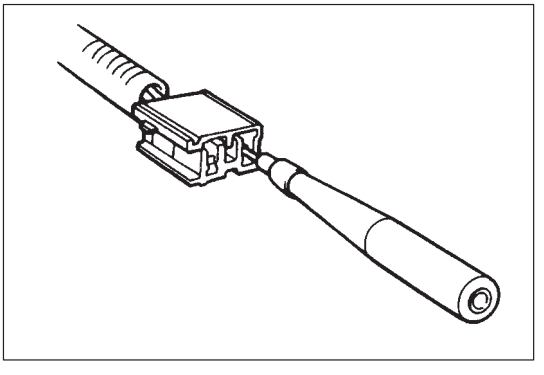
WARNING:
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

You should be familiar with the tools listed in “SPECIAL TOOL” in this section. You should be able to measure voltage and resistance. You should be familiar with proper use of a scan tool such as the SUZUKI scan tool Diagnostic Computer, Driver/Passenger Load Tool, Pretensioner Service Adapter Kit (For air bag system with seat belt pretensioner), Connector Test Adapter Kit and the Digital Multimeter.

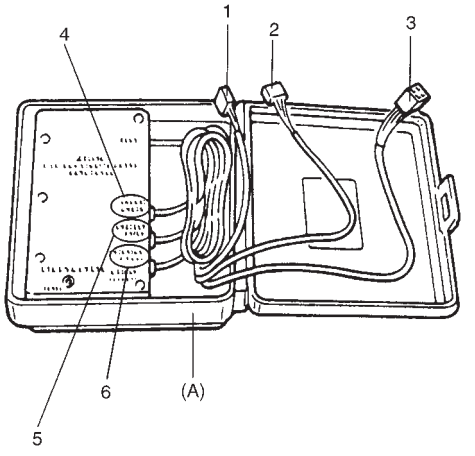


Connector Test Adapter kit
This must be used whenever a diagnostic procedure requests checking or probing a terminal.
Using the appropriate adapter in the special tool will ensure that no damage to the terminal will occur from the multimeter probe, such as spreading or bending.

Special Tool
(A): 09932-76010



The adapter will also give an idea of whether contact tension is sufficient, helping to find an open or intermittent open due to poor terminal contact.



1. Connector for contact coil and driver air bag (inflator) module (Located near the base of the steering column)
2. Connector for driver air bag (inflator) module or connector for driver and passenger seat belt pretensioners
3. Connector for passenger air bag (inflator) module
4. "BASE OF COLUMN"
5. "STEERING WHEEL"
6. "PASSENGER INFLATOR"

Air Bag Driver/Passenger Load Tool

This tool is used only when called for in this section. It is used as a diagnostic aid and safety device to prevent inadvertent air bag (inflator) module deployment and seat belt pretensioner activation.
The load tool has three connectors attached to its case are electrically functional and serve as resistive load substitutions.
No more than two connectors are used at any time.
One of connectors ("STEERING WHEEL") is used to substitute the load of the following.

- ○ driver air bag (inflator) module when it is connected at the top of the column to the contact coil assembly.
- ○ driver and passenger seat belt pretensioner when it is connected to air bag harness connector for driver and passenger seat belt pretensioner.

Special Tool
(A): 09932-75010

Another connector ("BASE OF COLUMN") is used to substitute the load of the driver air bag (inflator) module and the contact coil assembly when it is connected at the base of the column to the air bag wire harness.
The third connector ("PASSENGER INFLATOR") is used to substitute the load of the passenger air bag (inflator) module when it is connected to the air bag harness connector for passenger air bag (inflator) module.
By substituting the resistance of the load tool when called for, a determination can be made as to whether an inflator circuit component is causing system malfunction and which component is causing the malfunction.
The load tool should be used only when specifically called for in the diagnostic procedures.

AIR BAG DIAGNOSTIC SYSTEM CHECK

WARNING:
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

CAUTION:
The order in which diagnostic trouble codes are diagnosed is very important. Failure to diagnose the diagnostic trouble codes in the order specified may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

The diagnostic procedures used in this section are designed to find and repair air bag system malfunctions. To get the best results, it is important to use the diagnostic flow tables and follow the sequence listed below.

A. PERFORM THE “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE”
The “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE” must be the starting point of any air bag system diagnostics. The “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE” checks for proper “AIR BAG” warning lamp operation, the ability of the SDM to communicate through “AIR BAG” warning lamp and whether air bag diagnostic trouble codes exist.

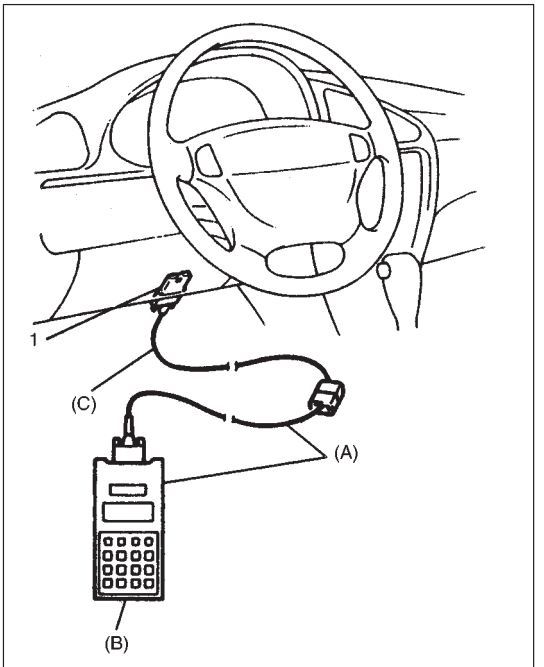
B. REFER TO THE PROPER DIAGNOSTIC TABLE AS DIRECTED BY THE “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE”.
The “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE” will lead you to the correct table to diagnose any air bag system malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.

C. REPEAT THE “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE” AFTER ANY REPAIR OR DIAGNOSTIC PROCEDURES HAVE BEEN PERFORMED.
Performing the “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE” after all repair or diagnostic procedures will ensure that the repair has been made correctly and that no other malfunctions exist.

FLOW TABLE TEST DESCRIPTION
STEP 1: Check that “AIR BAG” warning lamp lights.
STEP 2: Check diagnosis switch circuit.
STEP 3: Check that “AIR BAG” warning lamp turns off about 6 seconds after ignition switch is turned ON.
STEP 4: Check that history codes are in SDM memory.
STEP 5: Check that current code is in SDM memory.

AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE

STEP	ACTION	YES	NO
1	1) Make sure that battery voltage is about 11V or higher. 2) Note "AIR BAG" warning lamp as ignition switch is tuned ON. Does "AIR BAG" warning lamp come ON when ignition switch is tuned ON?	Go to Step 2.	**"AIR BAG" warning lamp does not come "ON"** Proceed to "TABLE B"
2	Does "AIR BAG" warning lamp keep flashing (indicating DTC) when ignition switch is turned ON?	**"AIR BAG" warning lamp flashes** Proceed to "TABLE C"	Go to Step 3.
3	After coming ON for about 6 seconds, then does "AIR BAG" warning lamp turn OFF?	Go to Step 4.	Go to Step 5.
4	1) Check DTC, referring to "DIAGNOSTIC TROUBLE CODE (DTC) CHECK" in this section. 2) [Using SUZUKI scan tool] Is "NO CODES" displayed? **NOTE:** **If SDM cannot communicate through serial data circuit, proceed to "TABLE D".** [Not using SUZUKI scan tool] Is DTC 12 indicated?	Air bag system is in good condition.	**NOTE:** **As execution of the "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE" will clear all DTCs, be sure to record all DTCs before servicing.** An intermittent trouble has occurred at some place. Check the connector harness, etc. related to the sensed DTC (Refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A). Then clear DTC (Refer to "DTC CLEARANCE") and repeat this table.
5	1) Check DTC, referring to "DIAGNOSTIC TROUBLE CODE (DTC) CHECK" in this section. 2) [Using SUZUKI scan tool] Is "NO CODES" displayed? **NOTE:** **If SDM cannot communicate through serial data circuit, proceed to "TABLE D".** [Not using SUZUKI scan tool] Is DTC 12 indicated?	**"AIR BAG" warning lamp come ON steady** Proceed to "TABLE A"	**NOTE:** **As executIon of the "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE" will clear all DTCs, be sure to record all DTCs before servicing.** Check and repair according to Flow Table corresponding to that DTC.



1. Data link connecter (DLC)

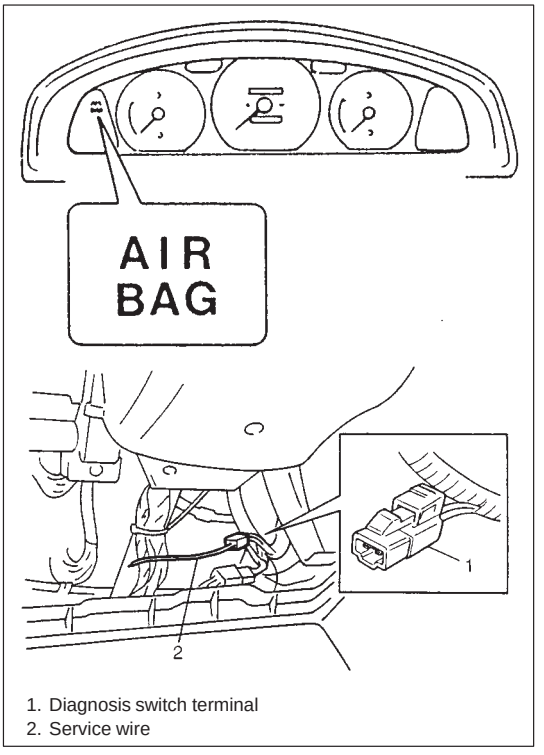
DIAGNOSTIC TROUBLE CODE (DTC) CHECK

[Using SUZUKI scan tool]

1) Turn ignition switch OFF.
2) After setting cartridge to SUZUKI scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

   Special Tool
   (A): 09931-76011(SUZUKI scan tool)
   (B): Mass storage cartridge
   (C): 09931-76030 (16/14 pin DLC cable)

3) Turn ignition switch ON.
4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).

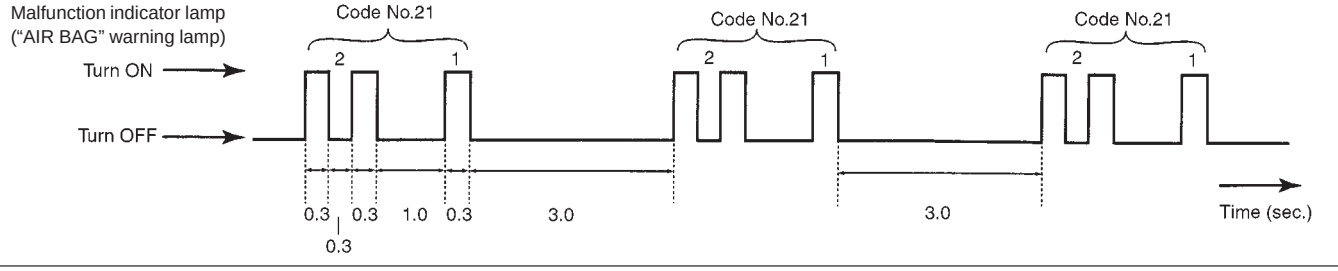


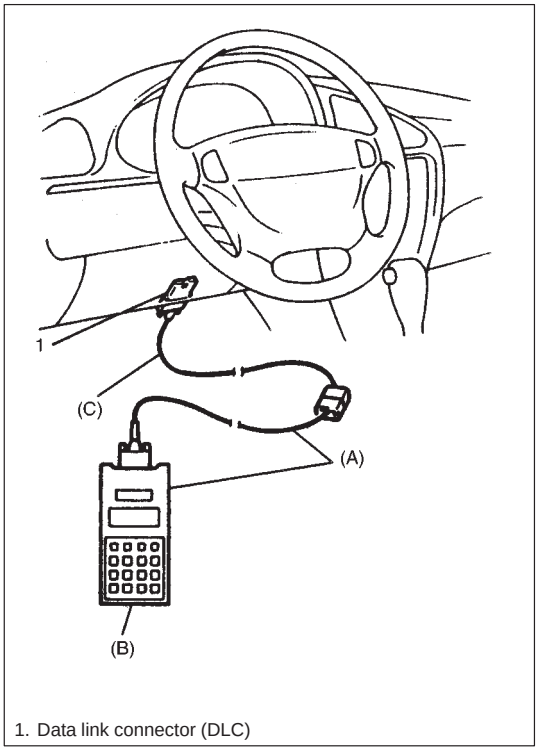
1. Diagnosis switch terminal
2. Service wire

[Not using SUZUKI scan tool]

1) Check that malfunction indicator lamp ("AIR BAG" warning lamp) comes ON when ignition switch is turned ON.
   If it does not come ON, proceed to "TABLE B".
2) Using service wire, ground diagnosis switch terminal in "AIR BAG" monitor coupler.
3) Read DTC from flashing pattern of malfunction indicator lamp ("AIR BAG" warning lamp). (Refer to "DIAGNOSTIC TROUBLE CODE TABLE" in this section.)
4) After completing the check, turn ignition switch OFF and disconnect service wire from "AIR BAG" monitor coupler.

EXAMPLE: When driver air bag initiator circuit resistance high (Code No.21) is set





1. Data link connector (DLC)

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

[Using SUZUKI scan tool]

1) Turn ignition switch OFF.
2) Connect SUZUKI scan tool to data link connector (DLC) in the same manner as when making this connection for DTC check.

   Special Tool
   (A): 09931-76011(SUZUKI scan tool)
   (B): Mass storage cartridge
   (C): 09931-76030 (16/14 pin DLC cable)

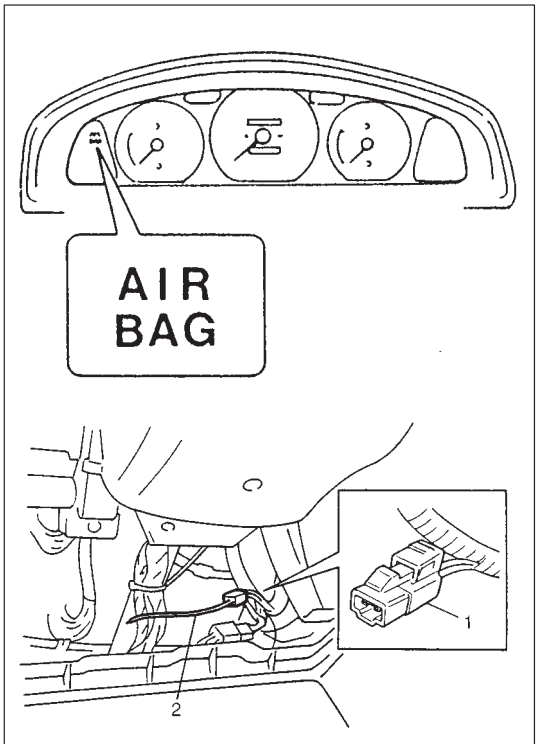
3) Turn ignition switch ON.
4) Erase DTC accord in to instructions displayed on SUZUKI scan tool.
   Refer to SUZUKI scan tool operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).
6) Perform "DIAGNOSIS TROUBLE CODE (DTC) CHECK" and confirm that normal DTC (DTC 12) is displayed and not malfunction DTC.

NOTE:
If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.

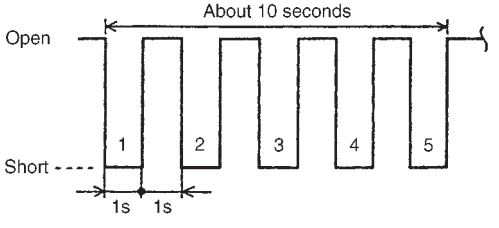
[Not using SUZUKI scan tool]

1) Turn ignition switch ON and wait about 6 seconds or more.
2) Using service wire, repeat shorting and opening between diagnosis switch terminal and ground terminal on "AIR BAG" monitor coupler 5 times at about 1 second intervals.
3) Perform "DIAGNOSIS TROUBLE CODE (DTC) CHECK" and confirm that normal DTC (DTC 12) is displayed and not malfunction DTC.

NOTE:
If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.

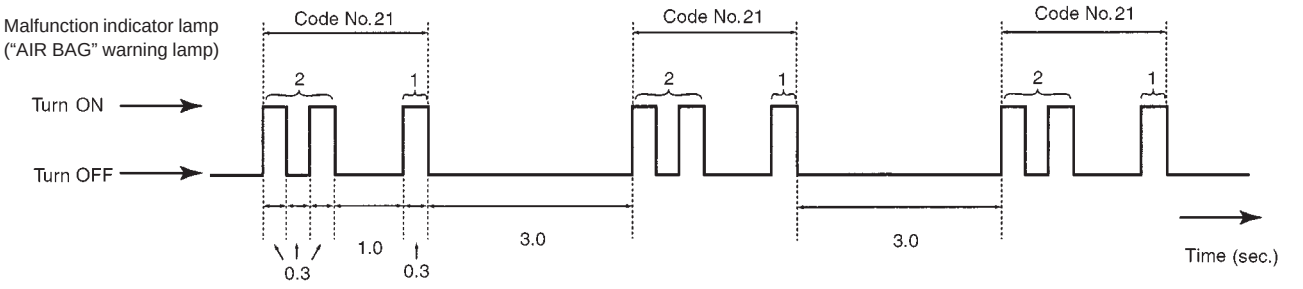


1. Diagnosis switch terminal
2. Service wire



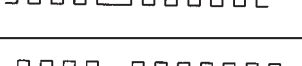
DIAGNOSTIC TROUBLE CODE TABLE (Page 1 of 2)

EXAMPLE: WHEN DRIVER AIR BAG INITIATOR CIRCUIT OPEN (CODE NO.21) IS SET



DIAGNOSTIC TROUBLE CODE		DIAGNOSIS		
NO.	MODE			
12		Normal		
15		Passenger air bag circuit	Resistance high	Diagnose trouble according to "DIAGNOSTIC FLOW TABLE" corresponding to each code No.
16			Resistance low	
18			Short to ground	
19			Short to power circuit	
21		Driver air bag circuit	Resistance high	
22			Resistance low	
24			Short to ground	
25			Short to power circuit	
31		Power source voltage	Too high	
32			Too low	

DIAGNOSTIC TROUBLE CODE TABLE (Page 2 of 2)

DIAGNOSTIC TROUBLE CODE		DIAGNOSIS		
NO.	MODE			
41		Driver pretensioner circuit	Resistance high	Diagnose trouble according to "DIAGNOSTIC FLOW TABLE" corresponding to each code No.
42			Resistance low	
43			Short to ground	
44			Short to power circuit	
45		Passenger pretensioner circuit	Resistance high	
46			Resistance low	
47			Short to ground	
48			Short to power circuit	
51		SDM	Frontal crash detected	
71			Internal fault	
61			"AIR BAG" warning lamp circuit failure	

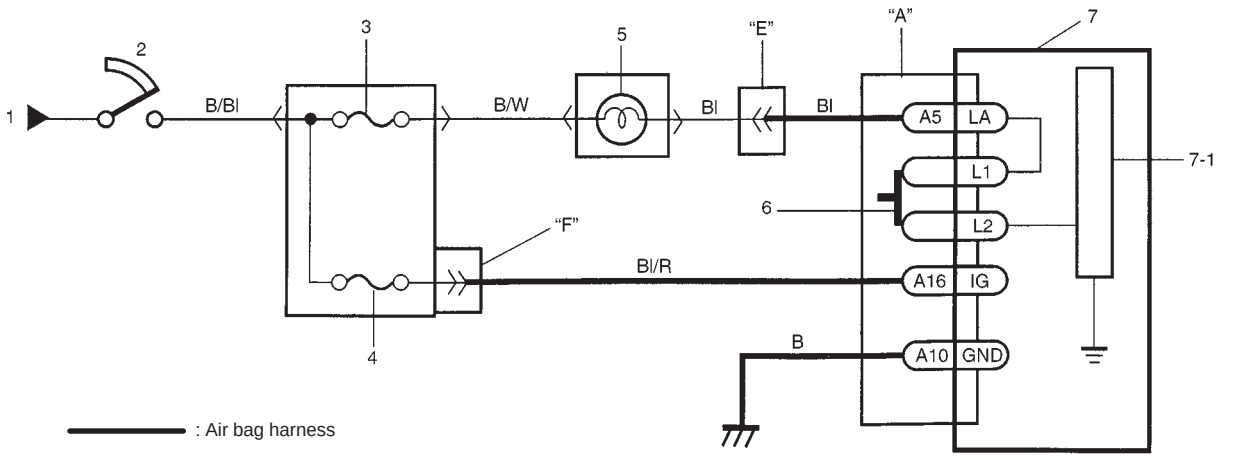
NOTE:

- ○ **When 2 or more codes are indicated, the lowest numbered code will appear first.**
- ○ **If a code not listed on the table is displayed, then the SDM is faulty.**
- ○ **Current DTC and history DTC can be identified by lighting and flashing of "AIR BAG" warning lamp as follows.**

	Current DTC Is set. (Abnormality exists at present.)	**History DTC is set only. (Faulty condition occurred once in the past but normal conditIon is restored at present.)**
"AIR BAG" warning lamp after ignition switch ON	**Remains ON.**	**Light up for 6 seconds and turns off.**
"AIR BAG" warning lamp when grounding diagnosis switch	**Current DTC is displayed.**	**History DTC is displayed.**

However, if a multiple number of DTC are set an even one of them is a current DTC, "AIR BAG" warning lamp remains on after ignition switch is turned ON. Therefore, it is not possible to identify any of them as to whether it is a current one or a history one. (But use of SUZUKI scan tool will make identification possible.)

TABLE A – “AIR BAG” WARNING LAMP COMES “ON” STEADY (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. “IG” fuse in J/B
4. “AIR BAG” fuse in J/B
5. “AIR BAG” warning lamp in combination meter
6. Connection detection pin
7. SDM

7-1. “AIR BAG” warning lamp driver circuit

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to “INTERMITTENT AND POOR CONNECTION” in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

TABLE TEST DESCRIPTION

STEP 1: Check “AIR BAG” fuse.

STEP 2: Check power source circuit.

STEP 3: Check “AIR BAG” warning lamp circuit.

TABLE A – "AIR BAG" WARNING LAMP COMES "ON" STEADY (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Ignition switch OFF. 2) Remove and inspect "AIR BAG" fuse. Is fuse good?	Go to Step 2.	"Bl/R" wire short to ground. After repair, replace "AIR BAG" fuse.
2	1) Disconnect SDM. 2) Check proper connection to SDM at terminal "A16". 3) If OK then check voltage between "Al6" terminal of SDM connector and body ground with ignition switch ON. Is it 8V or more?	Go to Step 3.	"Bl/R" wire (between "AIR BAG" fuse and SDM connector) open
3	1) Disconnect 13p connector from combination meter, referring to Section 8. 2) Check resistance between "A5" terminal of SDM connector and body ground. Is resistance 1 kI or more?	Substitute a known-good SDM and re-check.	"Bl" wire (between combination meter and SDM connector) short to ground

Fig. for STEP 2

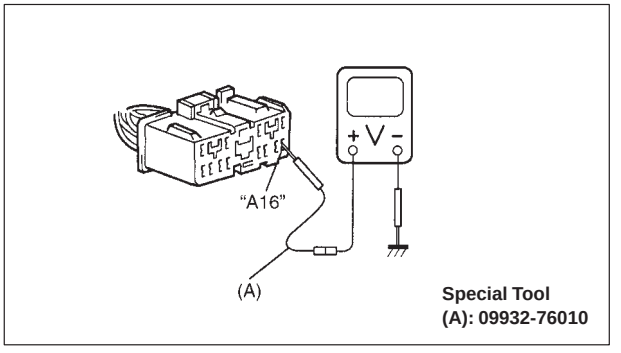
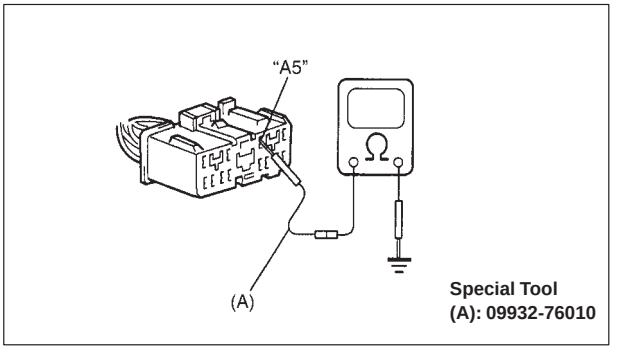


Fig. for STEP 3



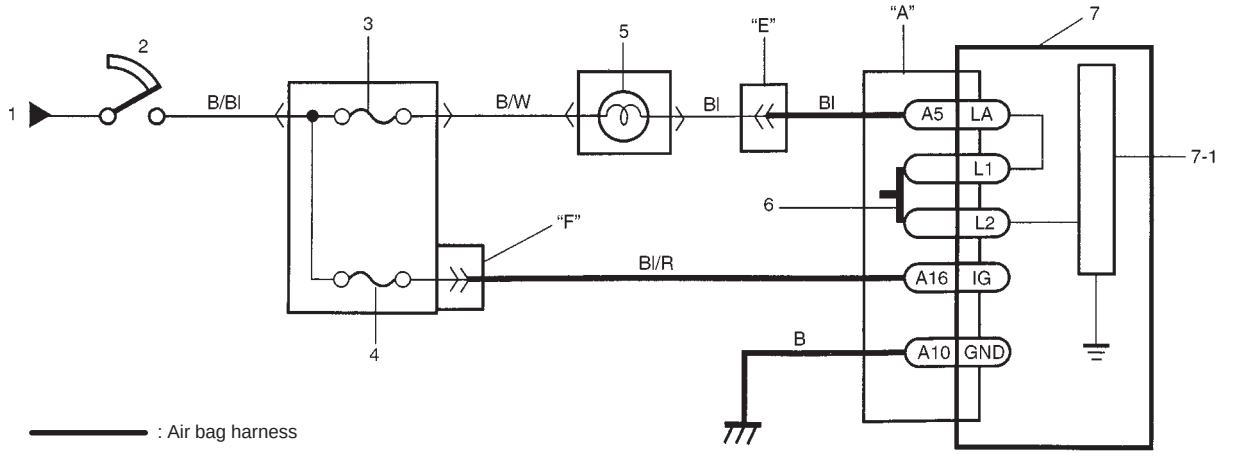
NOTE:

Upon completion of inspection and repair work, perform the following procedure.

1) Reconnect all air bag system components, ensure all components are properly mounted.

2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

TABLE B – “AIR BAG” WARNING LAMP DOES NOT COME “ON” (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. “IG” fuse in J/B
4. “AIR BAG” fuse in J/B
5. “AIR BAG” warning lamp in combination meter
6. Connection detection pin
7. SDM

7-1. “AIR BAG” warning lamp driver circuit

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to “INTERMITTENT AND POOR CONNECTION” in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

TABLE TEST DESCRIPTION

STEP 1: Check combination meter power feed circuit.
STEP 2: Check electrical connection check mechanism in SDM connector.
STEP 3: Check “AIR BAG” warning lamp circuit.
STEP 4: Check open in “AIR BAG” warning lamp circuit.
STEP 5: Check short from “AIR BAG” warning lamp circuit to power circuit.
STEP 6: Check “AIR BAG” bulb.

TABLE B – "AIR BAG" WARNING LAMP DOES NOT COME "ON" (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Set parking brake. 2) Note combination meter as ignition switch is turned ON. Does the "BRAKE" indicator (warning lamp) come ON?	Go to Step 2.	"B/Bl" wire, "IG" fuse or J/B (between ignition switch and combination meter) open or short to ground
2	1) With ignition switch OFF, disconnect SDM. 2) Check electrical connection check mechanism, referring to "AIR BAG WIRE HARNESS AND CONNECTORS" in this section. Is it in good condition?	Go to Step 3.	Repair electrical connection check mechanism.
3	1) Disconnect SDM. 2) Check proper connection to SDM at terminal "A5". 3) If OK then check voltage from "A5" terminal of SDM connector to body ground with ignition switch ON. Is it 9V or more?	Substitute a known-good SDM and recheck.	Go to Step 4.
4	1) Remove combination meter, referring to Section 8. 2) Check proper connection to combination meter at terminal for "AIR BAG" warning lamp and to SDM at terminal "A5". 3) If OK then check resistance between "Bl" wire terminal of combination meter connector (13p) and "A5" terminal of SDM connector. Is resistance 1 Ω or less?	Go to Step 5.	Repair high resistance or open in "Bl" wire circuit (between combination meter and SDM).
5	1) Measure voltage from "A5" terminal of SDM connector to body ground with ignition switch ON. Is it 9V or more?	Repair short from "Bl" wire circuit (between combination meter and SDM) to power circuit.	Go to Step 6.
6	Remove and inspect "AIR BAG" bulb. Is bulb good?	Substitute a known-good combination meter and recheck.	Replace bulb.

Fig. for STEP 2

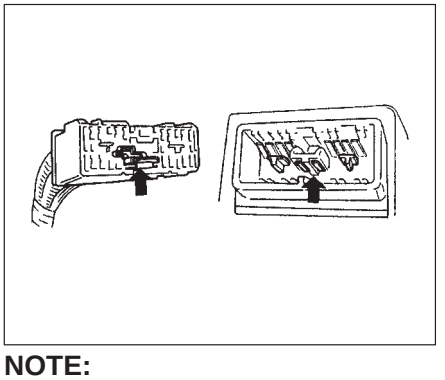
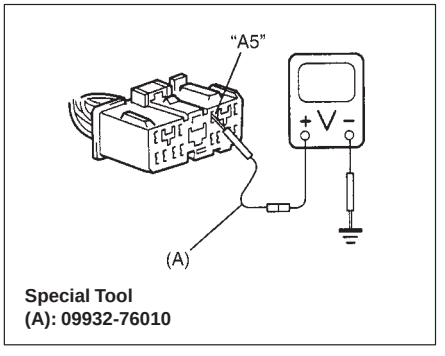
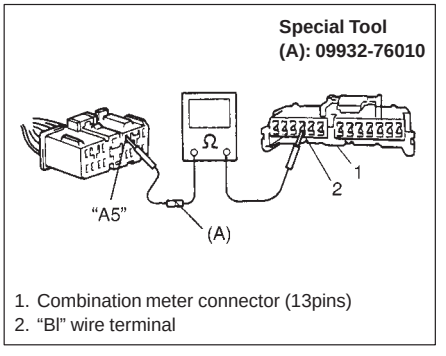


Fig. for STEP 3 and 5



Special Tool
(A): 09932-76010

Fig. for STEP 4



1. Combination meter connector (13pins)
2. "Bl" wire terminal

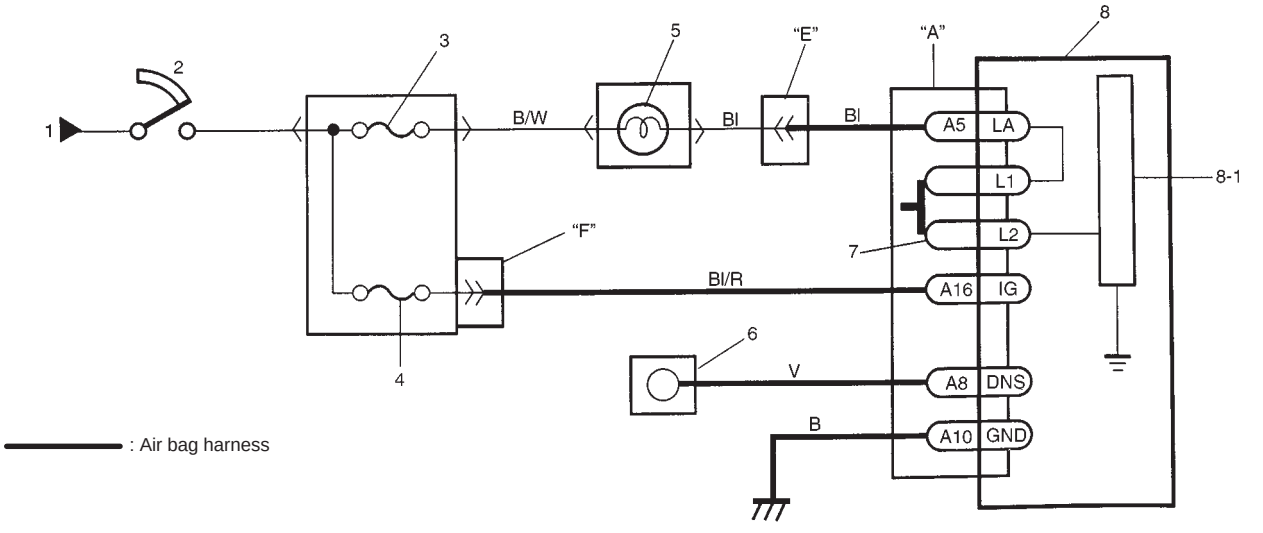
NOTE:

Upon completion of inspection and repair work, perform the following procedure.

1) Reconnect all air bag system components, ensure all components are properly mounted.

2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

TABLE C – “AIR BAG” WARNING LAMP FLASHES (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. “IG” fuse in J/B
4. “AIR BAG” fuse in J/B
5. “AIR BAG” warning lamp in combination meter
6. “AIR BAG” monitor coupler
7. Connection detection pin
8. SDM

8-1. “AIR BAG” warning lamp driver circuit

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to “INTERMITTENT AND POOR CONNECTION” in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

TABLE TEST DESCRIPTION

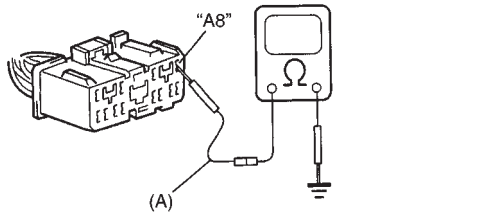
STEP 1: Check “AIR BAG” monitor coupler.

STEP 2: Check diagnosis switch circuit for air bag system.

TABLE C – “AIR BAG” WARNING LAMP FLASHES (Page 2 of 2)

STEP	ACTION	YES	NO
1	Check “AIR BAG” monitor coupler. Is it connected diagnosis switch terminal and ground terminal in “AIR BAG” monitor coupler by service wire?	Go to Step 2.	Remove service wire.
2	1) With ignition switch OFF, disconnect SDM. 2) Measure resistance between “A8” terminal of SDM connector and body ground. Is resistance 1 kI or more?	Substitute a known-good SDM and re-check.	Repair short from “V” wire circuit to ground.

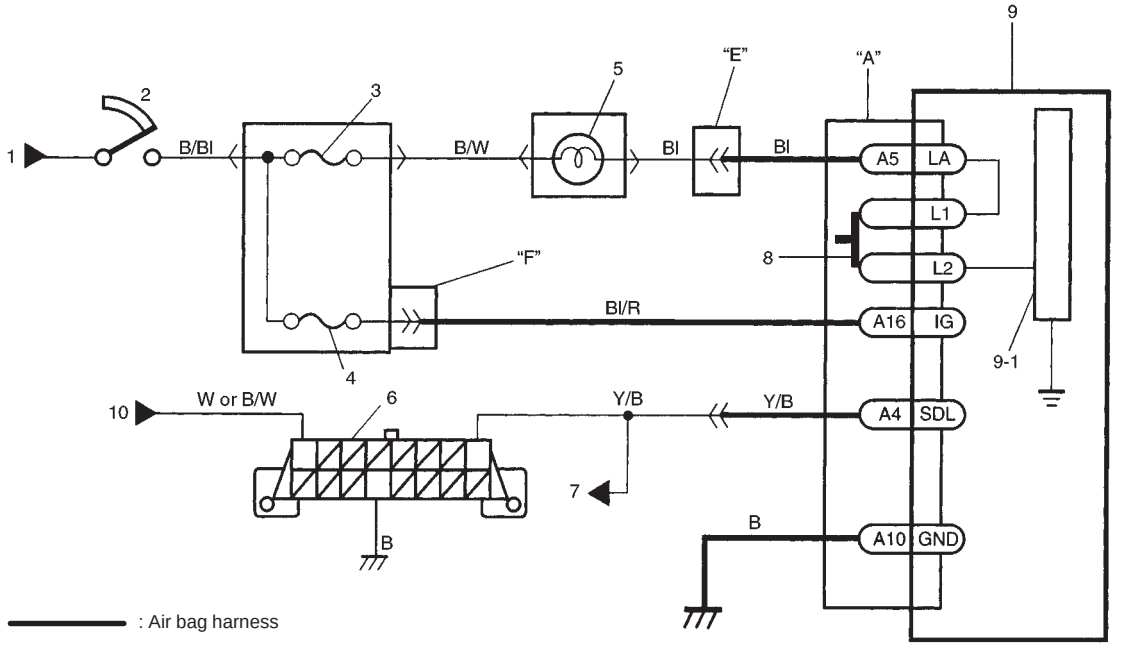
Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat “AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE” to confirm that the trouble has been corrected.

TABLE D – SDM CANNOT COMMUNICATE THROUGH THE SERIAL DATA CIRCUIT (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. "IG" fuse in J/B
4. "AIR BAG" fuse in J/B
5. "AIR BAG" warning lamp in combination meter
6. DLC
7. To ECM (PCM), TCM (it equipped), ICM (if equipped) and ABS controller (it equipped)
8. Connection detection pin
9. SDM

9-1. "AIR BAG" warning lamp driver circuit

10. From main fuse or ignition switch

CAUTION:

- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

TABLE TEST DESCRIPTION

STEP 1: Check connection of SUZUKI scan tool to DLC.

STEP 2: Check serial data link circuit.

STEP 3: Check high resistance or open in serial data link circuit (in air bag harness).

TABLE D – SDM CANNOT COMMUNICATE THROUGH THE SERIAL DATA CIRCUIT (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Make sure that SUZUKI scan tool is free from malfunction and correct cartridge for air bag system is used. 2) Ignition switch OFF. 3) Check proper connection of SUZUKI scan tool to DLC. Is connection in good condition?	Go to Step 2.	Properly connect scan tool to DLC.
2	Check if communication is possible by trying communication with other controller (ECM (PCM), TCM, ICM or ABS controller). Is it possible to communicate with other controller?	Go to Step 3.	Repair open in common section of serial data circuit ("Y/B" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("Y/B" wire circuit).
3	1) With ignition switch OFF, disconnect SDM and "Lamp and DLC" connector ("E" connector). 2) Check proper connection at "Y/B" wire terminal for DLC in "E" connector. 3) If OK, then check resistance between "Y/B" wire terminal in "E" connector and "A4" terminal of SDM connector. Is resistance 1 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "Y/B" wire circuit (in air bag harness).

Fig. for STEP 1

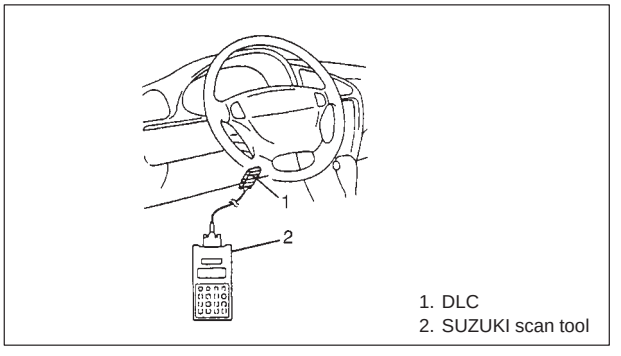
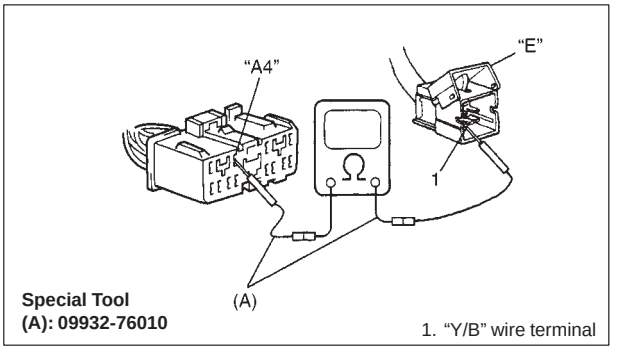


Fig. for STEP 3



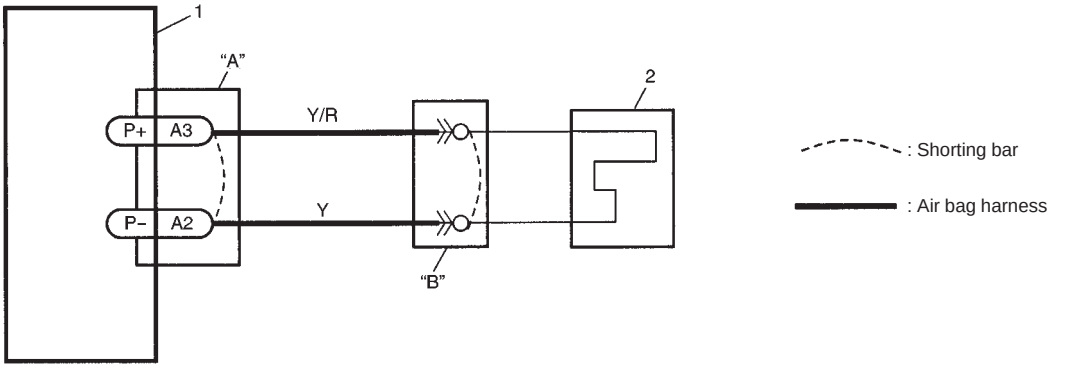
NOTE:

Upon completion of inspection and repair work, perform the following procedure.

1) Reconnect all air bag system components, ensure all components are properly mounted.

2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 15 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 1 of 2)



1. SDM
2. Passenger air bag (inflator) module

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

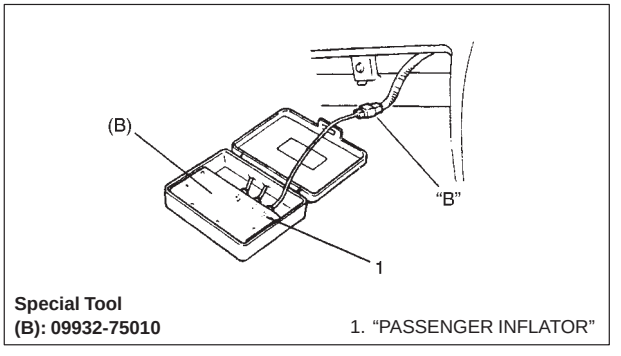
STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

CODE 15 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "B" connector. 3) If OK then connect special tool (B) to passenger air bag (inflator) module connector disconnected at the Step 1. With ignition switch ON, is DTC 15 current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A2" and "A3". 3) Release shorting bar in SDM connector by inserting a piece of paper, referring to the figure below. 4) If OK then measure resistance between "A2" and "A3" terminals with connected special tool (B). Is resistance 2.9 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "Y" or "Y/R" wire circuit.

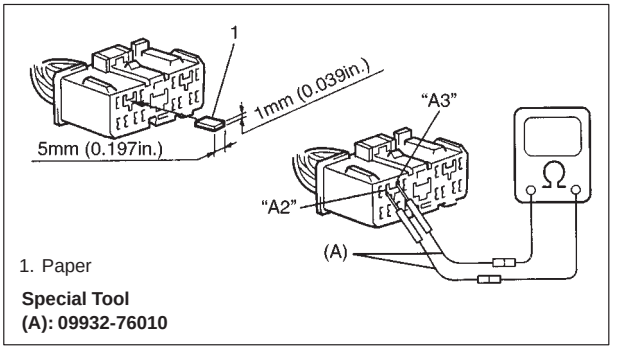
Fig. for STEP 1 and 2



Special Tool
(B): 09932-75010

1. "PASSENGER INFLATOR"

Fig. for STEP 2



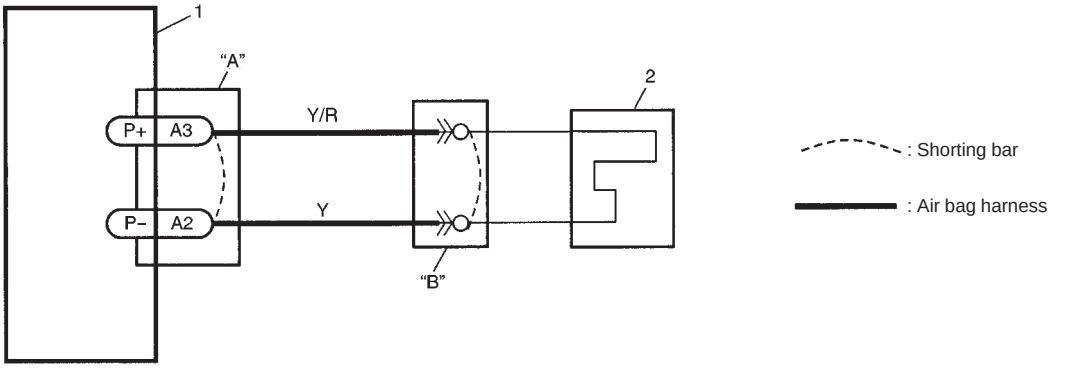
1. Paper

Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 16 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 1 of 2)



1. SDM
2. Passenger air bag (inflator) module

CAUTION:

- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

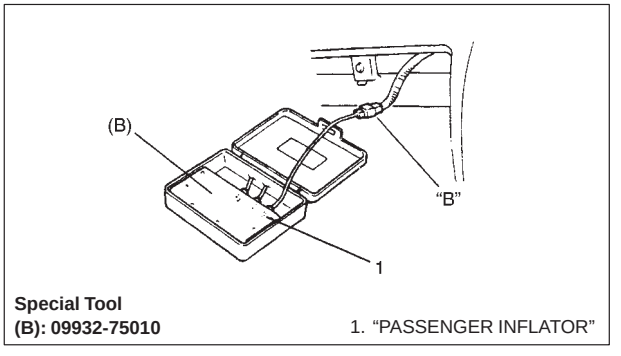
STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

CODE 16 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "B" connector. 3) If OK then connect special tool (B) to passenger air bag (inflator) module connector disconnected at the Step 1. With ignition switch ON, is DTC 16 current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A2" and "A3". 3) Release shorting bar in SDM connector by inserting a piece of paper, referring to the figure below. 4) If OK then measure resistance between "A2" and "A3" terminals with connected special tool (B). Is resistance 1.7 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from "Y" wire circuit to "Y/R" wire circuit or from "Y" or "Y/R" wire circuit to other wire circuit.

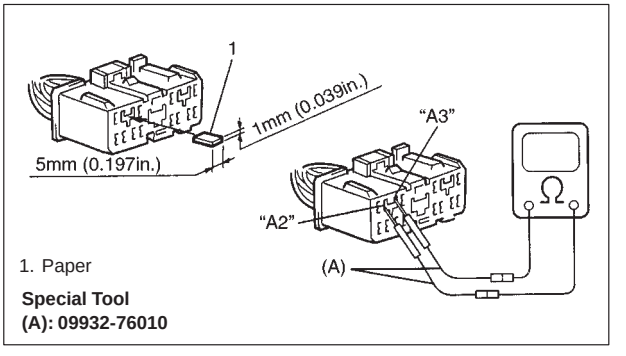
Fig. for STEP 1 and 2



Special Tool
(B): 09932-75010

1. "PASSENGER INFLATOR"

Fig. for STEP 2



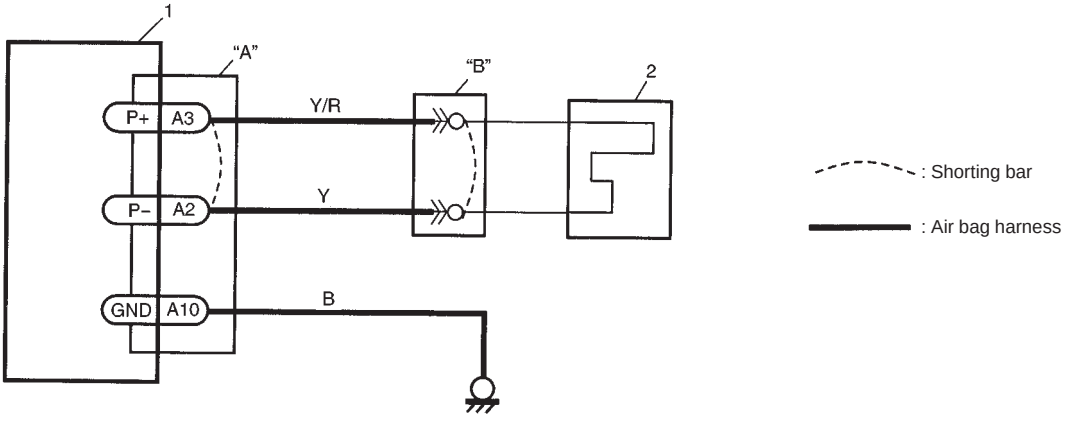
1. Paper

Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 18 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 1 of 2)



1. SDM
2. Passenger air bag (inflator) module

CAUTION:

- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The voltage measured at passenger air bag initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

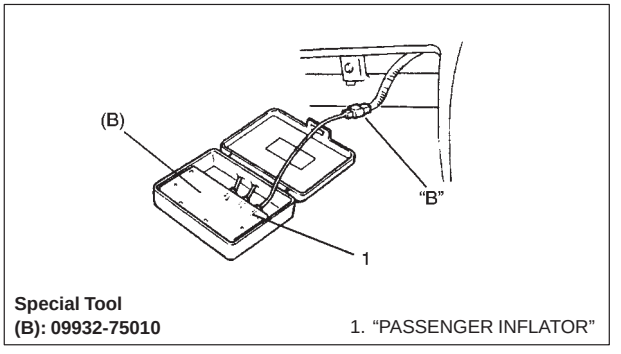
STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

CODE 18 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "B" connector. 3) If OK then connect special tool (B) to passenger air bag (inflator) module connector disconnected at the Step 1. With ignition switch ON, is DTC 18 current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
2	1) With ignition switch OFF, disconnect special tool (B) and SDM. 2) Measure resistance between "A2" and "A10" terminals. Is resistance 1 kΙ or more?	Substitute a known-good SDM and recheck.	Repair short from "Y" or "Y/R" wire circuit to ground.

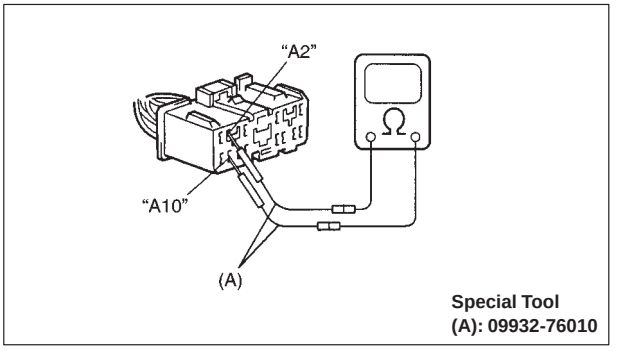
Fig. for STEP 1 and 2



Special Tool
(B): 09932-75010

1. "PASSENGER INFLATOR"

Fig. for STEP 2

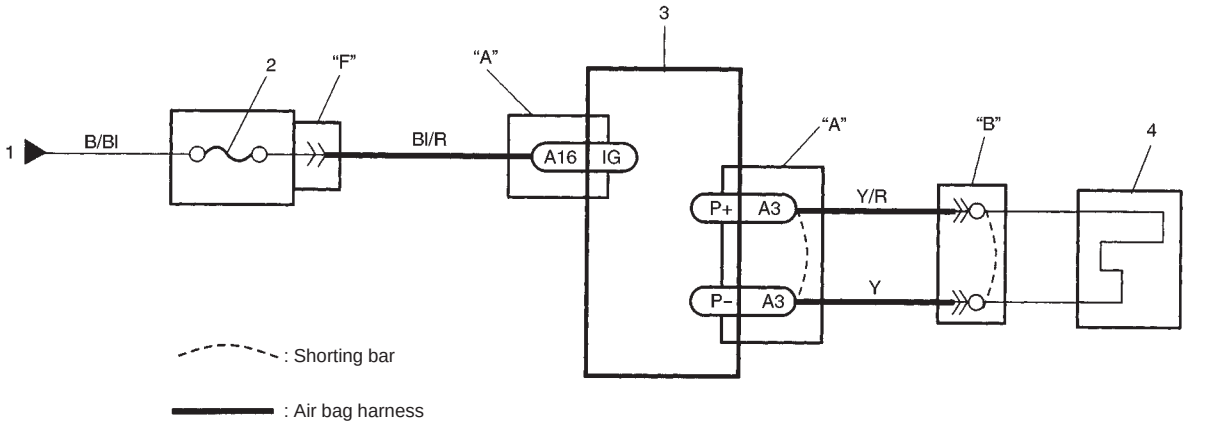


Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 19 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 1 of 2)



1. From ignition switch
2. "AIR BAG" fuse in J/B
3. SDM
4. Passenger air bag (inflator) module

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The voltage measured at passenger air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

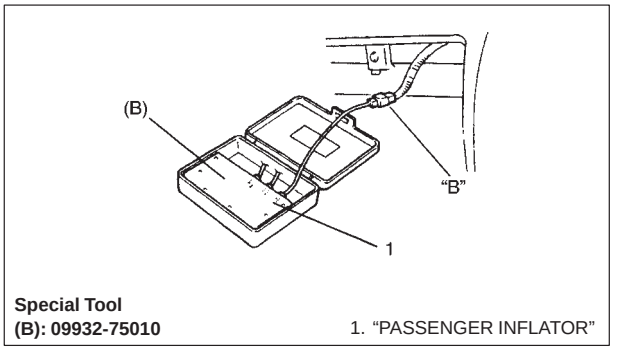
STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

CODE 19 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "B" connector. 3) If OK then connect special tool (B) to passenger air bag (inflator) module connector disconnected at the Step 1. With ignition switch ON, is DTC 19 current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
2	1) With ignition switch OFF, disconnect special tool (B) and SDM. 2) Measure voltage from "A3" terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	Repair short from "Y" or "Y/R" wire circuit to power circuit.

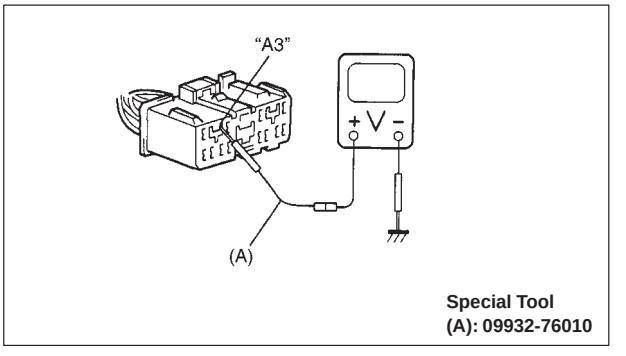
Fig. for STEP 1 and 2



Special Tool
(B): 09932-75010

1. "PASSENGER INFLATOR"

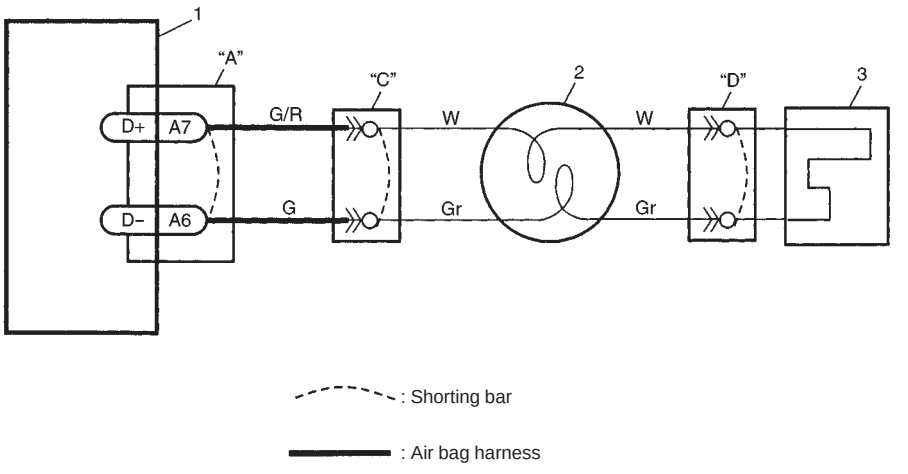
Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 21 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 1 of 2)



1. SDM
2. Contact coil assembly
3. Driver air bag (inflator) module

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.
STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.
STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

CODE 21 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect special tool (B) to contact coil connector disconnected at Step 1. With ignition switch ON, is DTC 21 current?	Go to Step 2.	Go to Step 3.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A6" and "A7". 3) Release shorting bar in SDM connector, referring to the figure below. 4) If OK then measure resistance between "A6" and "A7" terminals with connected special tool (B). Is resistance 3.5 Ω or less?	Substitute a known-good SDM and re-check.	Repair high resistance or open in "G" or "G/R" wire circuit.
3	1) With ignition switch OFF, disconnect special tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect special tool (B) to driver air bag (inflator) module disconnected at Step 1. With ignition switch ON, is DTC 21 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to Section 3C1).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to Section 3C1).

Fig. for STEP 1 and 2

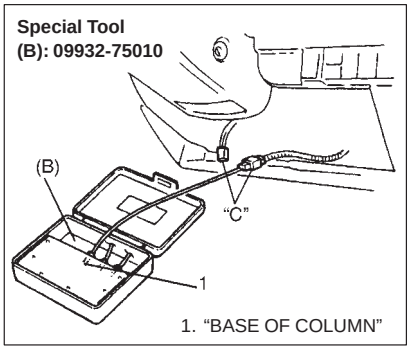


Fig. for STEP 2

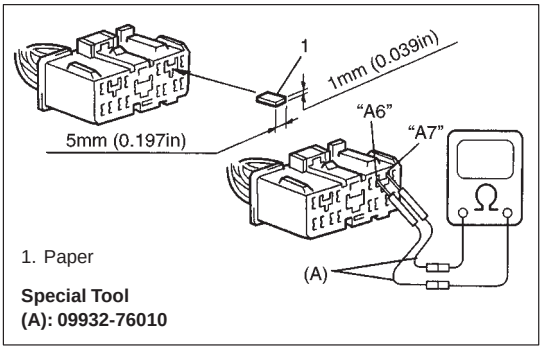
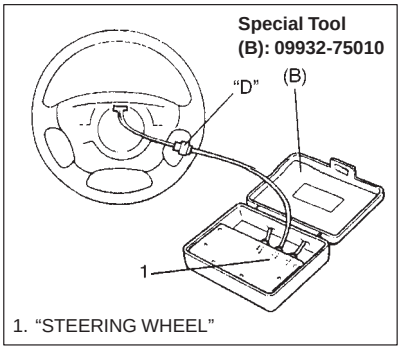


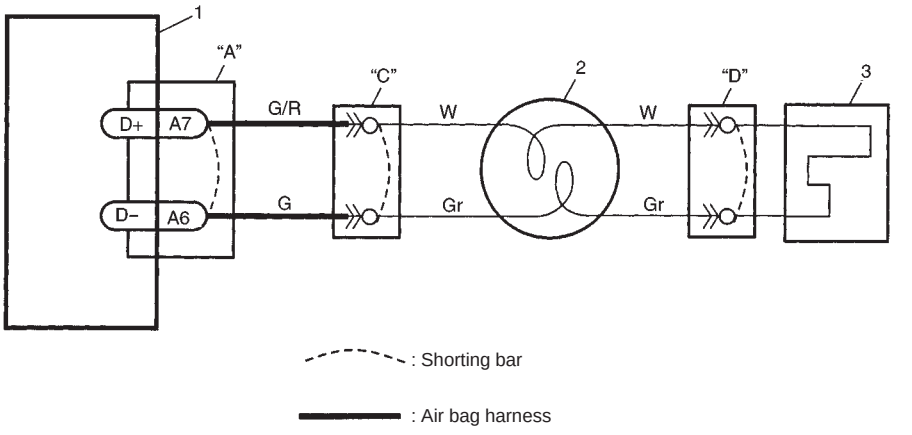
Fig. for STEP 3



NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 22 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 1 of 2)



1. SDM
2. Contact coil assembly
3. Driver air bag (inflator) module

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The combined resistance of the driver air bag (inflator) module, contact coil assembly, harness wiring and connector terminal contact is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.
STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.
STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

CODE 22 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect special tool (B) to contact coil connector disconnected at Step 1. With ignition switch ON, is DTC 22 current?	Go to Step 2.	Go to Step 3.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A6" and "A7". 3) Release shorting bar in SDM connector, referring to the figure below. 4) If OK then measure resistance between "A6" and "A7" terminals with connected special tool (B). Is resistance 1.7 I or more?	Substitute a known-good SDM and re-check.	Repair short from "G" wire circuit to "G/R" wire circuit or from "G" or "G/R" wire circuit to other wire circuit.
3	1) With ignition switch OFF, disconnect special tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect special tool (B) to driver air bag (inflator) module disconnected at Step 1. With ignition switch ON, is DTC 22 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to Section 3C1).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to Section 3C1).

Fig. for STEP 1 and 2

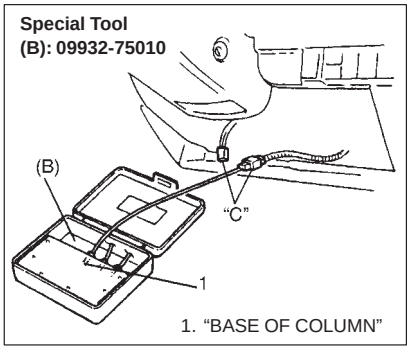


Fig. for STEP 2

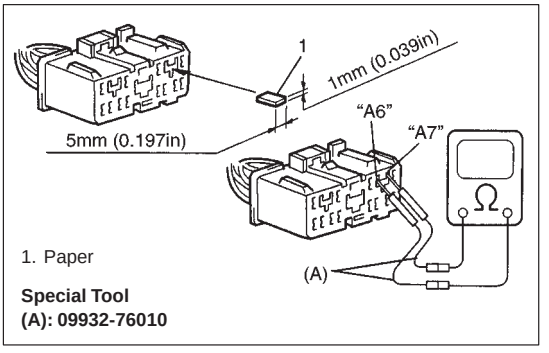
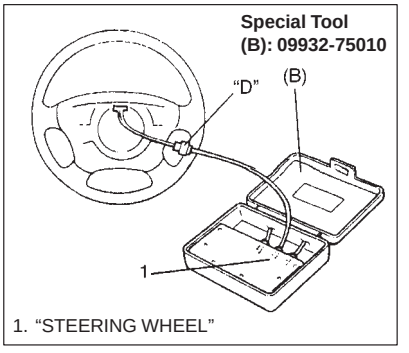


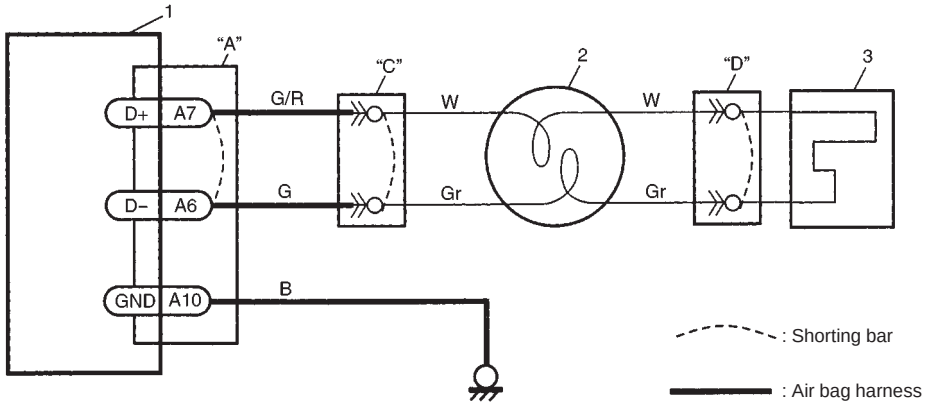
Fig. for STEP 3



NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 24 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 1 of 2)



1. SDM
2. Contact coil assembly
3. Driver air bag (inflator) module

CAUTION:

- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The voltage measured at driver air bag initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

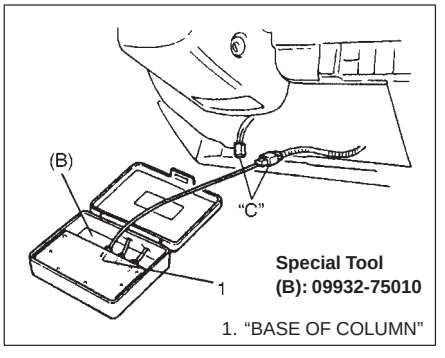
STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.
STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.
STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

CODE 24 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect special tool (B) to contact coil connector disconnected at Step 1. With ignition switch ON, is DTC 24 current?	Go to Step 2.	Go to Step 3.
2	1) With ignition switch OFF, disconnect special tool (B) and SDM. 2) Measure resistance between "A6" and "A10" terminals. Is resistance 1 kΩ or more?	Substitute a known-good SDM and re-check.	Repair short from "G" or "G/R" wire circuit to ground.
3	1) With ignition switch OFF, disconnect special tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect special tool (B) to driver air bag (inflator) module disconnected at Step 1. With ignition switch ON, is DTC 24 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to Section 3C1).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to Section 3C1).

Fig. for STEP 1 and 2



1. "BASE OF COLUMN"

Fig. for STEP 2

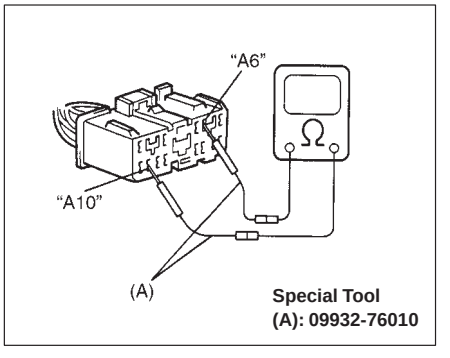
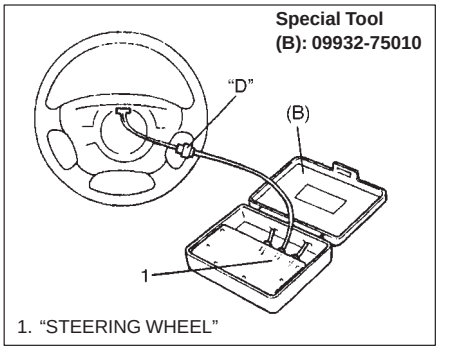


Fig. for STEP 3

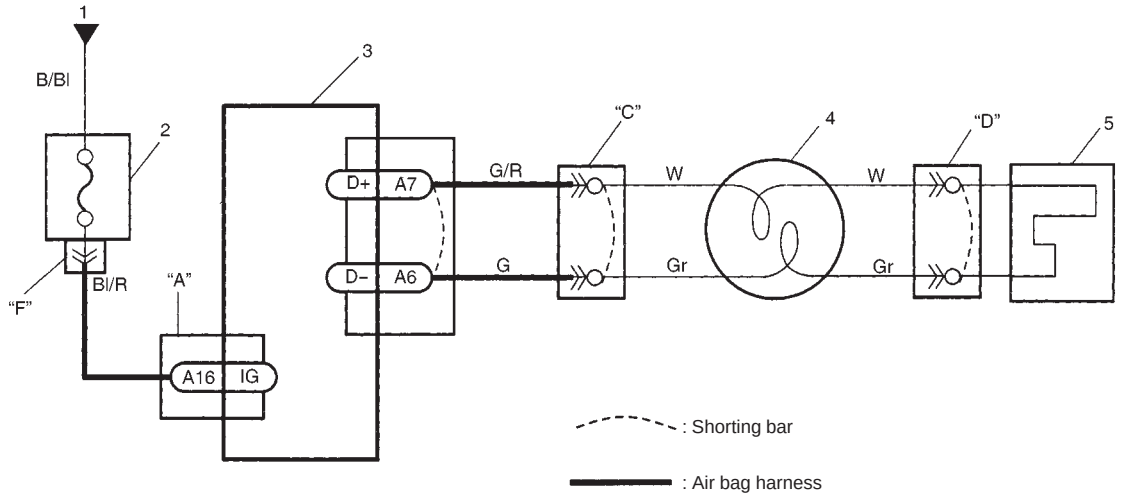


1. "STEERING WHEEL"

NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 25 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 1 of 2)



1. From ignItion switch
2. "AIR BAG" fuse in J/B
3. SDM
4. Contact coil assembly
5. Driver air bag (inflator) module

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The voltage measured at driver air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.
STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.
STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

CODE 25 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect special tool (B) to contact coil connector disconnected at Step 1. With ignition switch ON, is DTC 25 current?	Go to Step 2.	Go to Step 3.
2	1) With ignition switch OFF, disconnect special tool (B) and SDM. 2) Measure voltage from "A7" terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and re-check.	Repair short from "G" or "G/R" wire circuit to power circuit.
3	1) With ignition switch OFF, disconnect special tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect special tool (B) to driver air bag (inflator) module disconnected at Step 1. With ignition switch ON, is DTC 25 current?	1) Ignition switch OFF. 2) Replace contact coil assembly (Refer to Section 3C1).	1) Ignition switch OFF. 2) Replace driver air bag (inflator) module (Refer to Section 3C1).

Fig. for STEP 1 and 2

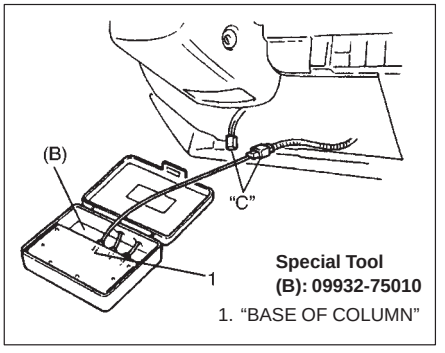


Fig. for STEP 2

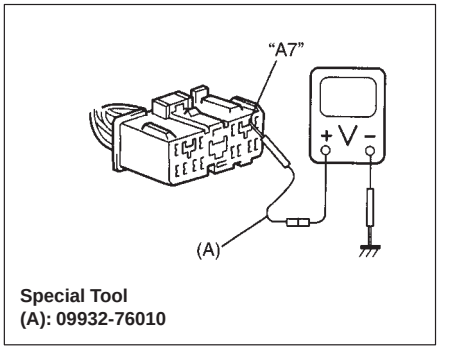
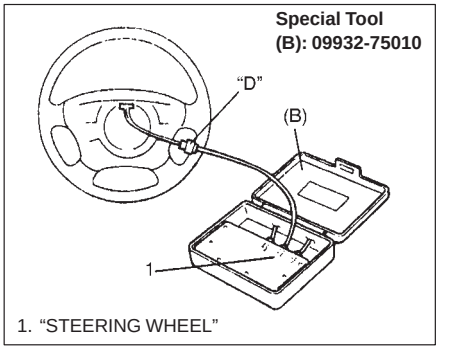


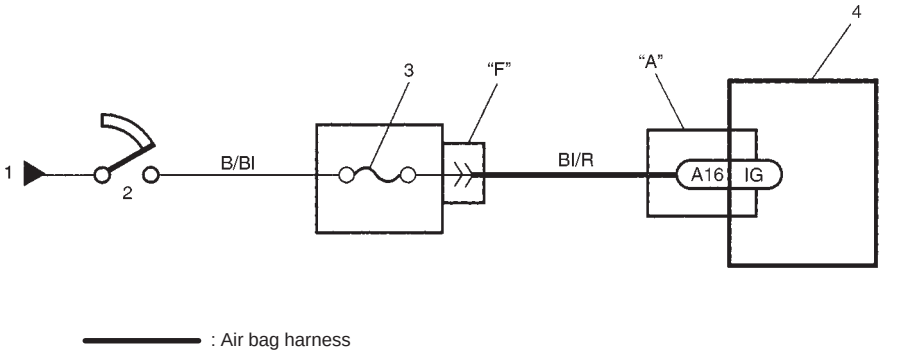
Fig. for STEP 3



NOTE:
Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.**
3) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

CODE 31 – POWER SOURCE VOLTAGE HIGH (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. "AIR BAG" fuse in J/B
4. SDM

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The power source voltage to SDM is above specified value for specified time.

TABLE TEST DESCRIPTION

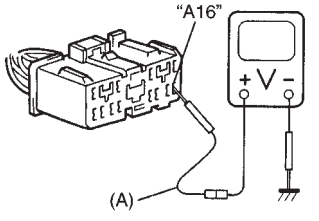
STEP 1: Check if voltage applied to SDM is within normal range.
STEP 2: Check if DTC 31 still exists.

CODE 31 – POWER SOURCE VOLTAGE HIGH (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at "A16" terminal. 3) If OK then ignition switch ON, and then check voltage from "A16" terminal on SDM harness connector to body ground. Is voltage 14 V or less?	Go to Step 2.	Check Charging System and repair as necessary. (Refer to "CHANGING SYSTEM" in Section 6H.)
2	With ignition switch OFF, reconnect SDM. With ignition switch ON, is DTC 31 current?	Substitute a known-good SDM and re-check.	Check Charging System and repair as necessary. (Refer to "CHANGING SYSTEM" in Section 6H.)

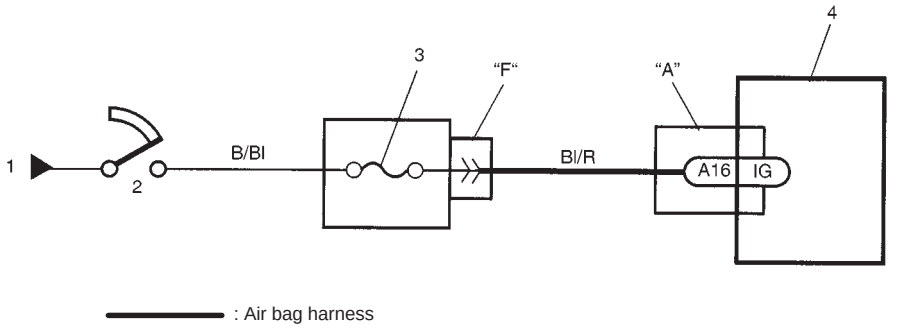
Fig. for STEP 1



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 32 – POWER SOURCE VOLTAGE LOW (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. "AIR BAG" fuse in J/B
4. SDM

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The power source voltage is below an approximately 8 V for specified time.

TABLE TEST DESCRIPTION

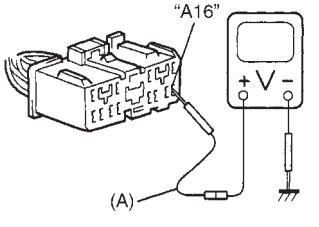
STEP 1: Check if voltage applied to SDM is within normal range.
STEP 2: Check if DTC 32 still exists.

CODE 32 – POWER SOURCE VOLTAGE LOW (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	Measure voltage on battery. Is voltage 11 V or more?	Go to Step 2.	Check Charging System and repair as necessary. (Refer to "CHANGING SYSTEM" in Section 6H.)
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at "A16" terminal. 3) If OK then ignition switch ON, and then check voltage from "A16" terminal on SDM harness connector to body ground. Is voltage 8 V or more?	Go to Step 4	Go to Step 3.
3	1) With ignition switch OFF, disconnect ignition connector ("F" connector) from J/B. 2) Check proper connection at terminal in "F" connector. 3) If OK then ignition switch ON, and then check voltage from terminal in "F" connector on J/B to body ground. Is voltage 8 V or more?	Repair poor connection, high resistance in "Bl/R" circuit of air bag harness.	Possibly faulty points are as follows. Check each of them and repair as necessary. ○ J/B ○ Circuit from battery to J/B ○ Charging System (Refer to "CHANGING SYSTEM" in Section 6H.)
4	With ignition switch OFF, reconnect SDM. With ignition switch ON, is DTC 32 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to "CHANGING SYSTEM" in Section 6H.)

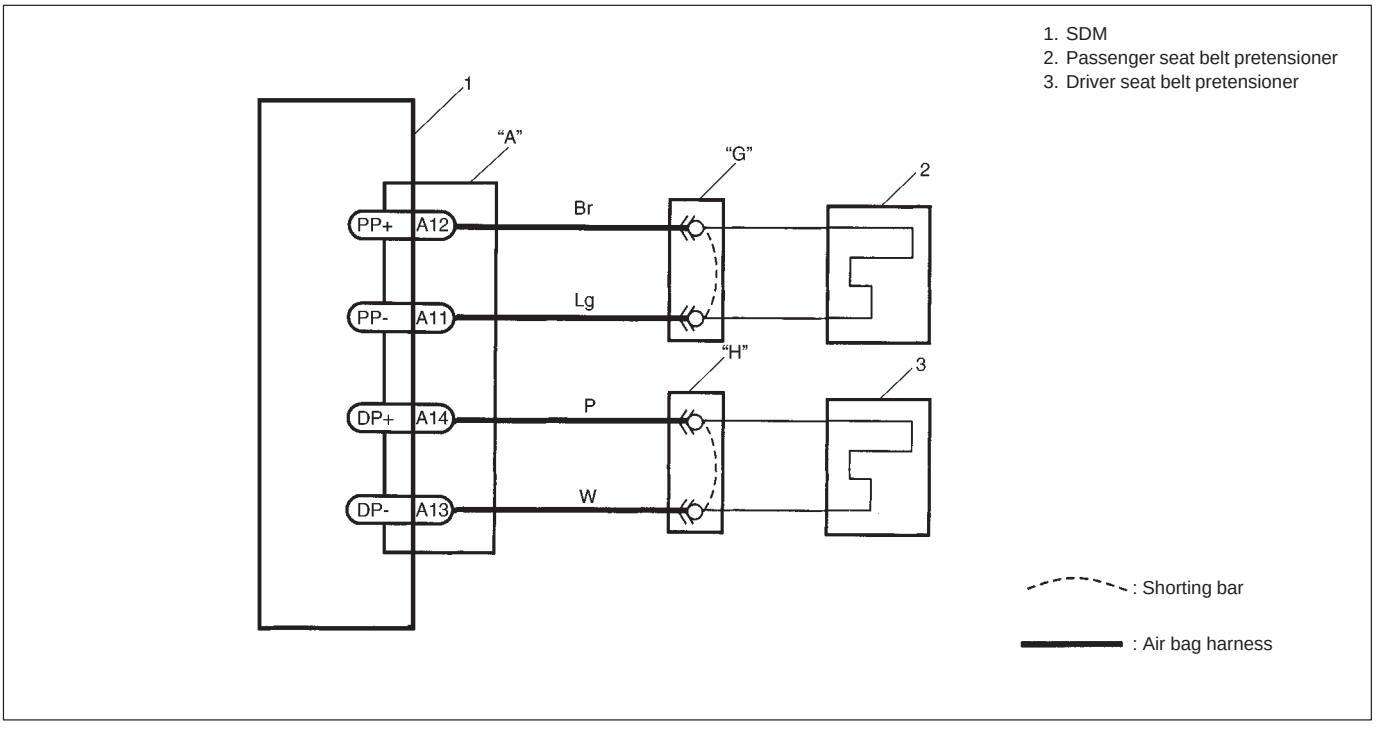
Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 41 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH
CODE 45 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH
(Page 1 of 2)



CAUTION:
- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The resistance of driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

CODE 41 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH
CODE 45 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH
(Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect special tool (B) to seat belt pretensioner connector disconnected at the Step 1. With ignition switch ON, is DTC 41 or 45 still current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A13" and "A14" or "A11" and "A12". 3) If OK then measure resistance between "A13" and "A14" terminals or "A11" and "A12" terminals with connected special tool (B). Is resistance 2.9 Ω or less?	Substitute a known-good SDM and recheck.	**DTC 41:** Repair high resistance or open in "P" or "W" wire circuit. **DTC 45:** Repair high resistance or open in "Lg" or "Br" wire circuit.

Fig. for STEP 1 and 2

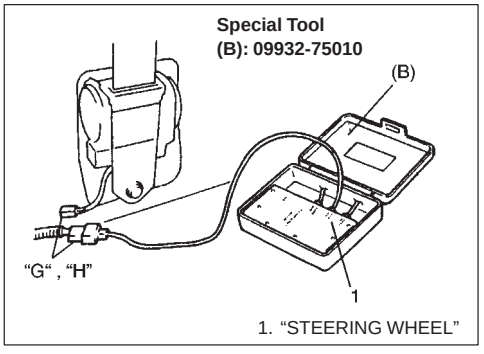
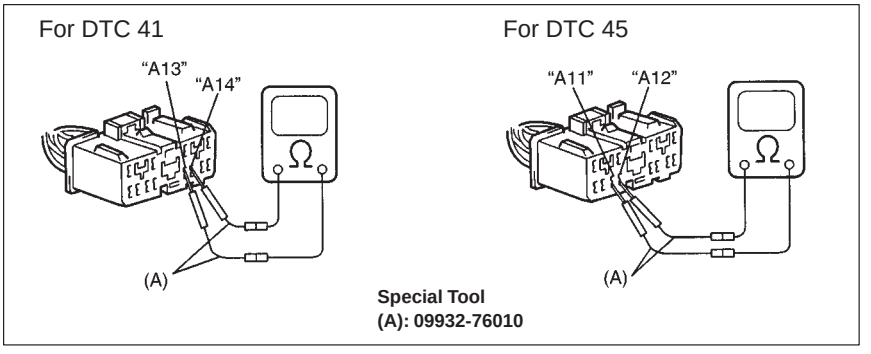
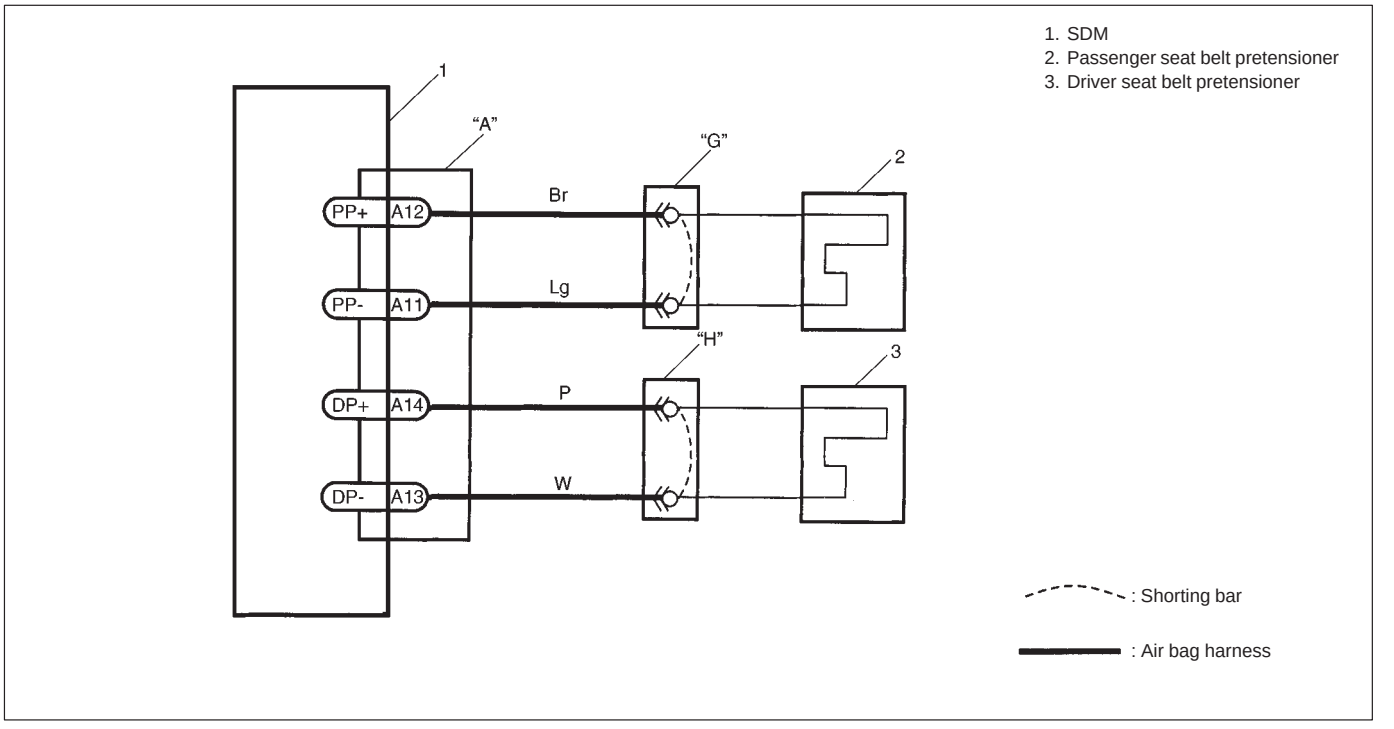


Fig. for STEP 2



NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 42 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW
CODE 46 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW
(Page 1 of 2)



CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The resistance of driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

CODE 42 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW
CODE 46 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW
(Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect special tool (B) to seat belt pretensioner connector disconnected at the Step 1. With ignition switch ON, is DTC 42 or 46 still current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A13" and "A14" or "A11" and "A12". 3) If OK then measure resistance between "A13" and "A14" terminals or "A11" and "A12" terminals with connected special tool (B). Is resistance 1.7 I or more?	Substitute a known-good SDM and re-check.	**DTC42:** Repair short from "P" wire circuit to "W" wire circuit or from "P" or "W" wire circuit to other wire circuit. **DTC46:** Repair short from "Lg" wire circuit to "Br" wire circuit or from "Lg" or "Br" wire circuit to other wire circuit.

Fig. for STEP 1 and 2

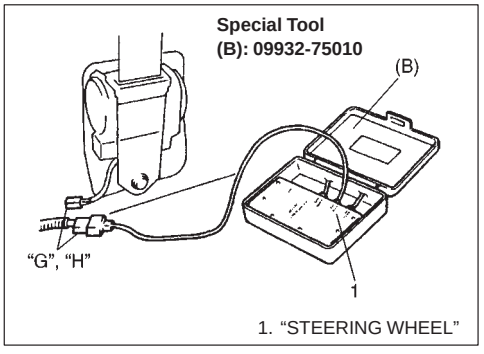
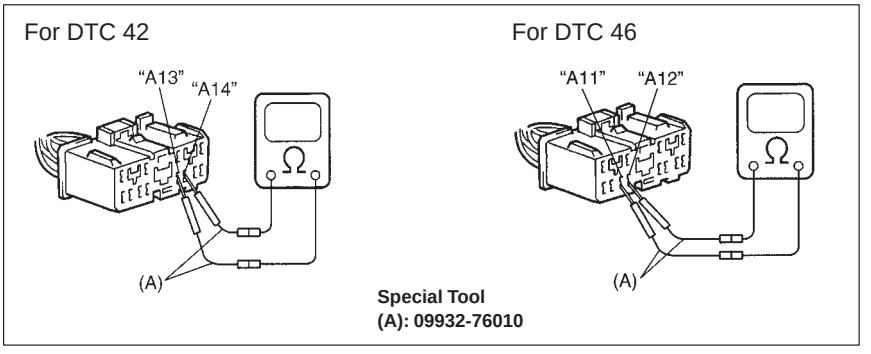
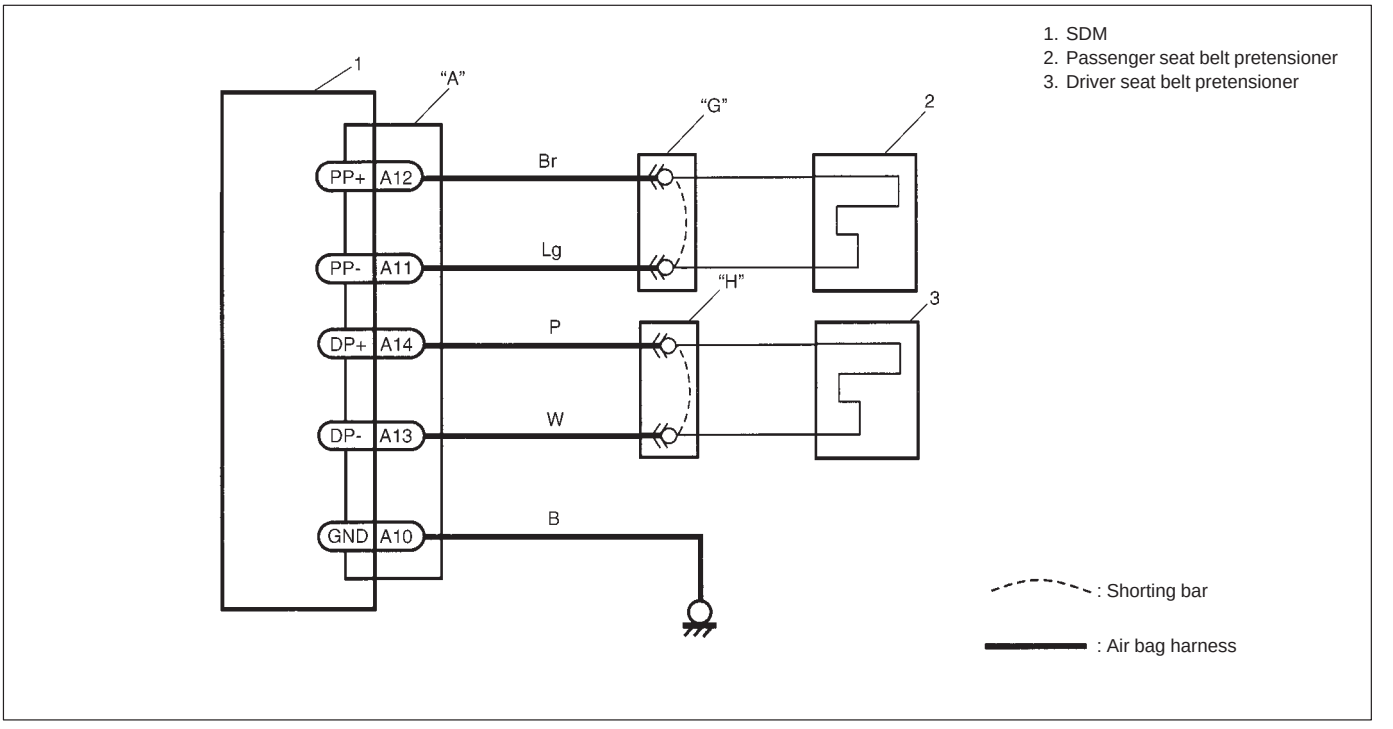


Fig. for STEP 2



NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 43 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND
CODE 47 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND
(Page 1 of 2)



CAUTION:
- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The voltage measured at driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

CODE 43 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND
CODE 47 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND
(Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect special tool (B) to seat belt pretensioner connector disconnected at the Step 1. With ignition switch ON, is DTC 43 or 47 still current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner.
2	1) With ignition switch OFF, disconnect special tool (B) and SDM. 2) Measure resistance between "A13" or "A11" and "A10" terminals. Is resistance 1 kΙ or more?	Substitute a known-good SDM and re-check.	**DTC 43 :** Repair short "P" or "W" wire circuit to ground. **DTC 47:** Repair short from "Lg" or "Br" wire circuit to ground.

Fig. for STEP 1 and 2

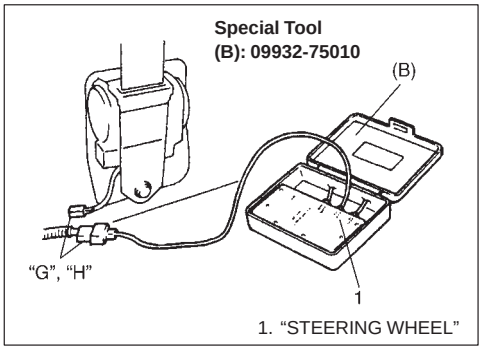
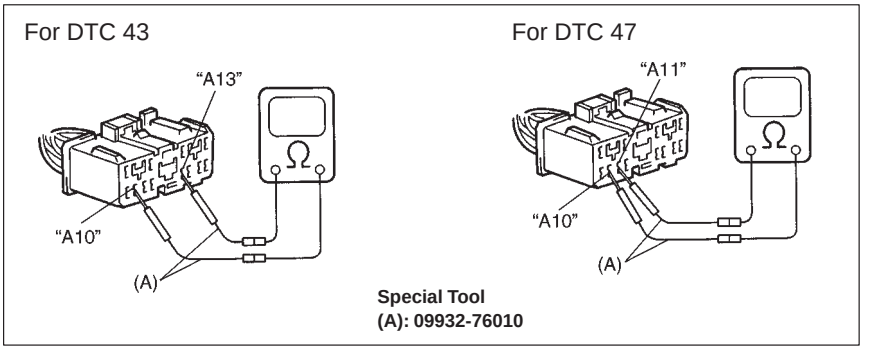
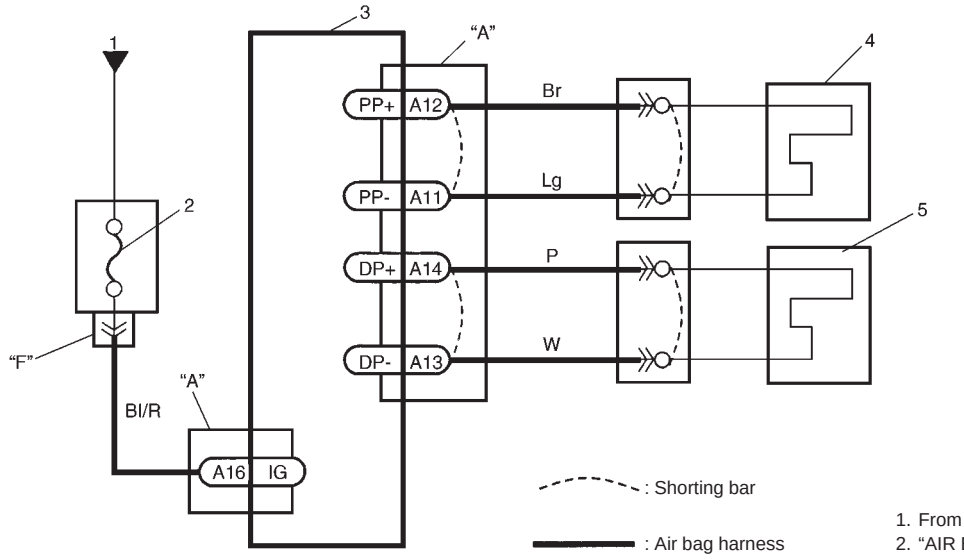


Fig. for STEP 2



NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 44 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT
CODE 48 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 1 of 2)



1. From ignition switch
2. "AIR BAG" fuse in J/B
3. SDM
4. Passenger seat belt pretensioner
5. Driver seat belt pretensioner

CAUTION:
- ○ **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- ○ **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- ○ **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN:

The voltage measured at driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

CODE 44 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT
CODE 48 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect special tool (B) to seat belt pretensioner connector disconnected at the Step 1. With ignition switch ON, is DTC 44 or 48 still current?	Go to Step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner.
2	1) With ignition switch OFF, disconnect special tool (B) and SDM. 2) Measure voltage from "A14" or "A12" terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	**DTC 44 :** Repair short "P" or "W" wire circuit to power circuit. **DTC 48 :** Repair short from "Lg" or "Br" wire circuit to power circuit.

Fig. for STEP 1 and 2

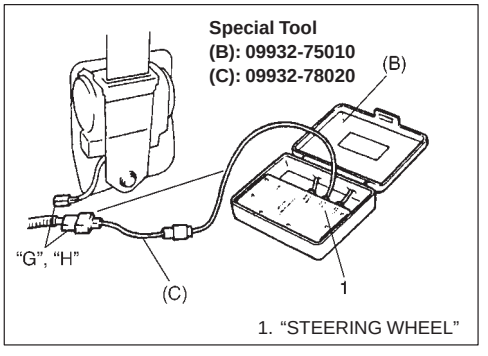
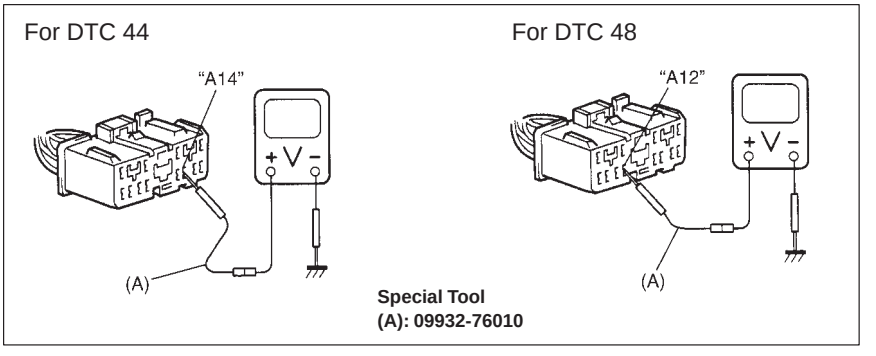


Fig. for STEP 2



NOTE:
Upon completion of inspection and repair work, perform the following procedure.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE"), if any.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 51 – FRONTAL CRASH DETECTED (SYSTEM ACTIVATION COMMANDED OUTPUTTED)

DTC WILL SET WHEN:

The SDM detects a frontal crash of sufficient force to warrant activation of the air bag system. (SDM outputs a deployment/activation command.)

TABLE TEST DESCRIPTION

STEP 1: Check that DTC51 has been set although air bag has not been deployed.
STEP 2: Check that DTC has been set due to failure of SDM.

NOTE:

Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	Ignition switch OFF. Has air bag system deployed?	Replace components and perform inspections as directed in "Repairs and Inspections Required After an Accident".	Go to Step 2.
2	Inspect front of vehicle and undercarriage for signs of impact. Are there signs of impact?	Replace components and perform inspections as directed in "Repairs and Inspections Required After an Accident".	Substitute a known-good SDM and recheck.

NOTE:

Upon completion of inspection and repair work, perform the following procedure.

1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.

CODE 71 – INTERNAL SDM FAULT

DTC WILL SET WHEN:

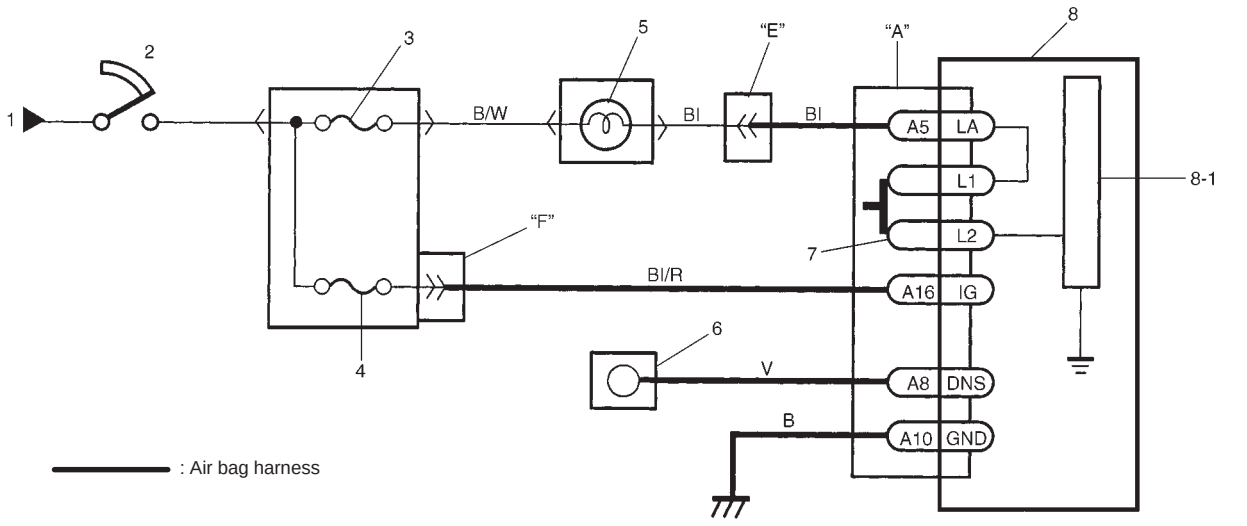
An internal SDM fault is detected by SDM.

NOTE:

○ Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC CHECK FLOW TABLE".
○ CODE 71 can never be cleared once it has been set.

1) Ignition switch OFF.
2) Replace SDM.
3) Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" in this section.

CODE 61 – "AIR BAG" WARNING LAMP FLASHES



1. From main fuse
2. Ignition switch
3. "IG" fuse in J/B
4. "AIR BAG" fuse in J/B
5. "AIR BAG" warning lamp in combination meter
6. "AIR BAG" monitor coupler
7. ConnectIon detection pin
8. SDM
8-1. "AIR BAG" warning lamp driver circuit

CAUTION:

- **When measurements are requested in this table use specified digital multi meter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "INTERMITTENT AND POOR CONNECTION" in Section 0A.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

DTC WILL SET WHEN

The voltage at the "AIR BAG" warning lamp circuit terminal "A5" does not match the commanded state of the warning lamp driver for specified time.

TABLE TEST DESCRIPTION

STEP 1: This test rechecks whether an abnormality is in SDM or in "AIR BAG" warning lamp circuit.

NOTE:

Before executing items in this table, be sure to perform "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE".

STEP	ACTION	YES	NO
1	1) Malfunctions within "AIR BAG" warning lamp circuit will set this diagnostic trouble code. These malfunctions are addressed in the "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" via Table A and Table C Failure to properly perform the "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" may result in misdiagnosis. 2) Ignition switch ON. 3) Clear diagnostic trouble codes. Is DTC 61 set?	Substitute a known-good SDM and recheck.	Recheck air bag system, referring to "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE".

NOTE:

Upon completion of inspection and repair work, perform the following procedure.

1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Repeat "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" to confirm that the trouble has been corrected.**

PRECAUTIONS

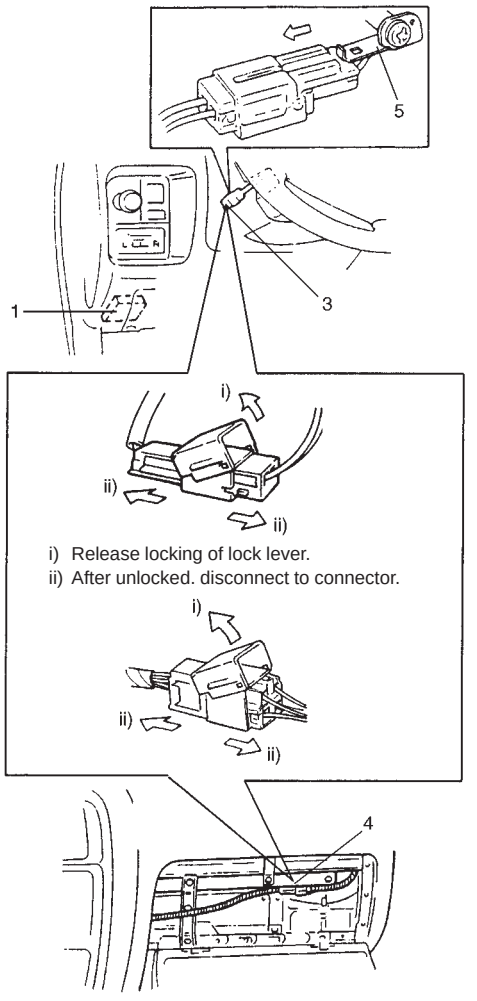
SERVICE PRECAUTION

WARNING/CAUTION labels are attached on each part of air bag system components (SDM, air bag (inflator) modules and seat belt pretensioners (if equipped)). Be sure to follow the instructions.

WARNING:
- **If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.**
- **Do not modify the steering wheel, dashboard or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.**
- **Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.**

- Many of service procedures require disconnection of “AIR BAG” fuse and air bag (inflator) modules (driver and passenger) from initiator circuit to avoid an accidental deployment.
- Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
- The “AIR BAG DIAGNOSTIC SYSTEM CHECK” must be the starting point of any air bag diagnostics. The “AIR BAG DIAGNOSTIC SYSTEM CHECK” will verify proper “AIR BAG” warning lamp operation and will lead you to the correct table to diagnose any air bag malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacements.
- Never use air bag component parts from another vehicle.
- If the vehicle will be exposed to temperatures over 93· C (200· F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended system activation.
- When servicing, if shocks may be applied (e.g., dropped from a height of 91.4 cm (3 feet) or more.) to air bag system component parts, remove those parts beforehand.
- When using electric welding, be sure to disconnect air bag (inflator) module and seat belt pretensioner connectors (driver and passenger) respectively.
- When applying paint around the air bag system related parts, use care so that the harness or connector will not be exposed to the paint mist.
- Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.

WARNING:
When performing service on or around air bag system components or air bag wiring, follow the procedures listed in the following pages to temporarily disable the air bag system. Refer to appropriate service manual procedures. Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.



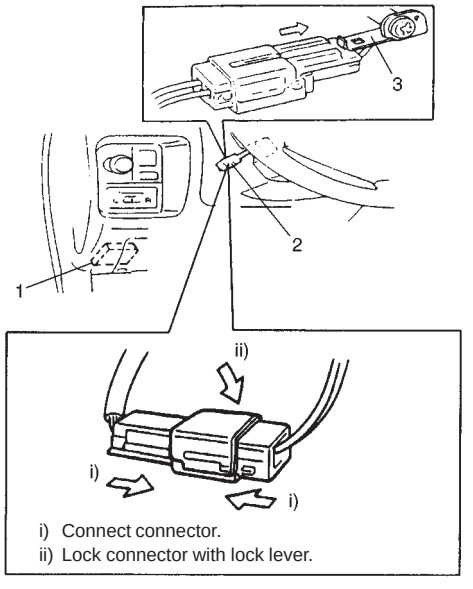
i) Release locking of lock lever.
ii) After unlocked. disconnect to connector.

1. Junction box (J/B)
3. Yellow connector of driver air bag (inflator) module
4. Yellow connector of passenger air bag (inflator) module
5. Connector stay

DISABLING AIR BAG SYSTEM

1) Turn steering wheel so that vehicle's wheels (front tires) and pointing straight ahead.
2) Turn ignition switch to "LOCK" position and remove key.
3) Remove "AIR BAG" fuse from junction box (J/B).
4) Remove steering wheel side cap (left side) and disconnect Yellow connector of driver air bag (inflator) module.
5) Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector of passenger air bag (inflator) module.

NOTE:
With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.
This is normal operation and does not indicate a air bag system malfunction.

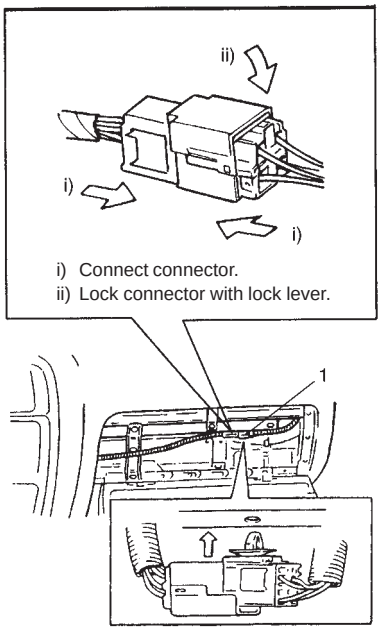


i) Connect connector.
ii) Lock connector with lock lever.

1. J/B
2. Yellow connector of driver air bag (inflator) module
3. Connector stay

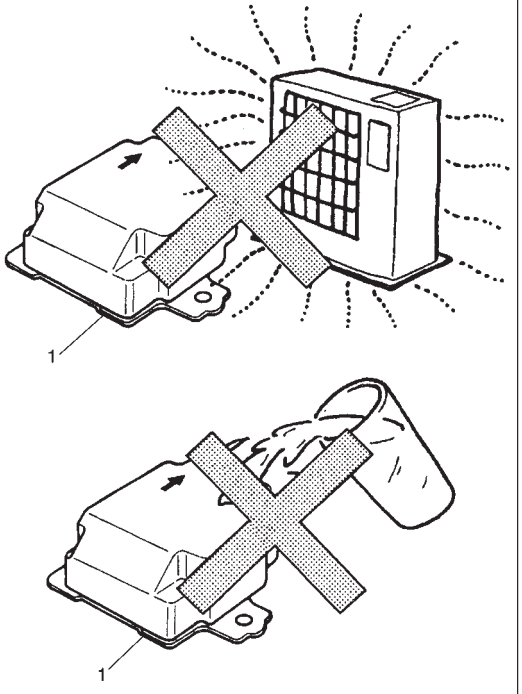
ENABLING AIR BAG SYSTEM

1) Turn ignition switch to "LOCK" and remove key.
2) Connect Yellow connector of driver air bag (inflator) module, and be sure to lock connector with lock lever.
   Fit driver air bag (inflator) module connector onto connector stay.



1. Yellow connector of passenger air bag (inflator) module

3) Connect Yellow connector of passenger air bag (inflator) module, and be sure to lock connector with lock lever.
   Fit passenger air bag (inflator) module connector onto connector stay.
4) Install glove box and steering wheel side cap (left side).
5) Install “AIR BAG” fuse to J/B.
6) Turn ignition switch to ON and verify that “AIR BAG” warning lamp comes on for 6 seconds and then turns off.
   If it does not operate as described, perform “AIR BAG DIAGNOSTIC SYSTEM CHECK” in this section.



1. SDM

HANDLING PRECAUTION

SDM

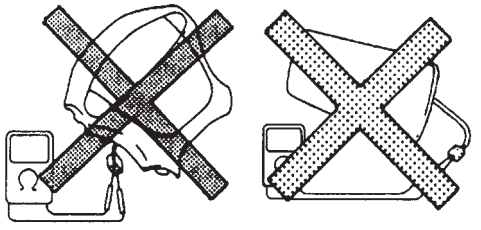
WARNING:
Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

CAUTION:
After detecting one time of such collision as to meet deployment conditions, the SDM must not be used.
Refer to “DIAGNOSIS” when checking the SDM.

- ○ Never attempt to disassemble SDM.
- ○ When storing SDM, select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- ○ If SDM was dropped from a height of 91.4 cm (3 ft) or more or if it is found to be damaged or deformed, replace it with a new one.
- ○ If installation part of SDM was damaged, repair that part completely before reinstallation.
- ○ All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointed toward the front of the vehicle to ensure proper operation of the air bag system.

LIVE (UNDEPLOYED) AIR BAG (INFLATOR) MODULES

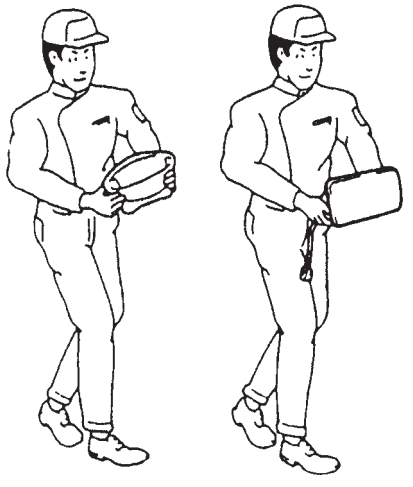
Special care is necessary when handling and storing a live (undeployed) air bag (inflator) modules.
The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.



WARNING:
Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag.

- ○ Never attempt to disassemble the air bag (inflator) modules.
- ○ If any abnormality is found, be sure to replace it with new one as an assembly.
- ○ When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it.
- ○ When grease, cleaning agent, oil, water, etc., got on the air bag (inflator) modules (driver and passenger), wipe it off immediately with a dry cloth.
- ○ If air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced with a new one as an assembly.

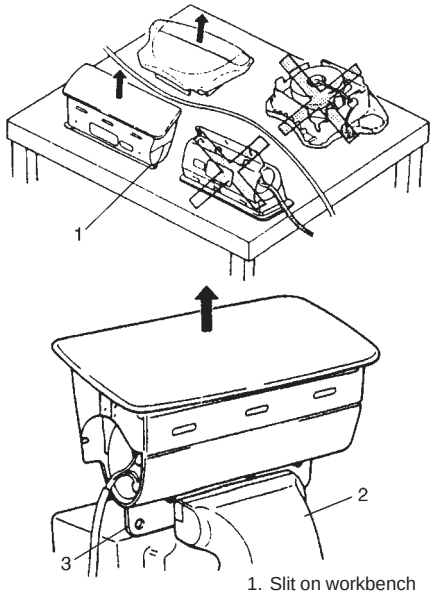
ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



WARNING:
- ○ **For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- ○ **When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module.**

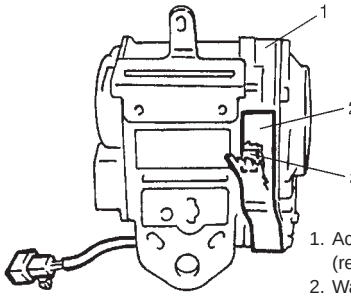
Otherwise, personal injury may result.

ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

WARNING:
When placing a live air bag (inflator) module on bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.
It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) modules.
This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.
Otherwise, personal injury may result.

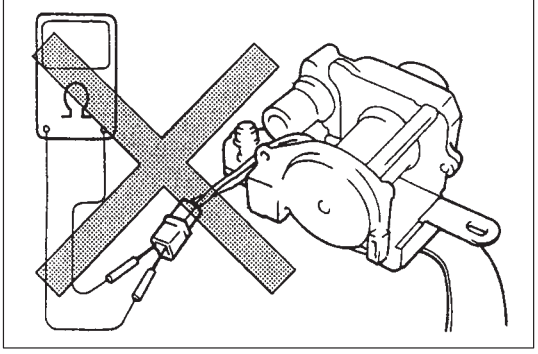


1. Activated pretensioner (retractor assembly)
2. Warning label
3. Exhaust hole

LIVE (INACTIVATED) SEAT BELT PRETENSIONERS

NOTE:
Whether the pretensioner has activated or not can be judged by the warning label attached on retractor assembly. If it has been torn by generated gas, the pretensioner has activated.

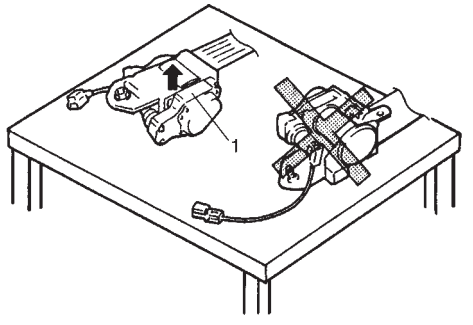
Special care is necessary when handling and storing live (inactivated) seat belt pretensioners.
Also, when the seat belt pretensioners activate, gas is generated and the seat belt is retracted into the retractor quickly.
Note, therefore, that if they activate accidentally, the seat belt pretensioners and other object(s) around them may be thrown through the air.



WARNING:
Never attempt to measure the resistance of the seat belt pretensioners. It is very dangerous as the electric current from the tester may activate pretensioner.

- ○ Never attempt to disassemble the seat belt pretensioners (retractor assembly).
- ○ If any abnormality is found, be sure to replace it with new one as an assembly.
- ○ When an abnormality is noted as existing in the live (inactivated) seat belt pretensioner, be sure to activate it before discarding it.
- ○ When grease, cleaning agent oil, water, etc., got on the seat belt pretensioners (retractor assembly), wipe it off immediately with a dry cloth.
- ○ If seat belt pretensioner was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced with a new one as an assembly.

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

WARNING:

- ○ **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65· C (150· F), without high humidity and away from electric noise.**
- ○ **Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.**
- ○ **When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.**

Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULES

WARNING:
- **The air bag (inflator) module immediately after deployment is very hot. Wait for at least 30 minutes to cool it off before proceeding the work.**
- **Do not apply water, oil, etc. to deployed air bag (inflator) module.**
- **After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.**
- **Wash your hands with mild soap and water after completing the work.**

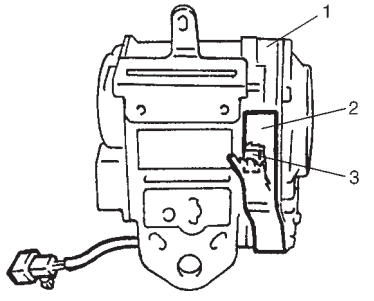
Refer to the procedure described under “DEPLOYED AIR BAG (INFLATOR) MODULES DISPOSAL” in this section.

ACTIVATED SEAT BELT PRETENSIONERS

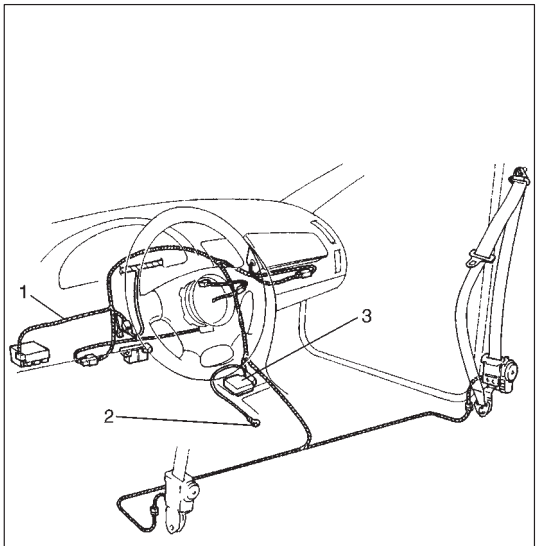
NOTE:
Whether the pretensioner has activated or not can be judged by the warning label attached on retractor assembly. If it has been torn by generated gas, the pretensioner has activated.

WARNING:
- **The seat belt pretensioner immediately after activation is very hot. Wait for at least 30 minutes to cool it off before proceeding the work.**
- **Do not apply water, oil, etc. to activated seat belt pretensioner.**
- **With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.**
- **Wash your hands with mild soap and water after completing the work.**

Refer to the procedure described under “ACTIVATED SEAT BELT PRETENSIONERS DISPOSAL” in this section.



1. Activated pretensioner (retractor assembly)
2. Warning label
3. Exhaust hole



1. Air bag wire harness
2. Ground
3. SDM case ground

AIR BAG WIRE HARNESS AND CONNECTORS

Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

- ○ When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- ○ When installing it, be careful so that the air bag wire harness is not caught or does not interfere with other parts.
- ○ Make sure all air bag system grounding points are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

DISPOSAL PRECAUTION

Do not dispose of the live (undeployed) air bag (inflator) modules and the live (inactivated) seat belt pretensioners. When disposal is necessary, be sure to deploy the air bag according to deployment procedure described under “AIR BAG (INFLATOR) MODULES DISPOSAL” and to activate the pretensioner according to activation procedure described under “SEAT BELT PRETENSIONERS DISPOSAL” in this section.

WARNING:
Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which could cause personal injury. Undeployed air bag (inflator) module and inactivated seat belt pretensioner must not be disposed of through normal refuse channels.
The undeployed air bag (inflator) module and inactivated seat belt pretensioner contain substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

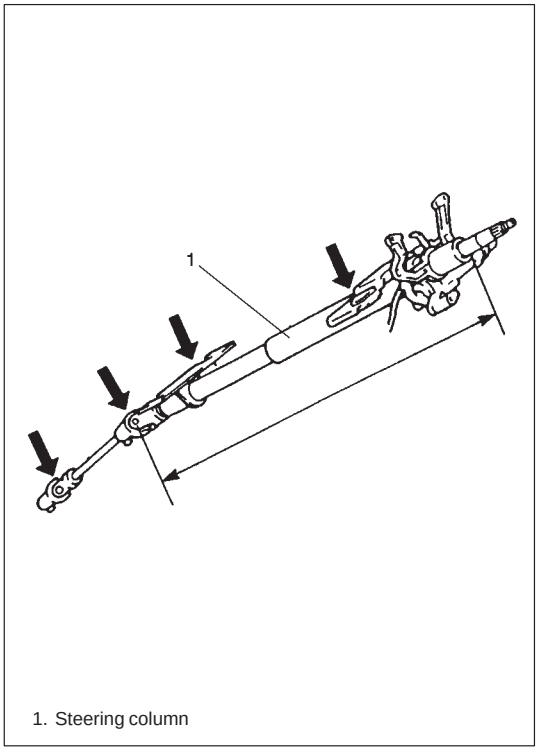
REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT

CAUTION:
- **All air bag system components, including the electrical harness (component mounting points), must be inspected after an accident. If any components are damaged or bent, they must be replaced even if air bag system activation did not occur.**
- **Never use air bag system parts from another vehicle.**
- **Do not attempt to service the parts below. Service of these parts is by replacement only.**
  - **– Driver/Passenger air bag (inflator) module**
  - **– Driver/Passenger seat belt pretensioner (if equipped)**
  - **– SDM**
  - **– Contact coil and combination switch assembly**
  - **– Air bag wire harness**
- **Proper operation of the sensors and air bag system requires that any repairs to the vehicle structure return it to its original production configuration.**

CAUTION:
After detecting one time of such collision as to meet deployment conditions, the SDM must not be used.
Refer to "DIAGNOSIS" when checking the SDM.

ACCIDENT WITH DEPLOYMENT – COMPONENT REPLACEMENT

Certain air bag system components must be replaced. Those components are:
- Driver and passenger air bag (inflator) modules
  - – Replace with new one.
- Driver and passenger seat belt pretensioners (if equipped)
  - – Replace with new one as an assembly.
- SDM after detecting such collision as to meet deployment conditions
  - – Replace with new one.



1. Steering column

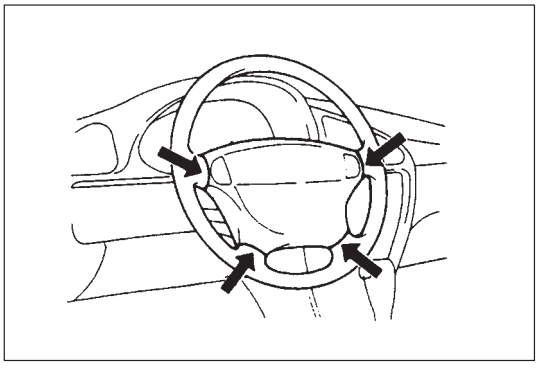
ACCIDENT WITH OR WITHOUT DEPLOYMENT – COMPONENT INSPECTIONS

Certain air bag and restraint system components must be inspected after any crash, whether the air bag deployed or not.
Those components are:

○ Steering column and shaft joints
– Check for length, damage and bend according to “CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE” in Section 3C1.

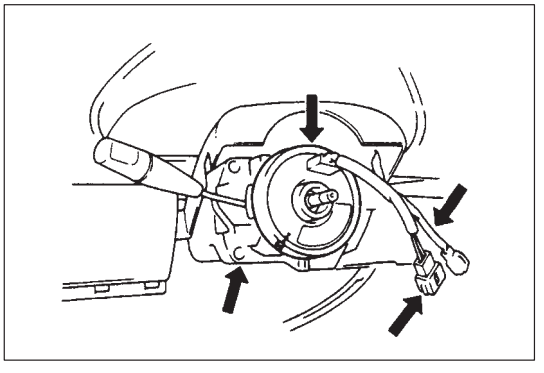
○ Steering column bracket and capsules
– Check for damage and bent.

If any faulty condition is found in above checks, replace faulty part.



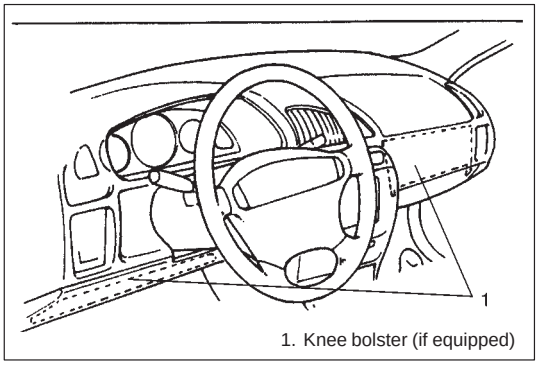
○ Steering wheel and driver air bag (inflator) module
– Check for damage or air bag (inflator) module fitness.
– Check trim cover (pad surface) for cracks.
– Check wire harness and connector for damage or tightness.

If any faulty condition is found in above checks, replace faulty part.



○ Contact coil and combination switch assembly
– Check wire harness and connectors for damage or tightness.
– Check contact coil case for damage.

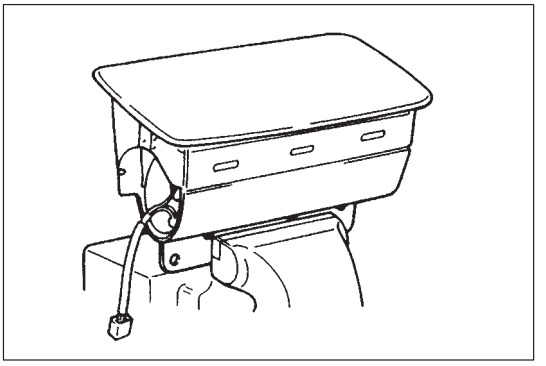
If any faulty condition is found in above checks, replace.



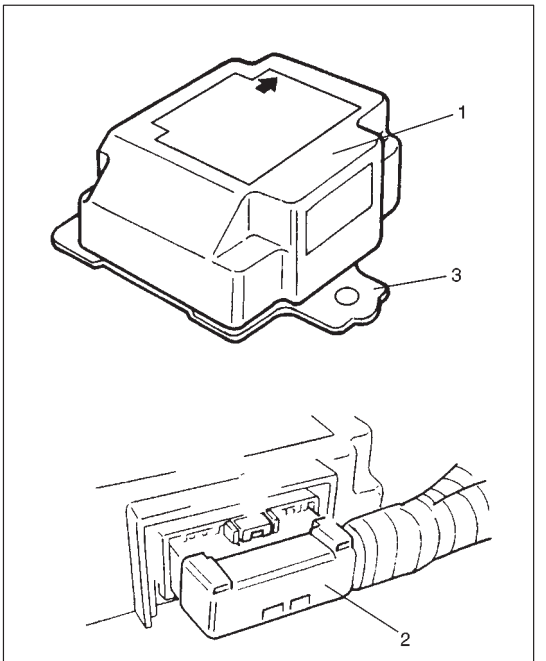
1. Knee bolster (if equipped)

○ Instrument panel member and reinforcement and knee bolster and panel
– Check for any distortion, bending, cracking or other damage.

If any faulty condition is found in above checks, replace.

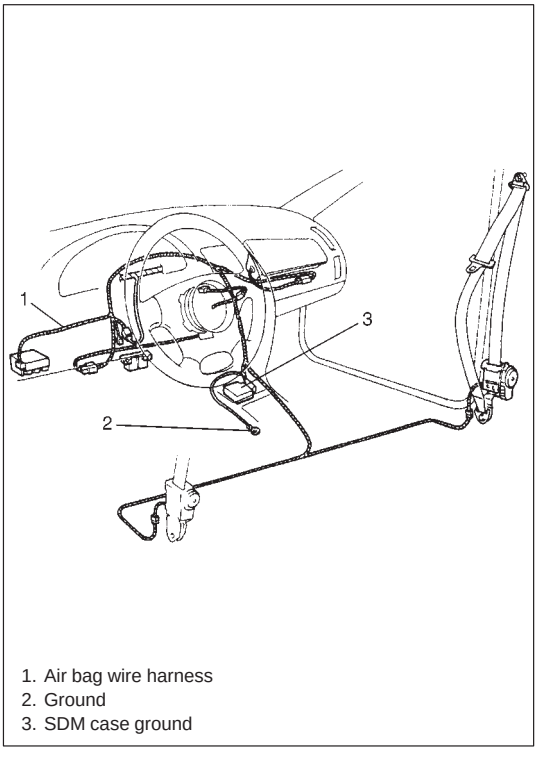


○ Passenger air bag (inflator) module
– Check for dents, cracks, damage or fitness.
– Check trim cover for cracks or deformities.
– Check harness and connector for damage or tightness.
If any faulty condition is found in above checks, replace.



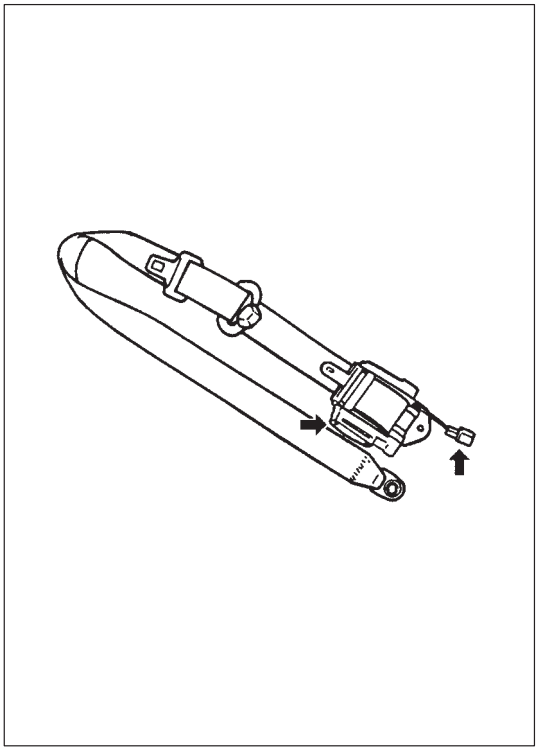
1. SDM
2. SDM connector
3. SDM plate

○ SDM and SDM plate
– Check for external damage such as deformation, scratch, crack, peeled paint, etc.
– Check whether SDM can installed properly due to a cause in itself. (There is a gap between SDM and SDM plate, or it cannot be fixed securely.)
– Check whether connector or lead wire of SDM has a scorching, melting or damage.
– Check whether connector can be connected securely or locked.
– Check SDM connector and terminals for tightness.
– Check SDM sets a diagnostic trouble code (Refer to “DIAGNOSTIC TROUBLE CODE CHECK” in this section.) and the diagnostic table leads to a malfunctioning SDM.
If any faulty condition is found in above checks, replace.



1. Air bag wire harness
2. Ground
3. SDM case ground

○ Air bag wire harness and connections
– Check for damages, deformities or poor connections.
(Refer to “INTERMITTENT AND POOR CONNECTION” in Section 0A.)
– Check wire harness clamps for tightness.
If any faulty condition is found, correct or replace.

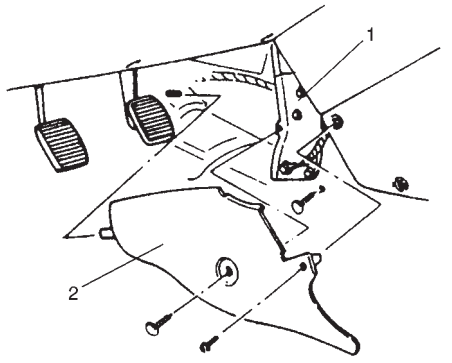


○ Seat belt pretensioner (if equipped)
– Check for dents, cracks, damage or fitness.
– Check harness and connector for damage or tightness.
If any faulty condition is found in above checks, replace.

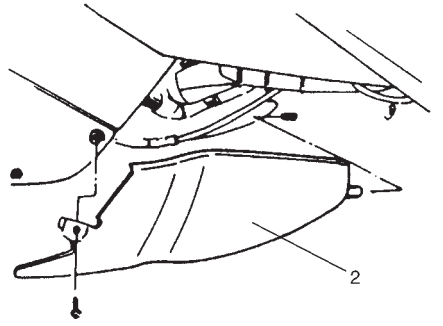
○ Seat belts and mounting points
– Refer to “SEAT BELT” in Section 9.

○ “AIR BAG” warning lamp (air bag system)
– After vehicle is completely repaired, perform “AIR BAG DIAGNOSTIC SYSTEM CHECK” described in this section.

[A]



[B]



[A]: Driver side
[B]: Passenger side

1. Steering support member lower brace
2. Console box extension

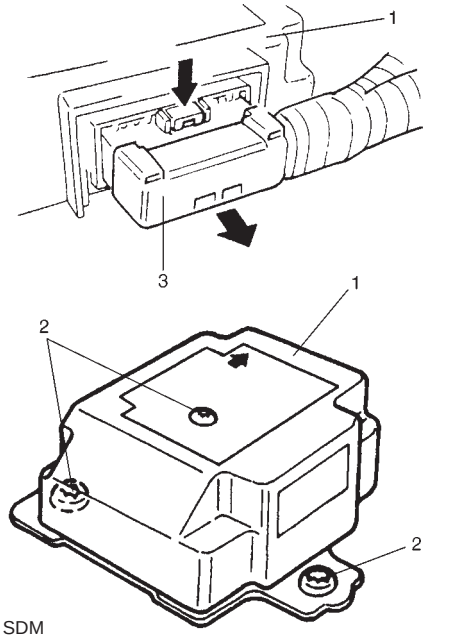
ON-VEHICLE SERVICE

SDM

WARNING:
During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).
Be sure to read "PRECAUTIONS" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or inactivation of the air bag system when necessary.

REMOVAL

1) Disconnect negative cable at battery.
2) Disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" in this section.
3) Remove console box extension.
4) Remove 4 bolts and steering support member lower brace.



1. SDM
2. SDM bolt
3. SDM connector

5) Disconnect SDM connector from SDM.
6) Remove SDM (with SDM plate) as an assembly from vehicle.

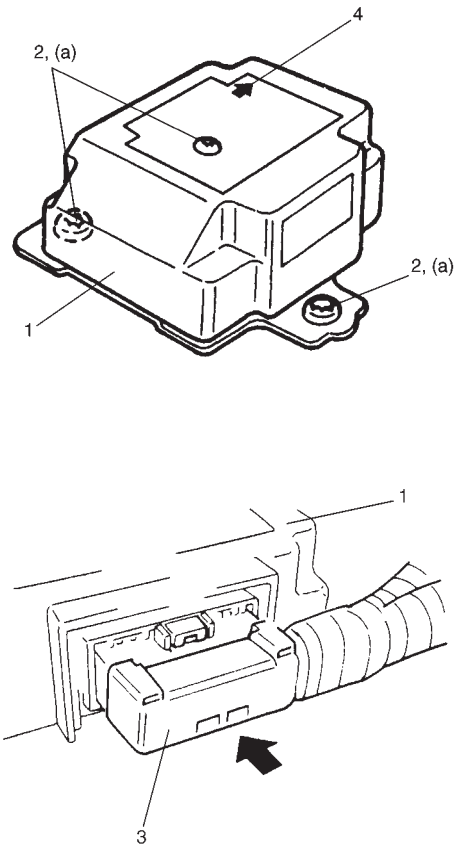
NOTE:
Do not separate SDM and SDM plate.

INSPECTION

CAUTION:
- **Do not connect a tester whatever type it may be.**
- **Never repair or disassemble SDM.**
- **If SDM was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.**

- Check SDM and SDM plate for dents, cracks or deformation.
- Check SDM connector for damage, cracks or lock mechanism.
- Check SDM terminal for bent, corrosion or rust.

If any faulty condition is found in above checks, replace.



1. SDM
2. SDM bolt
3. SDM connector
4. Arrow

INSTALLATION

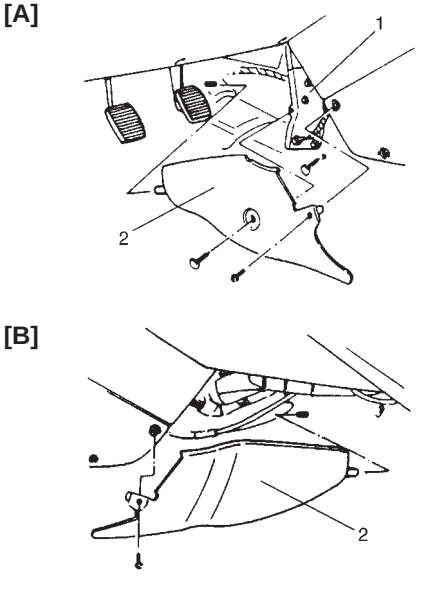
1) Check that none of the following faulty conditions exists.
   - ○ Bend, scratch, deformity in vehicle body mounted on SDM
   - ○ Foreign matter or rust on mating surface of vehicle body mounted on SDM
2) Install SDM (with SDM plate) to vehicle.

CAUTION:
Ensure that arrow on the SDM is pointing toward the front of the vehicle.

3) Tighten SDM bolts to specified torque.

Tightening Torque
(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

4) Connect SDM connector to SDM securely.



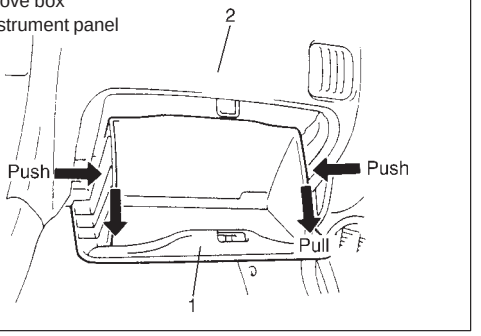
[A]: Driver side
[B]: Passenger side

1. Steering support member lower brace
2. Console box extension

5) Install steering support member lower brace.
6) Install console box extension.
7) Connect negative cable to battery.
8) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

PASSENGER AIR BAG (INFLATOR) MODULE

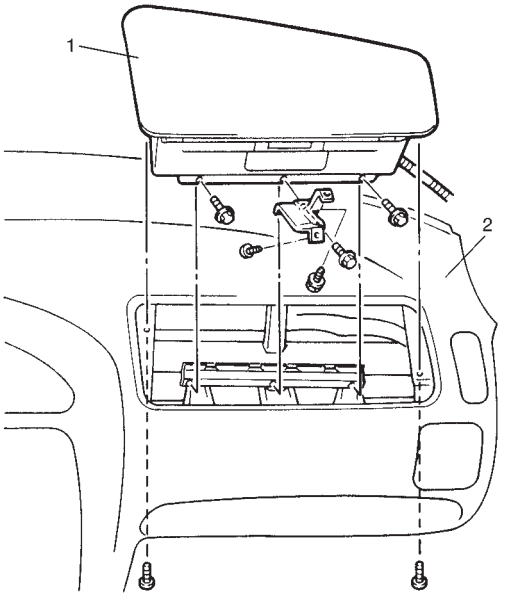
WARNING:
- **Never attempt to disassemble or repair the passenger air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.**
- **Be sure to read "SERVICE PRECAUTIONS" and "HANDLING PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.**



1. Glove box
2. Instrument panel

REMOVAL

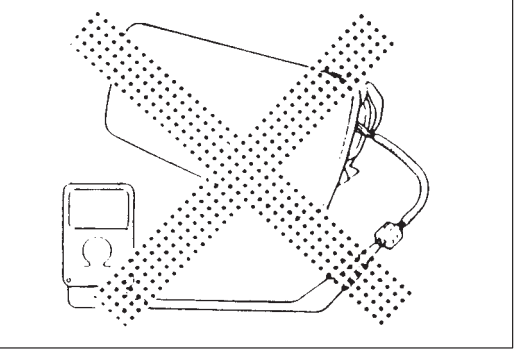
1) Disconnect negative battery cable at battery.
2) Open glove box, then while pressing glove box stopper, pull out glove box from instrument panel.
3) Disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" in this section.



1. Passenger air bag (inflator) module
2. Instrument panel

4) Remove passenger air bag (inflator) module attaching bolts and screws, and passenger air bag (inflator) module from vehicle.

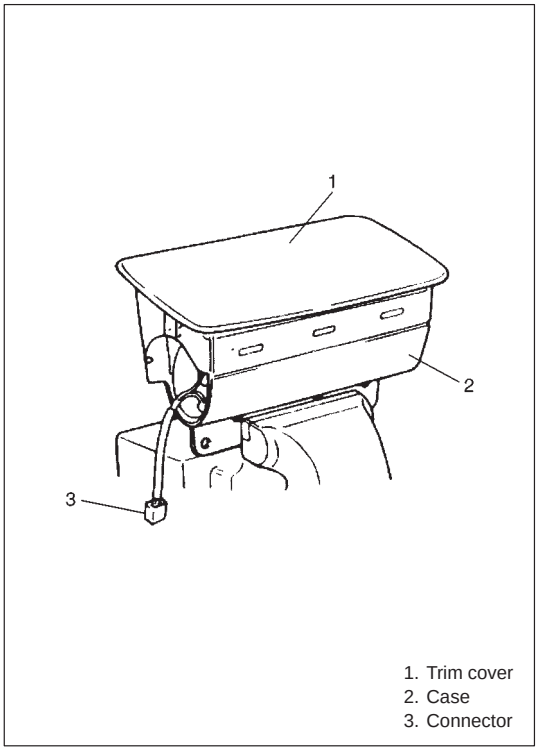
WARNING:
- **When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. Never carry air bag (inflator) module by wires or connector on the side of the module. In case of an accidental deployment, the bag will then deploy with minimal chance of injury.**
- **As the live passenger air bag (inflator) module must be kept with its bag (trim cover) facing up while being stored or left standing, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket. This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.**
- **Observe "HANDLING PRECAUTIONS" earlier in this section for handling and storing it.**
- **Otherwise personal injury may result.**



INSPECTION

WARNING:
Never measure resistance of passenger air bag (inflator) module or disassemble it. Otherwise, personal injury may result.

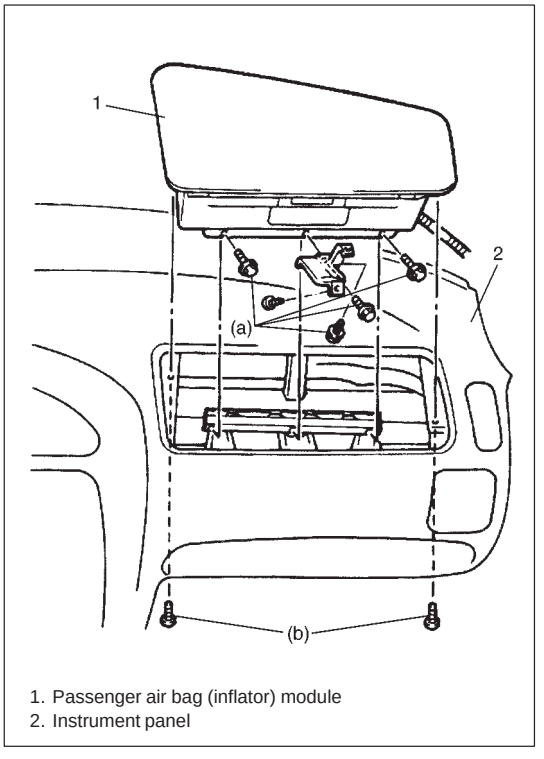
CAUTION:
If air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.



1. Trim cover
2. Case
3. Connector

Check air bag (inflator) module appearance visually for the following symptoms and if any one of them is applicable, replace with a new one.

- ○ Air bag has deployed.
- ○ There is a crack in trim cover (pad surface).
- ○ Wire harness or connector is damaged.
- ○ Air bag (inflator) module is damaged or a strong impact (e.g., dropping) was applied to it.



1. Passenger air bag (inflator) module
2. Instrument panel

INSTALLATION

1) Install passenger air bag (inflator) module to vehicle.
2) Tighten passenger air bag (inflator) module attaching bolts and screws to specified torque.

   Tightening Torque
   (a): 23 N·m (2.3 kg-m, 16.5 lb-ft)
   (b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

3) Connect negative battery cable to battery.
4) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

DRIVER AIR BAG (INFLATOR) MODULE

Refer to Section 3C1 for removal, inspection and installation.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

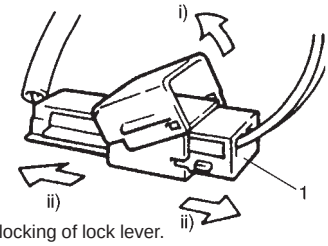
Refer to Section 3C1 for removal, inspection and installation.

“AIR BAG” WARNING LAMP

Refer to Section 8 for removal and installation.

SEAT BELT PRETENSIONER (IF EQUIPPED)

WARNING:
- **Never attempt to disassemble or repair the seat belt pretensioner (retractor assembly). If any abnormality is found, be sure to replace it with new one as an assembly.**
- **Be sure to read "PRECAUTIONS" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or unactivation of the seat belt pretensioner when necessary.**

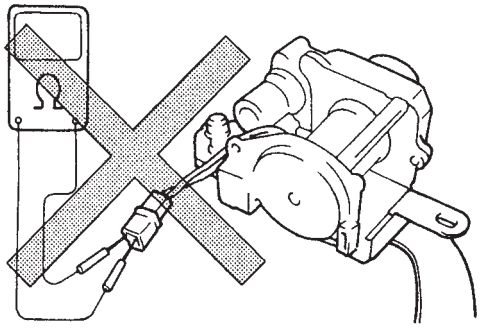


i) Release locking of lock lever.
ii) After unlocked, disconnect connector.

1. Seat belt pretensioner connector

REMOVAL

1) Disconnect negative battery cable at battery.
2) Disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" in this section.
3) Disconnect Yellow connector for seat belt pretensioner.
4) Remove front seat belts from the vehicle in the same way as when removing them without pretensioner described on "SEAT BELT" in Section 9.



INSPECTION

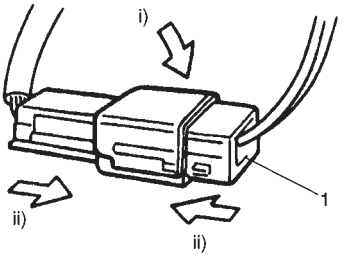
When checking seat belt with pretensioner, use the following check items in addition to those specified for seat belt without pretensioner described on "SEAT BELT" in Section 9.

WARNING:
Never measure resistance of pretensioner or disassemble it. Otherwise, personal injury may result.

CAUTION:
If seat belt pretensioner (retractor assembly) was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.

Check retractor assembly with seat belt pretensioner appearance visually for the following symptoms and if any one of them is applicable, replace it with a new one as an assembly.

- ○ Seat belt pretensioner has activated.
- ○ There is a crack in seat belt pretensioner (retractor assembly).
- ○ Wire harness or connector is damaged.
- ○ Seat belt pretensioner (retractor assembly) is damaged or a strong impact (e.g., dropping) was applied to it.



i) Connect connector.
ii) Lock connector with lock lever.

1. Seat belt pretensioner connector

INSTALLATION

1) Install front seat belts to the vehicle in the same way as when installing them without pretensioner described on “SEAT BELT” in Section 9.
2) Connect Yellow connector for seat belt pretensioner securely and fit seat belt pretensioner connector onto body.
3) Connect negative battery cable to battery.
4) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

DRIVER/PASSENGER AIR BAG (INFLATOR) MODULES DISPOSAL

WARNING:
Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which may cause personal injury. Undeployed air bag (inflator) modules must not be disposed of through normal refuse channels.
The undeployed air bag (inflator) module contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

Do not dispose of the live (undeployed) air bag (inflator) modules (driver/passenger). When disposal of the air bag (inflator) module(s) or entire vehicle including the air bag (inflator) module(s) is necessary, deploy the air bag according to the procedure described under “DEPLOYMENT OUTSIDE VEHICLE” or “DEPLOYMENT INSIDE VEHICLE” in this section.
The method employed depends upon the final disposition of the particular vehicle, as noted in “DEPLOYMENT OUTSIDE VEHICLE” and “DEPLOYMENT INSIDE VEHICLE” in this section.

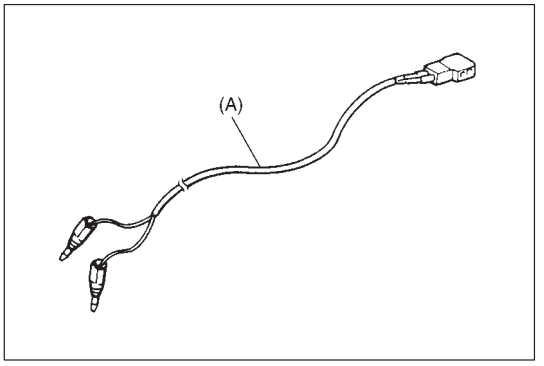
Deployment Outside Vehicle	Disposing of the air bag (inflator) module(s) only (i.e., the vehicle itself will be used again).
Deployment Inside Vehicle	Scrapping the entire vehicle including the air bag (inflator) module(s).

DEPLOYMENT OUTSIDE VEHICLE

Use this procedure when the vehicle itself is used again (only the air bag (inflator) module(s) are disposed of).

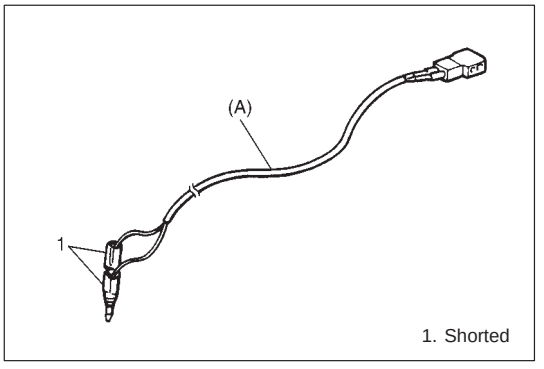
WARNING:
- **The following precautions must be observed for this work. Failure to observe any of them may result in personal injury.**
- **To avoid an accidental deployment, this work should be performed by no more than one person.**
- **The procedure should be followed strictly as described here.**
- **Be sure to read “HANDLING PRECAUTIONS” for the air bag (inflator) module beforehand.**
- **Never connect deployment harness to any power source before connecting deployment harness to the air bag (inflator) module. Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.**
- **Since a large amount of smoke is produced when air bag is deployed, select a well-ventilated area.**
- **The air bag (inflator) module will immediately deploy the air bag when a power source is connected to it. Wear safety glasses throughout this entire deployment and disposal procedure.**
- **Wear suitable ear protection when deploying air bag. Also, advise those who are in the area close to deployment site to wear suitable ear protection.**
- **Do not deploy driver and passenger air bag (inflator) modules at the same time.**

The following procedure requires use of special tool(s) (deployment harness and/or passenger air bag (inflator) module deployment fixture). Do not attempt procedure without it (them).



1) Turn ignition switch to “LOCK”, remove key and put on safety glasses.
2) Check that there is no open, short or damage in special tool (Deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool (Deployment harness)
(A): 09932-75030



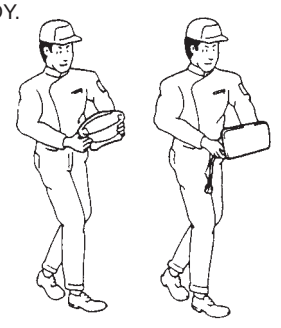
1. Shorted

3) Short the two deployment harness leads together by fully seating one banana plug into the other.

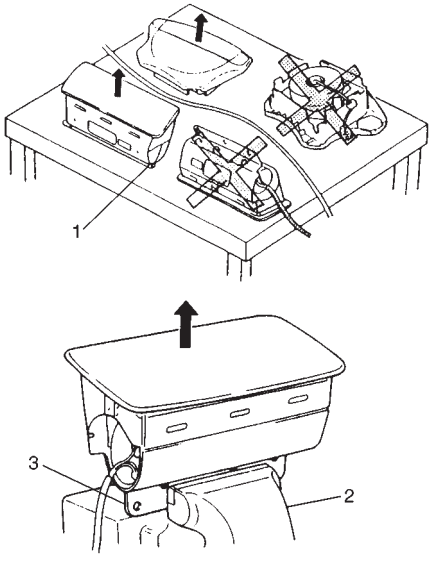
> **WARNING:**
> **Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.**

Special Tool (Deployment harness)
(A): 09932-75030

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.

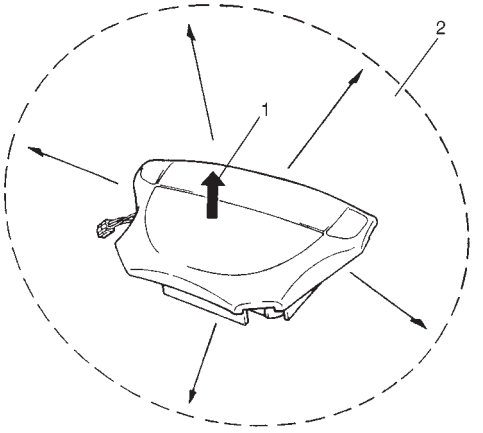


1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

4) Remove driver or passenger air bag (inflator) module from vehicle referring to Section 3C1 or 9J.
5) With driver air bag (inflator) module, remove horn lead, horn buttons and clamp from driver air bag (inflator) module.

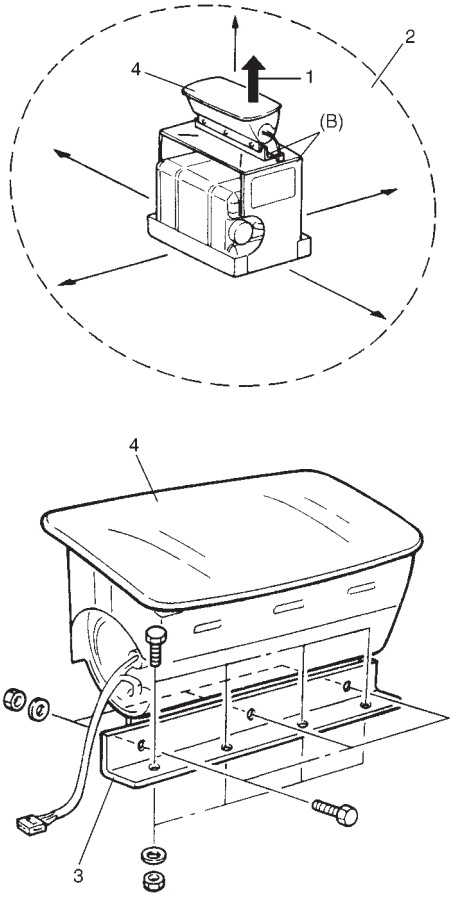
> **WARNING:**
> ○ **Always carry a live air bag (inflator) module with trim cover away from you.**
> ○ **When storing a live air bag (inflator) module or when leaving a live air bag (inflator) module unattended on a bench or other surface, always face the bag and trim cover up and away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.**
> ○ **This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.**
> **Failure to follow procedures may result in personal injury.**

6) Temporarily place driver or passenger air bag (inflator) module on the workbench or the vise according to above “WARNING”.



1. Trim cover must face up
2. 185 cm (6 feet) of clearance

7) In case of Driver Air Bag (Inflator) Module
   a) Clear a space on the ground about 185 cm (6 feet) in diameter where the driver air bag (inflator) module is to be deployed. A paved, outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended.
   Ensure no loose or flammable objects are within the deployment area.
   b) Place the driver air bag (inflator) module, with its vinyl trim cover facing up, on the ground in the space just cleared.



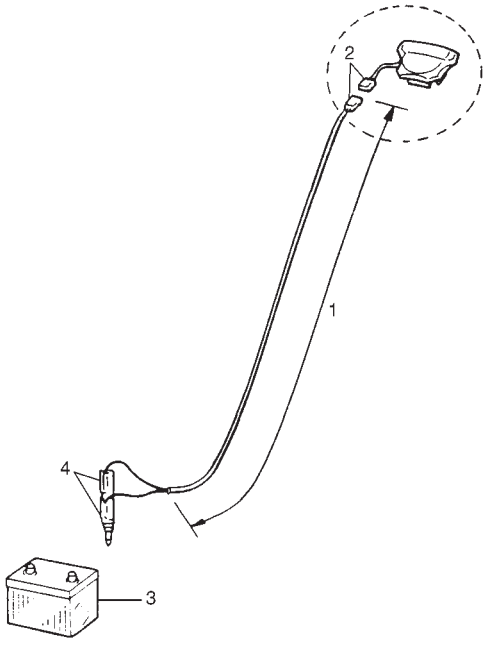
1. Trim cover must face up
2. 185 cm (6 feet) of clearance
3. Mounting attachment
4. Bag opening side

7) In case of Passenger Air Bag (Inflator) Module
   a) Clear a space on the ground approximately 185 cm (6 feet) in diameter where the fixture (special tool) with attached air bag (inflator) module is to be placed for deployment. A paved outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended. Ensure that no loose or flammable objects are within the deployment area.
   b) Place special tool (passenger air bag (inflator) module deployment fixture) on the ground in the space cleared in Step a), if it has not already been placed there.

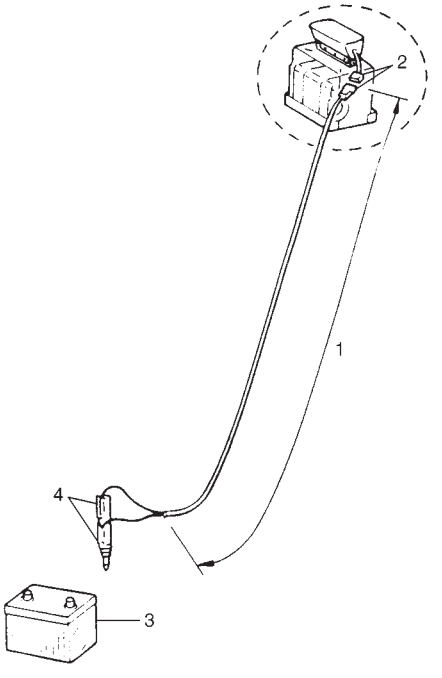
      Special Tool
      (Passenger air bag (inflator) module deployment fixture)
      (B): 09932-75040

   c) Fill plastic reservoir in fixture (special tool) with water or sand. This is necessary to provide sufficient stabilization of the fixture during deployment.
   d) Attach the passenger air bag (inflator) module in the fixture (special tool) using mounting attachment and hold-down bolts and nuts.
   Air bag (inflator) module must be mounted such that the bag will deploy upward. Securely hand-tighten all fasteners prior to deployment.

[A]



[B]



[A]: Driver (inflator) module
[B]: Passenger (inflator) module

1. Stretch deployment harness to full length 10 m (33 ft).
2. Connect connectors.
3. Power source (12V vehicle battery)
4. Short the two deployment harness leads.

8) Stretch the deployment harness from the driver or passenger air bag (inflator) module to its full length 10 m (33 ft).
9) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
10) Verify that the area around the driver or passenger air bag (inflator) module is clear of all people and loose or flammable objects.
11) Verify that the driver air bag (inflator) module is resting with its vinyl trim cover facing up.
    Verify that the passenger air bag (inflator) module is firmly and properly secured in passenger air bag (inflator) module deployment fixture (special tool).
12) Connect the driver or passenger air bag (inflator) module to the deployment harness connector and lock connector with lock lever.
13) Notify all people in the immediate area that you intend to deploy the air bag (inflator) module.

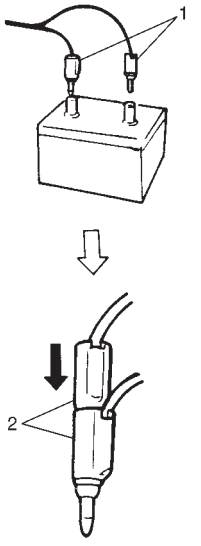
NOTE:

- **When the air bag deploys, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to deploy the air bag (inflator) module and suitable ear protection should be worn.**
- **When the air bag deploys, the driver air bag (inflator) module may jump about 30 cm (one foot) vertically. This is a normal reaction of the driver air bag (inflator) module to the force of the rapid gas expansion inside the air bag.**
- **After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction.**

WARNING:
Safety precautions must be observed when handling a deployed air bag (inflator) module.

- **After deployment, the metal surfaces of the air bag (inflator) module will be very hot. Do not touch the metal areas of the driver or passenger air bag (inflator) module for about 30 minutes after deployment.**
- **Do not place the deployed air bag (inflator) module near any flammable objects.**
- **Do not apply water, oil, etc. to deployed air bag (inflator) module.**
- **If the deployed air bag (inflator) module must be moved before it is cool, wear gloves and handle by the air bag or vinyl trim.**

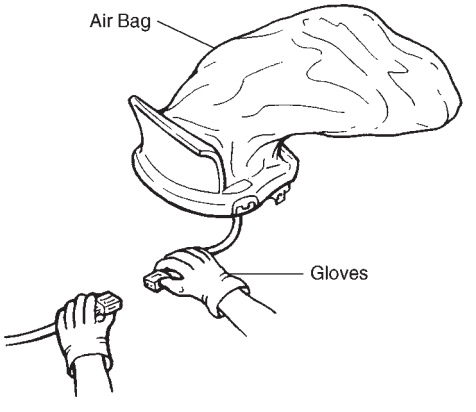
Failure to follow procedures may result in fire or personal injury.



1. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately deploy.
2. Short the two deployment harness leads.

14) Separate the two banana plugs on the deployment harness.
15) Connect the deployment harness to the power source (12V vehicle battery) to immediately deploy the driver or passenger air bag.
16) Disconnect the deployment harness from power source (12V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.

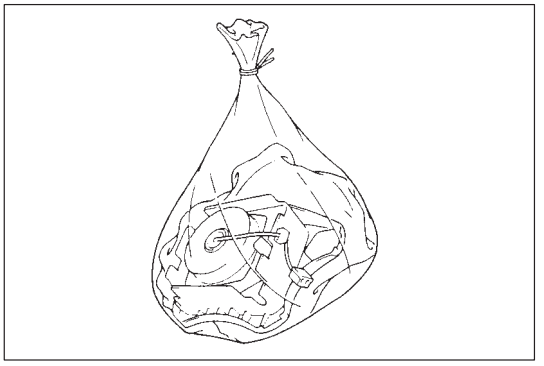
17) In the unlikely event that the driver or passenger air bag (inflator) module did not deploy after the following these procedures, proceed immediately with Steps 22) through 24). If the air bag (inflator) module did deploy, proceed with Steps 18) through 21).



18) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module.

NOTE:
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

19) Disconnect the deployment harness from the air bag (inflator) module as soon after deployment as possible. This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module canister. The deployment harness are designed to be reused. They should, however, be inspected for damage after each deployment and replaced if necessary.

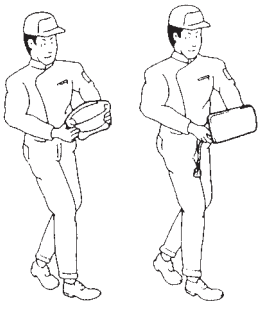


20) Dispose of the deployed air bag (inflator) module through normal refuse channels after it has cooled for at least 30 minutes and tightly seal the air bag (inflator) module in a strong vinyl bag. (Refer to "DEPLOYED AIR BAG (INFLATOR) MODULES DISPOSAL" in detail.)
21) Wash your hands with mild soap and water afterward.

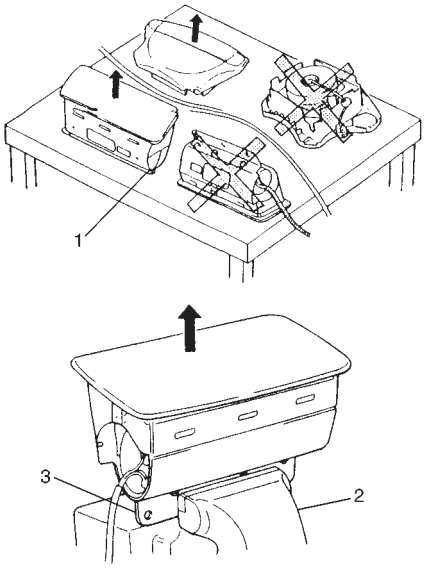
NOTE:
The remaining steps are to be followed in the unlikely event that the air bag (inflator) module did not deploy after the following these procedures.

22) Ensure that the deployment harness has been disconnected from the power source and that its two banana plugs have been shorted together by fully seating one banana plug into the other.
23) Disconnect the deployment harness from the air bag (inflator) module.

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

WARNING:
- **Always carry a live air bag (inflator) module with trim cover away from you.**
- **When storing a live air bag (inflator) module or when leaving a live air bag (inflator) module unattended on a bench or other surface, always face the bag and trim cover up and away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.**
- **This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.**

Failure to follow procedures may result in personal injury.

24) Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests.
25) Contact your local distributor for further assistance.

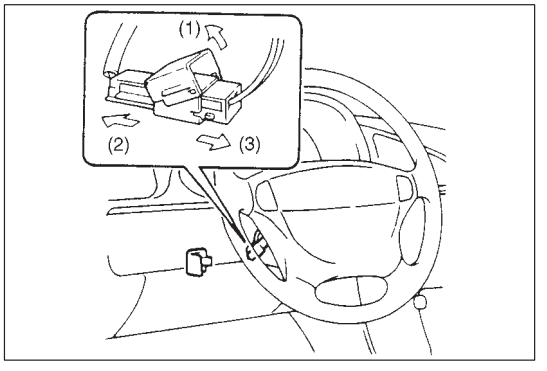
DEPLOYMENT INSIDE VEHICLE

Use this procedure when scrapping the entire vehicle including the driver and/or passenger air bag (inflator) module(s).

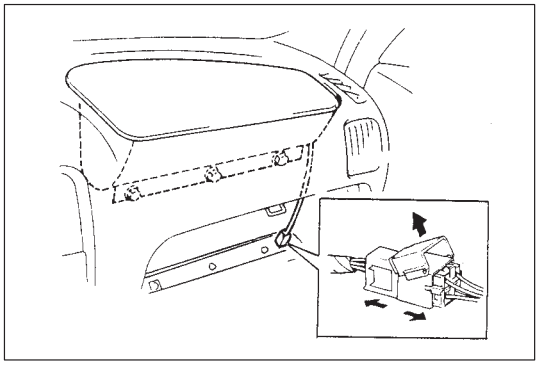
CAUTION:
When vehicle itself will be used again, deploy the air bag module outside vehicle according to "DEPLOYMENT OUTSIDE VEHICLE" in this section, for deploying it inside will cause the instrument panel, glove box and their vicinity to be deformed.
Failure to observe this CAUTION could cause unneeded vehicle inspection and repair.

WARNING:
The following precautions must be observed for this work. Failure to observe any of them may result in personal injury.
- **○ To avoid an accidental deployment, this work should be performed by no more than one person.**
- **○ The procedure should be followed strictly as described here.**
- **○ Be sure to read "HANDLING PRECAUTIONS" for the air bag (inflator) module beforehand.**
- **○ Never connect deployment harness to any power source before connecting deployment harness to the air bag (inflator) module. Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.**
- **○ The air bag (inflator) module will immediately deploy the air bag when a power source is connected to it. Wear safety glasses throughout this entire deployment and disposal procedure.**
- **○ Wear suitable ear protection when deploying air bag. Also, advise those who are in the area close to deployment site to wear suitable ear protection.**
- **○ Do not deploy driver and passenger air bag (inflator) modules at the same time.**

1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
2) Remove all loose objects from front seats and instrument panel.

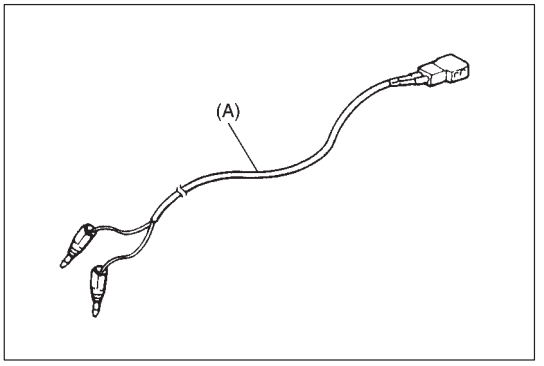


3) Driver side:
Remove steering wheel side cap (left side) and disconnect air bag (inflator) module connector.



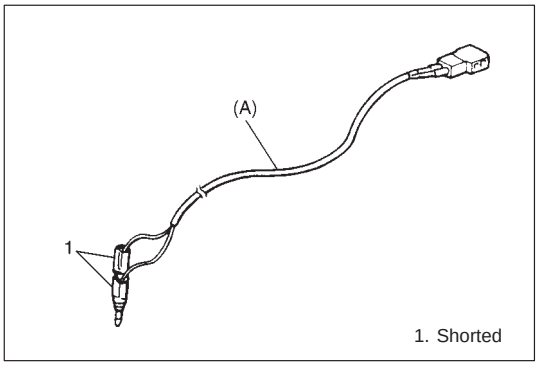
Passenger side:
Remove glove box from instrument panel and disconnect air bag (inflator) module connector.

4) Confirm that each air bag (inflator) module is securely mounted.



5) Check that there is no open/short or damage in special tool (Deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool (Deployment harness)
(A): 09932-75030

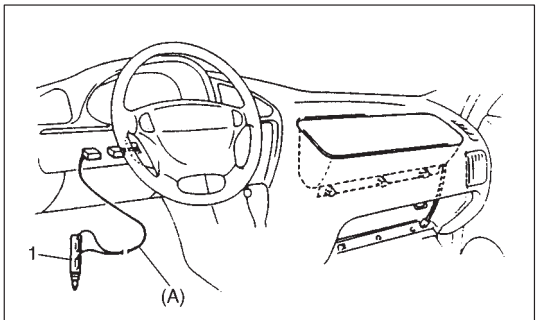


1. Shorted

6) Short the two deployment harness leads together by fully seating one banana plug into the other.

> **WARNING:**
> **Deployment wires shall remain shorted and not be connected to a power source until the air bag is to be deployed.**

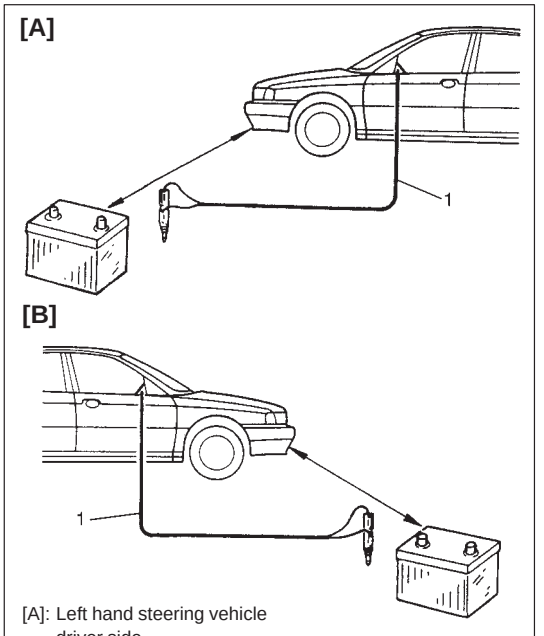
Special Tool (Deployment harness)
(A): 09932-75030



1. Short deployment harness leads

7) Connect deployment harness connector to air bag (inflator) module (driver or passenger) and lock connector with lock lever.

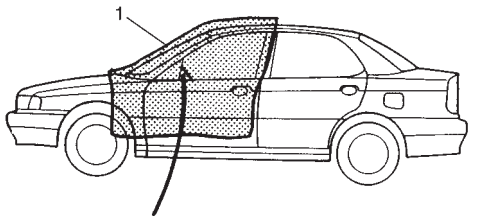
Special Tool (Deployment harness)
(A): 09932-75030



[A]: Left hand steering vehicle driver side
[B]: Right hand steering vehicle driver side

1. Stretch deployment harness to its full length 10 m (33 ft).

8) Route deployment harness out the vehicle.
9) Verify that the inside of the vehicle and the area surrounding the vehicle are clear of all people and loose or flammable objects.
10) Stretch the deployment harness to its full length 10 m (33 ft).
11) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.



1. Drop cloth blanket or similar item.

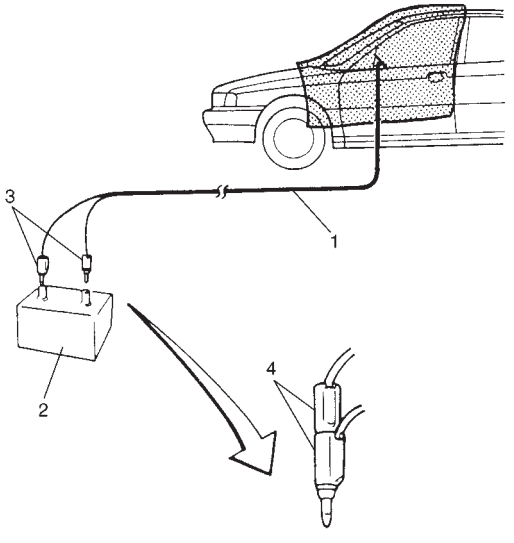
12) Completely cover windshield area and front door window openings with a drop cloth, blanket or similar item. This reduces the possibility of injury due to possible fragmentation of the vehicle's glass or interior.
13) Notify all people in the immediate area that you intend to deploy the air bag (inflator) module.

NOTE:
When the air bag deploys, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to deploy the air bag (inflator) module and suitable ear protection should be worn.

NOTE:
After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction.

WARNING:
Safety precautions must be observed when handling a deployed air bag (inflator) module.
- **After deployment, the metal surfaces of the air bag (inflator) module will be very hot. Do not touch the metal areas of the air bag (inflator) module for about 30 minutes after deployment.**
- **Do not apply water, oil, etc. to deployed air bag (inflator) module.**
- **If the deployed air bag (inflator) module must be moved before it is cool, wear gloves and handle by the air bag or vinyl trim.**

Failure to follow procedures may result in fire or personal injury.



1. Stretch it to full length 10 m (33 ft).
2. Power source (12V vehicle battery)
3. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately deploy.
4. Short harness leads after deployment.
5. Drop cloth, blanket or similar item.

14) Separate the two banana plugs on the deployment harness.
15) Connect the deployment harness to the power source (12V vehicle battery) to immediately deploy the driver or passenger air bag.
16) Disconnect the deployment harness from the power source (12V vehicle battery) and short the harness leads together by fully seating one banana plug into the other.

17) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module.

NOTE:
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

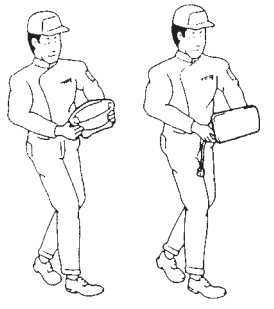
18) Disconnect the deployment harness from the air bag (inflator) module as soon after deployment as possible. This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module canister. The deployment harness are designed to be reused. They should, however, be inspected for damage after each deployment and replaced if necessary.
19) Carefully remove drop cloth from vehicle and clean off any fragments or discard drop cloth entirely.
20) Repeat Steps 2) through 19) to deploy driver or passenger air bag (inflator) module, if it does not try to deploy.
21) In the unlikely event that either or both of the air bag (inflator) modules proceed immediately with Steps 23) through 25). If the air bag (inflator) module did deploy, proceed with Steps 22).
22) With both air bags deployed the vehicle may be scrapped in the same manner as a non-air bag equipped vehicle.
23) Remove the undeployed air bag (inflator) module(s) from the vehicle. For driver air bag (inflator) module refer to Section 3C1, for passenger air bag (inflator) module refer to “ON-VEHICLE SERVICE” in this section.

WARNING:
- **Always carry a live air bag (inflator) module with trim cover away from you.**
- **When storing a live air bag (inflator) module or when leaving a live air bag (inflator) module unattended on a bench or other surface, always face the bag up, away from the surface.**
- **This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.**

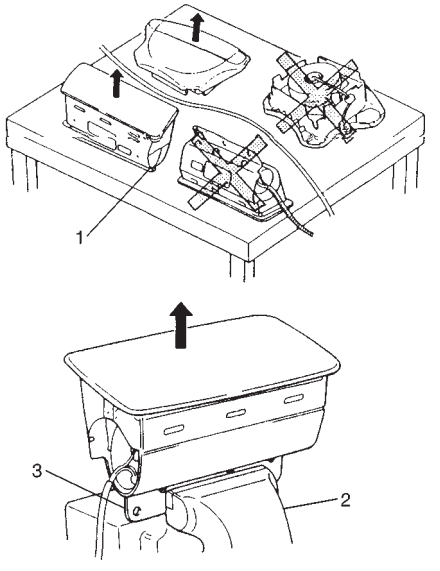
Failure to follow procedures could result in personal injury.

24) Temporarily store the air bag (inflator) module with the air bag opening facing up, away from the surface upon which it rests. Refer to “SERVICE PRECAUTION” in this section for details.
25) Contact your local distributor for further assistance.

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



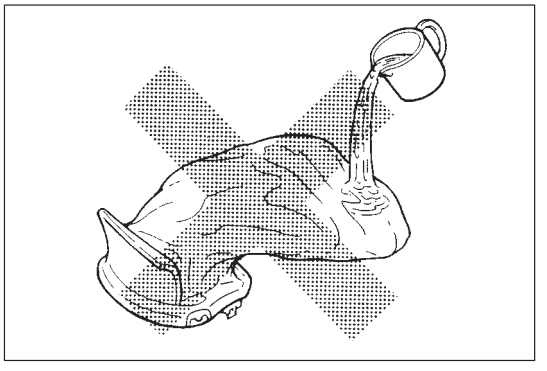
1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

DEPLOYED AIR BAG (INFLATOR) MODULES DISPOSAL

WARNING:
Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which may cause personal injury. Undeployed air bag (inflator) modules must not be disposed of through normal refuse channels.
The undeployed air bag (inflator) module contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

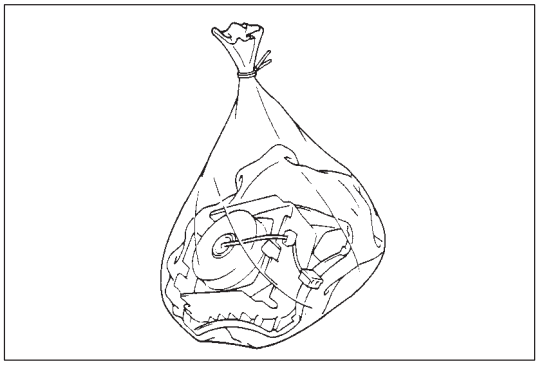
Deployed air bag (inflator) modules (driver/passenger) can be disposed of through normal refuse channels just like any other parts. For their disposal, however, the following points should be noted.

○ The air bag (inflator) module immediately after deployment is very hot. Wait for 30 minutes to cool it off before handling it.



○ Never apply water, oil, etc. to deployed air bag (inflator) module to cool it off and be careful so that water, oil, etc. does not get on the deployed air bag (inflator) module.

○ After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction. As with many service procedures, you should wear gloves and safety glasses.



○ When disposing of the deployed air bag (inflator) module alone, be sure to seal it in a vinyl bag.

○ When air bag (inflator) module(s) have been deployed inside the vehicle which is going to be scrapped, leave them as installed to the vehicle.

○ Be sure to wash your hands with mild soap and water after handling it.

SEAT BELT PRETENSIONERS DISPOSAL

WARNING:
Failure to follow proper seat belt pretensioner (retractor assembly) disposal procedures can result in pretensioner activation which may cause personal injury. Inactivated seat belt pretensioner must not be disposed of through normal refuse channels.
The inactivated seat belt pretensioner contain substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

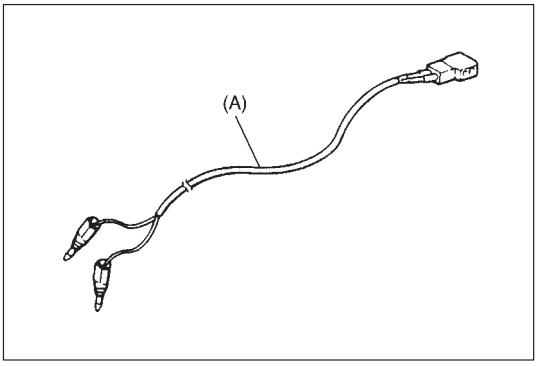
Do not dispose of the live (inactivated) seat belt pretensioners.
The method employed depends upon the final disposition of the particular vehicle, as noted in "ACTIVATION OUTSIDE VEHICLE" and "ACTIVATION INSIDE VEHICLE" in this section.
Activation Outside Vehicle . . . . . disposing of the seat belt pretension(s) only (i.e.,the vehicle itself will be used again).
Activation Inside Vehicle . . . . . scrapping the entire vehicle including the seat belt pretensioner(s).

ACTIVATION OUTSIDE VEHICLE

Use this procedure when the vehicle itself is used again (only the seat belt pretensioner(s) (retractor assembly) are disposed of).

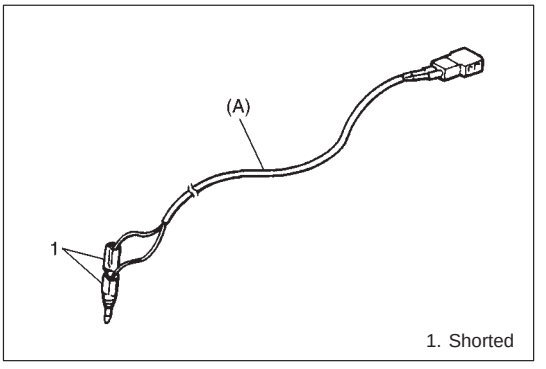
WARNING:
The following precautions must be observed for this work. Failure to observe any of them may result in personal injury.
- ○ **To avoid an accidental activation, this work should be performed by no more than one person.**
- ○ **The procedure should be followed strictly as described here.**
- ○ **Be sure to read "PRECAUTIONS" in this section for the seat belt pretensioner beforehand.**
- ○ **Never connect deployment harness to any power source before connecting deployment harness to the seat belt pretensioner. Deployment harness shall remain shorted and not be connected to a power source until the pretensioner is to be activated.**
- ○ **Since a large amount of smoke is produced when pretensioner is activated, select a well-ventilated area.**
- ○ **The seat belt pretensioner will immediately activate the pretensioner when a power source is connected to it. Wear safety glasses throughout this entire activation and disposal procedure.**
- ○ **Wear suitable ear protection when activating pretensioner. Also, advise those who are in the area close to activation site to wear suitable ear protection.**
- ○ **Do not activate driver and passenger seat belt pretensioners at the same time.**

The following procedure requires use of special tools (deployment harness and pretensioner service adapter kit). Do not attempt procedure without them.



1) Turn ignition switch to “LOCK”, remove key and put on safety glasses.
2) Check that there is no open, short or damage in special tool (deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool
(A): 09932-75030



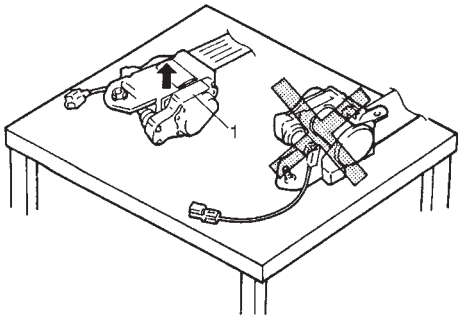
1. Shorted

3) Short the two deployment harness leads together by fully seating one banana plug into the other.

WARNING:
Deployment harness shall remain shorted and not be connected to a power source until the pretensioner is to be activated.

Special Tool
(A): 09932-75030

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



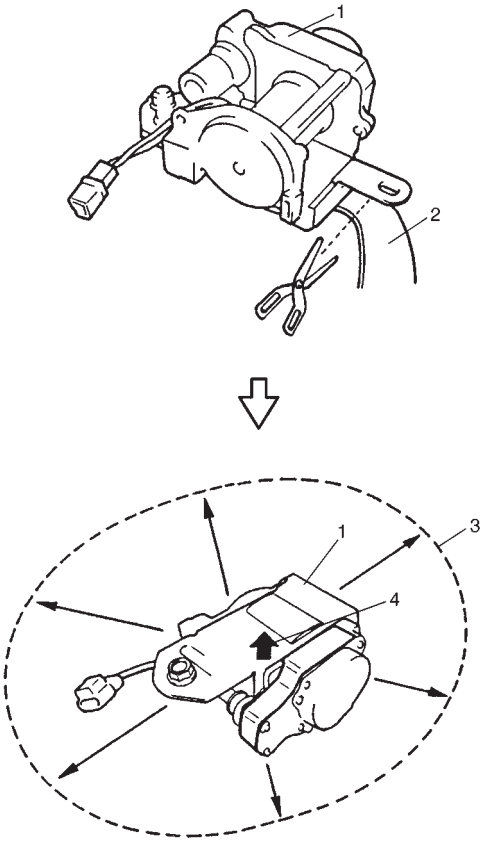
1. Warning label

4) Remove driver or passenger seat belt pretensioner(s) from vehicle, referring to Section 9.

WARNING:
- **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65° C (150° F), without high humidity and away from electric noise.**
- **Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.**
- **When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner module must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.**

Otherwise, personal injury may result.

5) Temporarily place seat belt pretensioner on the workbench or the vise according to above “WARNING”.

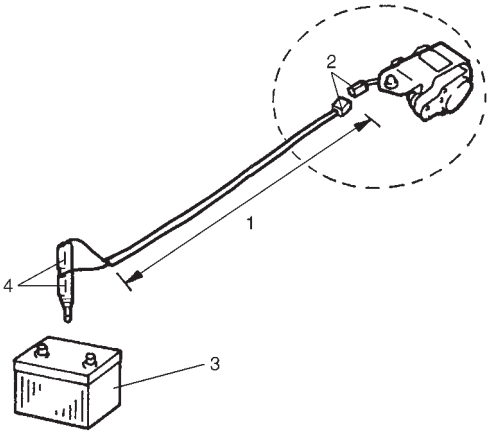


1. Seat belt pretensioner (retractor assembly)
2. Webbing
3. 185 cm (6 feet) of clearance
4. Warning label attached side face up

6) Pull out the webbing fully as shown and cut it at the root of the pretensioner (retractor assembly) as shown in the figure.

WARNING:
As the drum of the retractor assembly turns very quickly as soon as the webbing is cut, fix the retractor assembly with a vise on the workbench and keep your hands and fingers away from it when cutting the webbing.

7) Clear a space on the ground about 185 cm (6 feet) in diameter where the seat belt pretensioner is to be activated. A paved, outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended.
   Ensure no loose or flammable objects are within the activation area.
8) Place the seat belt pretensioner with its warning label attached side facing up as shown in the figure on the ground in the space just cleared.



1. Stretch deployment harness to full length 10 m (33 ft).
2. Connect connectors.
3. Power source (12V vehicle battery)
4. Short the two deployment harness leads.

9) Stretch the deployment harness from the seat belt pretensioner to its full length 10 m (33 ft).
10) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
11) Verify that the area around the seat belt pretensioner is clear of all people and loose or flammable objects.
12) Verify that the seat belt pretensioner, with its warning label attached side facing up as shown on the ground in the space just cleared.
13) Connect the seat belt pretensioner to the deployment harness connector and lock the connector with lock lever.

14) Notify all people in the immediate area that you intend to activate the seat belt pretensioner.

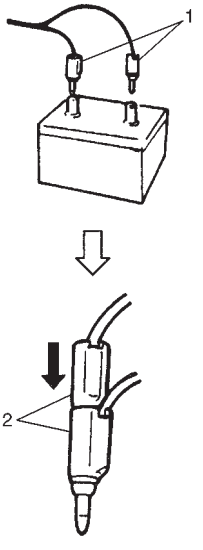
NOTE:

- **When the pretensioner activates, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to activate the seat belt pretensioner and suitable ear protection should be worn.**
- **When the pretensioner activates, the seat belt pretensioner may jump about 30 cm (one foot) vertically. This is a normal reaction of the seat belt pretensioner to the force of the rapid gas expansion inside the pretensioner.**

WARNING:
Safety precautions must be observed when handling an activated seat belt pretensioner.

- **After activation, the metal surfaces of the seat belt pretensioner will be very hot. Do not touch the metal areas of the seat belt pretensioner for about 30 minutes after activation.**
- **Do not place the activated seat belt pretensioner near any flammable objects.**
- **Do not apply water, oil, etc. to the activated seat belt pretensioner.**
- **If the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle it by using nonmetal material.**

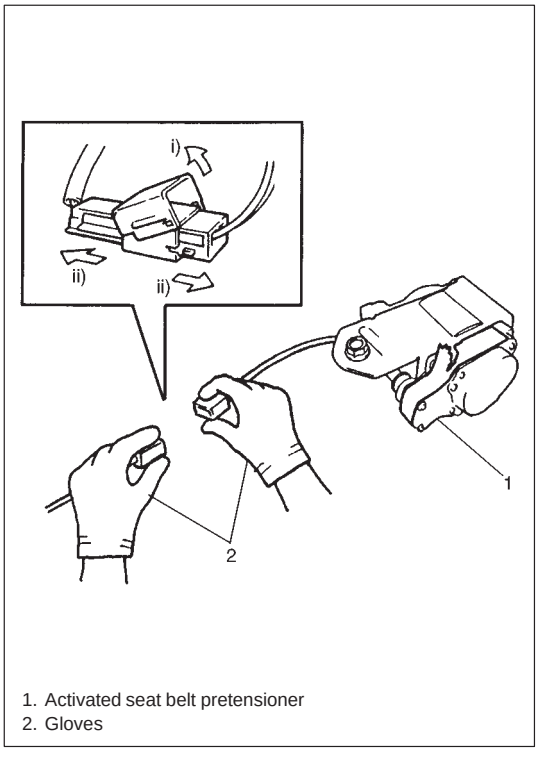
Failure to follow procedures may result in fire or personal injury.



1. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately activate.
2. Short to two deployment harness leads.

15) Separate the two banana plugs on the deployment harness.
16) Connect the deployment harness to the power source (12V vehicle battery) to immediately activate the pretensioner.
17) Disconnect the deployment harness from power source (12V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.

18) In the unlikely event that the seat belt pretensioner did not activate after the following these procedures, proceed immediately with Steps 23) through 26). If the the seat belt pretensioner did activate, proceed with Steps 19) through 22).

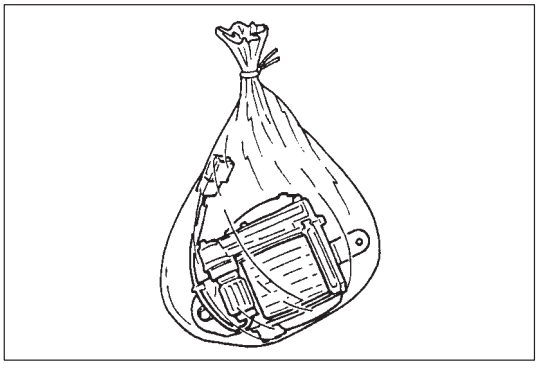


1. Activated seat belt pretensioner
2. Gloves

19) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the activated seat belt pretensioner.

NOTE:
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

20) Disconnect the deployment harness from the seat belt pretensioner as soon after activation as possible. This will prevent damage to the deployment harness due to possible contact with the hot seat belt pretensioner canister. The deployment harness are designed to be reused. They should, however, be inspected for damage after each activation and replaced if necessary.



21) Dispose of the activated seat belt pretensioner through normal refuse channels after it has cooled for at least 30 minutes and tightly seal the seat belt pretensioner in a strong vinyl bag. (Refer to “ACTIVATED SEAT BELT PRETENSIONERS DISPOSAL” in this section.)

22) Wash your hands with mild soap and water afterward.

NOTE:
The remaining steps are to be followed in the unlikely event that the seat belt pretensioner did not activate after the following these procedures.

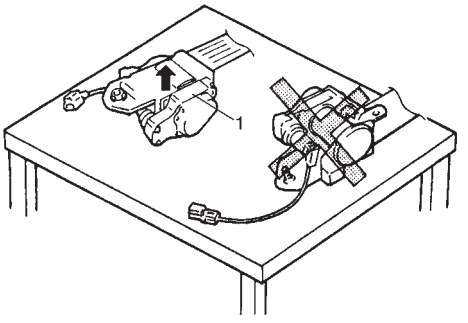
23) Ensure that the deployment harness has been disconnected from the power source and that its two banana plugs have been shorted together by fully seating one banana plug into the other.
24) Disconnect the deployment harness from the seat belt pretensioner.

WARNING:
- **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- **Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.**
- **When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner module must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.**

Otherwise, personal injury may result.

25) Temporarily store the seat belt pretensioner with its warning label attached side facing up, away from the surface upon which it rests. Refer to “PRECAUTIONS” in this section for details.
26) Contact your local distributor for further assistance.

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

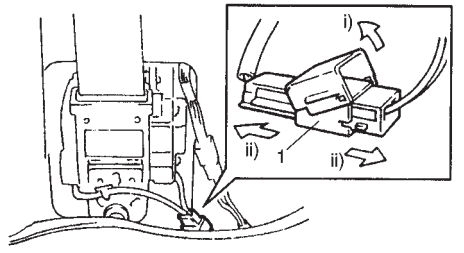
ACTIVATION INSIDE VEHICLE

Use this procedure when scrapping the entire vehicle including the seat belt pretensioner(s) (retractor assembly).

CAUTION:
When vehicle itself will be used again, activate pretensioner outside vehicle according to "ACTIVATION OUTSIDE VEHICLE", for activating it inside will cause the center pillar inner garnish and their vicinity to be deformed.
Failure to observe this CAUTION may require unneeded vehicle inspection and repair.

WARNING:
The following precautions must be observed for this work. Failure to observe any of them may result in personal injury.
- **○ To avoid an accidental activation, this work should be performed by no more than one person.**
- **○ The procedure should be followed strictly as described here.**
- **○ Be sure to read "PRECAUTIONS" for the seat belt pretensioner beforehand.**
- **○ Never connect deployment harness to any power source before connecting deployment harness to the seat belt pretensioner. Deployment harness shall remain shorted and not be connected to a power source until the pretensioner is to be activated.**
- **○ The seat belt pretensioner will immediately activate the pretensioner when a power source is connected to it. Wear safety glasses throughout this entire activation and disposal procedure.**
- **○ Wear suitable ear protection when activating pretensioner. Also, advise those who are in the area close to activation site to wear suitable ear protection.**
- **○ Do not activate driver and passenger seat belt pretensioners at the same time.**

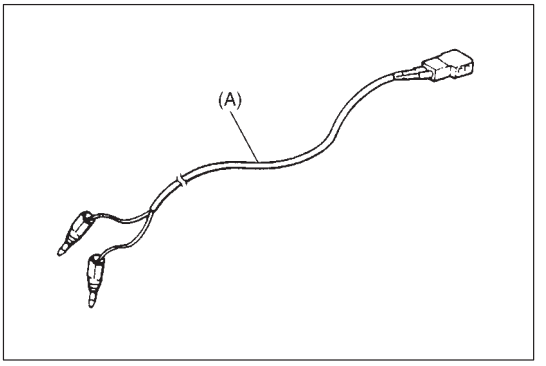
1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
2) Remove all loose objects from front seats and instrument panel.



1. Seat belt pretensioner connector

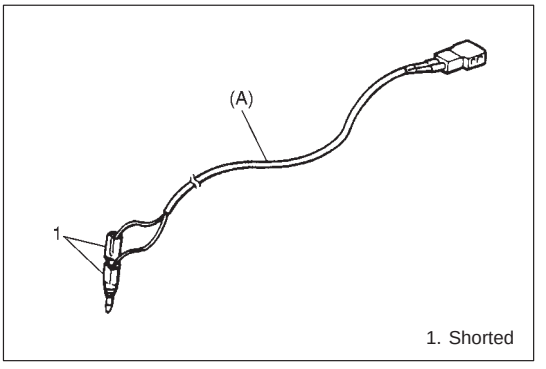
3) Remove both side center pillar inner garnishes and disconnect seat belt pretensioner connectors.

4) Confirm that each seat belt pretensioner is securely mounted.



5) Check that there is no open/short or damage in special tool (deployment harness). If any faulty condition is found, do not use it and be sure to use new deployment harness.

Special Tool
(A): 09932-75030

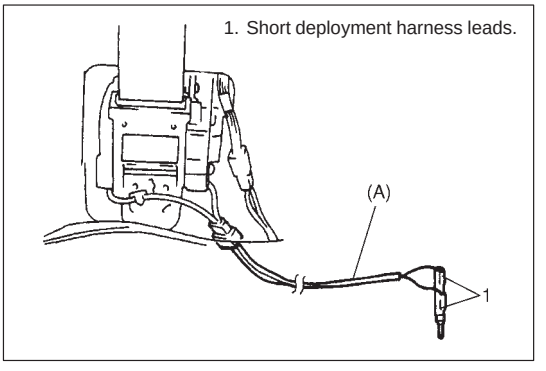


1. Shorted

6) Short the two deployment harness leads together by fully seating one banana plug into the other.

> **WARNING:**
> **Deployment wires shall remain shorted and not be connected to a power source until the pretensioner is to be activated.**

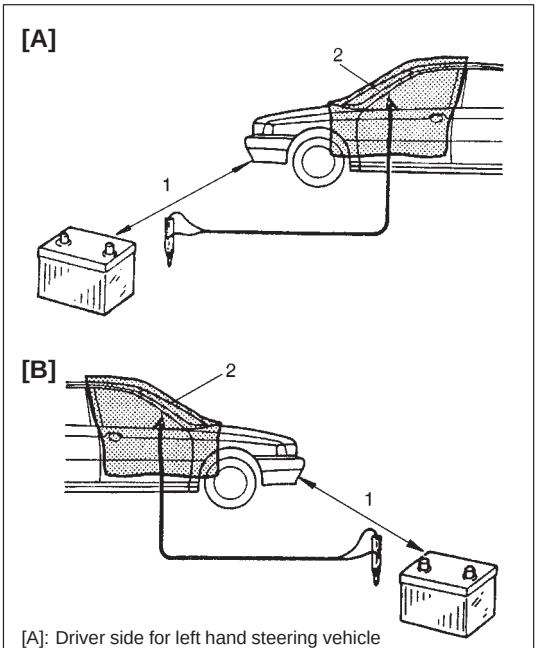
Special Tool
(A): 09932-75030



1. Short deployment harness leads.

7) Connect the deployment harness connector to the seat belt pretensioner and lock the connector with lock lever.

Special Tool
(A): 09932-75030



[A]: Driver side for left hand steering vehicle
[B]: Driver side for right hand steering vehicle

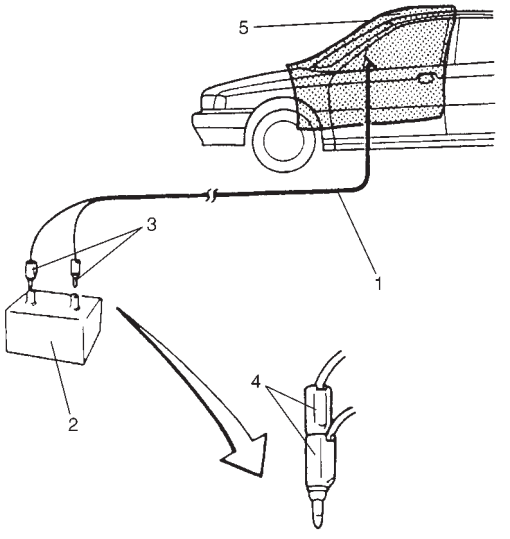
1. Stretch deployment harness to its full length 10 m (33 ft).
2. Drop clutch blanket or similar item.

8) Route deployment harness out the vehicle.
9) Verify that the inside of the vehicle and the area surrounding the vehicle are clear of all people and loose or flammable objects.
10) Stretch the deployment harness to its full length 10 m (33 ft).
11) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
12) Completely cover windshield area and front door window openings with a drop cloth, blanket to similar item. This reduces the possibility of injury due to possible fragmentation of the vehicle's glass or interior.
13) Notify all people in the immediate area that you intend to activate the seat belt pretensioner.

NOTE:
When the pretensioner activates, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to activate the seat belt pretensioner and suitable ear protection should be worn.

WARNING:
Safety precautions must be observed when handling an activated seat belt pretensioner.
- **After activation, the metal surfaces of the seat belt pretensioner will be very hot. Do not touch the metal areas of the seat belt pretensioner for about 30 minutes after activation.**
- **Do not apply water, oil, etc. to activated seat belt pretensioner.**
- **If the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle by using nonmetal material.**

Failure to follow procedures may result in fire or personal injury.



1. Stretch it to full length 10 m (33 ft).
2. Power source (12V vehicle battery)
3. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately activate.
4. Short harness leads after activation.
5. Drop cloth, blanket or similar them.

14) Separate the two banana plugs on the deployment harness.
15) Connect the deployment harness to the power source (12 V vehicle battery) to immediately activate the pretensioner.
16) Disconnect the deployment harness from the power source (12 V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.

17) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the activated seat belt pretensioner.

NOTE:
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

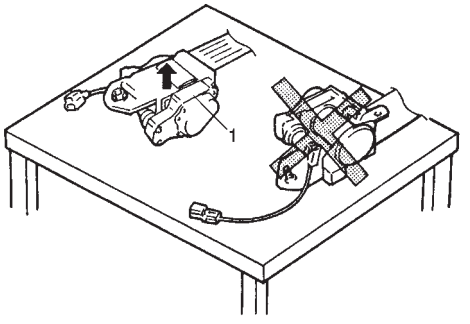
18) Disconnect the deployment harness from the seat belt pretensioner as soon after activation as possible. This will prevent damage to the deployment harness due to possible contact with the hot seat belt pretensioner canister. The deployment harness are designed to be reused. They should, however, be inspected for damage after each activation and replaced if necessary.
19) Carefully remove drop cloth from vehicle and clean off any fragments or discard drop cloth entirely.
20) Repeat Steps 2) through 19) to activate seat belt pretensioner which has not been activated, if any.

21) In the unlikely event that either or both of the seat belt pretensioners proceed immediately with Steps 23) through 25). If the seat belt pretensioner did activate, proceed with Step 22).

22) With pretensioners activated the vehicle may be scrapped in the same manner as a non-air bag system equipped vehicle.

23) Remove the inactivated seat belt pretensioner(s) from the vehicle. Refer to Section 9.

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

WARNING:

- **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- **Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.**
- **When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner module must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.**

Otherwise, personal injury may result.

24) Temporarily store the seat belt pretensioner with its warning label attached side facing up, away from the surface upon which it rests. Refer to “PRECAUTIONS” in this section for details.
25) Contact your local distributor for further assistance.

ACTIVATED SEAT BELT PRETENSIONERS DISPOSAL

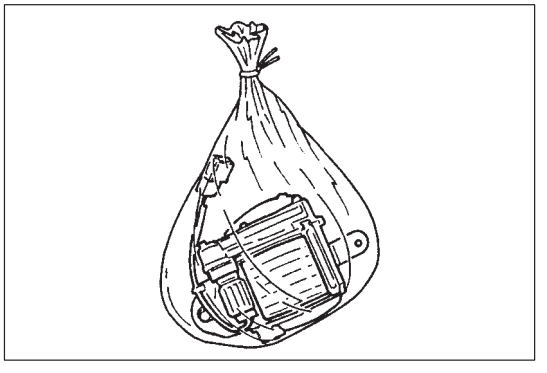
WARNING:
Failure to follow proper seat belt pretensioner disposal procedures can result in pretensioner activation which may cause personal injury. Inactivated seat belt pretensioner must not be disposed of through normal refuse channels.
The inactivated seat belt pretensioner contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

Activated seat belt pretensioners can be disposed of through normal refuse channels just like any other parts. For their disposal, however, the following points should be noted.

○ The seat belt pretensioner immediately after activation is very hot. Wait for 30 minutes to cool it off before handling it.

○ Never apply water, oil, etc. to activated seat belt pretensioner to cool it off and be careful so that water, oil etc. does not get on the activated seat belt pretensioner.

○ With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.



○ When disposing of the activated seat belt pretensioner alone, be sure to seal it in a vinyl bag.

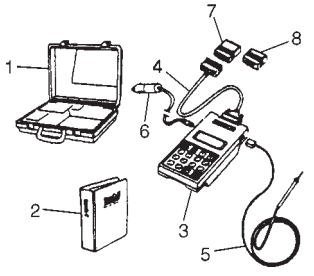
○ When seat belt pretensioner(s) have been activated inside the vehicle which is going to be scrapped, leave them as installed to the vehicle.

○ Be sure to wash your hands with mild soap and water after handling it.

TIGHTENING TORQUE SPECIFICATIONS

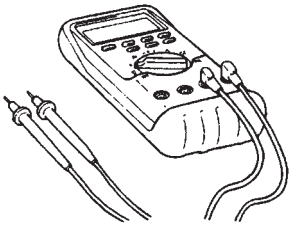
Fastening Parts	Tightening torque		
	N·m	kg-m	lb-ft
SDM bolt	5.5	0.55	4.0
Seat belt pretensioner (retractor assembly) bolt	Refer to Section 9.		

SPECIAL TOOL



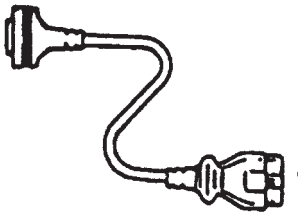
09931-76011
SUZUKI scan tool (Tech 1A) kit

1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

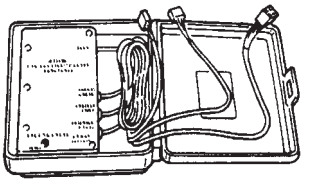


Digital multimeter for which the maximum test current is 10 mA or less at the minimum range of resistance measurement.

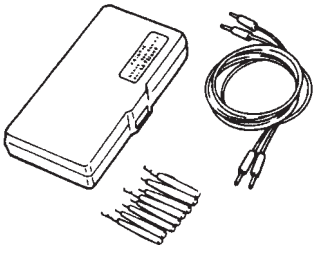
WARNING:
Be sure to use the specified digital multimeter. Otherwise, air bag deployment or personal injury may result.



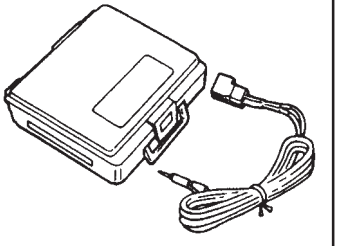
09931-76030
16/14 pin DLC cable



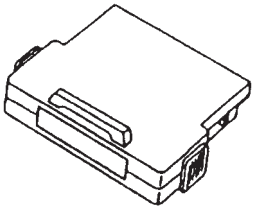
09932-75010
Air bag driver/passenger load tool



09932-76010
Connector test adapter kit



09932-75030
Air bag deployment harness



Mass storage cartridge

Prepared by

SUZUKI MOTOR CORPORATION

Overseas Service Department

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This is a summary of the Periodic Maintenance Schedule as found in the 1999 Suzuki Esteem owners manual. This summary will only include **KILOMETERS** and will only apply to non-California cars that are driven under normal driving conditions. If your car is licensed in California or driven under non-normal or extreme driving conditions please consult the Suzuki Owners Manual or your local Suzuki dealer for when maintenance should be performed. The word **INSPECT** (as listed in the manual) is stated as: “Inspect and correct, replace or lubricate if necessary”. **K** = 1,000 kilometers, for example 30k would equal 30,000 kilometers.	
ENGINE	
Drive Belts	Inspect at 50k km and every 50k km there after.
Camshaft Timing Belt	Replace at 100k km, inspect at 150k km, replace at 200k km.
Valve Lash	Inspect at 37.5k km and every 37.5k km there after.
Engine Oil and Oil Filter	Replace every 12.7k km.
Cooling System Hoses and Connections	Inspect at 25k km, and every 25k km there after.
Engine Coolant	Replace at 50k km, and every 50k km there after.
Exhaust System	Inspect at 50k km, and every 50k km there after.
Wiring Harness and Connectors	Inspect every 100k km.
IGNITION SYSTEM	
Spark Plugs	Replace at 50k km, and every 50k km there after.
Ignition Coil (Plug Cap)	Inspect at 50k km, and every 50k km there after.
Ignition Wiring	Replace at 100k km, and every 100k km there after.
FUEL SYSTEM	
Air Cleaner Filter Element	Replace every 50k km.
Fuel Tank, Caps and Lines	Inspect at 25k km, and every 25k km there after.
Fuel Filter	Replace at 175k km.
BRAKE	
Brake discs and pads	Inspect at 12.7k km, then every 25k km there after.
Brake drums and shoes	Inspect at 12.7k km, then every 25k km there after.
Brake hoses and pipes	Inspect at 12.7k km, then every 25k km there after.
Brake fluid level check	Inspect every 25k km, replace at 100k km.
Parking brake lever and cable lever movement check, adjustment	Inspect at 12.7k km, then every 25k km there after.
Brake pedal stroke check, adjustment	Inspect every 25k km.
CHASSIS AND BODY	
Clutch pedal (if equipped) (1.6 liter model) Free play check, adjustment Clutch fluid (1.8 liter model) (if equipped).	Inspect every 12.7k km.
Tires/wheel discs (including tire rotation)	Inspect every 12.7k km.
Drive axle boots	Inspect every 12.7k km.
Suspension system	Inspect every 12.7k km.
Steering system, steering wheel movement, linkage	Inspect every 12.7k km.
Manual transmission oil level check, replacement	Inspect every 12.7k km, replace every 50k km.
Automatic transmission, fluid level	Inspect every 12.7k km.
Automatic transmission, fluid change	Replace every 160k km.
Automatic transmission, fluid hose	Replace at 75k km.
All latches, hinges, locks and gear shift control lever/shaft	Inspect every 12.7k km.
Power steering (if equipped)	Inspect every 12.7k km.