SUZUKI

SQ416/SQ420
SQ625

SERVICE MANUAL

VOLUME 1 OF 2
CHASSIS/ELECTRICAL/BODY

SUZUKI
Caring for Customers
99500-65D01-01E
(英)

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 (Sections 6 – 6K).

Applicable model: SQ416/SQ420/SQ625

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 MANUALS:

Manual Name	Manual No.
SQ416/SQ420/SQ625 Unit Repair Manual for Manual Transmission, Automatic Transmission, Transfer and Differential.	99501-65D00
SQ416/SQ420/SQ625 Wiring Diagram Manual	99512-65D00

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NOTE:
The screen toned Sections 6 – 6K are included in Volume 2 and Section 8A is in Wiring Diagram Manual mentioned in Foreword of this manual.

SECTION 0A

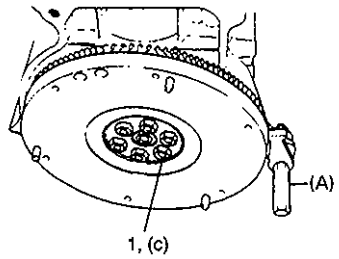
GENERAL INFORMATION

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HOW TO USE THIS MANUAL

1) There is a TABLE OF CONTENTS FOR THE WHOLE MANUAL on the third page of this manual, whereby you can easily find the section that offers the information you need. Also, there is a 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 TORQUE SPECIFICATION are given as shown in figure below.

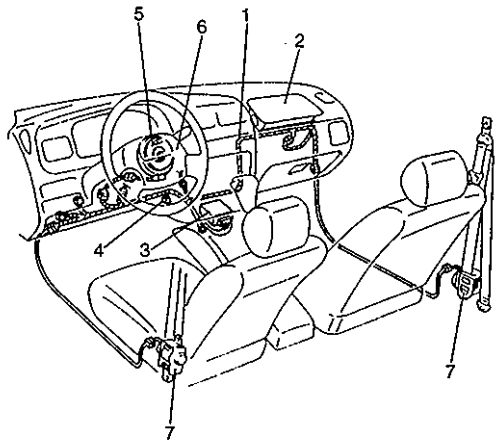


1. Flywheel bolts or drive plate bolts for A/T vehicle

6) Install oil pump. Refer to "Oil pump".
7) Install flywheel (for M/T vehicle) or drive plate (for A/T vehicle). Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts to specified torque.

Special Tool
(A): 09924-17810
Tightening Torque
(c): 78 N·m (7.8 kg-m, 56.0 lb-ft)

4) A number of abbreviations are used in the text.
For their full explanations, refer to **"ABBREVIATIONS 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 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.



1. Air bag wire harness
2. Passenger air bag (inflator) module
3. SDM
4. DLC
5. Contact coil
6. Driver air bag (inflator) module
7. Seat belt pretensioner (if equipped)

PRECAUTIONS

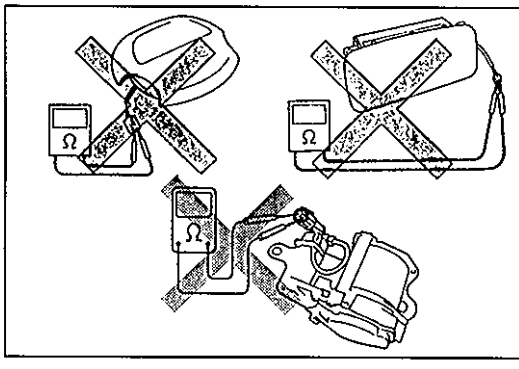
PRECAUTION FOR VEHICLES EQUIPPED WITH A SUPPLEMENTAL RESTRAINT (AIR BAG) SYSTEM

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 10B. 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 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 air bag system activation.**

DIAGNOSIS

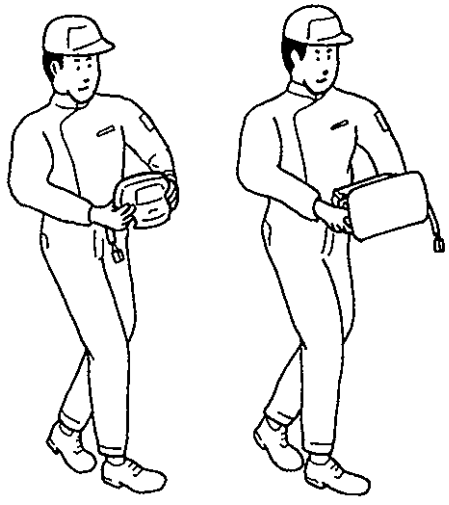
- **When troubleshooting air bag system, be sure to follow "DIAGNOSIS" in SECTION 10B. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacement.**
- **Never use electrical test equipment other than that specified in this manual.**



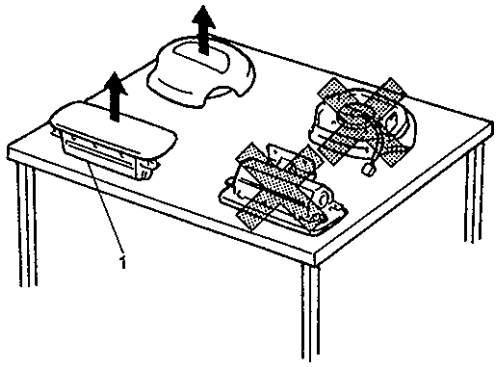
WARNING:

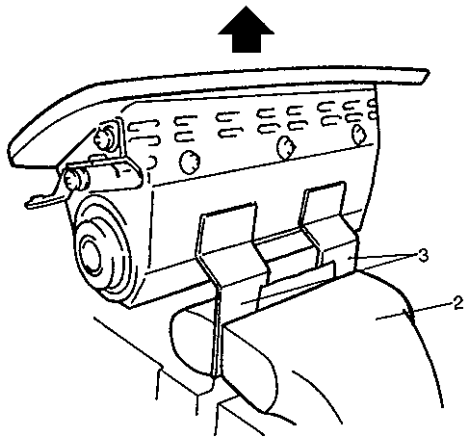
Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger) and seat belt pretentioners (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag or activate the pretensioner.

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

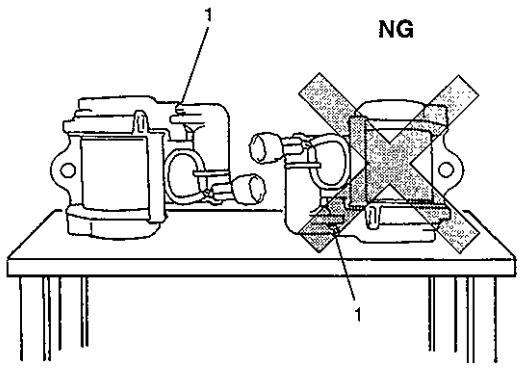
SERVICING AND HANDLING

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 10B 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.



1. Exhaust hole

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 seat belt pretensioner by wire or connector of pretensioner. When placing a live seat belt pretensioner on the workbench or some place like that, be sure not to lay it with its exhaust hole provided side facing down. It is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another. 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 10B 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:

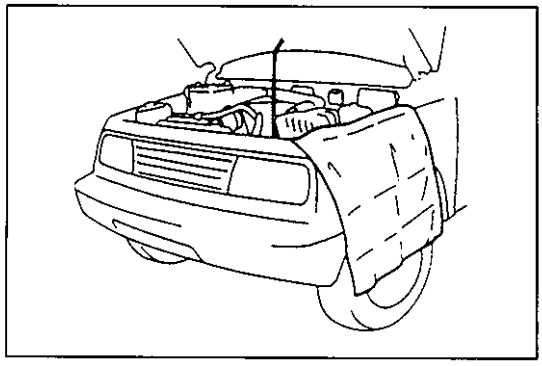
- Even when the accident was light enough not to cause air bags to activate, be sure to inspect system parts and other related parts according to instructions under "Repair and Inspection Required after an Accident" in SECTION 10B.
- When servicing parts other than air bag system, if shocks may be applied 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 "Service Precautions" under "On-Vehicle Service" in SECTION 10B.
- Never expose air bag system component 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 10B.

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.

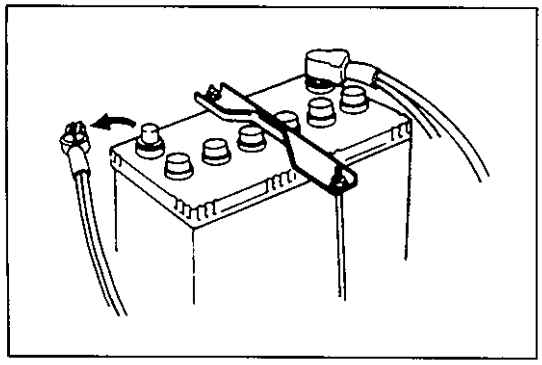
WARNING:

- **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, tail-pipe, 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.**

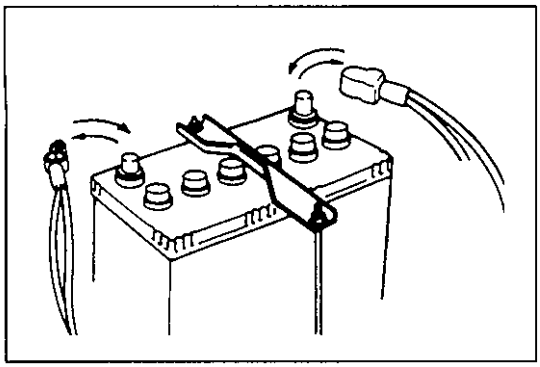


CAUTION:

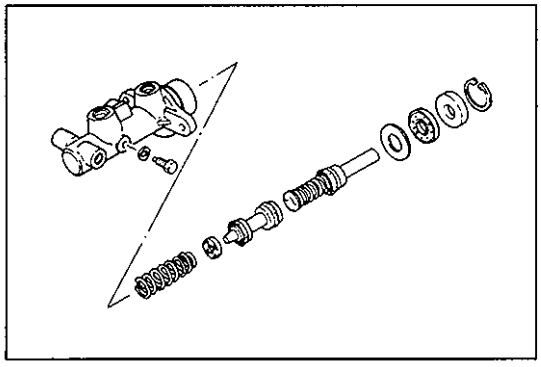
- **Before starting any service work, cover fenders, seats and any other parts that are likely to get scratched or stained during servicing. Also, be aware that what you wear (e.g, buttons) may cause damage to the vehicle's finish.**



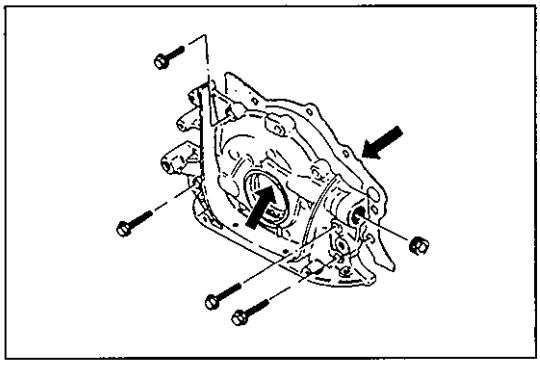
- **When performing service to electrical parts that does not require use of battery power, disconnect the negative cable of the battery.**



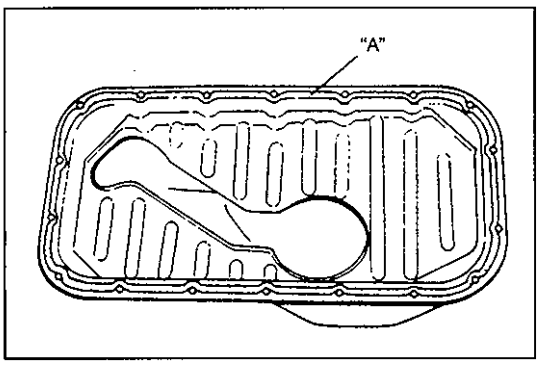
- When removing the battery, be sure to disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover.



- 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.

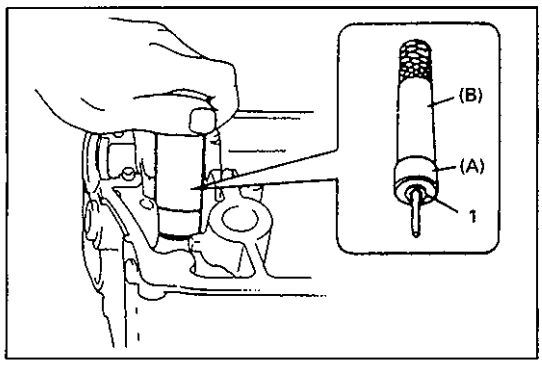


- Whenever you use oil seals, gaskets, packing, O-rings, locking washers, split pins, self-locking nuts, and certain other parts as specified, be sure to use new ones. Also, before installing new gaskets, packing, etc., be sure to remove any residual material from the mating surfaces.



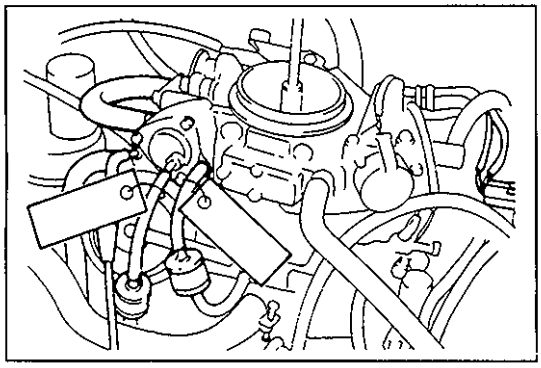
- Make sure that all parts used in reassembly are perfectly clean.
- When use of a certain type of lubricant, bond or sealant is specified, be sure to use the specified type.

"A": Sealant 99000-31150

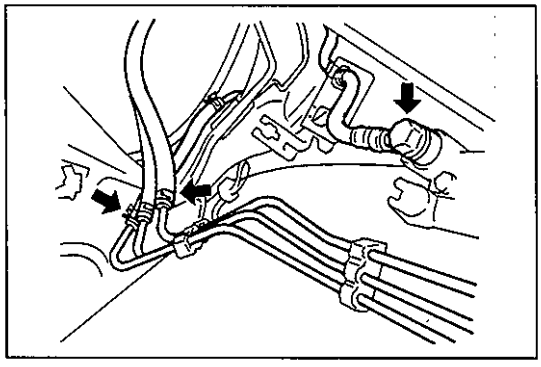


- Be sure to use special tools when instructed.

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 re-installed correctly.



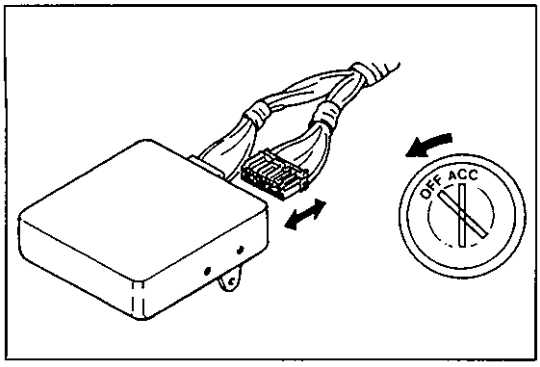
- After servicing fuel, oil, coolant, vacuum, exhaust or brake systems, check all lines related to the system for leaks.

- 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.

PRECAUTIONS FOR CATALYTIC CONVERTER

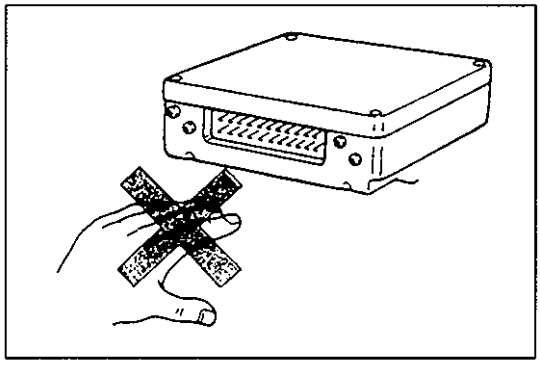
For vehicles equipped with a catalytic converter, use only unleaded gasoline and be careful not to let a large amount of unburned gasoline enter the converter or it can be damaged.

- 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.)

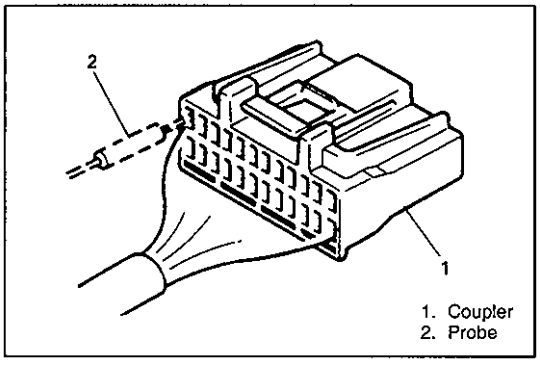


PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE

- When disconnecting and connecting coupler, make sure to turn ignition switch OFF, or electronic parts may get damaged.

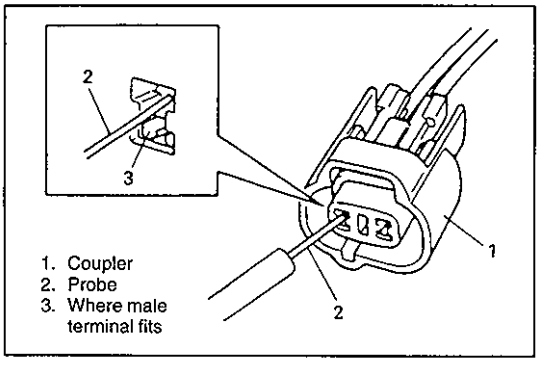


- Be careful not to touch the electrical terminals of parts which use microcomputers (e.g. electronic control unit like as ECM, PCM, P/S controller, etc). The static electricity from your body can damage these parts.
- Never connect any tester (voltmeter, ohmmeter, or whatever) to electronic control 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.



1. Coupler
2. Probe

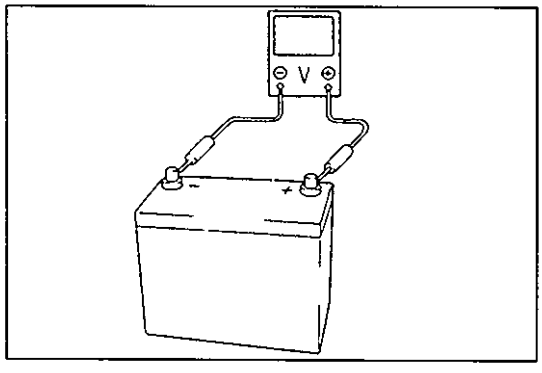
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector.



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.

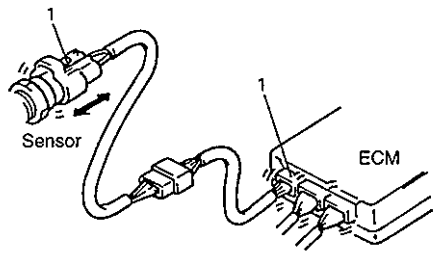
ELECTRICAL CIRCUIT INSPECTION PROCEDURE

While there are various electrical circuit inspection methods, described here is a general method to check its open and short circuit by using an ohmmeter and a voltmeter.

OPEN CIRCUIT CHECK

Possible causes for the open circuit are as follows. As the cause is in the connector or terminal in many cases, they need to be checked particularly carefully.

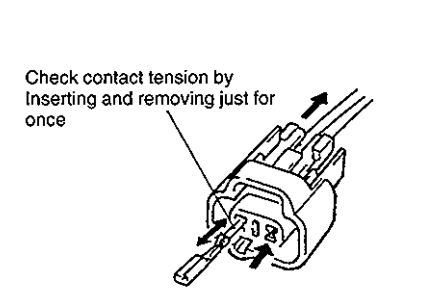
- Loose connection of connector
- Poor contact of terminal (due to dirt, corrosion or rust on it, poor contact tension, entry of foreign object etc.)
- Wire harness being open



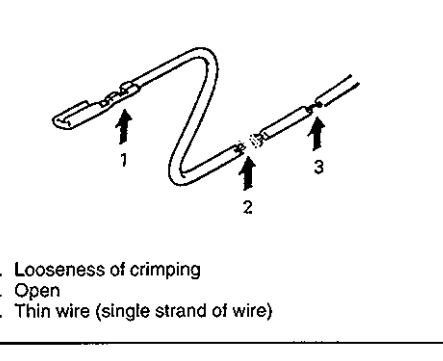
1. Check for loose connection

When checking system circuits including an electronic control unit such as ECM, TCM, ABS control module, etc., it is important to perform careful check, starting with items which are easier to check.

1) Disconnect negative cable from battery
2) Check each connector at both ends of the circuit being checked for loose connection. Also check lock condition of connector if equipped with connector lock.

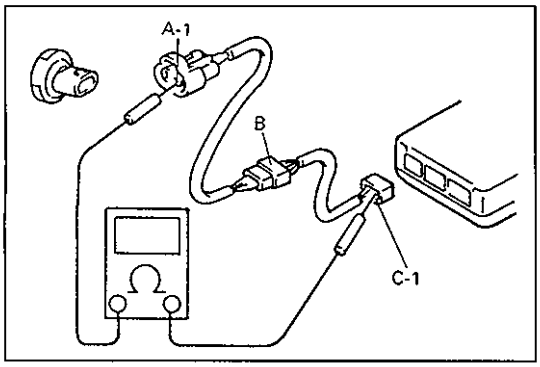


3) Using a test male terminal, check both terminals of the circuit being checked for contact tension of its female terminal.
   Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust entry of foreign object, etc.).
   At the same time, check to make sure that each terminal is locked in the connector fully.



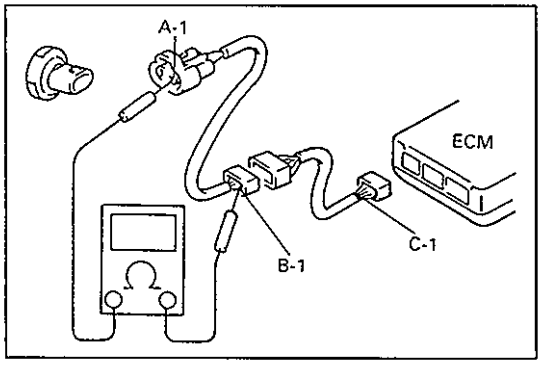
1. Looseness of crimping
2. Open
3. Thin wire (single strand of wire)

4) Using continuity check or voltage check procedure described in the following page, check the wire harness for open circuit and poor connection with its terminals. Locate abnormality, if any.



Continuity check

1) Measure resistance between connector terminals at both ends of the circuit being checked (between A-1 and C-1 in the figure). If no continuity is indicated (infinity or over limit), that means that the circuit is open between terminals A-1 and C-1.

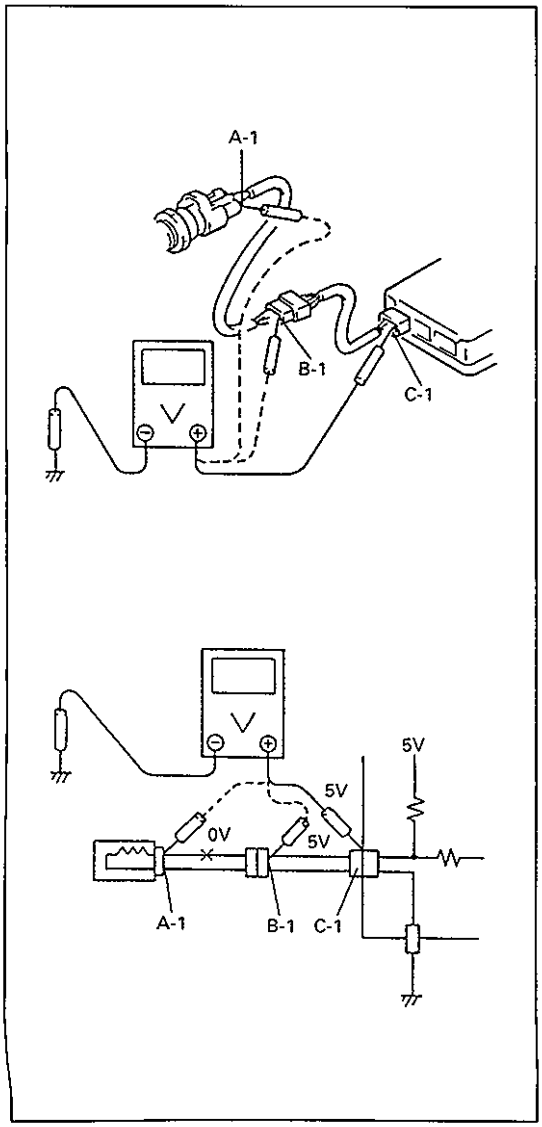


2) Disconnect the connector included in the circuit (connector-B in the figure) and measure resistance between terminals A-1 and B-1.
If no continuity is indicated, that means that the circuit is open between terminals A-1 and B-1. If continuity is indicated, there is an open circuit between terminals B-1 and C-1 or an abnormality in connector-B.

Voltage check

If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

1) With all connectors connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.

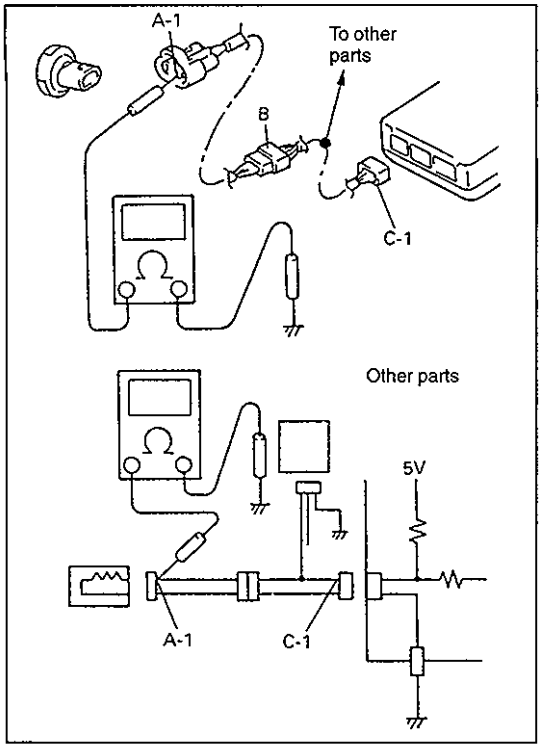


If measurements were taken as shown in the figure at the left and results were as listed below, it means that the circuit is open between terminals B-1 and A-1.

Voltage Between:
C-1 and body ground: Approx. 5V
B-1 and body ground: Approx. 5V
A-1 and body ground: 0V

Also, if measured values were as listed below, it means that there is a resistance (abnormality) of such level that corresponds to the voltage drop in the circuit between terminals A-1 and B-1.

Voltage Between:
C-1 and body ground: Approx. 5V
B-1 and body ground: Approx. 5V
A-1 and body ground: Approx. 3V
2V voltage drop

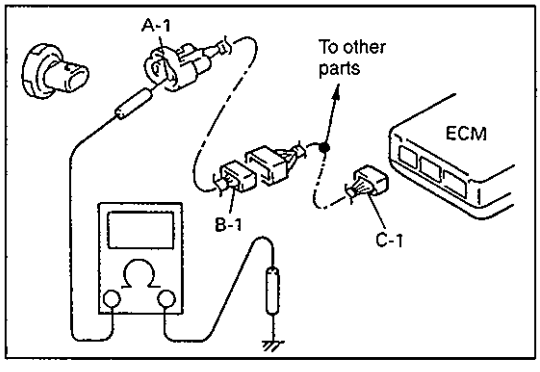


SHORT CIRCUIT CHECK (Wire harness to ground)

1) Disconnect negative cable from battery.
2) Disconnect connectors at both ends of the circuit to be checked.

NOTE:
If the circuit to be checked is connected to other parts, disconnect all connectors of those parts.
Otherwise, diagnosis will be misled.

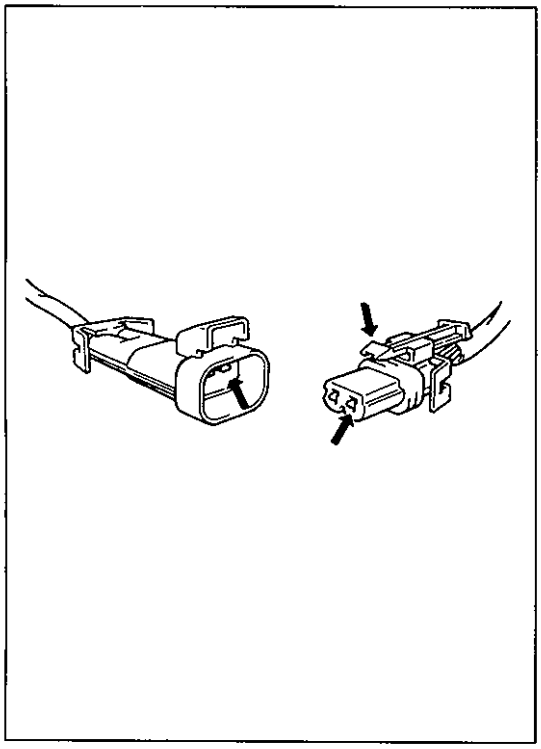
3) Measure resistance between terminal at one end of circuit (A-1 terminal in figure) and body ground. If continuity is indicated, it means that there is a short to ground between terminals A-1 and C-1 of the circuit.



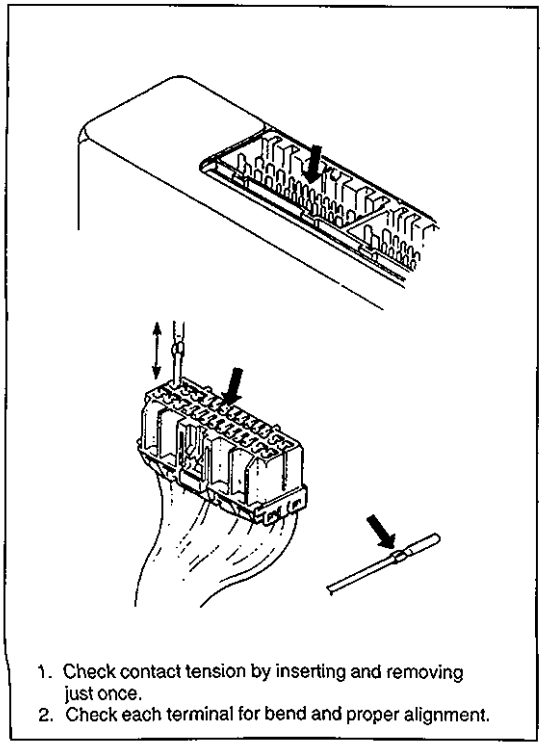
4) Disconnect the connector included in circuit (connector B) and measure resistance between A-1 and body ground.
If continuity is indicated, it means that the circuit is shorted to the ground between terminals A-1 and B-1.

INTERMITTENT AND POOR CONNECTION

Most intermittent are caused by faulty electrical connections or wiring, although a sticking relay or solenoid can occasionally be at fault. When checking it for proper connection, perform careful check of suspect circuits for:

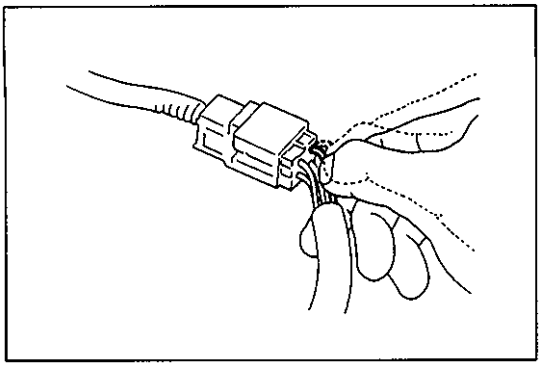


- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
  However, cleaning the terminal with a sand paper or the 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.

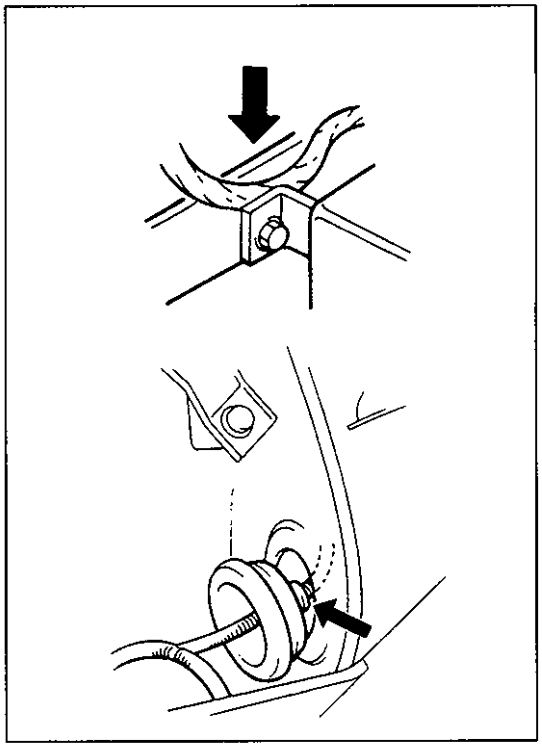


1. Check contact tension by inserting and removing just once.
2. Check each terminal for bend and proper alignment.

- Improperly formed or damaged terminals.
  Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal.
  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, repair or replace.



- 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 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.

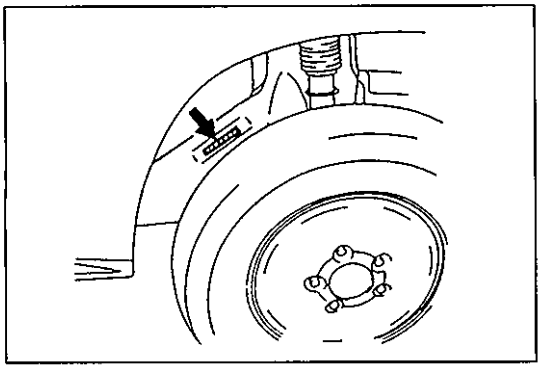
PRECAUTION FOR INSTALLING MOBILE COMMUNICATION EQUIPMENT

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.

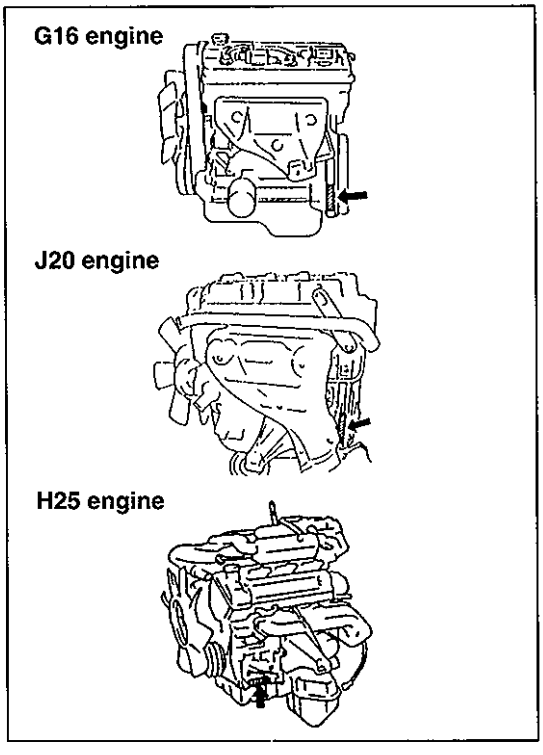
IDENTIFICATION INFORMATION

BODY NUMBER



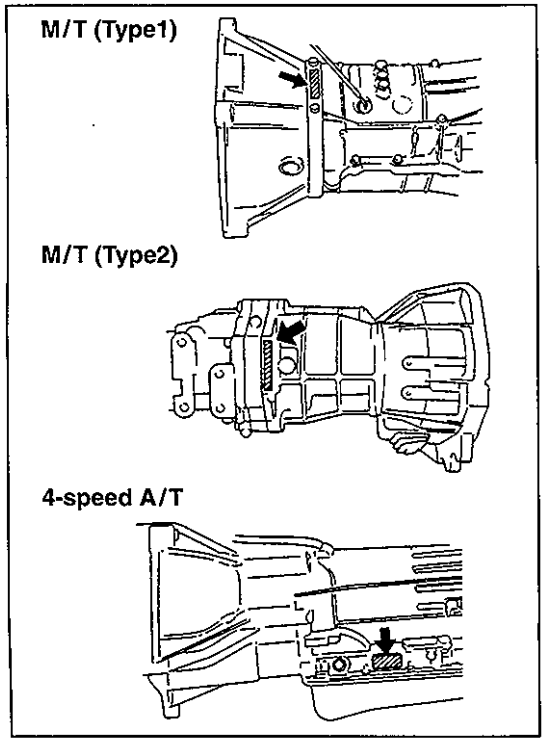
The vehicle body number is punched on the chassis inside the tire housing on the right front side.

ENGINE IDENTIFICATION NUMBER



The number is punched on the cylinder block.

TRANSMISSION IDENTIFICATION NUMBER

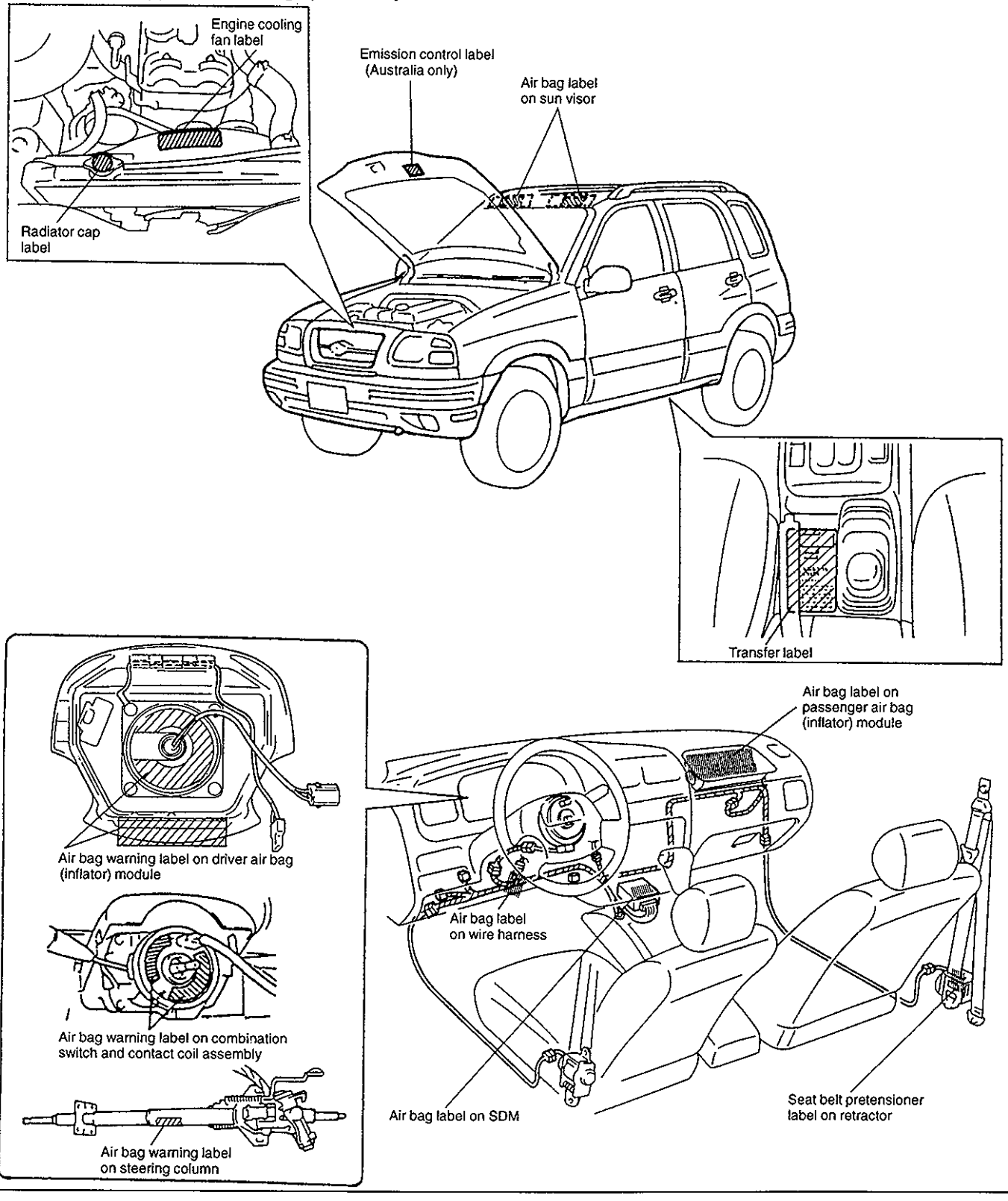


The number is located on the transmission case.

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.

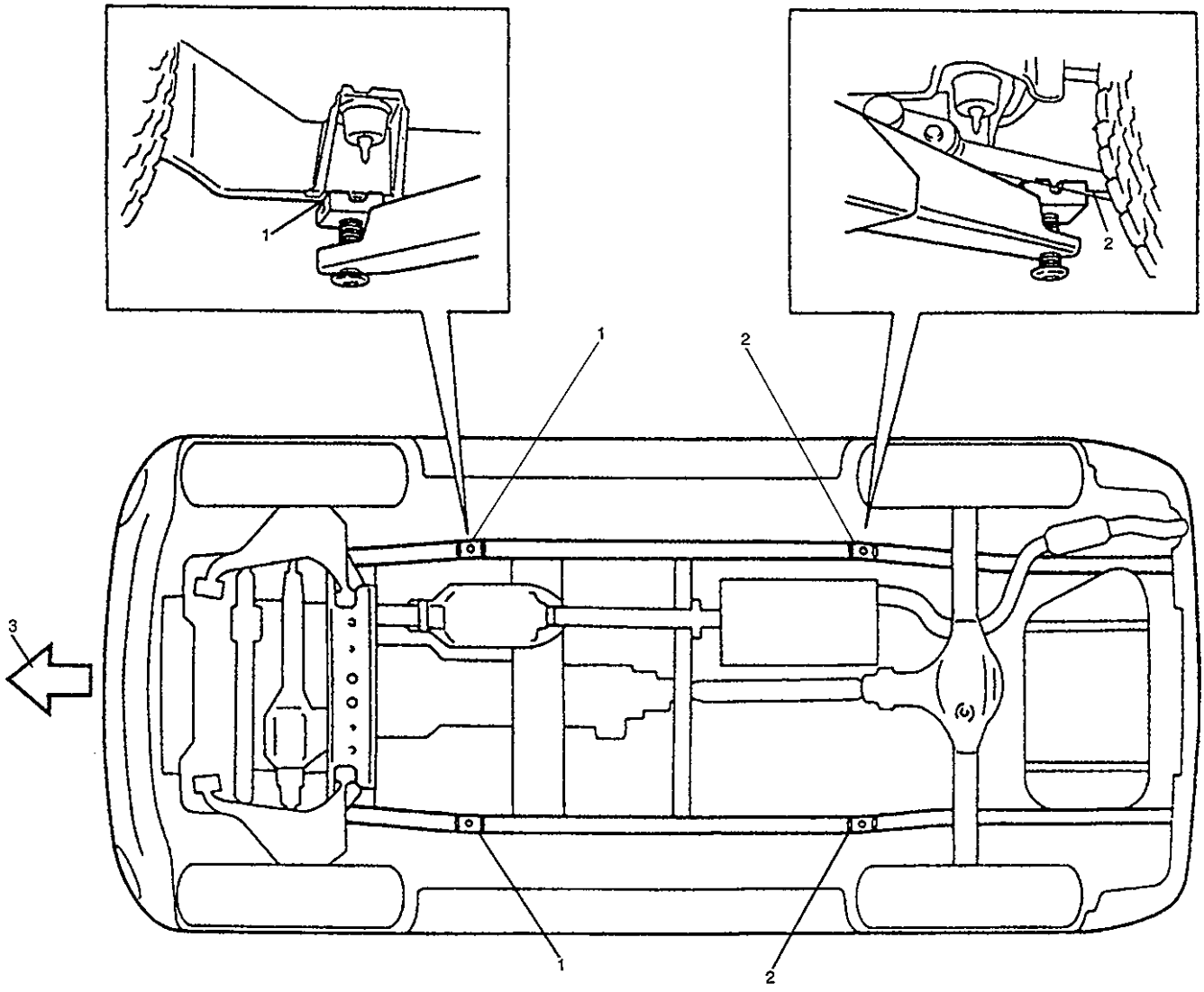


VEHICLE LIFTING POINTS

WARNING

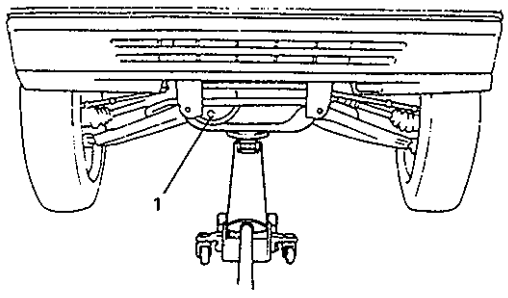
- **When using frame contact hoist, apply hoist as shown (right and left at the same position). Lift up the vehicle till 4 tires are a little off the ground and make sure that the vehicle will not fall off by trying to move vehicle body in both ways. Work can be started only after this confirmation.**
- **Before applying hoist to underbody, always take vehicle balance throughout service into consideration. Vehicle balance on hoist may change depending of what part to be removed.**
- **Make absolutely sure to lock hoist after vehicle is hoisted up.**
- **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:

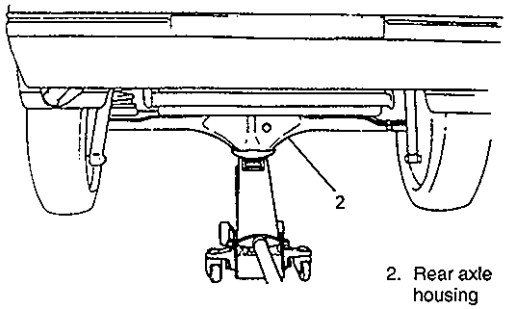


1. Front lifting point
2. Rear lifting point
3. Front

When using floor jack:



1. Front differential housing

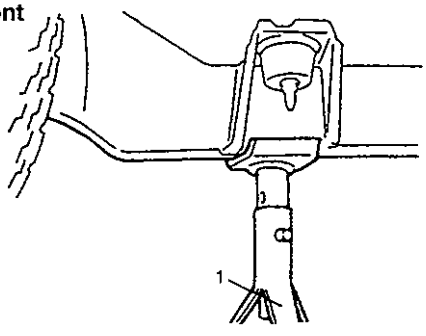


2. Rear axle housing

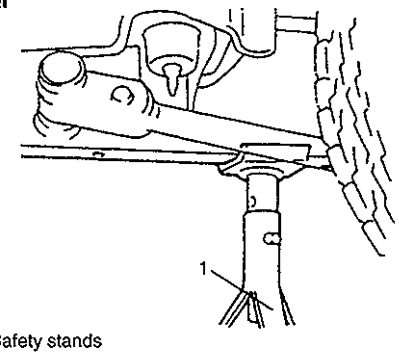
In raising front or rear vehicle end off the floor by jacking, be sure to put the jack against the center portion of the front suspension frame or rear axle housing.

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.

Front



Rear



1. Safety stands

To perform service with either front or rear vehicle end jacked up, be sure to place safety stands under chassis frame so that body is securely supported. And then check to ensure that chassis frame does not slide on safety stands and the vehicle is held stable for safety's sake.

ABBREVIATIONS MAY BE USED IN THIS MANUAL

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

CKT	: Circuit
CMP Sensor	: Camshaft Position Sensor (Crank Angle Sensor, CAS)
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
EPS	: Electronic Power Steering
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

I

IAC Valve	: Idle Air Control Valve (Idle Speed Control Solenoid Valve, ISC Solenoid Valve)
IAT Sensor	: Intake Air Temperature Sensor (Air temperature Sensor, ATS)
ICM	: Immobilizer Control Module
IG	: Ignition
ISC Actuator	: Idle Speed Control Actuator (Motor)

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

P

- PNP : Park/Neutral Position
- P/S : Power Steering
- PSP Switch : Power Steering Pressure Switch (P/S Pressure Switch)
- PCM : Powertrain Control Module
- PCV : Positive Crankcase Ventilation

R

- 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
- 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
- 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

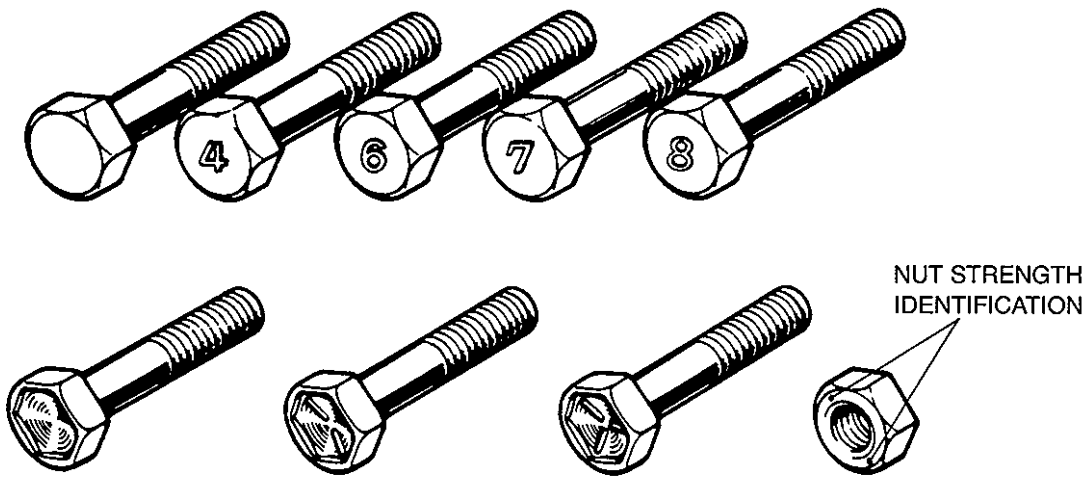
METRIC INFORMATION

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.

FASTENER STRENGTH IDENTIFICATION

Most commonly used metric fastener strength property classes are 4T, 7T and radial line with the class identification embossed on the head of each bolt. Some metric nuts will be marked with punch 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 size. Correct replacement bolts and nuts are available through the parts division.



METRIC BOLTS–IDENTIFICATION CLASS NUMBERS OR MARKS CORRESPOND TO BOLT STRENGTH–INCREASING NUMBERS REPRESENT INCREASING STRENGTH.

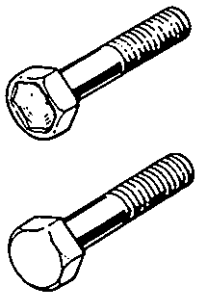
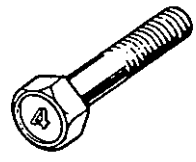
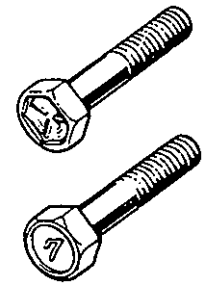
STANDARD TIGHTENING TORQUE

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 and nut, 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 light alloy.**

Tightening torque chart

STRENGTH / THREAD DIAMETER (mm)	 Conventional bolt		 "4T" bolt	 "7T" bolt		
	N·m	kg-m	lb-ft	N·m	kg-m	lb-ft
4	1.5	0.15	1.0	2.3	0.23	2.0
5	3.0	0.30	2.5	4.5	0.45	3.5
6	5.5	0.55	4.0	10	1.0	7.5
8	13	1.3	9.5	23	2.3	17.0
10	29	2.9	21.0	50	5.0	36.5
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	98.0
16	105	10.5	76.0	210	21	152.0
18	160	16	116.0	240	24	174.0

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).**

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Fuel System 0B-13
Emission Control System 0B-14
Electrical System 0B-15
Chassis and Body 0B-15
Final Inspection 0B-27
RECOMMENDED FLUIDS AND LUBRICANTS 0B-28

MAINTENANCE SCHEDULE

MAINTENANCE SCHEDULE UNDER NORMAL DRIVING CONDITIONS

Interval: This interval should be judged by odometer reading or months, whichever comes first.		This table includes services as scheduled up to 80,000 km (48,000 miles) mileage. Beyond 80,000 km (48,000 miles), carry out the same services at the same intervals respectively.							
	km (x 1,000)	10	20	30	40	50	60	70	80
	miles (x 1,000)	6	12	18	24	30	36	42	48
	Months	6	12	18	24	30	36	42	48
ENGINE									
1-1. Drive belt (tension, damage)		–	–	–	I	–	–	–	R
1-2. Camshaft timing belt (G16 engine only)		Replace every 100,000 km or 60,000 miles							
1-3. Valve lash (clearance) (G16 engine only)		–	–	I	–	–	I	–	–
1-4. Engine oil and oil filter	G16 engine	R	R	R	R	R	R	R	R
	J20/H25 engines	Replace every 15,000 km, 9,000 miles or 12 months							
1-5. Engine coolant		–	–	–	R	–	–	–	R
1-6. Cooling system hoses and connections		–	I	–	I	–	I	–	I
1-7. Exhaust pipes and mountings		–	–	–	I	–	–	–	I&(R)
IGNITION SYSTEM									
2-1. Spark plugs	When unleaded fuel is used – Vehicle without HO2S	–	R	–	R	–	R	–	R
	When unleaded fuel is used – Vehicle with HO2S	–	–	–	–	R	–	–	–
	When leaded fuel is used, refer to "Severe Driving Condition" schedule.								
2-2. Ignition wiring (G16 engine only)		–	–	–	–	–	–	–	R
FUEL SYSTEM									
3-1. Air cleaner filter element		I	I	I	R	I	I	I	R
3-2. Fuel tank cap, fuel lines and connections		–	–	–	I	–	–	–	I&(R)
3-3. Fuel filter		Replace every 100,000 km or 60,000 miles							
EMISSION CONTROL SYSTEM									
4-1. Crankcase ventilation hoses and connections (Vehicle without HO2S)		–	I	–	I	–	I	–	I
4-2. PCV valve	Vehicle without HO2S	–	–	–	I	–	–	–	I
	Vehicle with HO2S	–	–	–	–	–	–	–	I
4-3. Fuel evaporative emission control system	Vehicle without HO2S	–	I	–	I	–	I	–	I
	Vehicle with HO2S	–	–	–	–	–	–	–	I
ELECTRICAL SYSTEM									
5-1. Wiring harness and connections		–	–	–	I	–	–	–	I

NOTES:

"R": Replace or change

"I": Inspect and correct, replace or lubricate if necessary

- ***Item 1-7 (R) is applicable to exhaust mounting rubber only.***
- ***Item 3-2 (R) is applicable to fuel tank cap only.***
- ***For Sweden, item 2-1, 2-2, 4-2 and 4-3 should be performed by odometer reading only.***

Interval: This interval should be judged by odometer reading or months, whichever comes first.		This table includes services as scheduled up to 80,000 km (48,000 miles) mileage. Beyond 80,000 km (48,000 miles), carry out the same services at the same intervals respectively.							
	km (x 1,000)	10	20	30	40	50	60	70	80
	miles (x 1,000)	6	12	18	24	30	36	42	48
	Months	6	12	18	24	30	36	42	48
CHASSIS AND BODY									
6- 1. Clutch (pedal and fluid level)		–	I	–	I	–	I	–	I
6- 2. Brake discs and pads (front) Brake drums and shoes (rear)		–	I	–	I	–	I	–	I
6- 3. Brake hoses and pipes		–	I	–	I	–	I	–	I
6- 4. Brake fluid		–	I	–	R	–	I	–	R
6- 5. Brake pedal		–	I	–	I	–	I	–	I
6- 6. Brake lever and cable		–	I	–	I	–	I	–	I
6- 7. Tires		I	I	I	I	I	I	I	I
6- 8. Wheel discs		I	I	I	I	I	I	I	I
6- 9. Wheel bearings		–	I	–	*I	–	I	–	*I
6-10. Suspension system		*I	I	–	I	–	I	–	I
6-11. Propeller shafts		–	I	–	I	–	I	–	I
6-12. Manual transmission oil		I	I	I	R	I	I	I	R
6-13. Automatic transmission	Fluid level	I	I	I	I	I	I	I	I
	Fluid change	Replace every 160,000 km (100,000 miles)							
	Fluid hose	–	–	–	–	–	R	–	–
6-14. Transfer and differential oil		I	I	I	R	I	I	I	R
6-15. Steering system		I	I	I	I	I	I	I	I
6-16. Power steering (if equipped)		I	I	I	I	I	I	I	I
6-17. All hinges, latches and locks		I	I	I	I	I	I	I	I
6-18. Air conditioning filter element		–	I	–	R	–	I	–	R

NOTES:

"R": Replace or change

"I": Inspect and correct, replace or lubricate if necessary

- ***Item 6-9 *I is applicable to not only rattled wear but also their grease.***
- ***Item 6-10 *I should be performed at 10,000 km only.***

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 – Towing a trailer
B – Repeated short trips
C – Driving on rough and/or muddy roads
D – Driving on dusty roads
E – Driving in extremely cold weather and/or salted roads
F – Repeated short trips in extremely cold weather
G – Leaded fuel use

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
— — C D — —	Drive belt	I	Every 12,000 miles (20,000 km) or 12 months
		R	Every 24,000 miles (40,000 km) or 24 months
A B — D E F	Engine oil and oil filter	R	Every 3,000 miles (5,000 km) or 3 months
A B C — E —	Exhaust pipes and mountings	I	Every 6,000 miles (10,000 km) or 6 months
— — — D — —	Air cleaner filter element *1	I	Every 1,500 miles (2,500 km)
		R	Every 12,000 miles (20,000 km) or 12 months
A B C D — F G	Spark plugs	R	Every 6,000 miles (10,000 km) or 6 months
A B C D — —	Brake discs and pads (Front) Brake drums and shoes (Rear)	I	Every 6,000 miles (10,000 km) or 6 months
A B C — E —	Propeller shafts	I	Every 6,000 miles (10,000 km) or 6 months
A — C — — F	Manual transmission, transfer and differential oil	R	Every 12,000 miles (20,000 km) or 12 months
A — C — — F	Automatic transmission fluid	R	Every 12,000 miles (20,000 km) or 12 months
— — C — — —	Drive axle shaft boots	I	Every 6,000 miles (10,000 km) or 6 months
— — C — — —	Bolts and nuts on chassis (suspension)	T	Every 6,000 miles (10,000 km) or 6 months
— — — D E —	Air conditioning filter element *2 (if equipped)	I	Every 10,000 km (6,000 miles) or 6 months
		R	Every 40,000 km (24,000 miles) or 24 months

NOTES:
"I" : Inspect and correct, replace or lubricate if necessary "T": Tighten to the specified torque
"R": Replace or change
- ****1: Inspect or replace more frequently if the vehicle is used under dusty conditions.***
- ****2: Clean more frequently if the air flow from air conditioning decreases.***

MAINTENANCE SERVICE

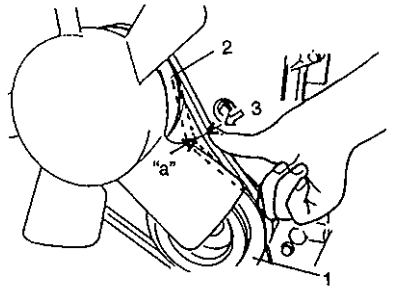
ENGINE

ITEM 1-1

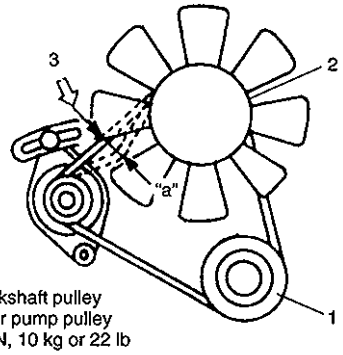
Drive Belt Inspection and Replacement

WARNING:
All inspection and replacement are to be performed with ENGINE NOT RUNNING.

G16



H25



1. Crankshaft pulley
2. Water pump pulley
3. 100 N, 10 kg or 22 lb

Water pump and generator drive belt (G16 and H25 engines)

Inspection

1) Disconnect negative cable at battery.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
   If any defect exists, replace.
   Check belt for tension.

   Water pump and generator belt tension
   "a": 6 – 8 mm (0.24 – 0.32 in.) deflection for G16, 9 – 11 mm (0.35 – 0.43 in.) deflection for H25 under 100 N, 10 kg or 22 lb pressure

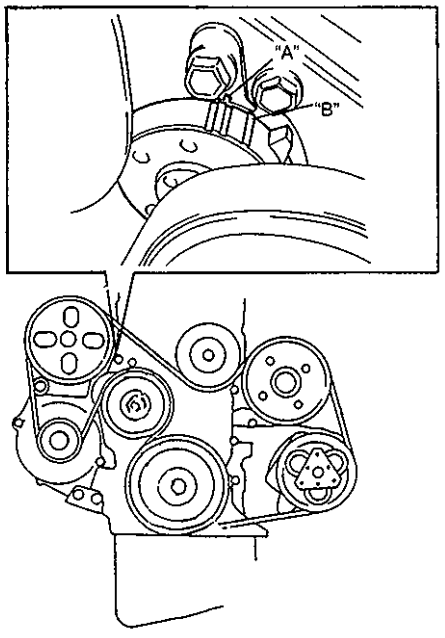
   NOTE:
   When replacing belt with a new one, adjust belt tension to 5 – 7 mm (0.20 – 0.27 in.) for G16, 7 – 9 mm (0.28 – 0.35 in.) for H25.

3) If belt is too tight or too loose, adjust it to specification by adjusting alternator position.
4) Tighten alternator adjusting bolt and pivot bolts.
5) Connect negative cable to battery.

Replacement

Replace belt. Refer to Section 6B for replacement procedure of pump belt.

J20



Water pump, generator, power steering and/or A/C compressor (if equipped) drive belt (J20 engine)

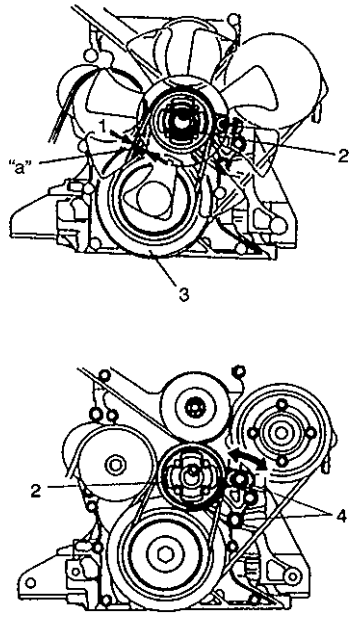
Inspection

1) Disconnect negative cable at battery.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If any of above conditions are found, replace.
   Also, check belt for tension.
   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.

Replacement

Replace belt referring to Section 6H for replacement procedure of generator drive belt.

J20



1. 100 N, 10 kg or 22 lb
2. Fan pulley
3. Crankshaft pulley
4. Adjusting and pivot bolt

Engine cooling fan drive belt (J20 engine)

Inspection

1) Disconnect negative cable at battery.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If any defect exists, replace. Check belt for tension.

   Cooling fan belt tension
   "a": 5 – 7 mm (0.20 – 0.27 in.) deflection under 100 N, 10 kg or 22 lb pressure.

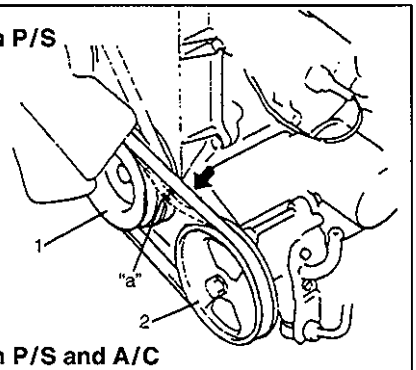
   NOTE:
   When replacing belt with a new one, adjust belt deflection to 4 – 5 mm (0.16 – 0.19 in.)

3) If the belt is too tight or too loose, adjust it to specification by adjusting cooling fan pulley position.
4) Tighten adjusting bolt and pivot bolt.
5) Connect negative cable at battery.

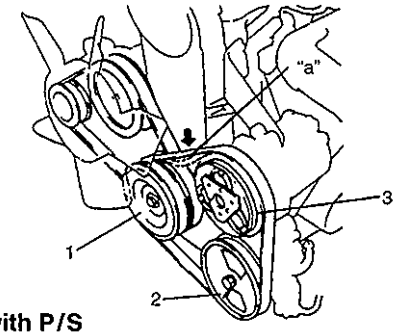
Replacement

Replace belt referring to Section 6B for replacement procedure of cooling fan drive belt.

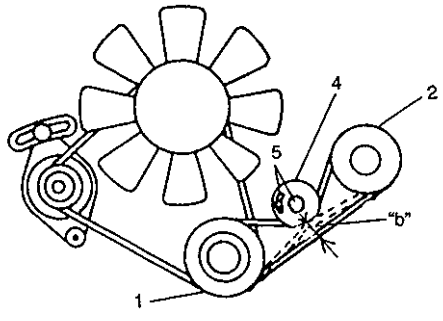
G16 with P/S



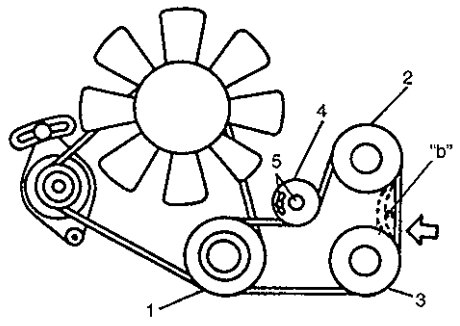
G16 with P/S and A/C



H25 with P/S



H25 with P/S and A/C



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

Power steering pump and/or A/C compressor drive belts (if equipped) for G16 and H25 engines.

Inspection

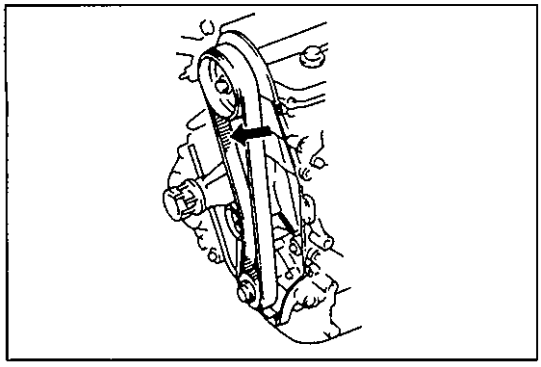
1) Disconnect negative cable at battery.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness.
   If any defect exists, replace.
   Check belt for tension.

   Power steering pump and/or A/C compressor drive belt tension.
   "a": 6 – 9 mm (0.24 – 0.35 in.) deflection under 100 N, 10 kg or 22 lb pressure.
   "b": 4 – 9 mm (0.16 – 0.35 in) deflection under 100 N, 10 kg or 22 lb pressure.

   If belt tension is out of above specification, adjust it referring to Section 1B or 3B1.
3) Connect negative cable to battery.

Replacement

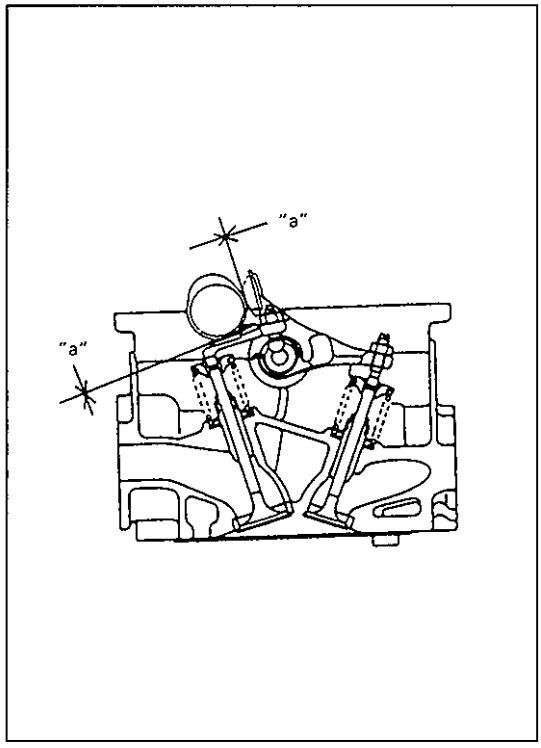
Replace belt referring to Section 1B or 3B1 for replacement procedure of belt.



ITEM 1-2

Camshaft Timing Belt Replacement (G16 engine only)

Replace timing belt referring to Section 6A1.



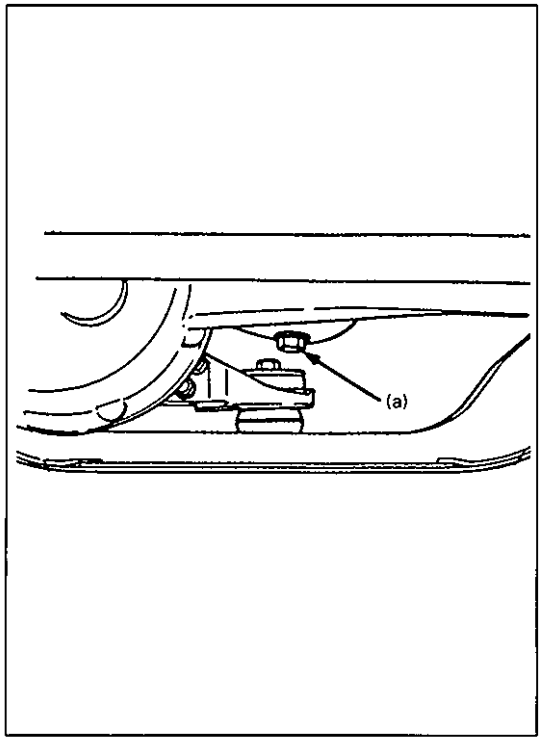
ITEM 1-3

Valve Lash Inspection (G16 engine only)

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 (gap "a") specification	Intake	0.13 – 0.17 mm (0.005 – 0.007 in)	0.17 – 0.21 mm (0.007 – 0.008 in)
	Exhaust	0.23 – 0.27 mm (0.009 – 0.011 in)	0.28 – 0.32 mm (0.011 – 0.013 in)

3) Install cylinder head cover and tighten bolts to specification.



ITEM 1-4

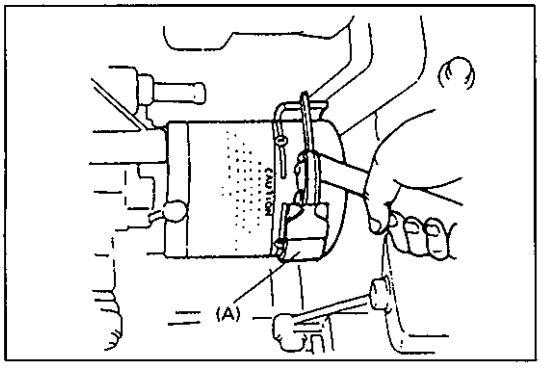
Engine Oil and Filter Change

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.

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 the following work.

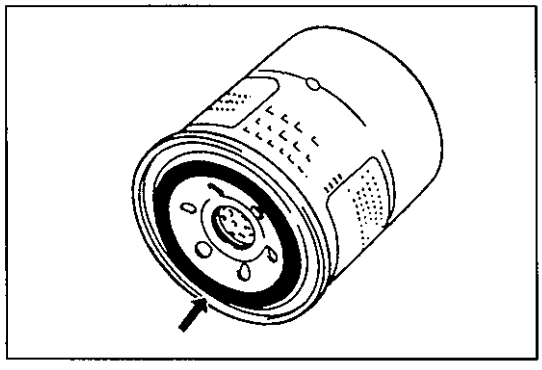
1) Drain engine oil by removing drain plug.
2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)



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

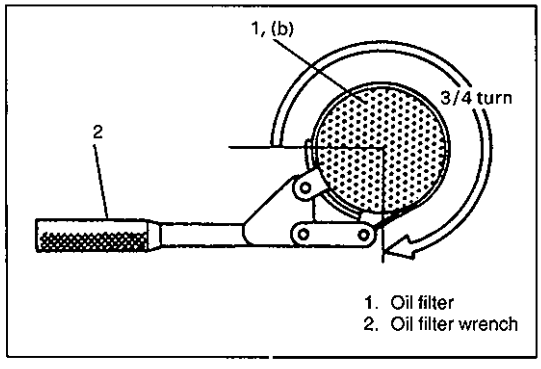
Special Tool
(A): 09915-47310 (H25 engine)
09915–47330 (G16 and J20 engines)



NOTE:
Before fitting new oil filter, be sure to oil its O-ring. Use engine oil for this purpose.

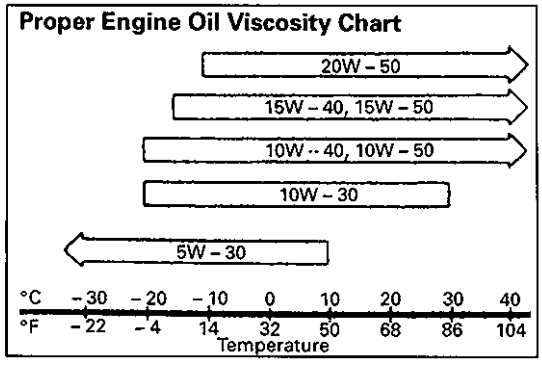
4) Screw new filter on oil filter stand by hand until the filter O-ring contacts the mounting surface.

CAUTION:
To tighten oil filter properly, it is important to accurately identify the position at which at filter O-ring first contacts the mounting surface.



5) Tighten the filter 3/4 turn from the point of contact with the mounting surface using an oil filter wrench.

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



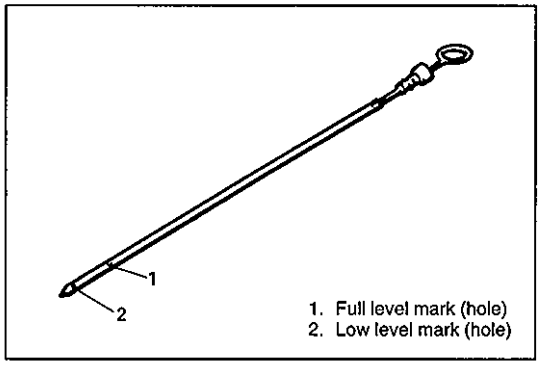
6) Replenish oil until oil level is brought to FULL level mark on dipstick. (oil pan and oil filter capacity). The filler inlet is at the top of the cylinder head cover.
It is recommended to use engine oil of SG, SH or SJ grade.

NOTE:
For temperature between –20°C (–4°F) and 30°C (86°F), it is highly recommended to use SAE 10W – 30 oil.

	G16 Engine	J20 Engine	H25 Engine
Oil pan capacity	About 4.0 liters (8.5/7.0 US/Imp pt.)	About 5.0 liters (10.6/8.8 US/Imp pt.)	←
Oil filter capacity	About 0.2 liters (0.4/0.3 US/Imp pt.)	←	About 0.5 liters (1.1/0.9 US/Imp pt.)
Others	About 0.3 liters (0.6/0.5 US/Imp pt.)	About 0.4 liters (0.8/0.7 US/Imp pt.)	About 0.7 liters (1.5/1.2 US/Imp pt.)
Total	About 4.5 liters (9.5/7.9 US/Imp pt.)	About 5.6 liters (11.8/9.8 US/Imp pt.)	About 6.2 liters (13.1/10.9 US/Imp pt.)

NOTE:
Engine oil capacity is specified. However, note that the amount of oil required when actually changing oil may somewhat differ from the data in the table depending on various conditions (temperature, viscosity, etc.)

7) Check oil filter and drain plug for oil leakage.



1. Full level mark (hole)
2. Low level mark (hole)

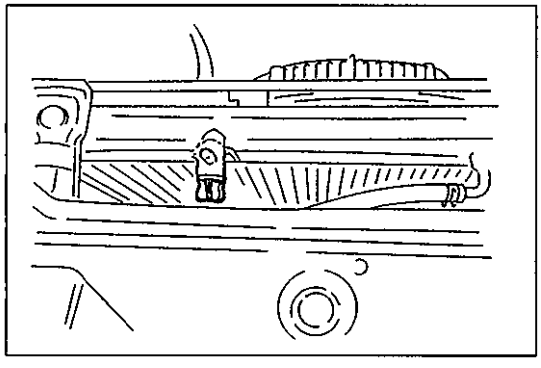
8) Start engine and run it for three minutes. Stop it and wait five minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

NOTE:
Step 1) – 7) outlined above must be performed with ENGINE NOT RUNNING. For step 8), be sure to have adequate ventilation while engine is running.

ITEM 1-5

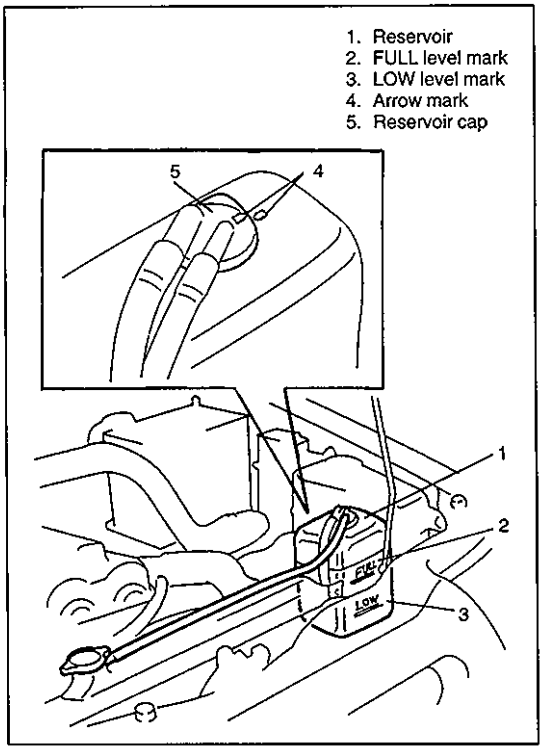
Engine Coolant Change

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, which is on the side of radiator, and drain.
4) Tighten plug securely. Also reinstall reservoir.

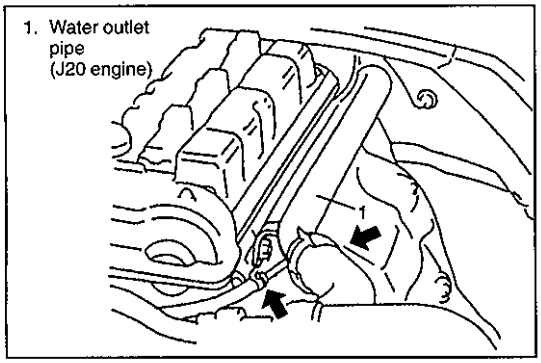
5) Fill radiator with specified amount of coolant, and run engine for 2 or 3 minutes at idle. This drives out any air which may still be trapped within cooling system. STOP ENGINE. Add coolant as necessary until coolant level reaches the filler throat of radiator. Reinstall radiator cap.



6) Add coolant to reservoir so that its level aligns with Full mark. Then, reinstall cap aligning arrow marks on reservoir and cap.

NOTE:
When installing reservoir cap, align arrow marks on reservoir and cap.

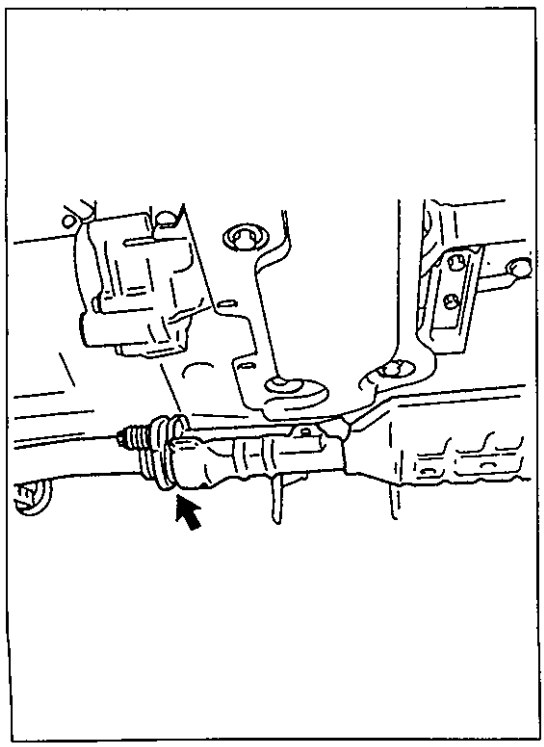
CAUTION:
When changing engine coolant, use mixture of 50% water and 50% ANTIFREEZE/ANTICORROSION COOLANT for the market where ambient temperature falls lower than –16°C (3°F) in winter, and mixture of 70% water and 30% ANTIFREEZE/ANTICORROSION COOLANT for the market where ambient temperature doesn't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



ITEM 1-6

Cooling System Hoses and Connections Inspection

1) Visually inspect cooling system hoses for any evidence of leakage and cracks. Examine them for damage, and check connection clamps for tightness.
2) Replace all hoses which show evidence of leakage, cracks or other damage. Replace all clamps which cannot maintain proper tightness.



ITEM 1-7

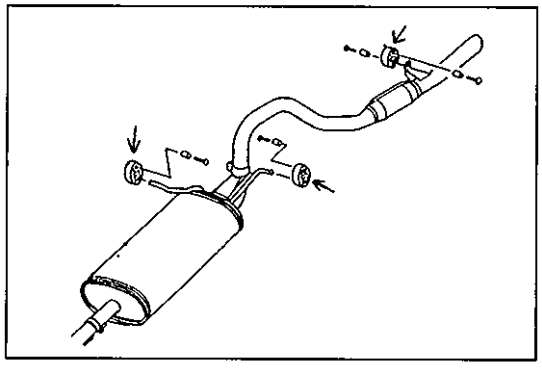
Exhaust Pipes and Mountings Inspection

WARING:
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 the 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 connections, dents and damages.
  If bolts or nuts are loose, tighten them to specification.
- 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 the vehicle.

- Make sure that exhaust system components have enough clearance from the underbody to avoid overheating and possible damage to the floor carpet.
- Any defects should be fixed at once.



Mounting replacement

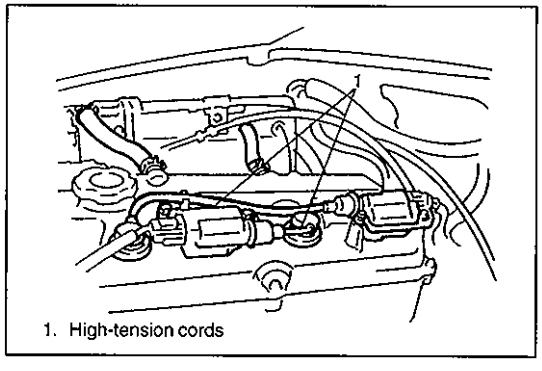
Replace muffler rubber mountings with new ones periodically. Refer to Section 6K for installation.

IGNITION SYSTEM

ITEM 2-1

Spark Plugs Replacement

Replace spark plugs with new ones referring to Section 6F1 or 6F2.

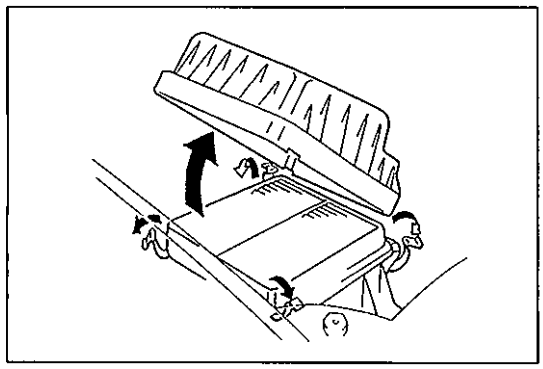


1. High-tension cords

ITEM 2-2

Ignition Wiring Replacement (G16 engine only)

1) Disconnect negative cable at battery.
2) Replace high-tension cords for No.1 and No.3 plugs with new ones.
3) Clamp it securely.
4) Connect negative cable to battery.



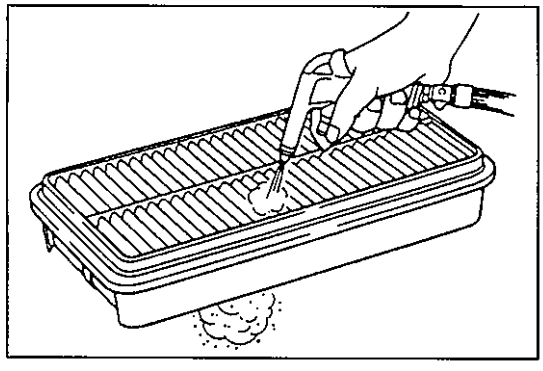
FUEL SYSTEM

ITEM 3-1

Air Cleaner Element

Inspection

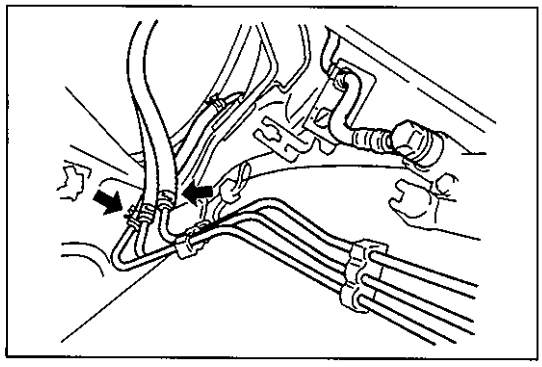
1) Remove air cleaner case clamps.
2) Take cleaner element out of air cleaner case.
3) Check air cleaner element for dirt. Replace excessively dirty element.



4) Blow off dust by compressed air from air outlet side of element.
5) Install air cleaner element into case.
6) Install air cleaner case cap and clamp it securely.

Replacement

Replace air cleaner element with new one according to above steps 1), 2) and 5), 6).

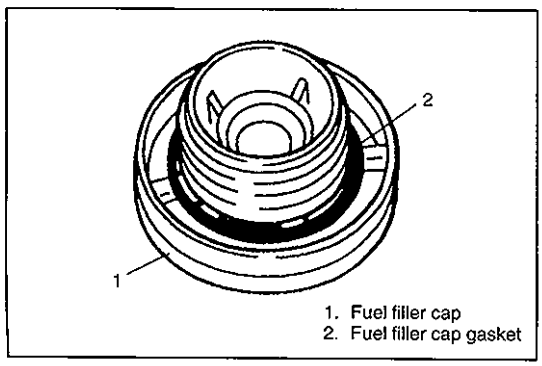


ITEM 3-2

Fuel tank Cap, Fuel Lines and Connections

Inspection

1) Visually inspect fuel lines and connections for evidence of fuel leakage, hose cracking and damage. Make sure all clamps are secure.
   Repair leaky joints, if any.
   Replace hoses that are suspected of being cracked.



1. Fuel filler cap
2. Fuel filler cap gasket

2) Visually inspect gasket of fuel tank cap. If it is damaged or deteriorated, replace it with new one.

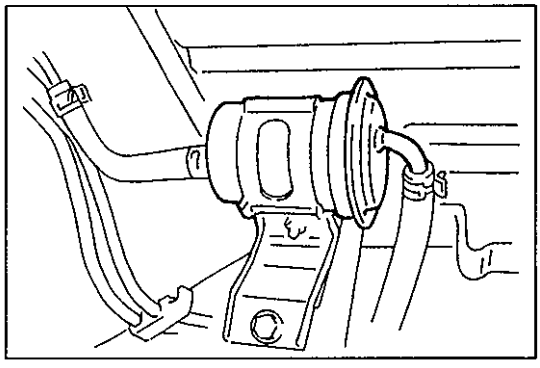
Fuel tank cap replacement

Replace tank cap with new one periodically.

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 located at the front part of fuel tank, inside the right-hand side of chassis.
Replace fuel filter with new one periodically, referring to Section 6C for proper procedure.

EMISSION CONTROL SYSTEM

ITEM 4-1

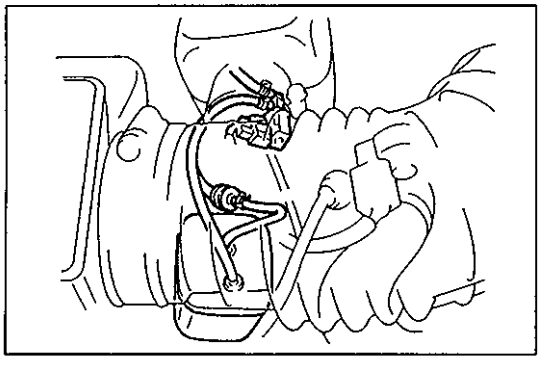
Crankcase Ventilation Hoses and Connections Inspection (Vehicle not equipped with oxygen sensor)

Refer to following item 4-2, PCV valve inspection.

ITEM 4-2

PCV (Positive Crankcase Ventilation) Valve Inspection

Check crankcase ventilation hose and PCV hose for leaks, cracks or clog, and PCV valve for stick or clog. Refer to On-vehicle service of Section 6E1/6E2 for PCV valve checking procedure.



ITEM 4-3

Evaporative Emission Control System Inspection

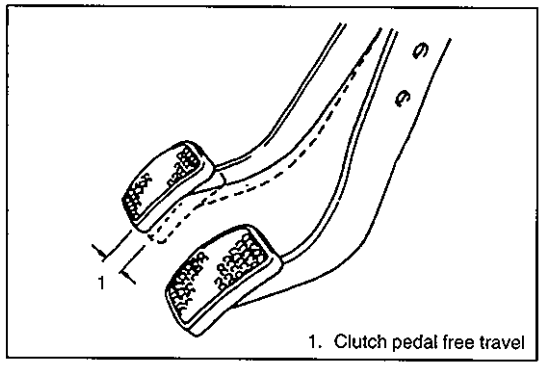
1) Visually inspect hoses for cracks, damage, or excessive bends. Inspect all clamps for damage and proper position.
2) Check evaporative emission control system for operation, referring to Section 6E1/6E2.
3) Check EVAP canister for operation and clog, referring to Section 6E1/6E2.
4) Check tank pressure control valve for operation referring to Section 6E1/6E2.

ELECTRICAL SYSTEM

ITEM 5-1

Wiring Harness and Connections Inspection

1) Visually inspect all wires in engine compartment for evidence of breakage.
   Inspect condition of insulation (cracks). All clips and clamps should have solid connection to wires.
2) Replace any wires in a deteriorated or otherwise defective condition.



1. Clutch pedal free travel

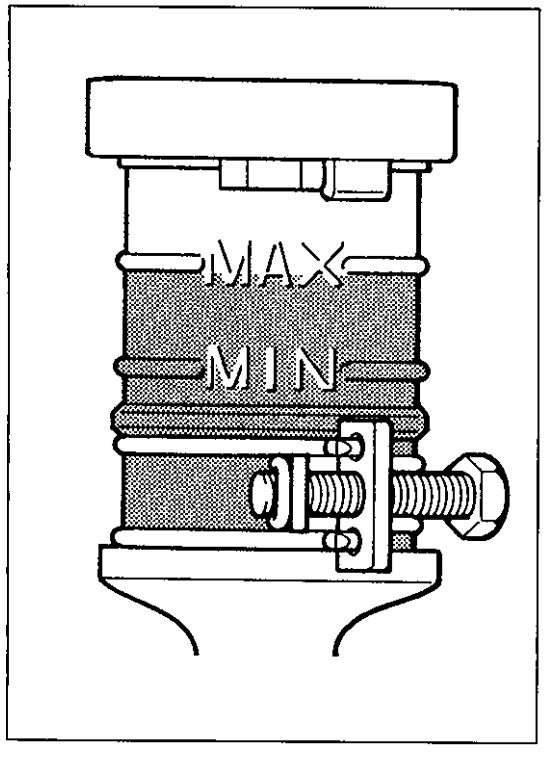
CHASSIS AND BODY

ITEM 6-1

Clutch

Pedal inspection

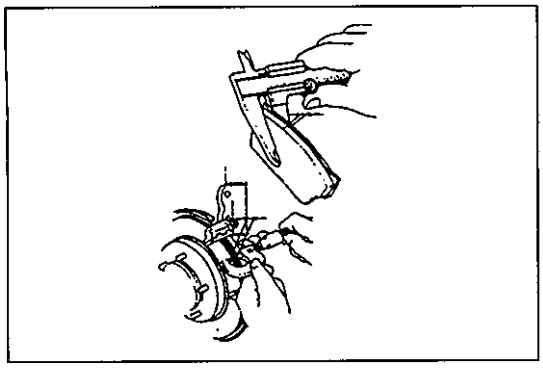
Check clutch pedal for height and free travel referring to Section 7C1. Adjust or correct if necessary.



Fluid inspection

1) Check around master cylinder and reservoir for fluid leakage. If found leaky, correct.
2) Check fluid level.
   If fluid level is lower than the minimum level of reservoir, refilling is necessary. Fill reservoir with specified brake fluid indicated on clutch reservoir cap.
   For the details, refer to On-vehicle service in Section 7C1.

CAUTION:
Since clutch system of this vehicle is factory-filled with glycol-base brake fluid, do not use or mix different type of fluid when refilling system; otherwise serious damage will occur. Do not use old or used brake fluid, or one taken from unsealed container.

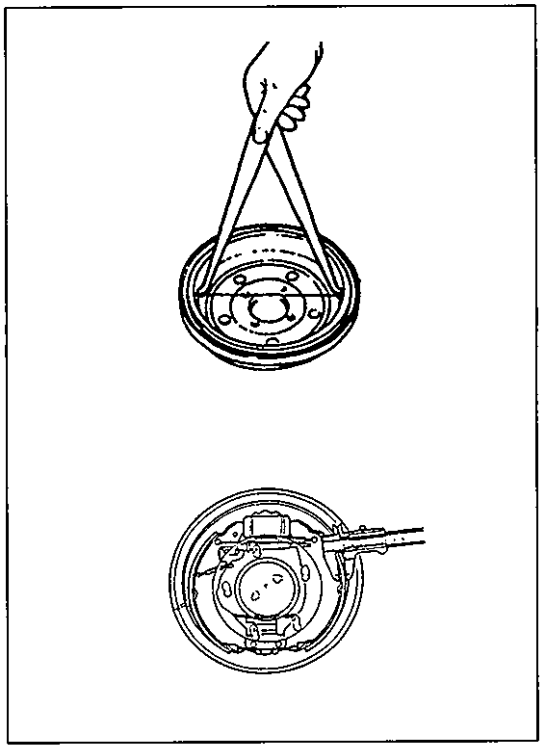


ITEM 6-2

Brake Discs, Pads, Brake Drums and Shoes Inspection

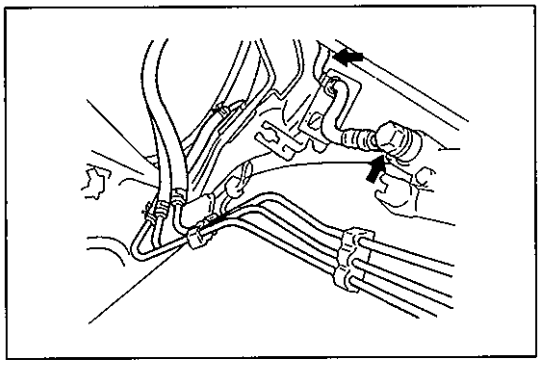
[Brake discs and pads]

1) Remove wheel and caliper but don't disconnect brake hose from caliper.
2) Check front disc brake pads and discs for excessive wear, damage and deflection. Replace parts as necessary. For details, refer to Section 5.
   Be sure to torque caliper pin bolts to specification.



[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 leaks. Replace these parts as necessary.
   For details, refer to Section 5.

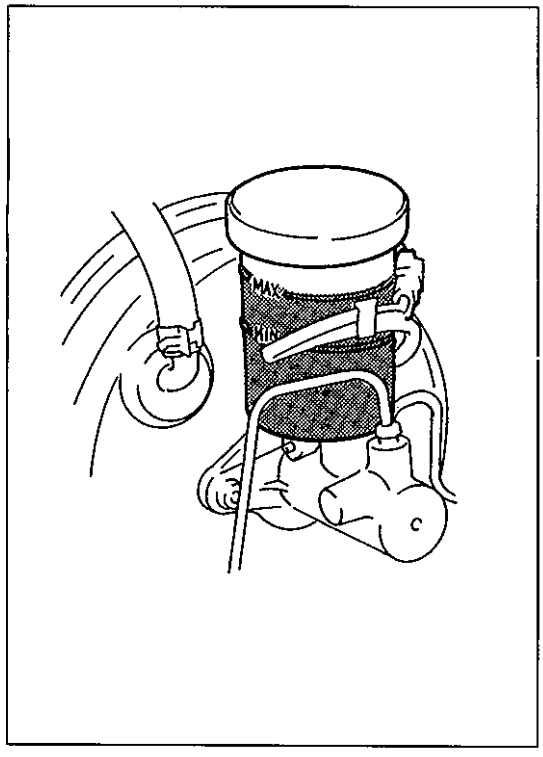


ITEM 6-3

Brake Hoses and Pipes Inspection

Check brake hoses and pipes for proper hookup, leaks, cracks, chafing and other damage.
Replace any of these parts as necessary.

CAUTION:
After replacing any brake pipe or hose, be sure to carry out air purge operation.



ITEM 6-4

Brake Fluid Inspection and Change

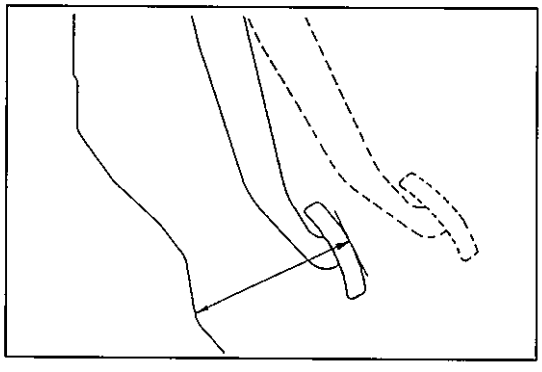
Inspection

1) Check around master cylinder and reservoir for fluid leakage.
   If found leaky, correct.
2) Check fluid level.
   If fluid level is lower than the minimum level of reservoir, refilling is necessary. Fill reservoir with specified brake fluid indicated on reservoir cap.
   For the details, refer to On-vehicle service in Section 5.

CAUTION:
Since brake system of this vehicle is factory-filled with glycol-base brake fluid, do not use or mix different type of fluid when refilling system; otherwise serious damage will occur. Do not use old or used brake fluid, or one taken from unsealed container.

Change

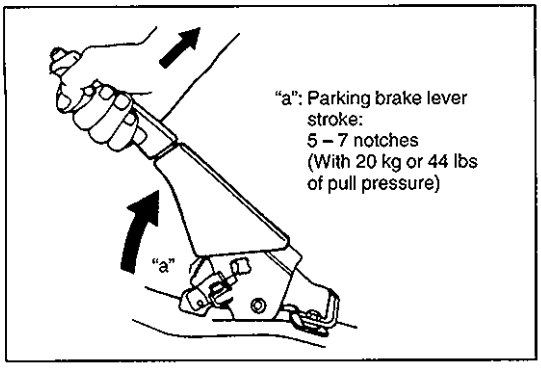
Change brake fluid as follows.
Drain existing fluid from brake system completely, fill system with above recommended fluid and carry out air purge operation.
For air purging procedure, refer to Section 5.



ITEM 6-5

Brake Pedal Inspection

Check brake pedal travel referring Section 5.

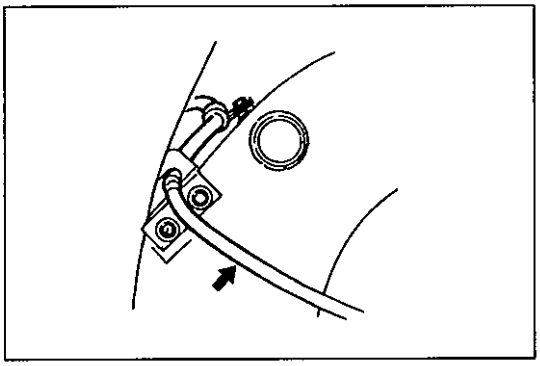


ITEM 6-6

Parking Brake Lever and Cable Inspection

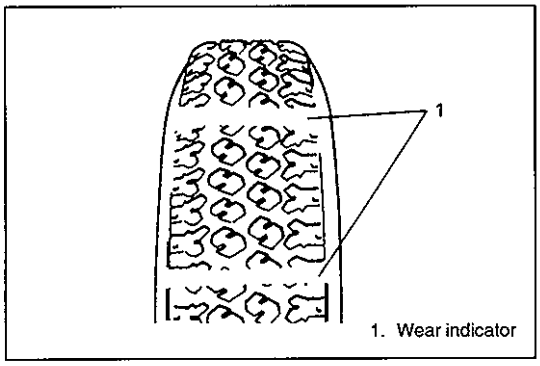
Parking brake lever

1) Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
2) 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 in Section 5.



Parking brake cable

Inspect brake cable for damage and smooth movement.
Replace cable if it is in deteriorated condition.



ITEM 6-7

Tire Inspection and Rotation

1) Check tires for uneven or excessive wear, or damage.
   If defective, replace.
   Refer to Section 3 for details.

2) Check inflating pressure of each tire and adjust pressure to specification as necessary.
   Refer to Section 3F for details.

   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 the vehicle.**

3) Rotate tires.
   For details, refer to Section 3F.

ITEM 6-8

Wheel Discs Inspection

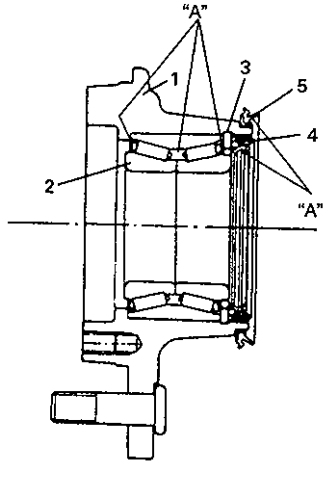
Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.

ITEM 6-9

Wheel Bearing Inspection

Inspection of wheel bearing

1) Check front wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to Front Suspension Inspection in Section 3D.
2) Check rear wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to Wheel Bearing Inspection in Section 3E.



1. Wheel hub
2. Wheel bearing
3. Circlip
4. Wheel bearing oil seal
5. Wheel hub oil seal

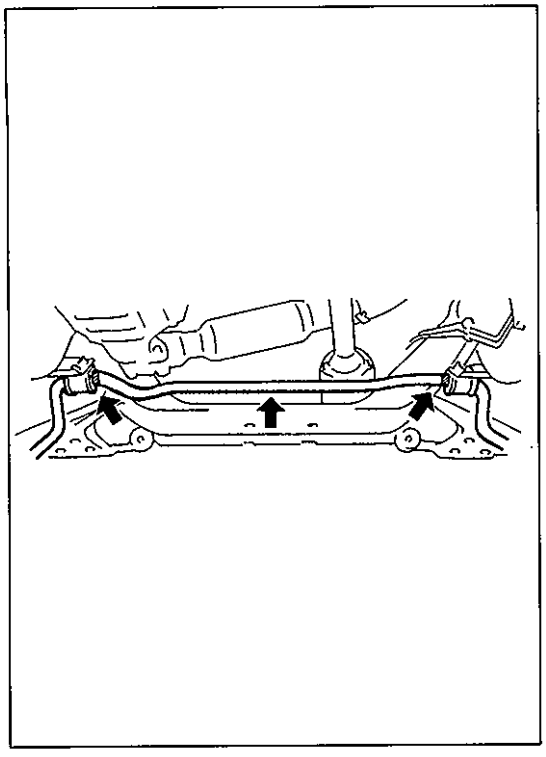
"A": Greasing points

Inspection of front wheel bearing grease

1) Remove wheel hub referring to Front Wheel Hub Removal in Section 3D.
2) Check grease around front wheel bearing rollers for deterioration and capacity.
   If grease is deteriorated, remove grease thoroughly and apply enough amount of new wheel bearing grease. If grease is found insufficient, add some more.
3) For reinstallation, refer to Wheel Hub Installation in Section 3D.

   NOTE:
   - **To reinstall bearing lock nut and lock plate, make sure to torque them to specification.**
   - **Be sure to tighten each bolt and nut to specified torque when reinstalling them.**

4) Upon completion of reinstalling all parts, check to make sure that front wheel bearing is not loose and wheel turns smoothly.



ITEM 6-10

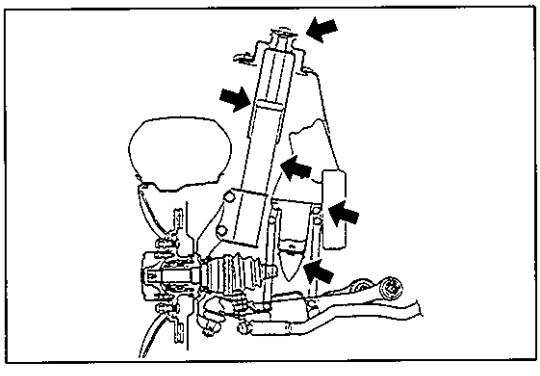
Suspension Inspection

Check suspension bolts and nuts for tightness and retighten them as necessary.
Repair or replace defective parts, if any.

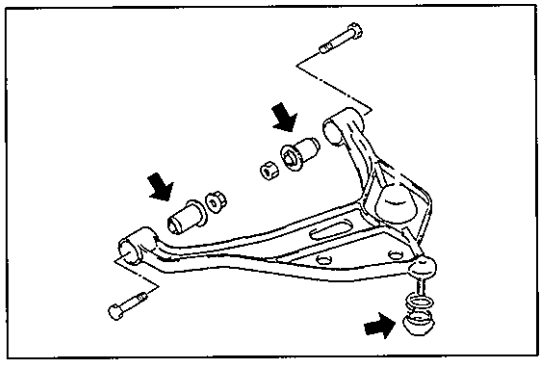
NOTE:
For details of check points, refer to tables of Tightening Torque Specification in Section 3D and 3E.

Front

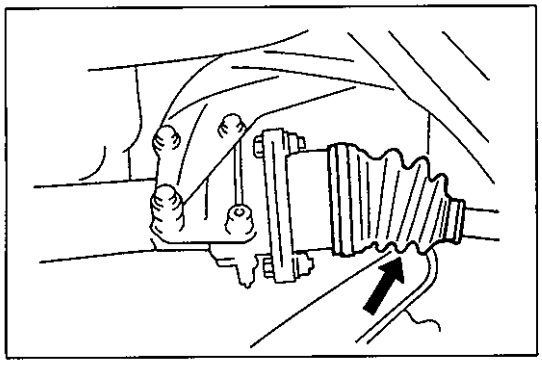
1) Check stabilizer bar for damage or deformation.
2) Check bushing for damage, wear or deterioration.



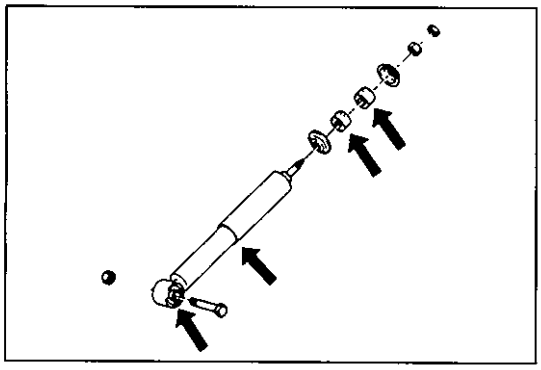
3) Inspect strut for damage, deformation, oil leakage and operation. If strut is found faulty, replace it as an assembly unit, because it can not be disassembled.
   Refer to Front Suspension Inspection in Section 3D for operation check.
4) Inspect strut boot for damage or crack.
5) Inspect for cracks or deformation in spring seat.
6) Inspect for deterioration of bump stopper.
7) Inspect strut mount for wear, cracks or deformation.



8) Check ball joint stud dust seal (boot) for leaks, detachment, tear or other damage. Check suspension arm bushing for damage, wear or deterioration.

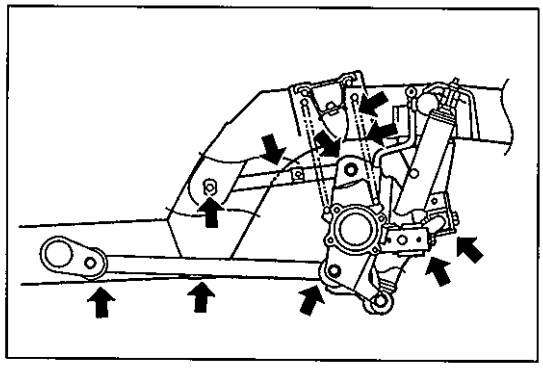


9) Check drive axle boots (wheel side and differential side) for leaks, detachment, tear or other damage.
   Replace boot as necessary.



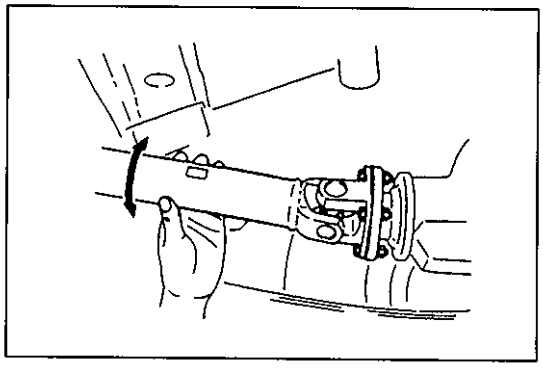
Rear

10) Check shock absorber for damage, deformation, oil leakage and operation.
11) Check bushings for wear and damage.



12) Check coil spring, upper rod, lower rod and lateral rod for deformation and damage.
13) Check upper rod, lower rod and lateral rod bushings and bump stopper for wear, damage and deterioration.

14) Check other suspension parts for damage, loose or missing parts; also for parts showing signs of wear or lack of lubrication. Replace any parts found defective in steps 1) to 14).

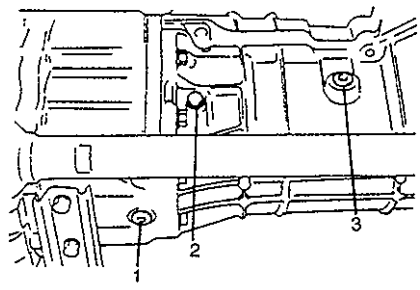


ITEM 6-11

Propeller Shafts Inspection

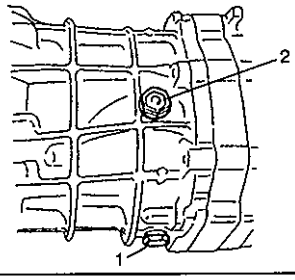
1) Check universal joint and spline of propeller shaft for rattle. If rattle is found, replace defective part with a new one.
2) Check propeller shaft (front & rear) flange yoke bolts for tightness, and retighten them as necessary.
   Refer to Section 4B for tightening torque.

Type 1



1. Drain plug (Apply sealant)
2. Reverse idle gear shaft bolt (DO NOT LOOSEN IT)
3. Filler/level plug (Apply sealant)

Type 2



1. Drain plug
2. Filler level plug

ITEM 6-12

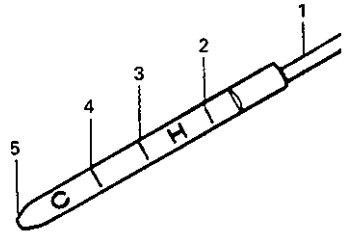
Transmission Oil Inspection and Change (For Manual transmission)

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 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.
5) Tighten level plug to specified torque.
   Refer to Section 7A or 7A1 for installation and tightening torque.

Change

Change transmission oil with new specified oil referring to Section 7A.



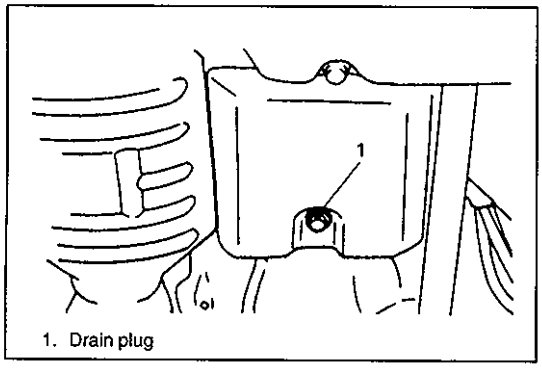
1. Level gauge
2. FULL HOT mark
3. LOW HOT mark
4. FULL COLD mark
5. LOW COLD mark

ITEM 6-13

Transmission Fluid Inspection and change (For Automatic Transmission)

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 7B1 and be sure to perform it under specified conditions.
   If fluid level is low, replenish specified fluid.

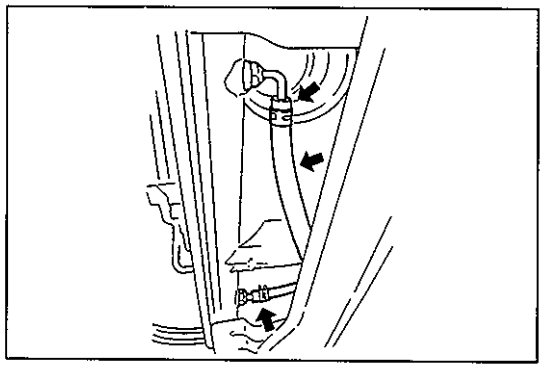


1. Drain plug

Change

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) Change fluid. For its procedure, refer to On-vehicle service in Section 7B1.

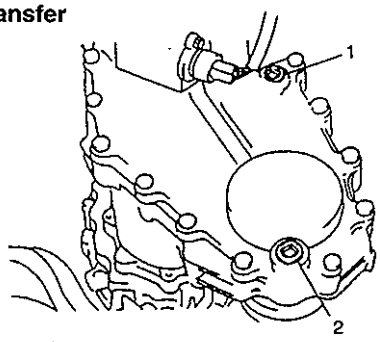
CAUTION:
Use of specified fluid is absolutely necessary.



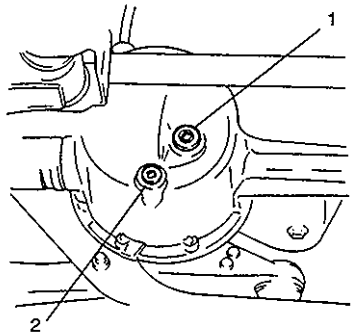
Fluid cooler hose change

Replace inlet and outlet hoses of cooler hose and their clamps. For replacement procedure, refer to On-vehicle service in Section 7B1.

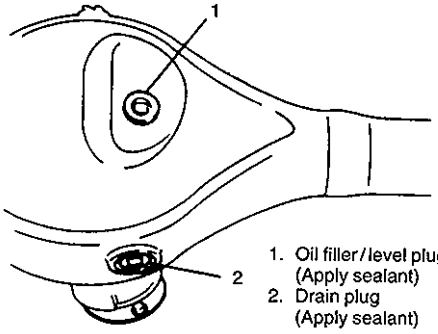
Transfer



Front differential



Rear differential



1. Oil filler/level plug (Apply sealant)
2. Drain plug (Apply sealant)

ITEM 6-14

Transfer and Differential Oil Inspection and Change

Inspection

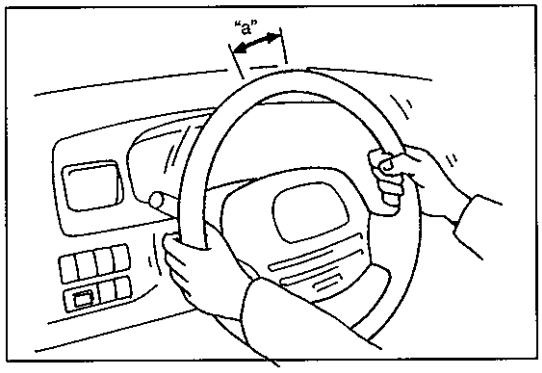
1) Check transfer case and differential for evidence of oil leakage. Repair leaky point if any.
2) Make sure that vehicle is placed level for oil level check.
3) Remove level plug of transfer and differentials (front and rear) and check oil level.
   Oil level can be checked roughly by means of level 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.

CAUTION:
Specified gear oil must be used for differential.

4) Tighten level plug to specified torque.
   Refer to Section 7D, 7E or 7F for tightening torque.

Change

Change transfer oil and differentials oil with new specified oil referring to Section 7D, 7E and 7F respectively.

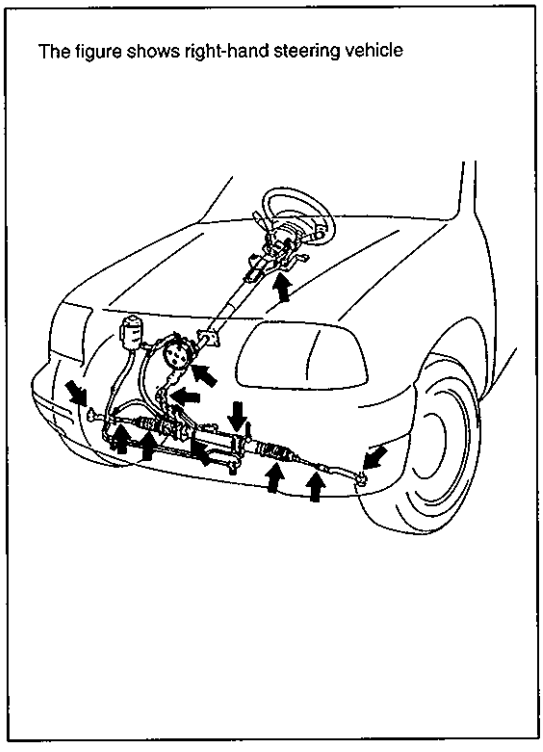


ITEM 6-15

Steering System Inspection

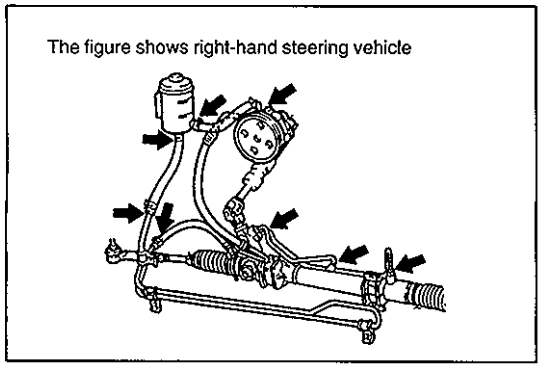
1) Check steering wheel for play and rattle, holding vehicle in straight forward condition on the ground.

   Steering wheel play "a": 0 – 30 mm (0 – 1.2 in.)



2) Check universal joints of steering shaft for rattle and damage. If rattle or damage is found, replace defective part with a new one.
3) Check steering linkage for looseness and damage. Repair or replace defective part, if any.
4) Check bolts and nuts for tightness and retighten them as necessary. Repair or replace defective parts, if any.
   Refer to table of Tightening Torque Specification in Section 3B (or 3B1) and 3C (or 3C1) for particular check points.
5) Check boots of steering linkage for damage (leaks, detachment, tear, dent, etc.). If damage is found, replace it with new one.
   If any dent is found on steering rack boots, correct it to original shape by turning steering wheel to the right or left as far as it stops and holding it for a few seconds.
6) Check wheel alignment.

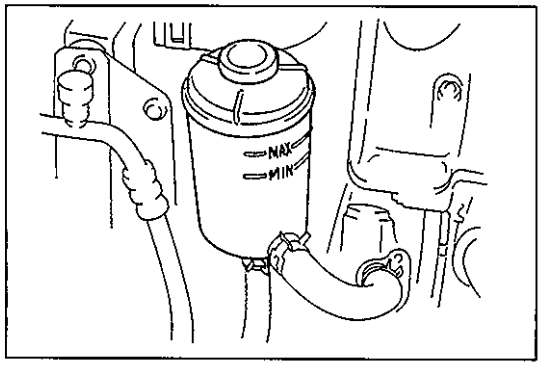
   NOTE:
   For details of wheel alignment, refer to Wheel Alignment in Section 3A.



ITEM 6-16

Power Steering (P/S) System Inspection (if equipped)

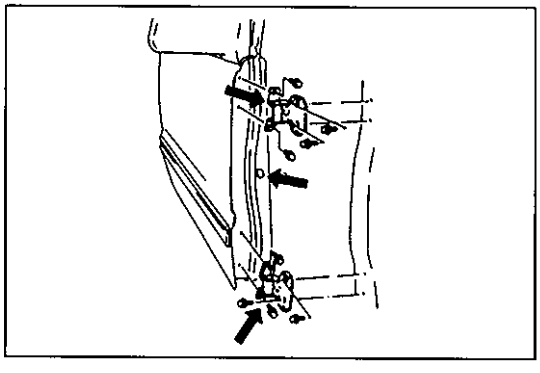
1) Visually check power steering system for fluid leakage and hose for damage and deterioration.
   Repair or replace defective parts, if any.



2) With engine stopped, check fluid level indicated on fluid tank, which should be between MAX and MIN marks. If it is lower than MIN, fill fluid up to MAX mark.

   NOTE:
   - **Be sure to use an equivalent of DEXRON®-II or DEXRON®-III for P/S fluid.**
   - **Fluid level should be checked when fluid is cool.**

3) Visually check pump drive belt for cracks and wear.
4) Check belt for tension, referring to item 1-1.
   If necessary, have belt adjusted or replaced.



ITEM 6-17

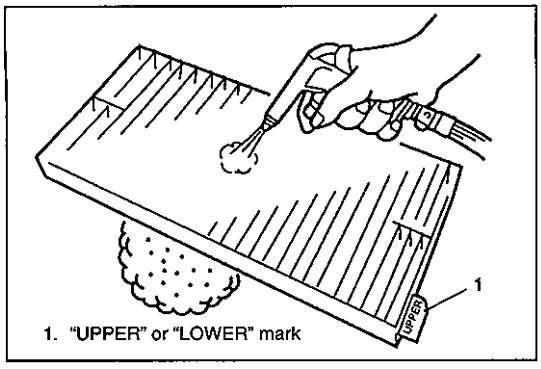
All Hinges, Latches and Locks Inspection

Doors

Check that each door of front, rear and back doors opens and closes smoothly and locks 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" or "LOWER" mark

ITEM 6-18

Air Conditioning Filter Element (if equipped)

Inspection

1) Remove air conditioning filter element from cooling unit referring to Section 1B.
2) Check filter element for dirt. Replace excessively dirty element.
3) Blow off dust by compressed air from air outlet side of element.
4) Install filter element to cooling unit referring to Section 1B.

Replacement

Replace air conditioning filter element with new one referring to Section 1B.

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 front seat 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 vehicle could move without warning and possibly cause personal injury or property damage.

On automatic transmission vehicles, try to start the engine in each select lever position. The starting motor should crank only in "P" (Park) or "N" (Neutral).
On manual transmission vehicles, place the shift lever in "Neutral," depress clutch pedal 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 Selector Lever (Transmission)
Check gear shift or selector 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 selector lever is shifted to.

CAUTION:
With automatic transmission equipped vehicle, make sure that vehicle is at complete stop when shifting selector 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 braking force is applied equally on all wheels,
- and that brake do 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 for this check.

RECOMMENDED FLUIDS AND LUBRICANTS

Engine oil	SG, SH or SJ (Refer to engine oil viscosity chart in item 1-4)
Engine coolant (Ethylene glycol base coolant)	"Antifreeze/Anticorrosion coolant"
Brake fluid	Specified fluid indicated on reservoir tank cap
Manual transmission oil	Refer to Section 7A or 7A1.
Transfer oil	
Differential oil (front & rear)	Refer to Section 7E or 7F.
Automatic transmission fluid and Power steering fluid	An equivalent of DEXRON®-II or DEXRON®-III
Clutch linkage pivot points	Water resistance chassis grease (SUZUKI SUPER GREASE A 99000-25010)
Door hinges	Engine oil or water resistance chassis grease
Hood latch assembly	
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 or 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).**

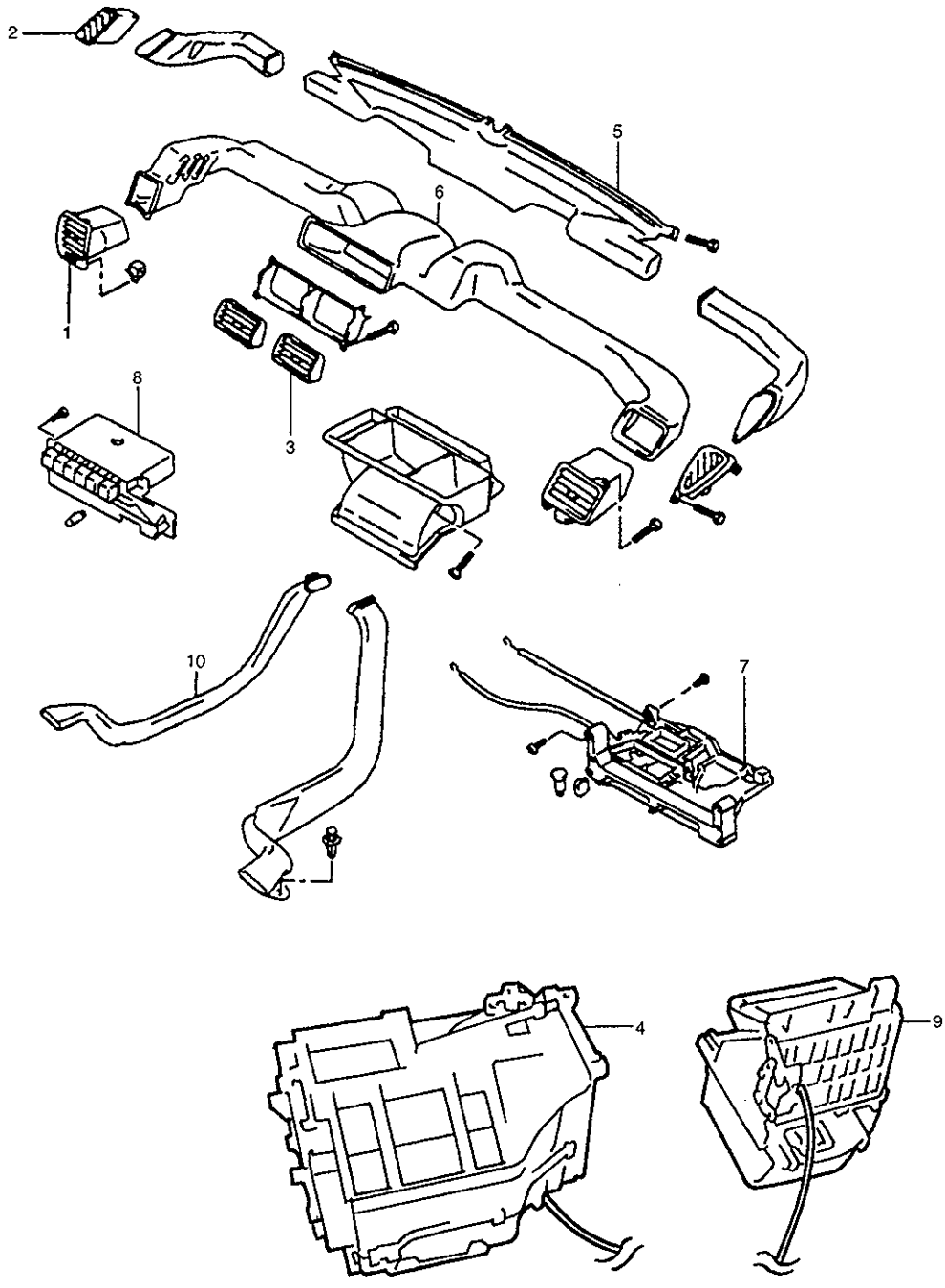
NOTE:
The link mechanism of the heater varies depending on the specifications.

CONTENTS

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ON-VEHICLE SERVICE 1A- 4
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Heater Control Lever Assembly 1A-11
Heater Control Cables 1A-13
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GENERAL DESCRIPTION

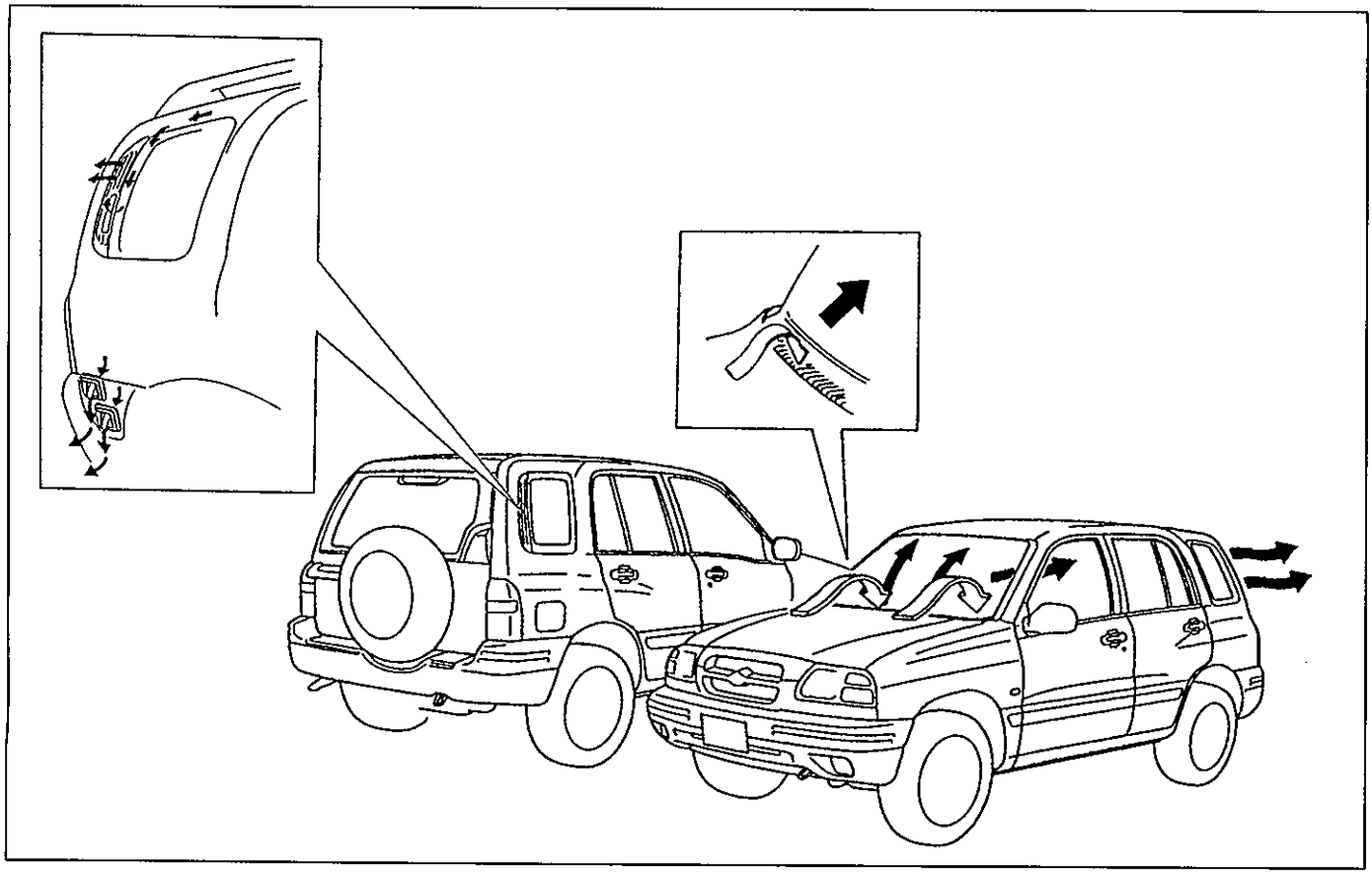
The heater, an in and out air selectable-type hot water heater, is so constructed that it is possible to assure an agreeable ventilation at all times by providing the ventilator air outlets at the center and both sides (right and left) of the instrument panel, the hot air outlet at a place close to the feet of front passengers, and the defroster air outlets at places, right and left, along the windshield glass.
The heater and ventilation consist of following parts.



1. Side ventilator outlet
2. Side defroster outlet
3. Center ventilatior outlet
4. Heater unit
5. Defroster duct
6. Ventilator duct
7. Control lever
8. Mode control switch
9. Blower unit
10. Rear duct

BODY VENTILATION

The body ventilation system of this vehicle has a fresh air intake located at the cowl top panel. When fresh air intake control lever is at FRESH AIR position, ventilating air is drawn into the interior from the cowl center garnish and drawn out from the ventilator outlet provided at each side body outer panel (both right and left side).



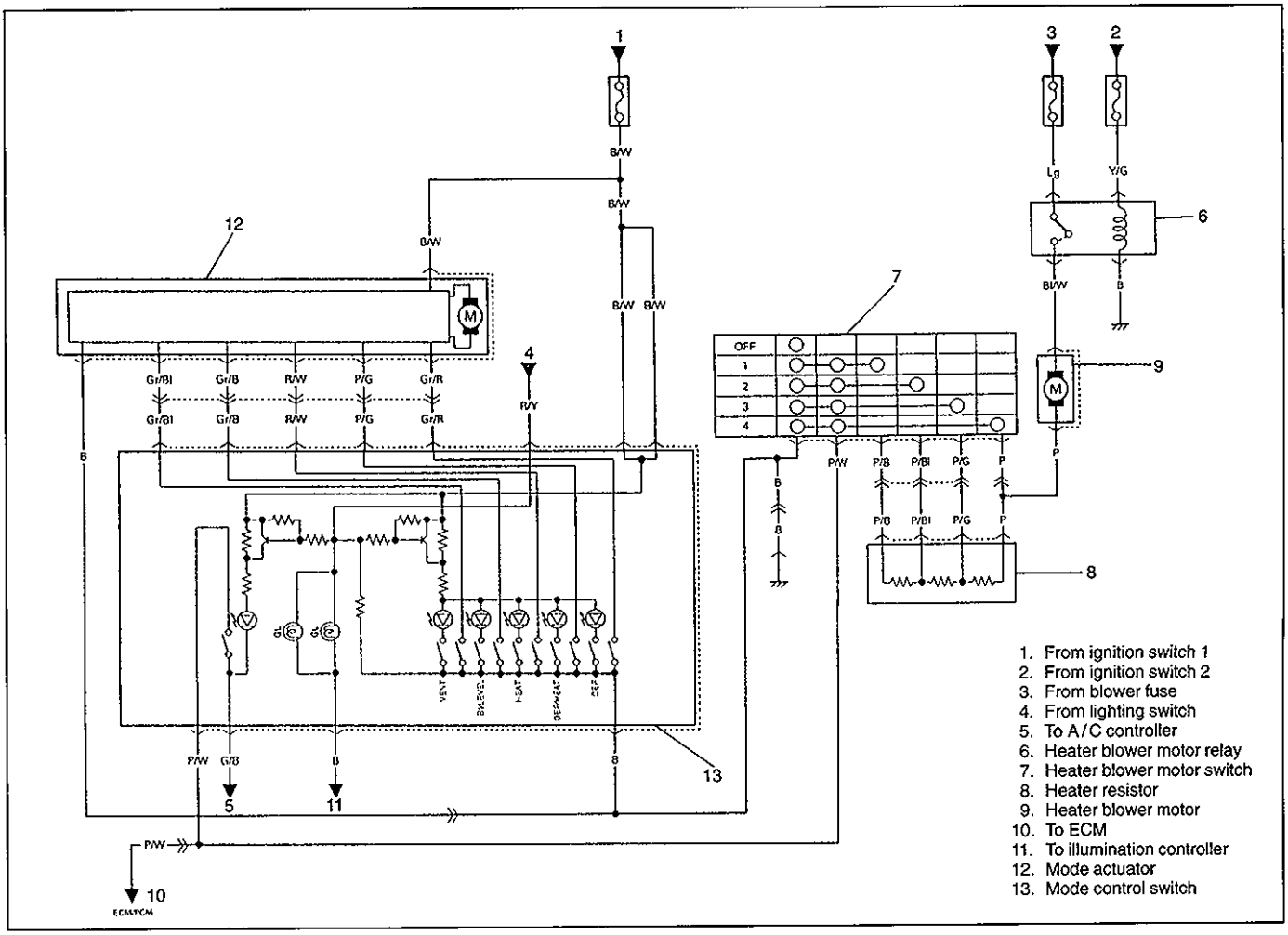
DIAGNOSIS

DIAGNOSIS TABLE

Trouble	Possible cause	Remedy
Heater blower won't work even when its switch is ON.	Blower fuse blown Blower resistor faulty Blower motor faulty Wiring or grounding faulty	Replace fuse to check for short. Check resistor. Replace motor. Repair as necessary.
Incorrect temperature output.	Control cables broken or binding Air damper broken Air ducts clogged Heater radiator leaking or clogged Heater hoses leaking or clogged	Check cables. 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 as necessary. Check and replace as necessary. Replace fuse to check for short. Repair as necessary. Repair damper. Repair air ducts.

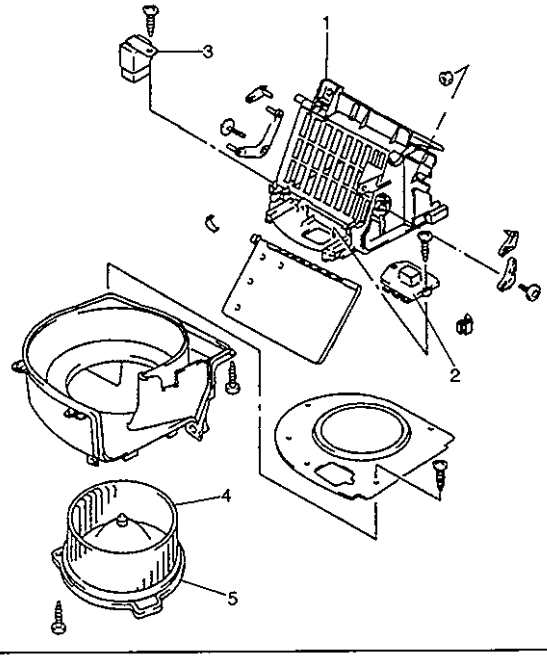
ON-VEHICLE SERVICE

WIRING CIRCUIT

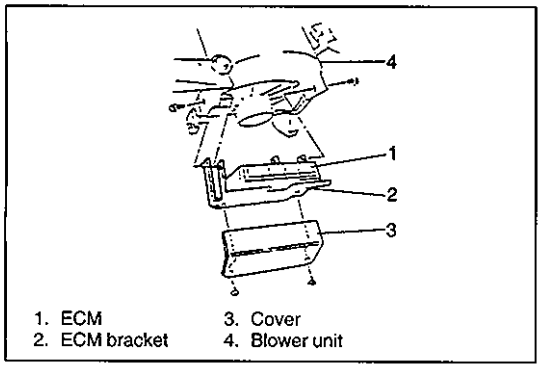


1. From ignition switch 1
2. From ignition switch 2
3. From blower fuse
4. From lighting switch
5. To A/C controller
6. Heater blower motor relay
7. Heater blower motor switch
8. Heater resistor
9. Heater blower motor
10. To ECM
11. To illumination controller
12. Mode actuator
13. Mode control switch

BLOWER UNIT



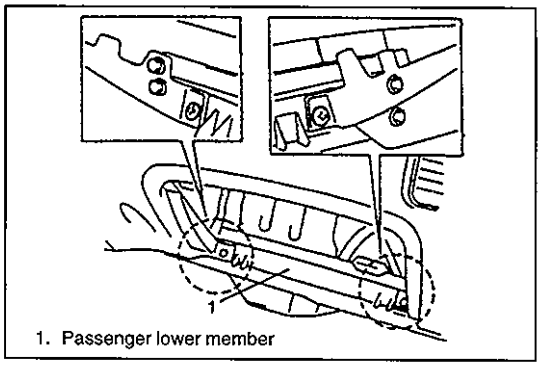
1. Blower unit
2. Blower motor resistor
3. Blower motor relay
4. Blower fan
5. Motor assembly



1. ECM
2. ECM bracket
3. Cover
4. Blower unit

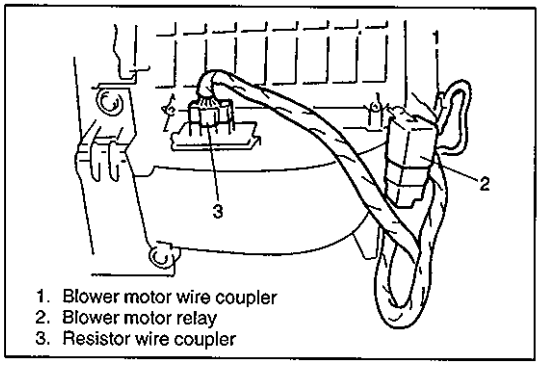
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disable air bag system, if equipped. Refer to DISABLING AIR BAG SYSTEM in Section 10B.



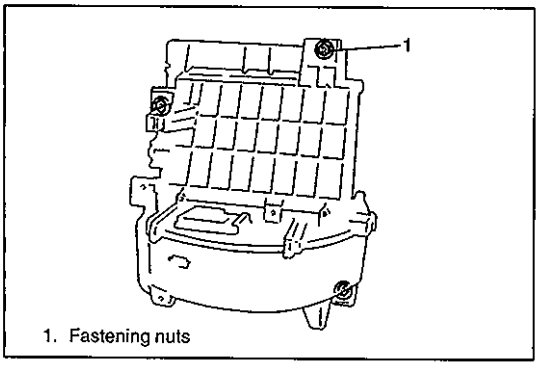
1. Passenger lower member

3) Remove passenger lower member.
4) Remove ECM with bracket from blower motor unit.



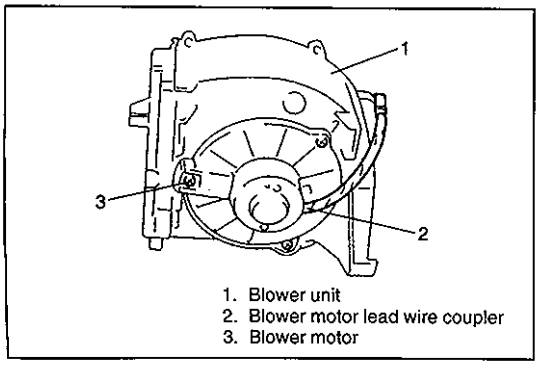
1. Blower motor wire coupler
2. Blower motor relay
3. Resistor wire coupler

5) Disconnect blower motor, blower motor relay and resistor lead wires at couplers.



1. Fastening nuts

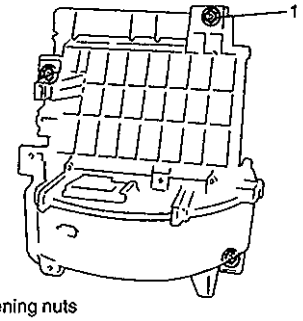
6) Remove cooling unit (If equipped).
Refer to item EVAPORATOR (COOLING UNIT) REMOVAL in Section 1B.
7) Disconnect fresh air control cable from blower motor case.
8) Remove blower motor unit.



1. Blower unit
2. Blower motor lead wire coupler
3. Blower motor

9) Disconnect blower motor lead wire at coupler.
10) Remove blower motor.

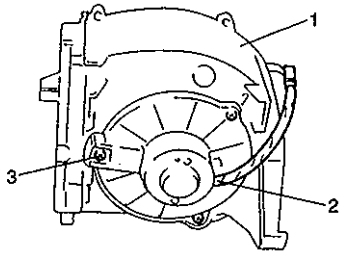
INSTALLATION
1) Reverse removal procedure for installation.
2) Connect fresh air control cable, refer to HEATER CONTROL CABLES INSTALLATION.
3) Enable air bag system, if equipped. Refer to ENABLING AIR BAG SYSTEM in Section 10B.



1. Fastening nuts

HEATER BLOWER MOTOR

REMOVAL
1) Disconnect negative (–) cable at battery.
2) Disable air bag system, if equipped. Refer to DISABLING AIR BAG SYSTEM in Section 10B.
3) Remove ECM with bracket from blower motor unit.
4) Disconnect harness clamps from dash panel.
5) Loosen three nuts fastening blower unit.



1. Blower unit
2. Blower motor lead wire coupler
3. Blower motor

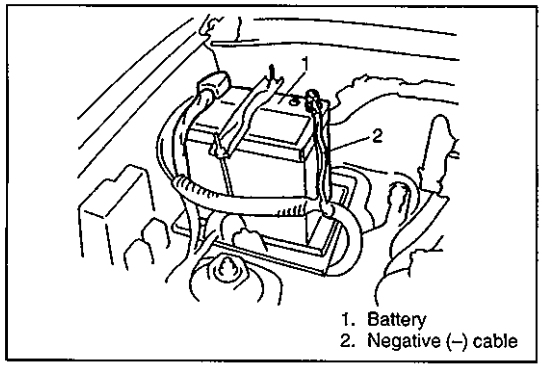
6) Disconnect blower motor lead wire at coupler.
7) Remove blower motor.

INSTALLATION
1) Reverse removal procedure for installation.
2) Enable air bag system, if equipped. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

HEATER BLOWER RESISTOR

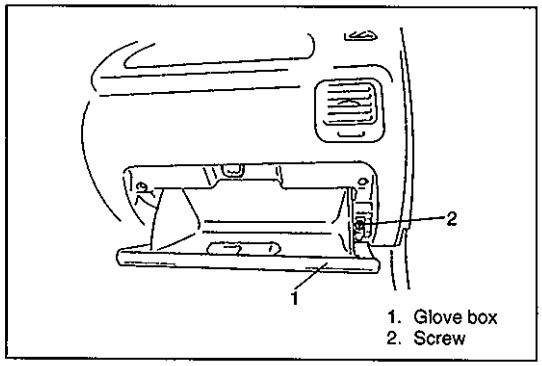
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disable air bag system, if equipped. Refer to DISABLING AIR BAG SYSTEM in Section 10B.



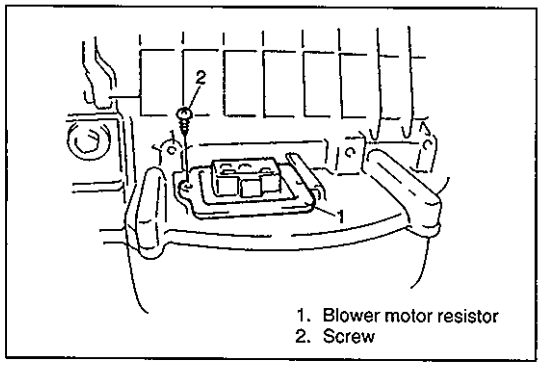
1. Battery
2. Negative (–) cable

3) Open glove box, then remove screw.
4) Remove glove box.



1. Glove box
2. Screw

5) Disconnect resistor coupler.
6) Remove heater blower resistor by loosening its fastening screw.



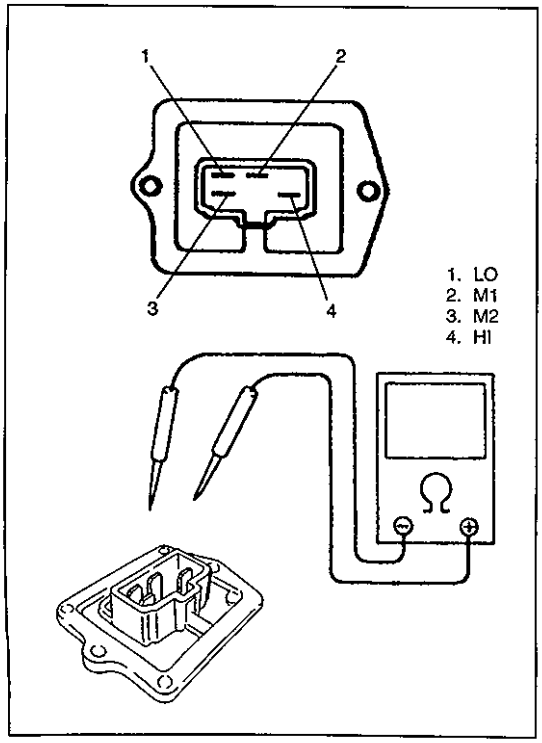
1. Blower motor resistor
2. Screw

INSPECTION

Measure each terminal-to-terminal resistance on resistor.

Resistance H-LO: Approx. 2.0 Ω
H-M1: Approx. 1.0 Ω
H-M2: Approx. 0.4 Ω

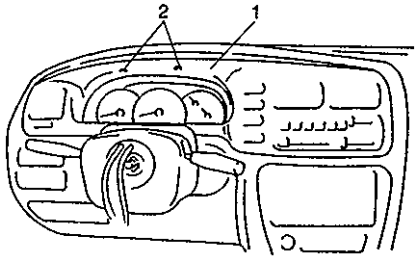
If measured resistance is incorrect, replace heater blower resistor.



1. LO
2. M1
3. M2
4. HI

INSTALLATION

1) Install heater blower resistor with screws.
2) Enable air bag system, if equipped. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

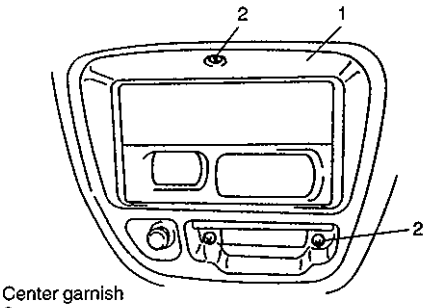


1. Meter cluster hood
2. Screws

MODE CONTROL SWITCH

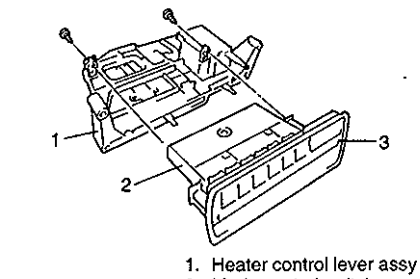
REMOVAL

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 10B.
3) Pull off control lever knobs.
4) Remove meter cluster hood.



1. Center garnish
2. Screws

5) Remove ashtray, center garnish and instrument glove box compartment.



1. Heater control lever assy
2. Mode control switch
3. Heater control panel

6) Remove mode control switch with heater control panel.
7) Remove heater control panel from mode control switch.

INSPECTION

Mode Control Switch

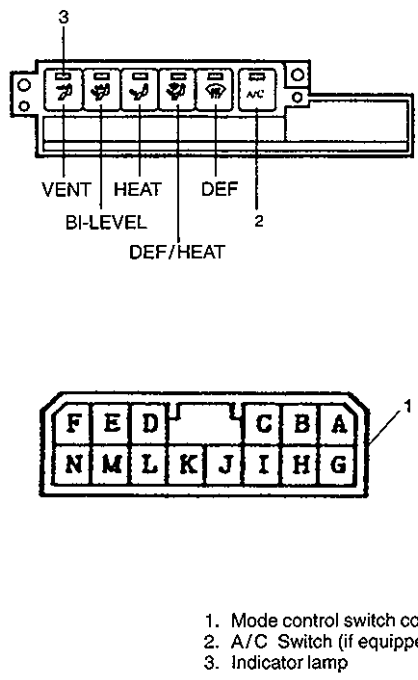
- Check if continuity exists between each pair of terminals listed below when mode control button is pressed.

Mode	Mode control switch terminals
VENT	F – M
BI-LEVEL	F – N
HEAT	F – E
DEF/HEAT	F – B
DEF	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 "A" and (–) to terminal "H", 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.



1. Mode control switch coupler
2. A/C Switch (if equipped)
3. Indicator lamp

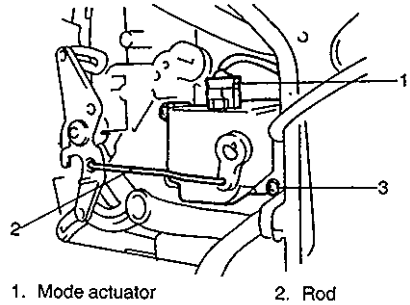
INSTALLATION

1) Install in reverse order of removal procedure.
2) If equipped with air bag system, enable air bag system. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

MODE ACTUATOR

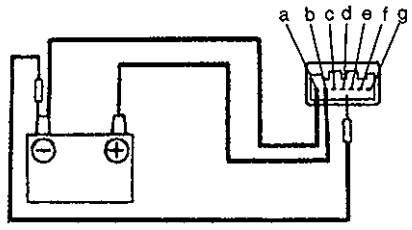
REMOVAL

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 10B.
3) Remove column hole cover.

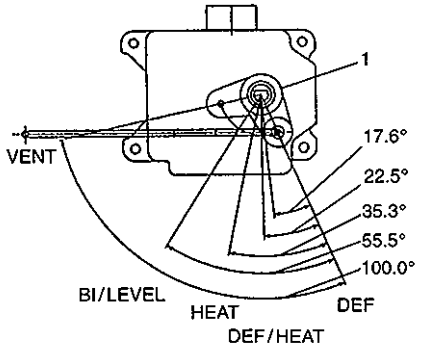


1. Mode actuator coupler
2. Rod
3. Screw

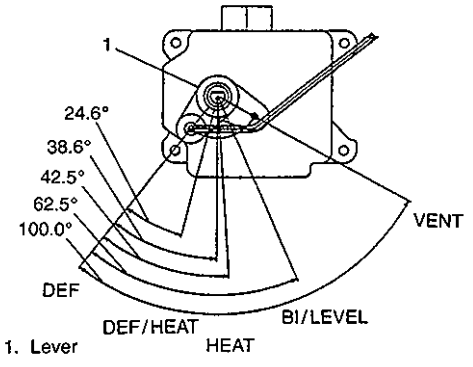
4) Disconnect mode actuator coupler.
5) Disconnect mode actuator rod from heater unit.
6) Remove mode actuator from heater unit.



FOR LEFT HAND STEERING VEHICLE



FOR RIGHT HAND STEERING VEHICLE



1. Lever

INSPECTION

1) Connect battery voltage (+) to terminal "b'" and (–) to terminal "a".
2) Connect each terminal listed below to terminal "a'" (negative (–) terminal of battery) and check if lever rotation angle is as specified in figure at the left.

MODE	TERMINAL
VENT	c
BI-LEVEL	d
HEAT	e
DEF/HEAT	f
DEF	g

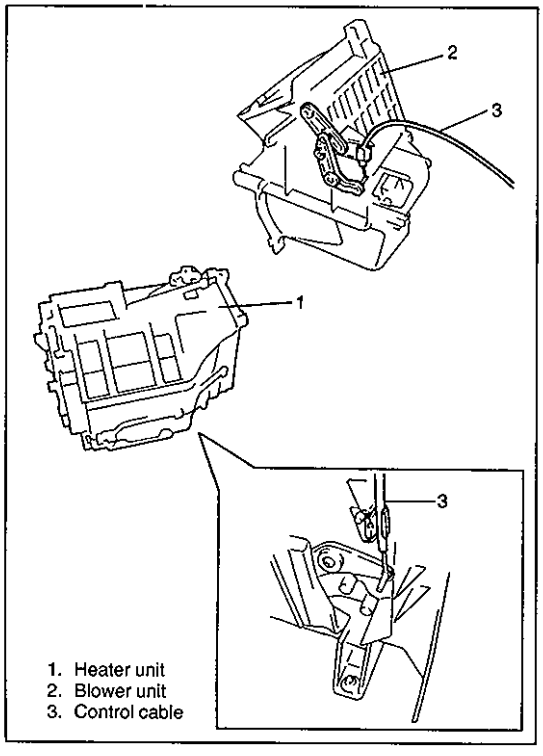
INSTALLATION

1) Install in reverse order of removal procedure.
2) If equipped with air bag system, enable air bag system. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

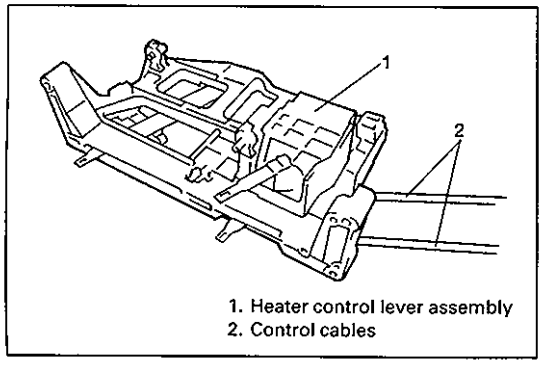
HEATER CONTROL LEVER ASSEMBLY

REMOVAL

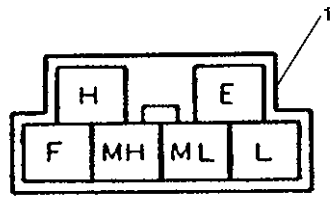
1) Disconnect negative (–) cable at battery.
2) If equipped with air bag system, disable air bag system. Refer to DISABLING AIR BAG SYSTEM in Section 10B.
3) Remove mode control switch, refer to step 3) to 6) of item MODE CONTROL SWITCH REMOVAL in this section.
4) Remove glove box.



5) Disconnect control cables from blower motor unit and heater unit.



6) Disconnect heater blower motor switch connector.
7) Remove heater control lever assembly.



1. Blower motor switch connector

INSPECTION

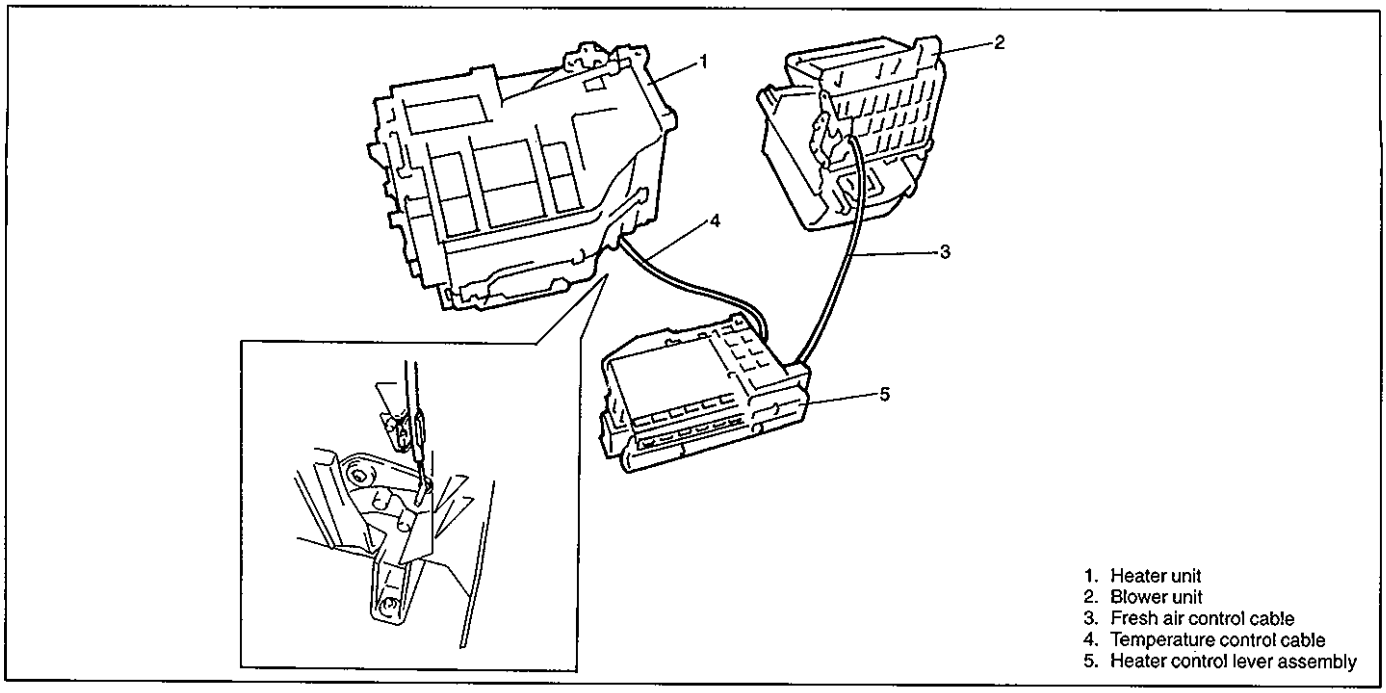
Check heater blower motor switch for each terminal-to-terminal continuity. For the detail refer to "WIRING CIRCUIT" earlier in this section.

	E	F	L	ML	MH	H
LOW	○	○	○			
M1	○	○		○		
M2	○	○			○	
HIGH	○	○				○

INSTALLATION

1) Install in reverse order of removal procedure.
2) If equipped with air bag, enable air bag system.
   Refer to ENABLING AIR BAG SYSTEM in Section 10B.

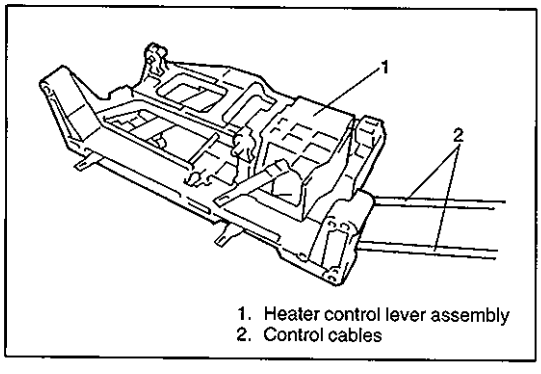
HEATER CONTROL CABLES



1. Heater unit
2. Blower unit
3. Fresh air control cable
4. Temperature control cable
5. Heater control lever assembly

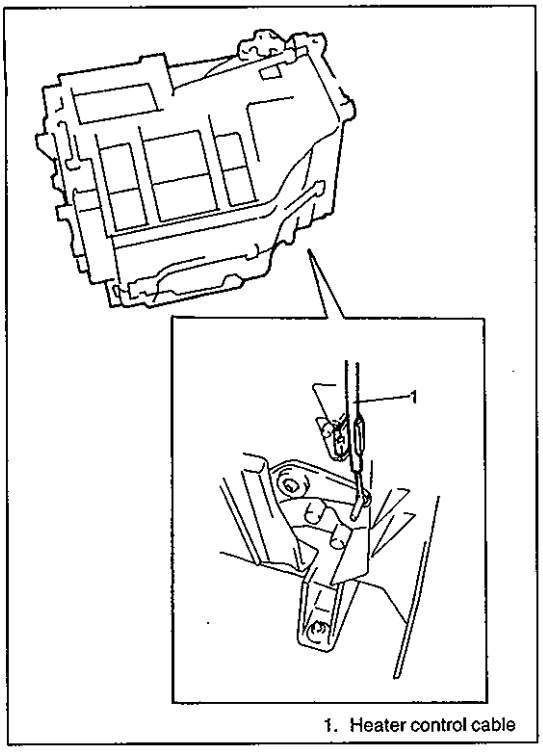
REMOVAL

1) Remove heater control lever assembly.
   Refer to steps 1) to 7) of HEATER CONTROL LEVER ASSEMBLY REMOVAL in this section.



1. Heater control lever assembly
2. Control cables

2) Disconnect control cables from control lever.

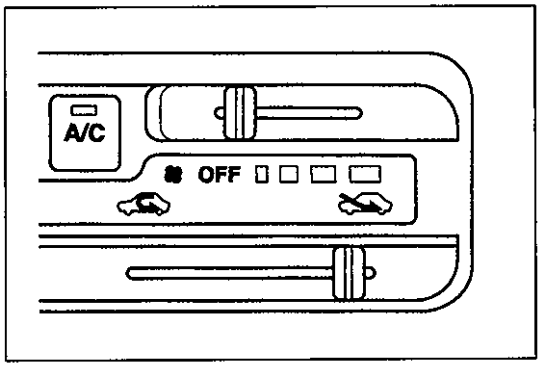


1. Heater control cable

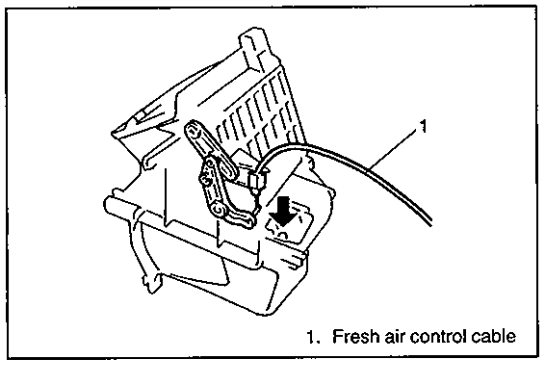
INSTALLATION

- Install control cables by reversing removal procedure, noting the following point.

NOTE:
After installing control cables, be sure that control levers move smoothly and stop at proper position.



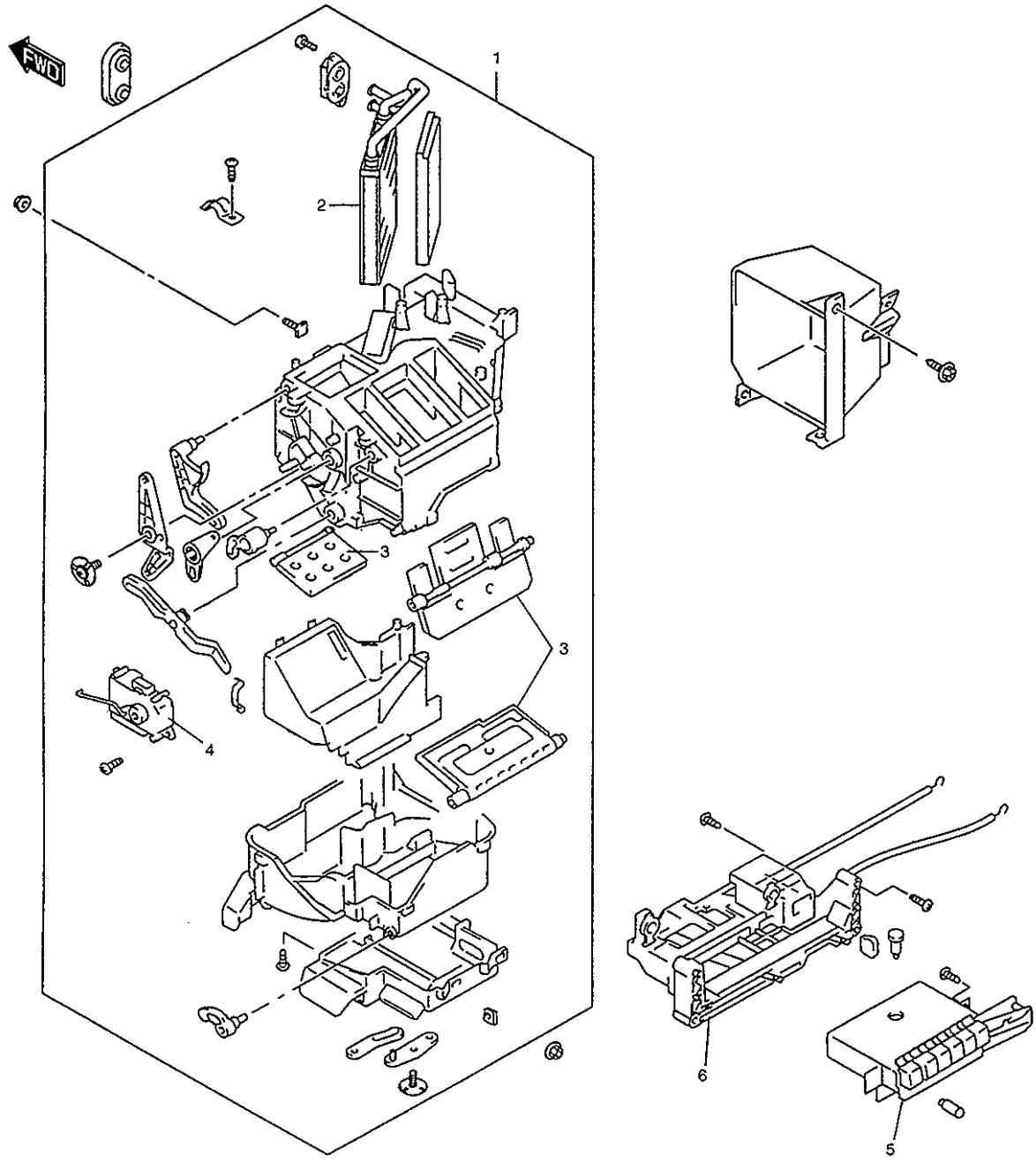
- Move control lever to FRESH position.



1. Fresh air control cable

- Push lever fully in arrow direction and fix cable with clamp in position as shown in left figure.

HEATER UNIT

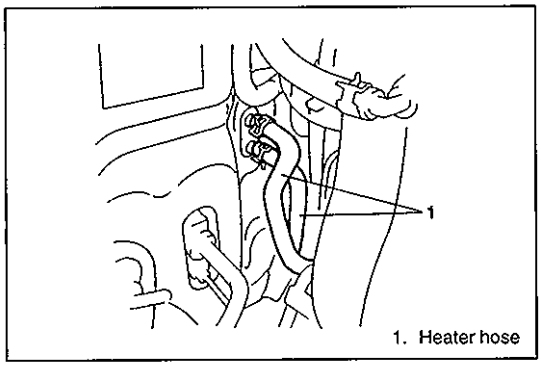


1. Heater ass'y
2. Heater core
3. Damper
4. Mode actuator
5. Mode control switch
6. Control lever ass'y

REMOVAL

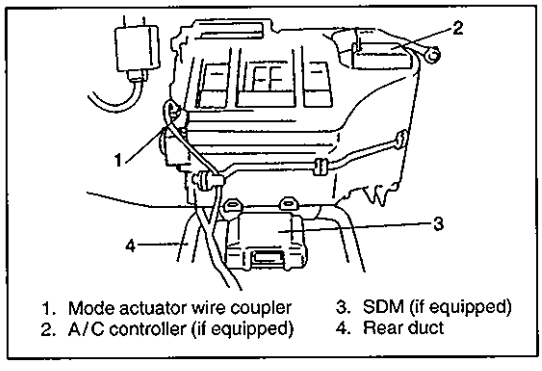
WARNING:
Failure to follow the following procedure and WARNING may cause air bag deployment, personal injury, damage to parts, or air bag being unable to deploy.
- **Never rest a steering column assembly on steering wheel with air bag (inflator) module face down and column vertical.**
- **When handling 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) Disable air bag system, if equipped. Refer to DISABLING AIR BAG SYSTEM in Section 10B.



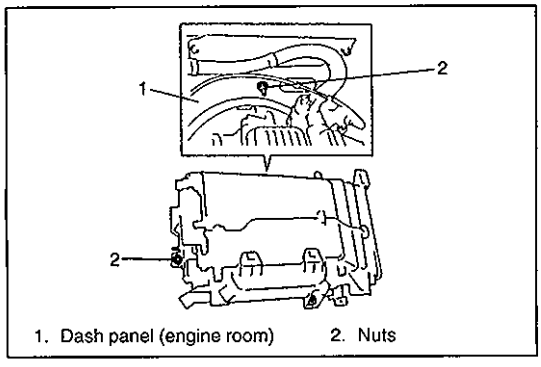
1. Heater hose

3) Drain engine coolant and disconnect heater hoses from heater unit.
4) Remove instrument panel, refer to item INSTRUMENT PANEL REMOVAL at Section 9.
5) Remove cooling unit (If equipped).
Refer to item EVAPORATOR (COOLING UNIT) REMOVAL in Section 1B.



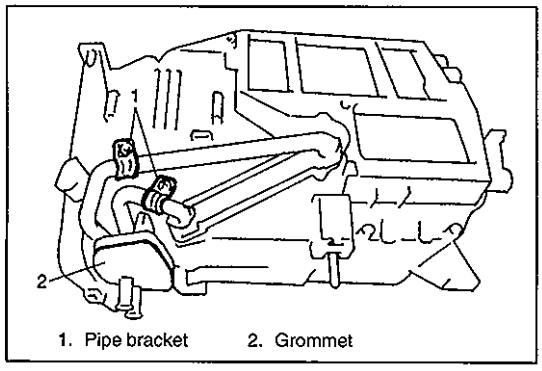
1. Mode actuator wire coupler
2. A/C controller (if equipped)
3. SDM (if equipped)
4. Rear duct

6) Disconnect rear duct from heater unit.
7) Disconnect mode actuator lead wire at couplers.
8) Remove A/C controller (If equipped).
9) Remove SDM (If equipped).



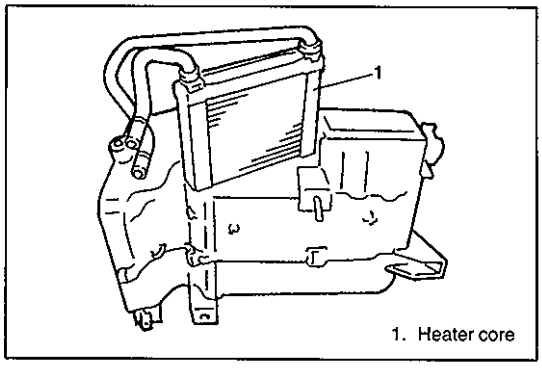
1. Dash panel (engine room)
2. Nuts

10) Remove heater unit.



1. Pipe bracket 2. Grommet

11) Remove heater core pipe clamps and grommet.



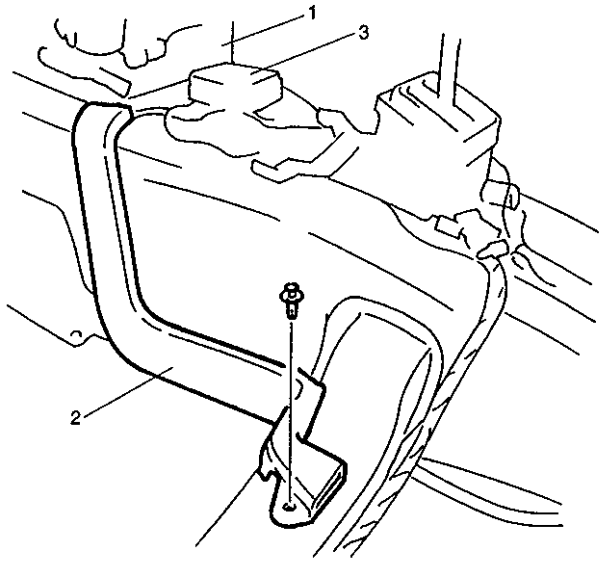
1. Heater core

12) Pull out heater core from unit.

INSTALLATION

1) Install heater unit by reversing removal procedure, noting the following items.
   - When installing each part, be careful not to catch any cable or wiring harness.
   - When installing steering column assembly, refer to STEERING COLUMN INSTALLATION in Section 3C or 3C1.
2) Install control cables. (Refer to HEATER CONTROL CABLES in this section.)
3) Fill engine coolant to radiator.
4) Enable air bag system, if equipped. Refer to ENABLING AIR BAG SYSTEM in Section 10B.
5) Evacuate and charge system. Refer to items EVACUATING SYSTEM and PROCEDURE OF CHARGING in Section 1B.

REAR DUCT



1. Heater unit
2. Rear duct
3. SDM

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Remove front seat.
3) Remove console box.
4) Take off carpet till rear duct is totally exposed.
5) Remove rear duct.

INSTALLATION

Reverse removal sequence to install rear duct.

SECTION 1B

AIR CONDITIONING (OPTIONAL)

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).**

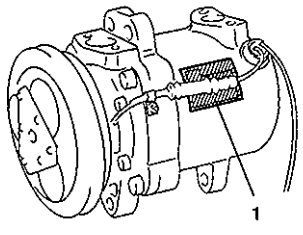
CAUTION:
The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).
None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using refrigerant CFC-12 (R-12) and the other using refrigerant HFC-134a (R-134a).
Be sure to check which refrigerant is used before any service work including inspection and maintenance. For identification between these two types, refer to the description in page 1B-2.
When replenishing or changing refrigerant and compressor oil and when replacing parts, make sure that the material or the part to be used is appropriate to the A/C installed in the vehicle being serviced. Use of incorrect one will result in leakage of refrigerant, damage in parts or other faulty condition.

CONTENTS

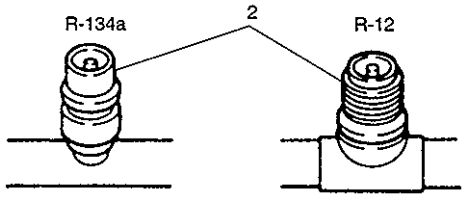
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Major Components and Refrigerant Flow of Air Conditioning System 1B- 3
Component Location in Engine Room ... 1B- 4
Preparation Prior to Installation 1B- 6
Precaution for Installation 1B- 6
Installation 1B- 6
For installation and its procedure INSTALLATION INSTRUCTION MANUAL is packed with air conditioning parts.
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GENERAL DESCRIPTION

Air conditioning for this vehicle is available as an optional equipment. This section describes function of its main components, installation, servicing etc.



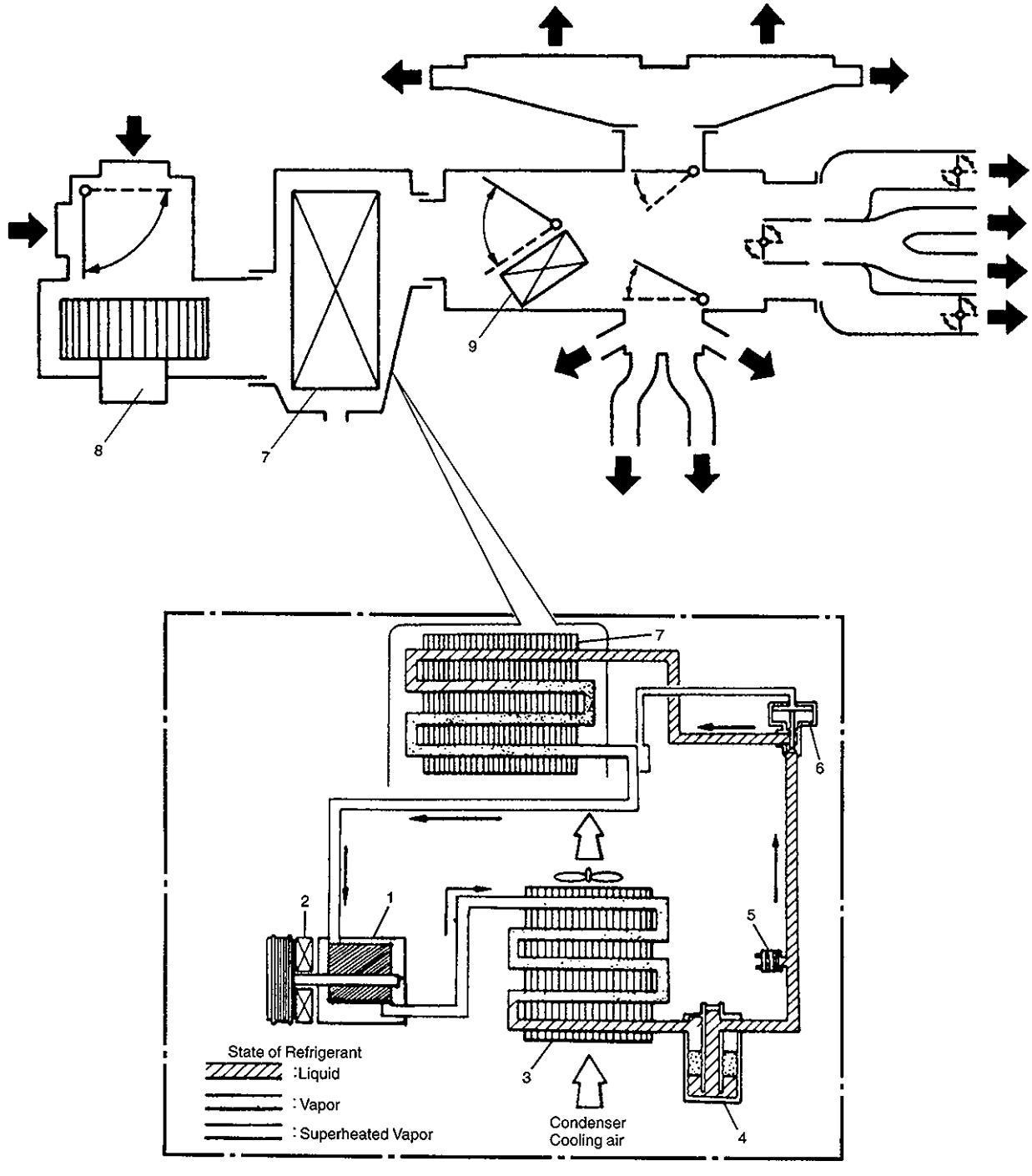
1. Compressor label



2. Service valve

Whether the A/C in the vehicle being serviced uses R-134a or R-12 is indicated on LABEL on the compressor. Also, it can be checked by the shape of the service (charge) valve.

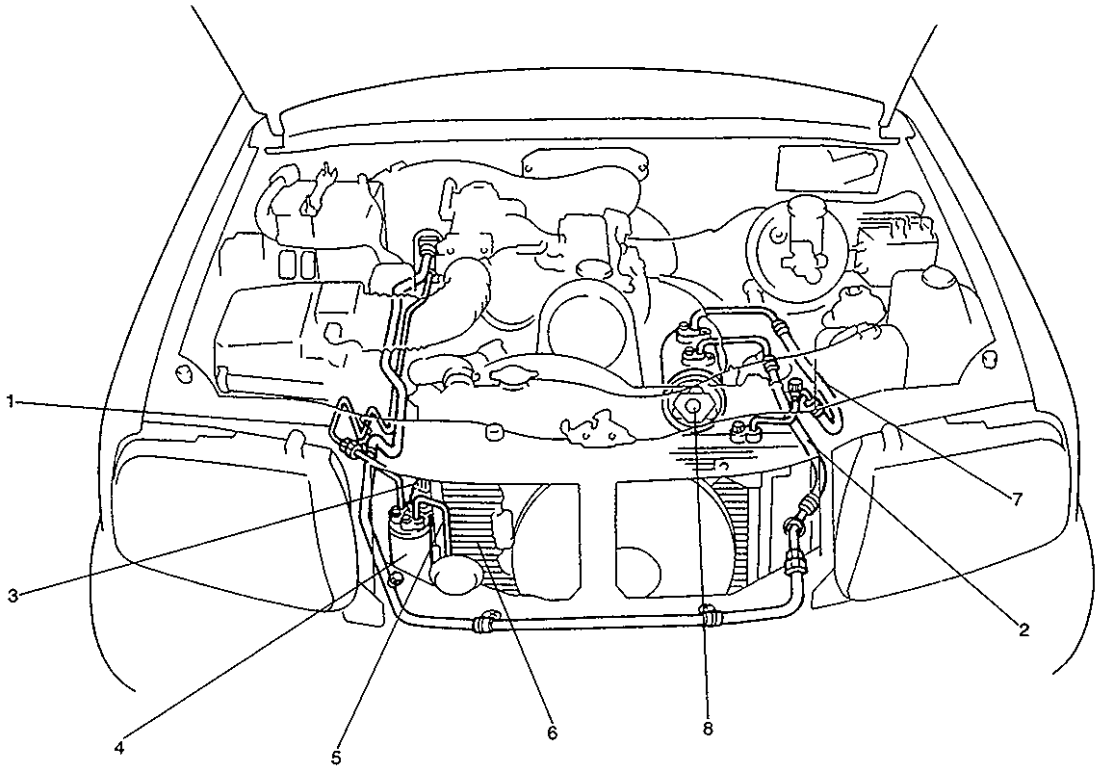
MAJOR COMPONENTS AND REFRIGERANT FLOW OF AIR CONDITIONING SYSTEM



1. Compressor
2. Magnet clutch
3. Condenser
4. Receiver/dryer
5. Dual pressure switch
6. Expansion valve
7. Evaporator
8. Blower motor
9. Heater core

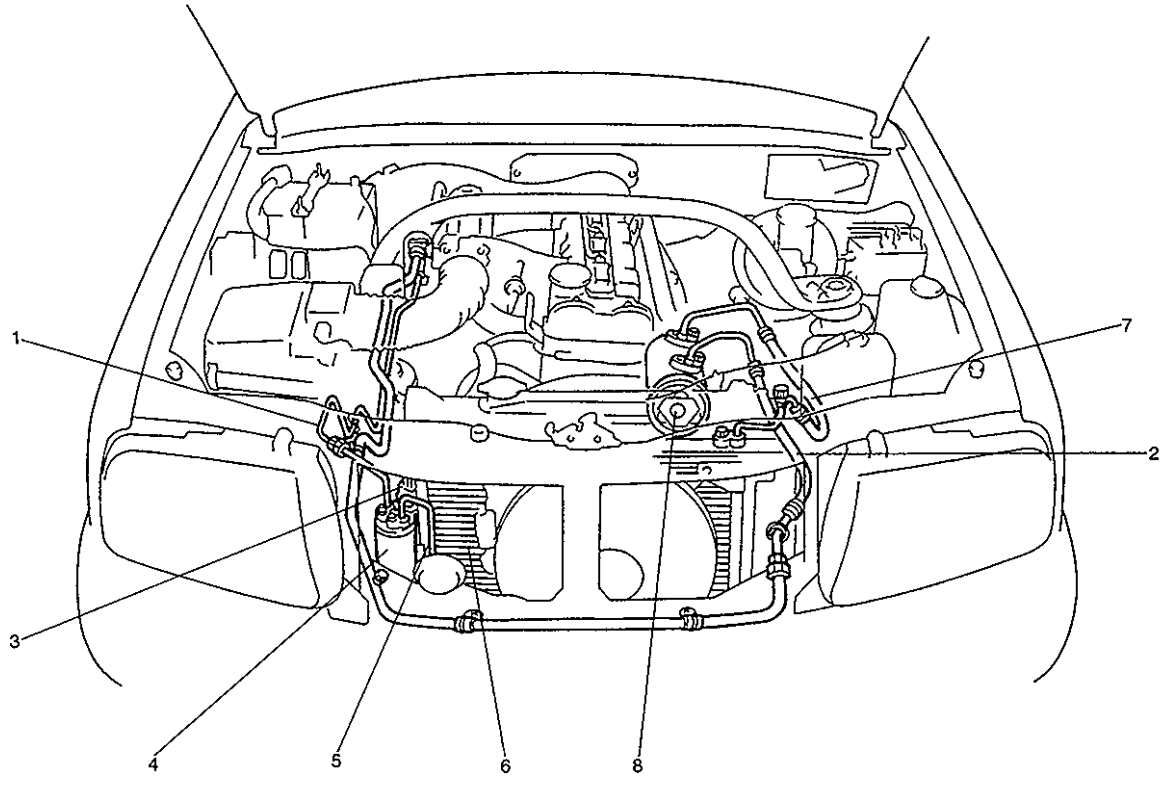
COMPONENT LOCATION IN ENGINE ROOM

G16 LH steering vehicle

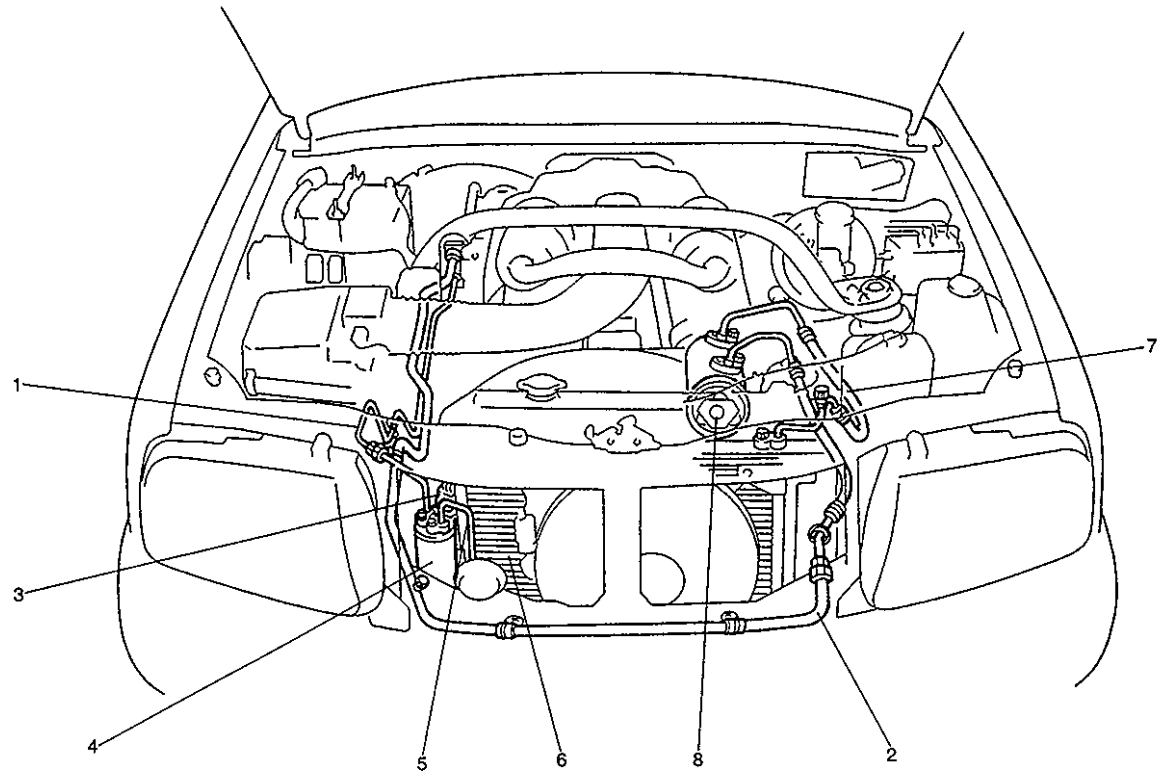


1. Receiver/Dryer outlet pipe
2. Compressor suction hose/pipe
3. Dual pressure switch
4. Receiver/Dryer
5. Condenser outlet pipe
6. Condenser
7. Compressor delivery hose
8. Compressor

J20 LH steering vehicle



H25 LH steering vehicle



1. Receiver/Dryer outlet pipe
2. Compressor suction hose/pipe
3. Dual pressure switch
4. Receiver/Dryer
5. Condenser outlet pipe
6. Condenser
7. Compressor delivery hose
8. Compressor

PREPARATION PRIOR TO INSTALLATION

A. INSPECTION AND ADJUSTMENT OF VEHICLE

Before installing air conditioning, check and adjust following items.

1) Engine ignition timing.
2) Engine cooling system.
3) Battery electrolyte and charging system.
4) Passenger compartment sealing.
5) Fuel system.
6) General vehicle conditions.

B. PREPARATION OF AIR CONDITIONING COMPONENTS

When unpacking parts kit, arrange unpacked parts in the order of installation.

At this time, you have to make sure the kit has no missing or defective parts. Also, when installing air conditioner, you have to use covers for protection of fender and seat.

PRECAUTION FOR INSTALLATION

1) Negative (–) cable must be disconnected from battery.
2) Engine-installed air conditioning components should be tightened by specified torque using bolts supplied in the kit.
3) Air conditioning lines and wire harnesses should, when installed, be routed correctly so as not to interfere with peripheral parts.
4) Hoses and tubes should be connected with each other respectively after applying two to three drops of refrigerant to seats of flared nuts.
5) Line fittings should be tightened or loosened using two wrenches so that they are supported evenly during such tightening or loosening.
6) Flared nuts should be tightened by specified torque.
7) Until it becomes possible to connect each component into position, blind plugs of attaching portions should not be removed.

NOTE:
Remove plugs from compressor carefully to allow refrigerant to escape slowly. This is necessary because compressor is shipped out from factory with a slight charge of refrigerant to prevent its seals from corroding.

8) When handling refrigerant HFC-134a (R-134a), you should always wear safety goggles and also use care that it will not get on your skin.
9) Refrigerant HFC-134a (R-134a) can should be kept at about 40°C (100°F) by putting it in hot water.

INSTALLATION

When installing air conditioning, refer to instruction manual which is packed with A/C parts.

DIAGNOSIS

GENERAL

Condition	Possible Cause	Correction
No cooling or warm air.	● Magnetic clutch does not engage properly	
	a) A/C 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.
	i) ECT sensor faulty or A/C cut signal circuit faulty	Check ECT sensor. Refer to Section 6E1 or 6E2 for details
	● 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 clogged screw	Check receiver/dryer.
Cool air comes out only intermittently.	● Magnetic clutch slipping	Check magnetic 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 magnetic 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.	● Filter element clogged	Check and clean as necessary.
	● 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.

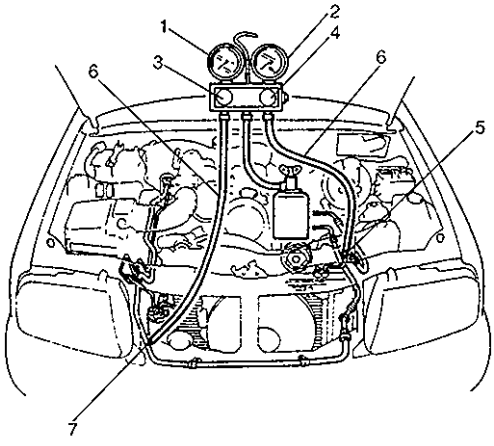
COMPRESSION SYSTEM

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 bearing • Defective cylinder and/or shaft	Replace Replace
2	Noise from magnetic clutch	• Defective bearing • Defective clutch face	Replace Replace
3	Insufficient cooling	• Defective gasket • Defective reed valve	Replace Replace
4	Not rotating	• Locked by item 1 and 3-2 • Seized magnetic clutch • Rotating parts seized by insufficient oil amount	Replace Replace Replace
5	Oil and/or gas leakage	• Defective seal • Defective O-ring	Replace Replace

BLANK

LH steering vehicle shown



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.

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 (with A/C idle up)	**G16** 850 r/min. **J20** 800 r/min. **H25** 800 r/min.
Blower switch	Max.
Temperature control	Max. cold
Doors	All open
Air inlet damper position	Recirculation

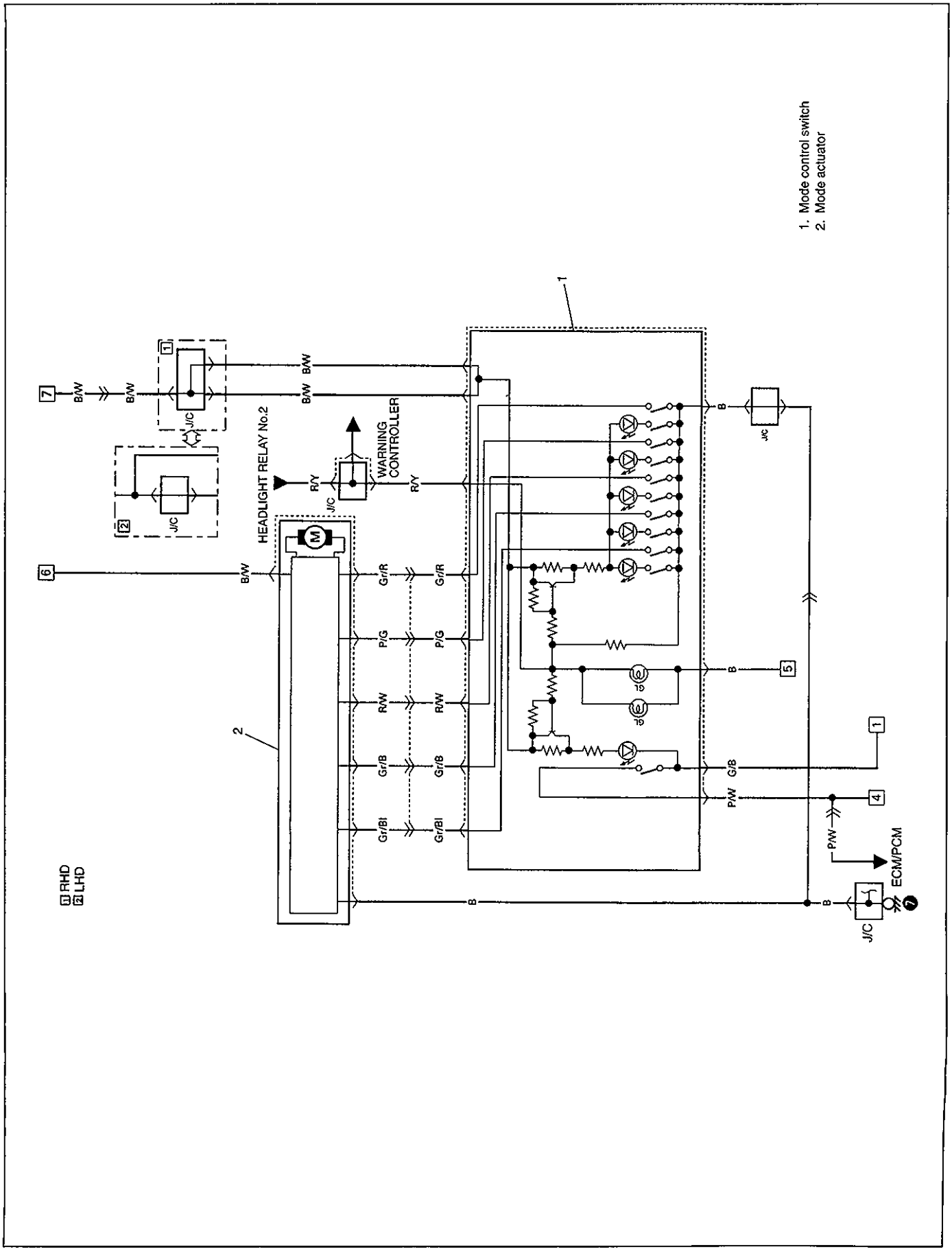
2) Since the operating pressure for the HFC-134a refrigerant at high temperatures is higher than that of the R-12, the gauge readings will be slightly higher.

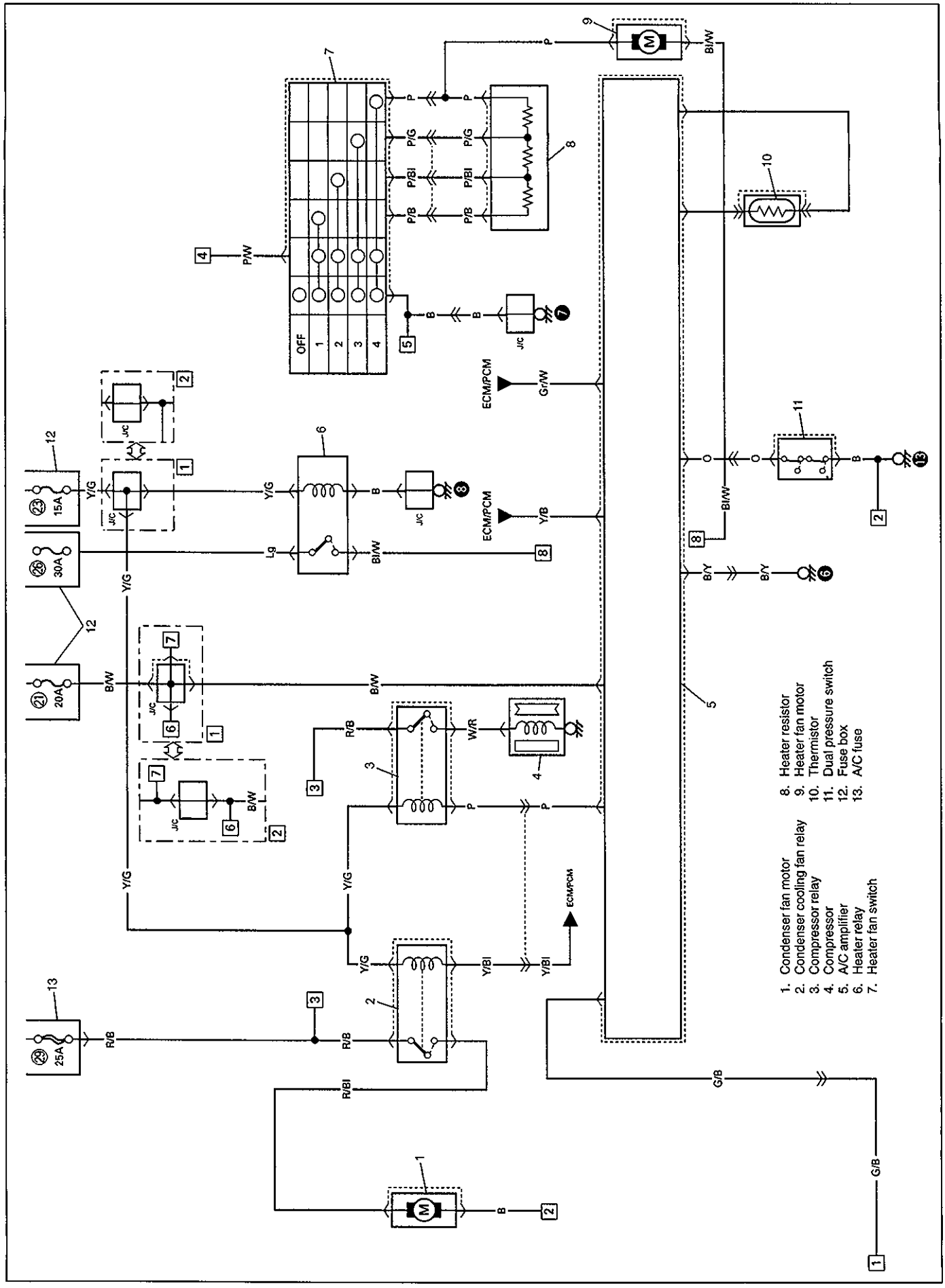
CORRECTIVE MEASURES FOR MALFUNCTION SYMPTOMS

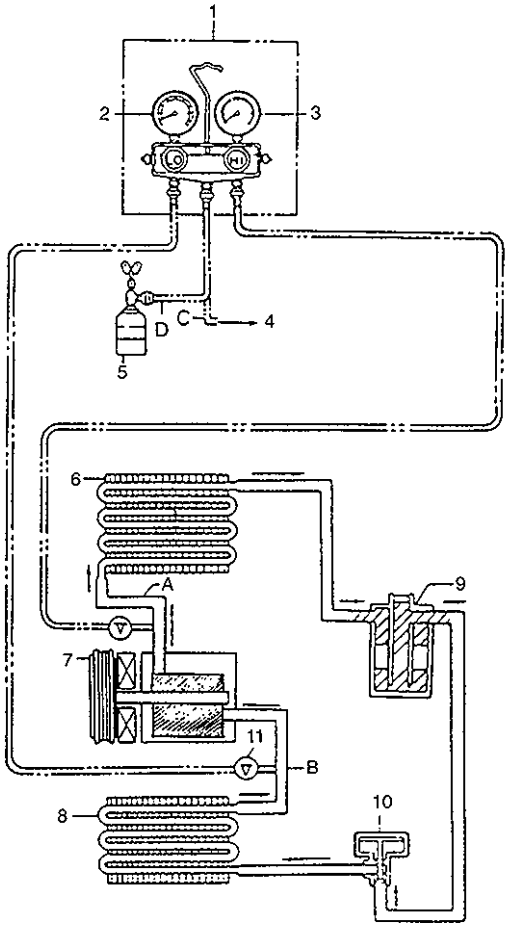
Starting on the next page, gauge readings, conditions, causes, and measures (classified according to malfunction symptoms) will be discussed.

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. Also high pressure side reading fluctuates between the abnormal and normal pressure.	• Expansion valve is frozen due to moisture 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 – 0.98 (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. • Both pressure becoming equal right after A/C is turned OFF.	• Internal leak in compressor.	• Inspect compressor and repair or replace as necessary.
0.25 – 0.3 (2.5 – 3.0 35.6 – 42.6)	1.96 – 2.45 (20 – 25 285 – 355)	• High 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.
		• High pressure reading on both low and high pressure sides. • Low pressure side tubing is not cold when touched. • 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.

WIRING CIRCUIT




1. Condenser fan motor
2. Condenser cooling fan relay
3. Compressor relay
4. Compressor
5. A/C amplifier
6. Heater relay
7. Heater fan switch
8. Heater resistor
9. Heater fan motor
10. Thermistor
11. Dual pressure switch
12. Fuse box
13. A/C fuse
OFF
ECM/PCM
J/C
15A
20A
25A
30A



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.

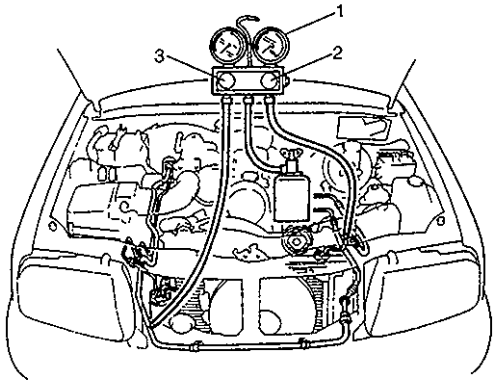
CHARGING SYSTEM WITH REFRIGERANT

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.**

LH steering vehicle shown



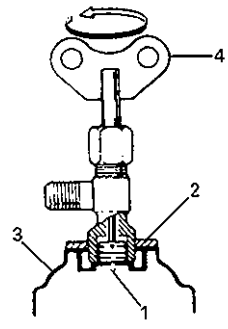
1. Manifold gauge set
2. High pressure side (Delivery side hose)
3. Low pressure side (Suction side hose)

PROCEDURE OF CHARGING

1) Make sure that hoses are routed properly after evacuating the system.
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.

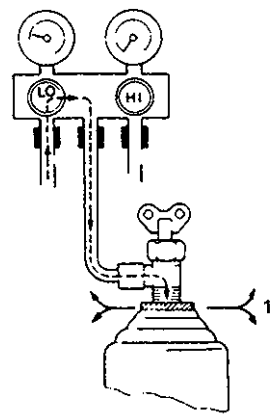
WARNING:
Make sure that high pressure-side valve is closed securely.

3) Start engine and keep engine speed at 1,000 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.



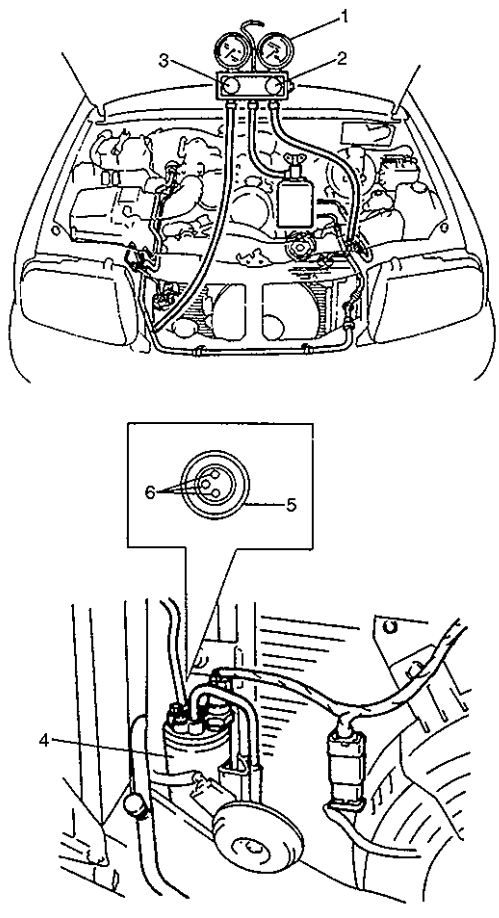
1. Needle
2. Plate nut
3. Refrigerant container
4. Handle

5) When refrigerant container is emptied, use 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 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 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"

LH steering vehicle shown



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 (500 – 600 g, 17.5 – 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 200 – 300 kPa (2 – 3 kg/cm^2, 29 – 43 psi)

High pressure gauge when charged with specified amount
About 1370 – 1670 kPa (14 – 17 kg/cm^2, 200 – 244 psi)

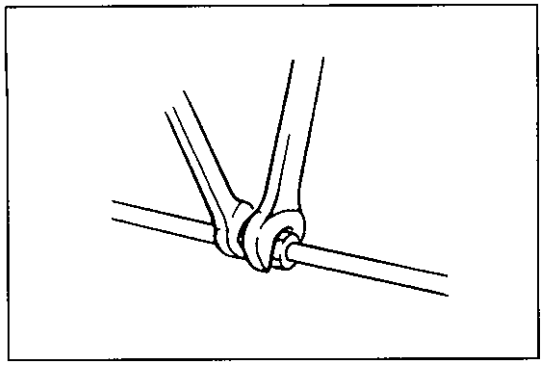
REMOVING MANIFOLD GAUGE SET

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, 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.

ON-VEHICLE SERVICE

NOTE

When servicing air conditioning system, the following rules must be observed.

CAUTION:
None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using CFC-12 (R-12) and the other using HFC-134a (R-134a).
(For identification between these two types, refer to page 1B-2).
When replenishing or changing refrigerant and compressor oil and when replacing parts, make sure that the material or the part to be used is appropriate to the A/C installed in the vehicle being serviced. Use of incorrect one will result in leakage of refrigerant, damage in parts or other faulty condition.

WIRING

1) Disconnect battery negative terminal.
2) Connect wire connectors securely.
3) When routing wire harness through panel hole, previously insert rubber bushing into hole for its protection.
4) Use vinyl tape or original clamps to connect air conditioning wire harness to main wire harness.
5) If original harness has been disconnected or removed while servicing, replace it to a proper position.
6) During installation, be careful not to pinch original air conditioning wire harnesses.
7) When adding wires to wire harness by soldering, use wires with the same diameter and tape for each connection.
8) Keep wire harness away from any moving components and high temperature.
9) Keep connecting portions away from fuel lines.
10) Make sure wire harness contacts no sharp edges or corners.

PIPING

1) Never use heat for bending pipes. When bending a pipe, try to make its bending radius as slight as possible.
2) Keep internal parts of air conditioning free from moisture and dirt. When disconnecting any line from system, install a blind plug or cap to the fitting immediately.
3) When connecting hoses and pipes, apply a few drops of refrigerant oil to seats of coupling nuts and O-ring.
4) When tightening or loosening a fitting, use two wrenches, one for turning and the other for support.
5) Be specially careful for direction of receiver/dryer. (Inlet-side has the "IN" mark.) Receiver/dryer inlet fitting must be connected to pipe from condenser outlet fitting.

6) Tighten flared nuts according to Table of Tightening Torque as shown below:

Tightening Torque (Flared Nut Used for)
1/4 inch pipe: 13 N·m (1.3 kg-m, 9.5 lb-ft)
8mm pipe: 13 N·m (1.3 kg-m, 9.5 lb-ft)
3/8 inch pipe: 25 N·m (2.5 kg-m, 18.0 lb-ft)
1/2 inch pipe: 35 N·m (3.5 kg-m, 25.5 lb-ft)
5/8 inch pipe: 45 N·m (4.5 kg-m, 32.5 lb-ft)

7) Route drain hose so that drained water does not make any contact to vehicle components.

HANDLING REFRIGERANT HFC -134a (R-134a)

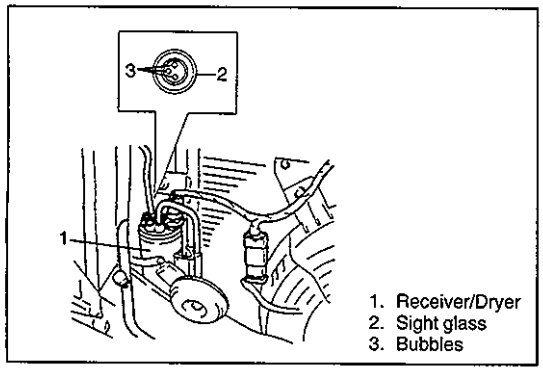
1) When handling refrigerant, always wear goggles to protect your eyes.
2) Avoid you direct contact to liquid refrigerant.
3) Do not heat refrigerant container higher than 40°C (100°F).
4) Do not discharge refrigerant into atmosphere.
5) Do not allow liquid refrigerant to touch bright metals. Refrigerant 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 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 refrigerant R-134a get on your skin, such affected part should be treated in the same manner as when skin is frostbitten or frozen.

REFRIGERANT RECOVERY

When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment. Discharging refrigerant 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.



1. Receiver/Dryer
2. Sight glass
3. Bubbles

REFRIGERATING SYSTEM

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 and compare what is observed with the symptoms listed in "CHECKING REFRIGERANT CHARGE" table given below.

CHECKING REFRIGERANT CHARGE

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.

CONDENSER

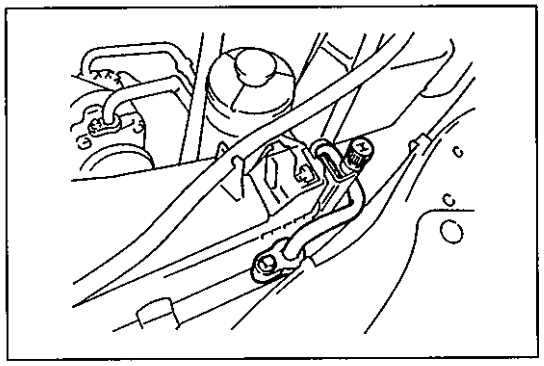
INSPECTION

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.

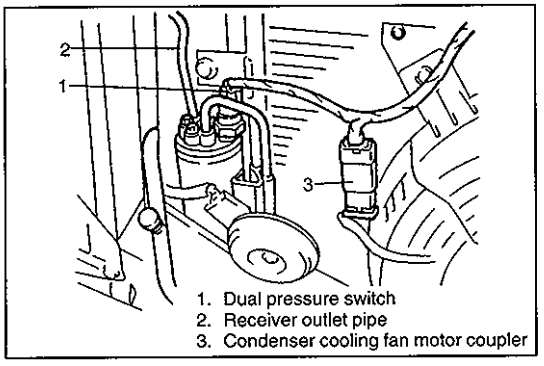
REMOVAL

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 assembly (Refer to Section 9 "BODY SERVICE").



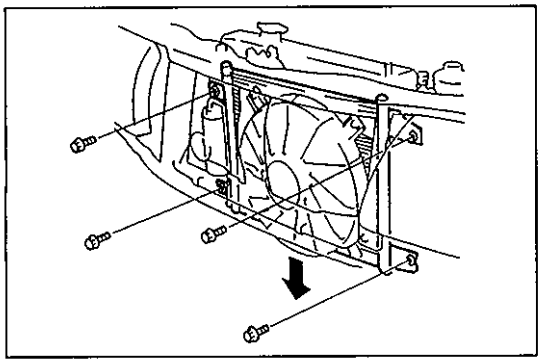
4) Disconnect compressor delivery hose from condenser inlet fittings.

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



1. Dual pressure switch
2. Receiver outlet pipe
3. Condenser cooling fan motor coupler

5) Disconnect coupler from dual pressure switch.
6) Detach receiver outlet pipe.
7) Disconnect condenser cooling fan motor coupler.



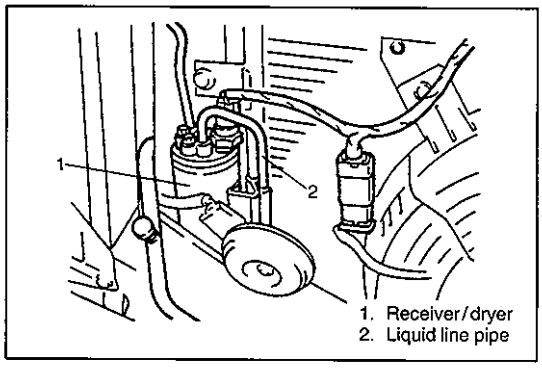
8) Remove condenser with fan and receiver/dryer.

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

9) 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.

RECEIVER/DRYER
INSPECTION
Use a leak tester to check for gas leakage, sight glass and fittings.

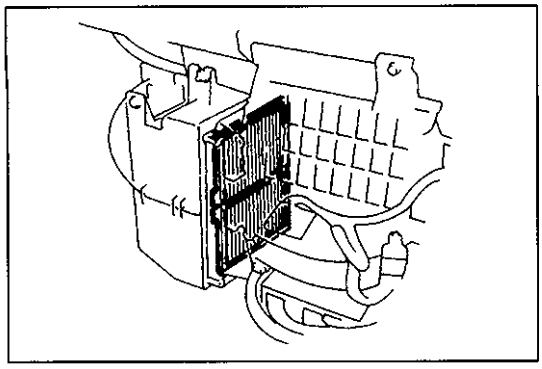


REMOVAL
1) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment. The amount of compressor oil removed must be measured and the same amount must be added to the system when reinstalling.
2) Disconnect liquid line pipes.
3) Remove receiver/dryer 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.**

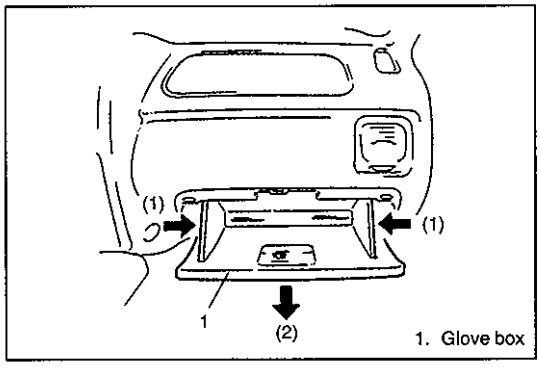
2) Evacuate and charge system according to previously-described procedure.



FILTER ELEMENT

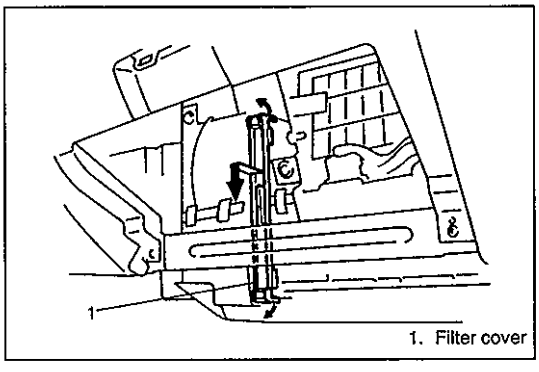
REMOVAL

1) Disconnect negative cable at battery.
2) For vehicle with air bag system, disable air bag system. Refer to DISABLING AIR BAG SYSTEM in section 10B.



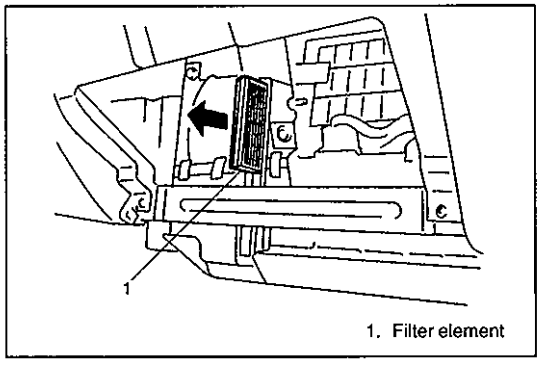
1. Glove box

3) Pull down glove box.



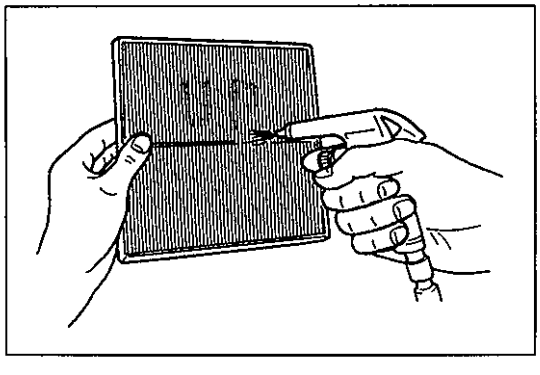
1. Filter cover

4) Remove filter cover.



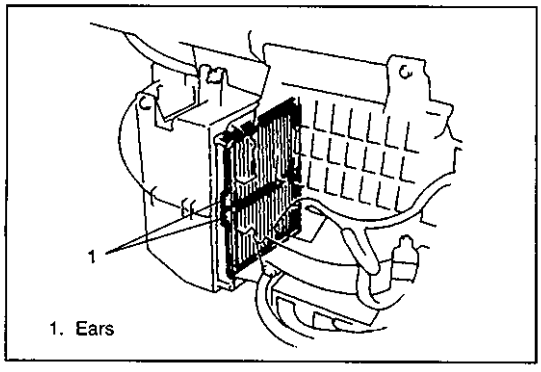
1. Filter element

5) Pull out filter element. Pull out upper filter first then the lower one.



CLEAN

Blow off dust by compressed air from air outlet side of the filter element.



1. Ears

INSTALLATION

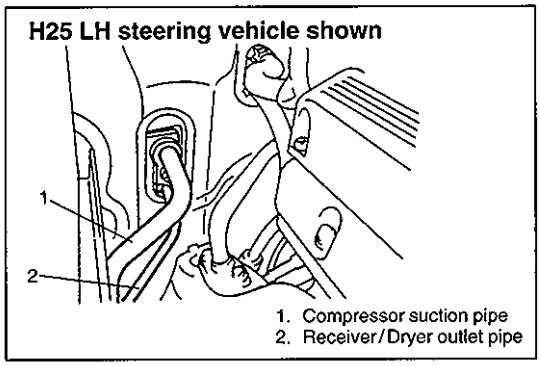
Reverse removal procedure for installation noting the followings:

- Match the ears of the filter at the center
- Enable air bag system after installation. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

EVAPORATOR (COOLING UNIT)

REMOVAL

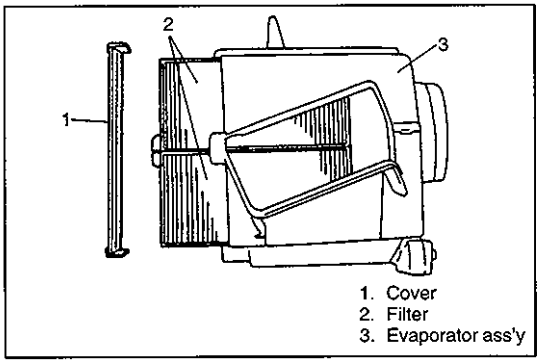
1) Disconnect negative (–) cable at battery.
2) Disable air bag system. Refer to "Disabling Air Bag System" in Section 10B.
3) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment. The amount of compressor oil removed must be measured and the same amount added to the system.



4) Disconnect compressor suction pipe, and receiver/dryer outlet pipe from evaporator (cooling unit).

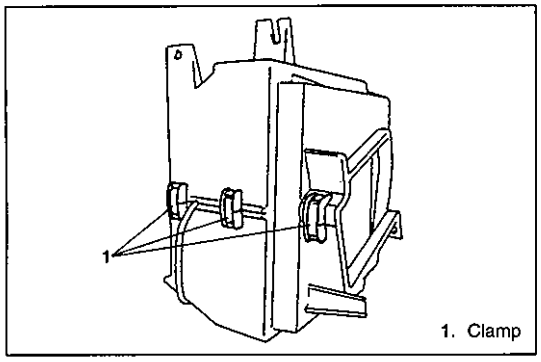
NOTE:
As soon as above hose and pipe are disconnected, cap opened fittings so that moisture and dust may not enter cooling unit.

5) Remove blower motor unit. Refer to Section 1A "HEATER AND VENTILATION".
6) Disconnect thermistor wire coupler.
7) Remove evaporator with evaporator case.

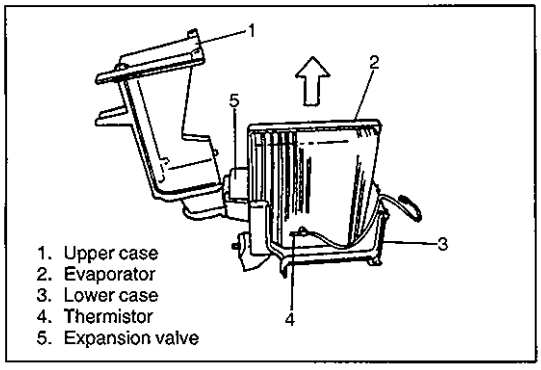


DISASSEMBLY

1) Remove filter assembly.



2) Detach clamps to separate evaporator upper and lower cases from each other.



1. Upper case
2. Evaporator
3. Lower case
4. Thermistor
5. Expansion valve

3) Remove upper case and remove evaporator from lower case.
4) Remove following components from evaporator.
   - Expansion valve
   - Thermistor

INSPECTION

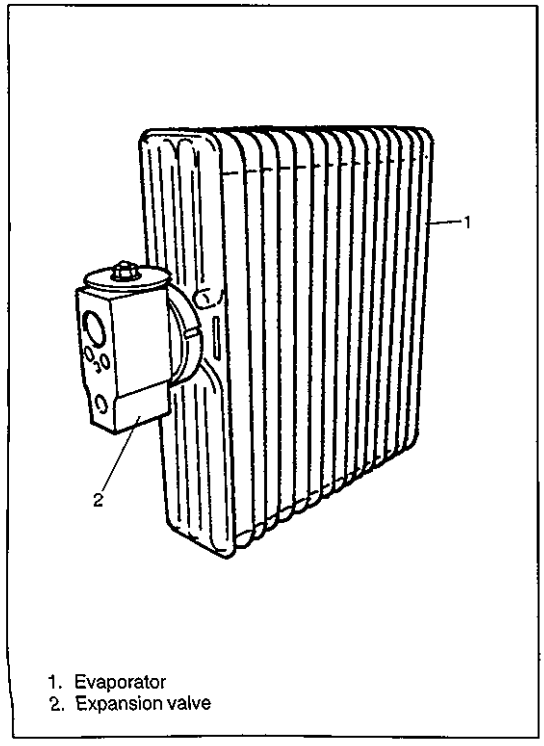
1) Check evaporator fins for blockage. If found clogged, use compressed air to clean the fins.

   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 evaporator.
2) Enable air bag system. Refer to "Enabling Air Bag System" in Section 10B.
3) Evacuate and charge system according to previously described procedure.



1. Evaporator
2. Expansion valve

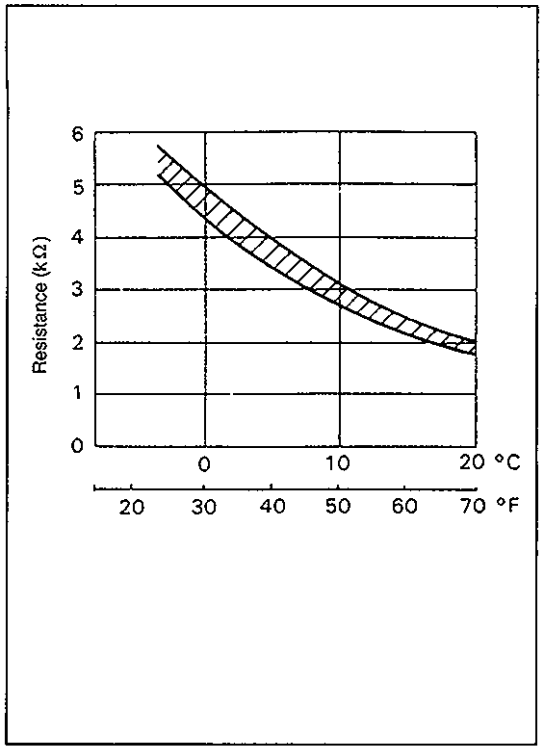
EXPANSION VALVE

INSPECTION

Refer to "Troubleshooting Procedure Using Manifold Gauge Set" in this section.

REMOVAL AND INSTALLATION

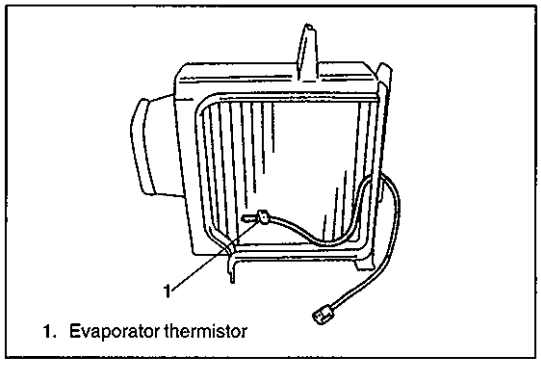
Refer to EVAPORATOR (COOLING UNIT).



EVAPORATOR THERMISTOR

A thermistor is a temperature sensor to sense the temperature of air discharged 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.



1. Evaporator thermistor

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 10B.
3) Evacuate and charge system according to previously described procedure.

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 must be added to the system when reinstalling.
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.

ELECTRICAL CIRCUIT

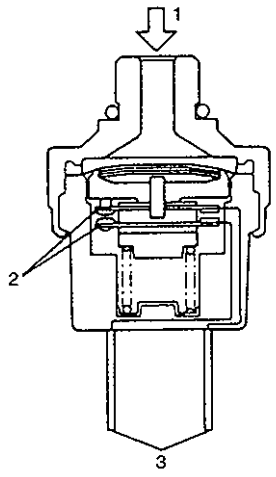
A/C SWITCH

Inspection

Refer to Section 1A "MODE CONTROL SWITCH INSPECTION" in this manual.

INSPECTION OF IDLE SPEED WITH A/C ON

For G16 and J20, refer to section 6E1, and for H25, refer to section 6E2.



1. Pressure
2. Movable contact
3. Pressure switch terminal

DUAL PRESSURE SWITCH

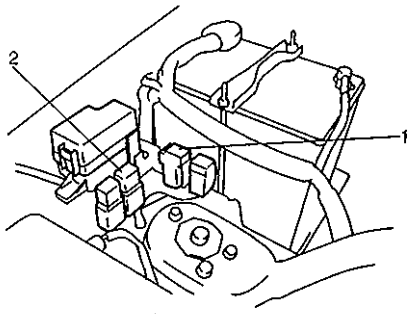
This vehicle is equipped with switch which operates according to high or low pressure.

Inspection

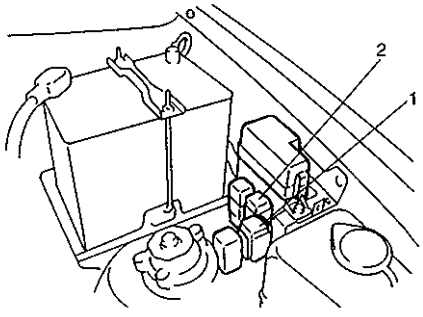
1) Check switches for continuity at normal temperature (approx. 25°C, 77°F) when A/C system has a proper charge of refrigerant and when A/C system (compressor) is under operation. In each of these cases, switches should show proper continuity.
2) When pressure is at following specified pressure, switch should show no continuity.

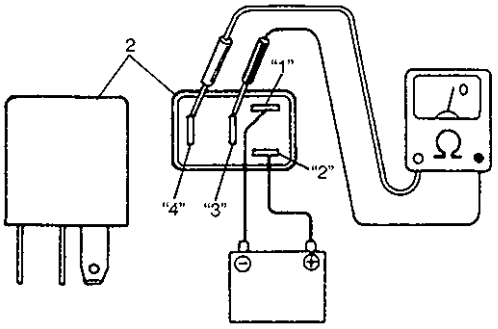
HIGH SIDE PRESSURE	SWITCH
196 kPa (2.0 kg/cm^2, 28 psi) or below	No continuity
3140 kPa (32 kg/cm^2, 455 psi) or above	

LH steering vehicle



RH steering vehicle





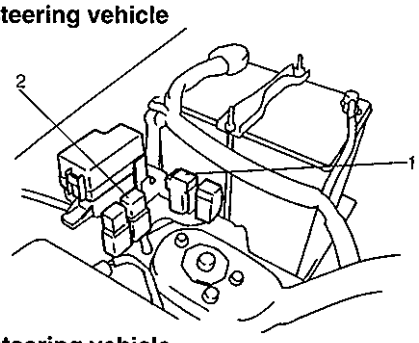
1. Condensor cooling fan relay
2. A/C compressor relay

A/C COMPRESSOR RELAY

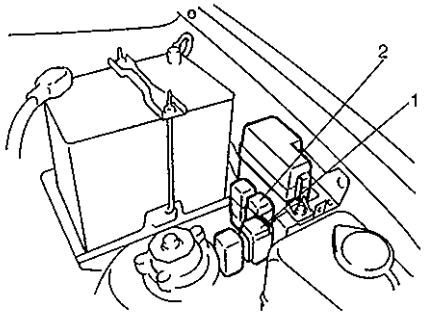
Inspection

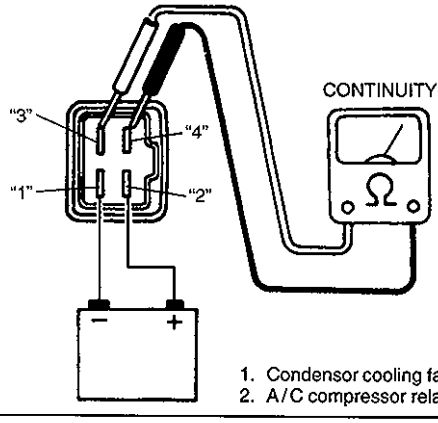
1) Disconnect negative cable at battery.
2) Remove A/C compressor relay from vehicle.
3) Connect battery positive (+) terminal to terminal "2" of relay. Connect battery negative (–) terminal to terminal "1" of relay. Check continuity between terminal "3" and "4".
   If there is no continuity when relay is connected to the battery, replace relay.

LH steering vehicle



RH steering vehicle





1. Condensor cooling fan relay
2. A/C compressor relay

CONDENSER COOLING FAN RELAY

Inspection

1) Disconnect negative cable at battery.
2) Remove condenser cooling fan relay from vehicle.
3) Connect battery positive (+) terminal to terminal "2" of relay.
   Connect battery negative (–) terminal "1" of relay.
   Check continuity between terminal "3" and "4".
   If there is no continuity when relay is connected to the battery, replace relay.

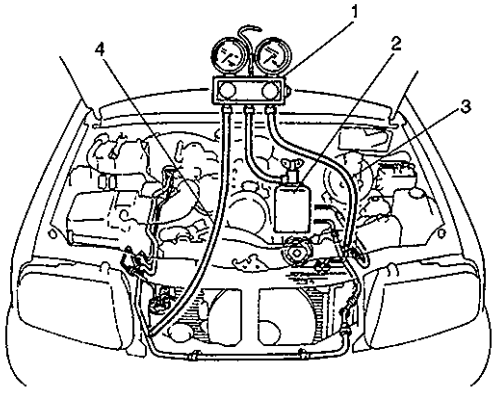
COMPRESSION SYSTEM

CAUTION:
None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using CFC-12 (R-12) and the other using HFC-134a (R-134a).
For identification between these two types, refer to page 1B-2.
When replenishing or changing refrigerant and compressor oil and when replacing parts, make sure that the material or the part to be used is appropriate to the A/C installed in the vehicle being serviced. Use of incorrect refrigerant or compressor oil will result in leakage of refrigerant, damage in parts or other faulty condition.

CAUTION

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 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.

LH Steering vehicle shown



1. Manifold gauge set
2. Refrigerant container
3. High pressure side (Delivery side hose)
4. Low pressure side (Suction side hose)

COMPRESSOR

INSPECTION

1) Install manifold gauge set as illustrated.
2) Close Hi and Lo hand valves.
3) Run engine at fast idle.
4) Check compressor for following:
   a. High pressure gauge reading is not low and low pressure gauge reading is not higher than normal.
   b. Metallic sound.
   c. Leakage from shaft seal.

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

REMOVAL

1) Run engine at idle with A/C ON for 10 minutes.
2) Disconnect negative cable at battery.
3) Recover refrigerant from refrigeration system using recovery and recycling equipment.

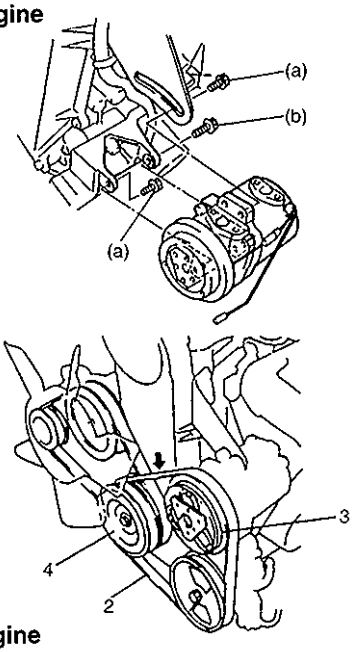
   NOTE:
   The amount of compressor at removed must be measured and the same amount must be poured when installing the compressor.

4) Disconnect thermal protector lead wire.
5) Disconnect suction and discharge hoses from compressor.

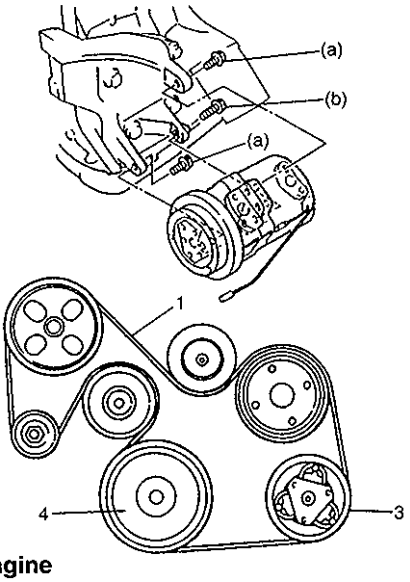
   NOTE:
   Cap open fitting immediately to keep moisture out of system.

6) **For G16 engine:**
   Remove compressor drive belt by loosening compressor mounting bolts.
   For J20 engine:
   Remove generator belt. Refer to Section 6H for details.
   For H25 engine:
   Remove compressor drive belt by loosening tension pulley bolt.
7) Remove compressor with clutch assy from its mount.
8) Drain oil from compressor, and measure its amount.

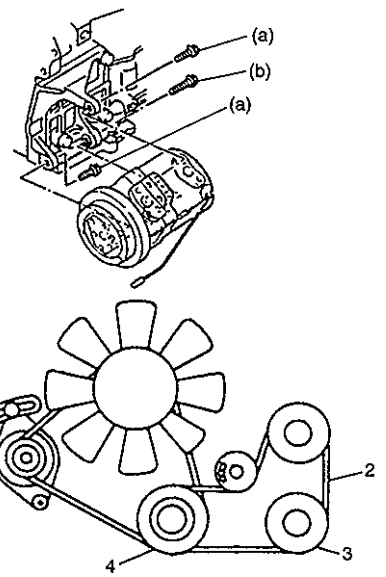
G16 engine



J20 engine



H25 engine



1. Generator belt
2. Compressor drive belt
3. Compressor pulley
4. Crankshaft pulley

INSTALLATION

1) Pour new compressor oil. The amount must be the same with the amount measured in REMOVAL.

NOTE:
Compressor assembly supplied from factory is filled up with following amount of oil.

Amount of oil in compressor: 120 cm^3 (120 cc, 7.5 in^3)

2) **For G16 engine:**
Install compressor temporarily to bracket, then install compressor drive belt.

For J20 and H25 engine:
Install compressor to its bracket.
Tighten bolts (a) first, then (b).

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

3) Connect suction and discharge hoses to compressor.

4) **For G16 engine:**
Tension compressor drive belt by tightening compressor mounting bolts. Refer to Section 3B1 for drive belt tension.
Tighten bolt (a) first, then (b).

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

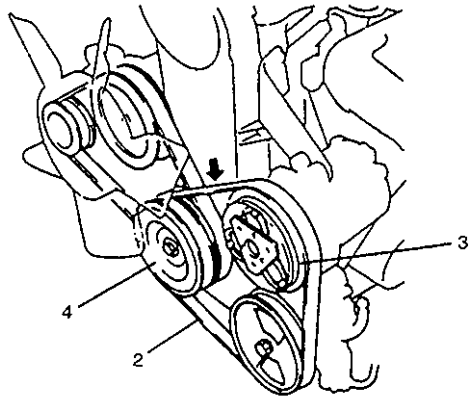
For J20 engine:
Install generator belt. Refer to Section 6H for details.

For H25 engine:
Install compressor drive belt. Refer to Section 3B1 for installation and belt tension.

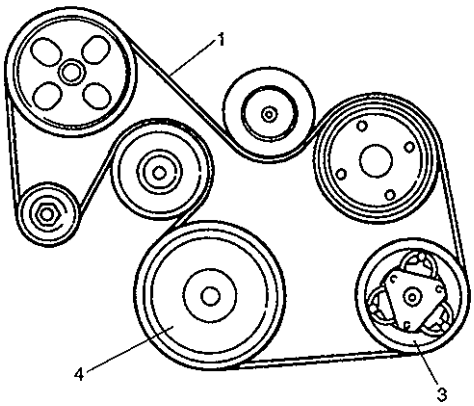
5) Connect thermal protector lead wire.
6) Evacuate and charge system according to previously described procedure.

CAUTION:
Be sure to use HFC-134a (R-134a) compressor oil.

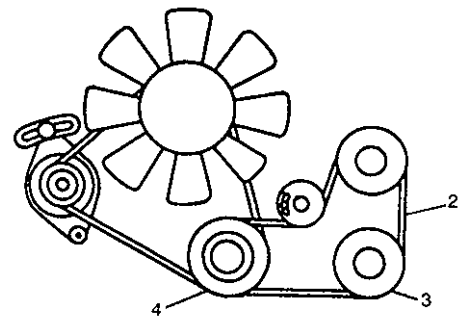
G16 engine



J20 engine



H25 engine



1. Generator belt
2. Compressor drive belt
3. Compressor pulley
4. Crankshaft pulley

DRIVE BELT

INSPECTION

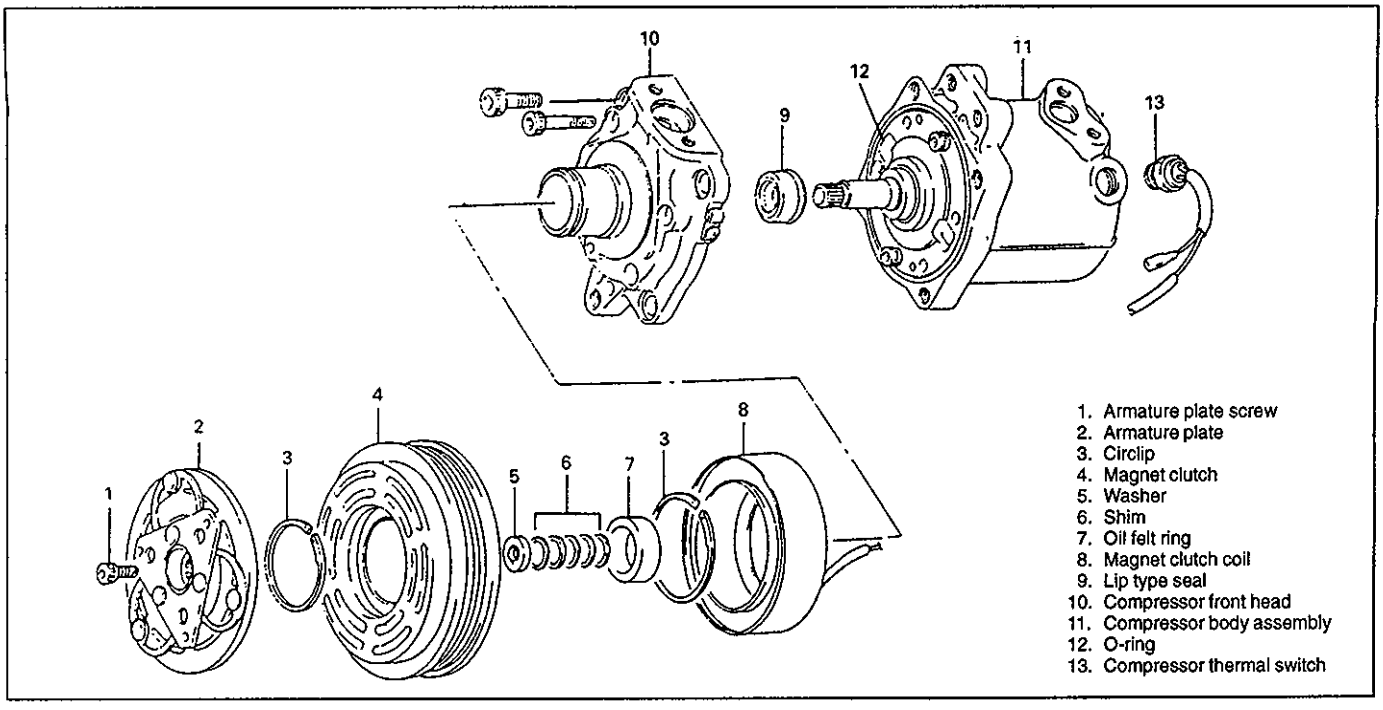
For G16 and H25 engine

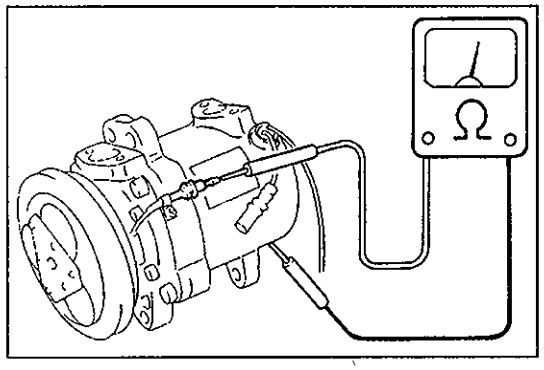
Refer to Section 3B1 for details.

For J20 engine

Refer to Section 6H for details.

MAGNET CLUTCH



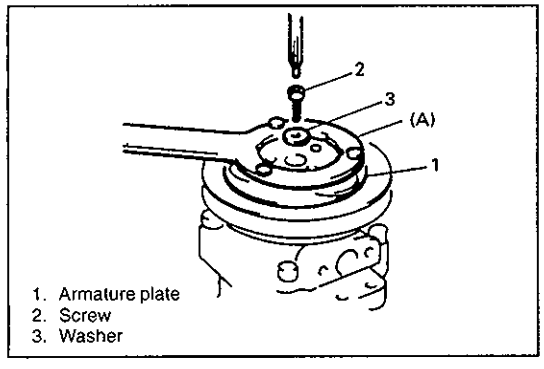


INSPECTION

a. Inspect pressure plate and rotor for signs of oil.
b. Check clutch bearings for noise and grease leakage.
c. Using an ohmmeter, measure resistance of stator coil between clutch lead wire and ground.

If measured resistance is not within tolerance, replace coil.

Standard resistance: SEIKO SEIKI COMPRESSOR
2.9 – 3.8 Ω

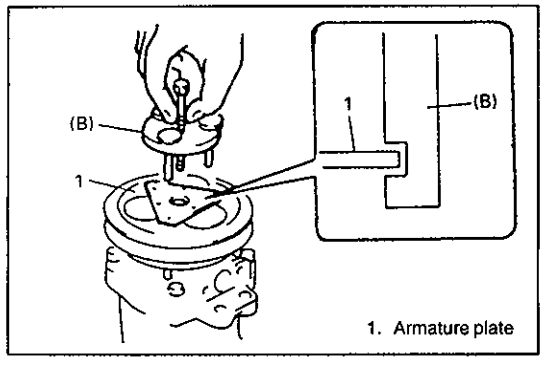


REMOVAL

1) Remove compressor from vehicle. Refer to COMPRESSOR in this section.
2) Fix armature plate with special tool (A) and remove armature plate screw.

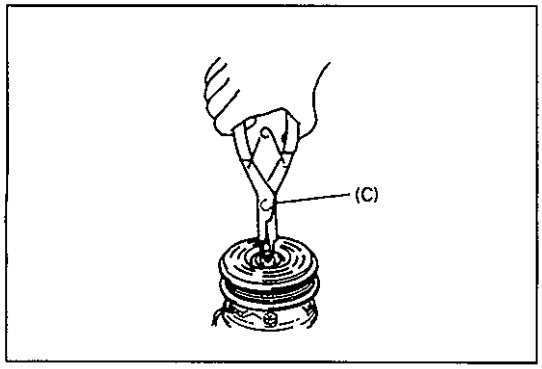
Special Tool
(A): 09991-06020

NOTE:
Do not reuse armature plate nut.



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

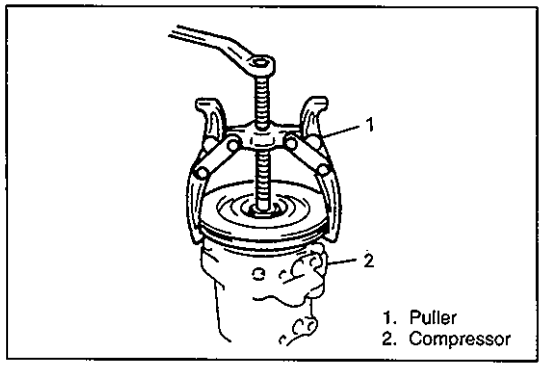
Special Tool
(B): 09991-06030



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

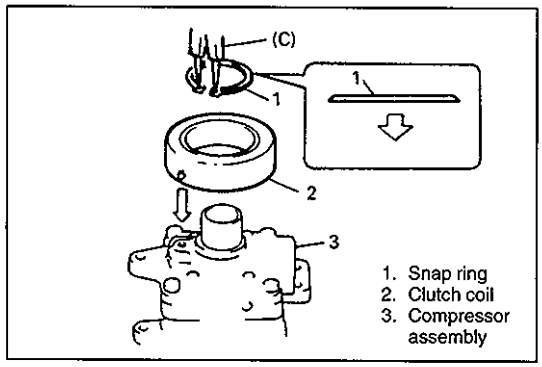
7) Remove magnet clutch lead wire clamp screw, and disconnect magnet clutch read wire.



8) Remove magnet clutch with puller.

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

9) Remove magnet clutch coil.

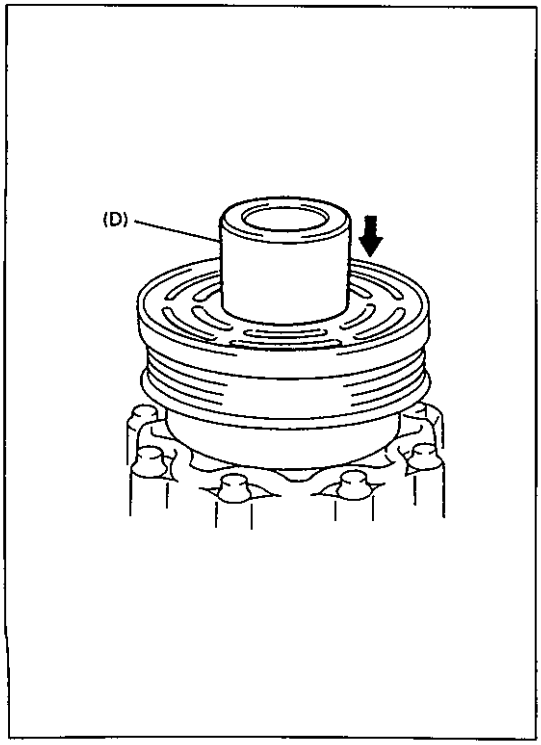


INSTALLATION

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

Special Tool
(C): 09990-06107

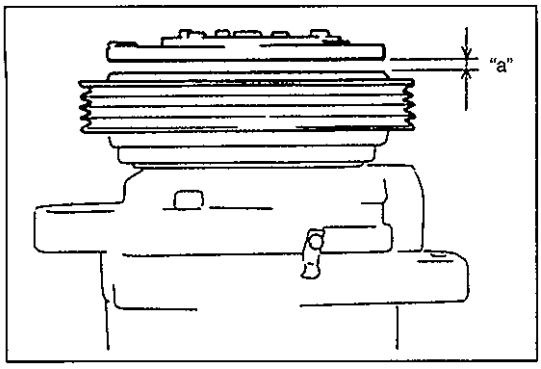
3) Clamp covering portion of lead wire.



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.

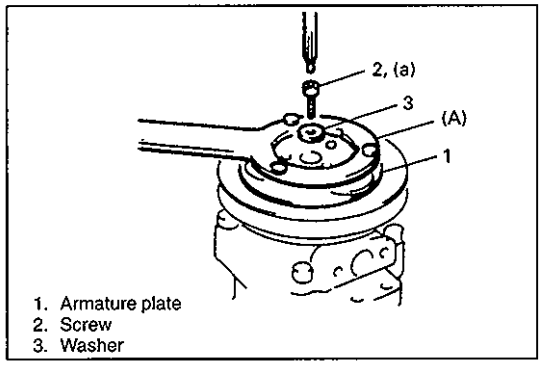
Special Tool
(D): 09991-06010

CAUTION:
Be careful not to scratch bearing seal.



5) Adjust clearance, between armature plate and magnet clutch by putting shim on compressor shaft.

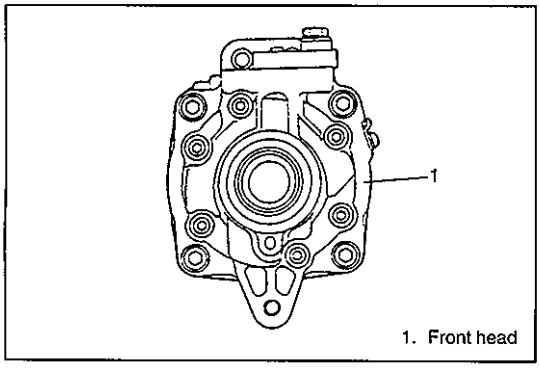
Standard clearance "a": 0.3 – 0.6 mm (0.012 – 0.024 in.)



6) Tighten new armature plate nut as specified below.

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

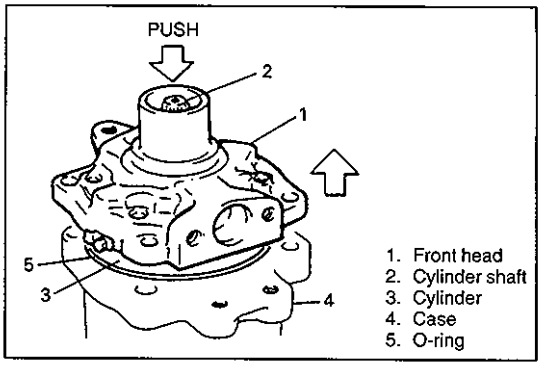
Special Tool
(A): 09991-06020



LIP TYPE SEAL

REMOVAL

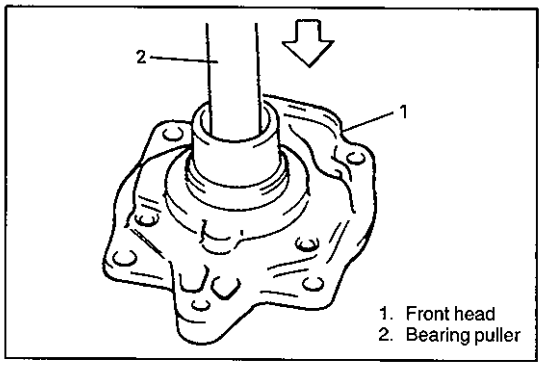
1) Remove magnet clutch, referring to "MAGNET CLUTCH" in this section.
2) Remove front head mounting screw (10 pcs).



3) Remove front head by pushing cylinder shaft.

NOTE:
Be careful not to remove cylinder from case.

4) Remove O-ring.



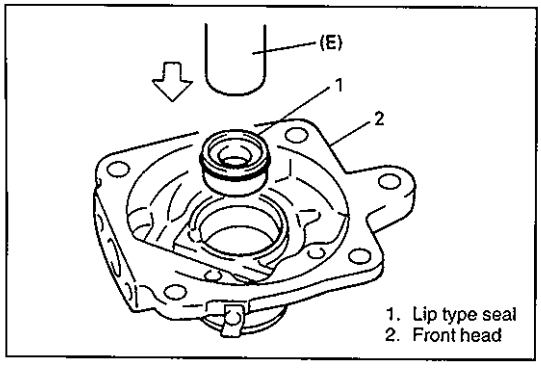
5) Remove lip seal from front head.

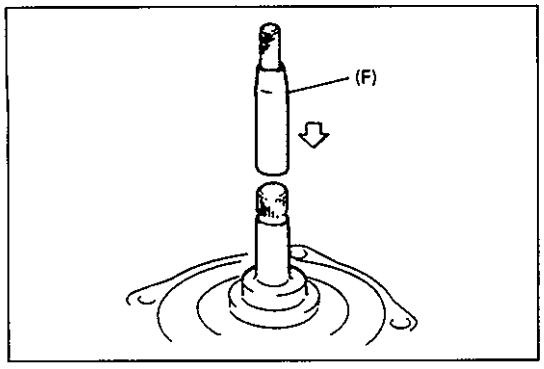
INSTALLATION

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

Special Tool
(E): 09991-06050

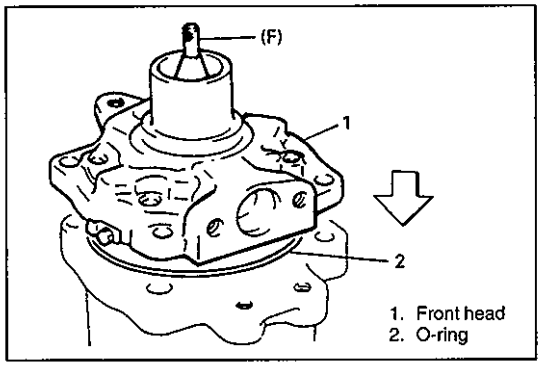
CAUTION:
Do not reuse mechanical seal once removed from compressor.



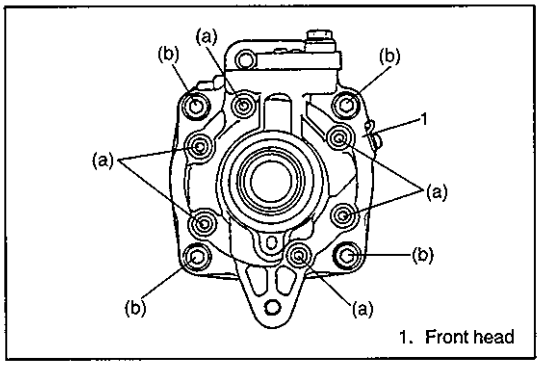


2) Coat special tool (F) surface with oil and place it on the shaft.

Special Tool
(F): 09991-06040



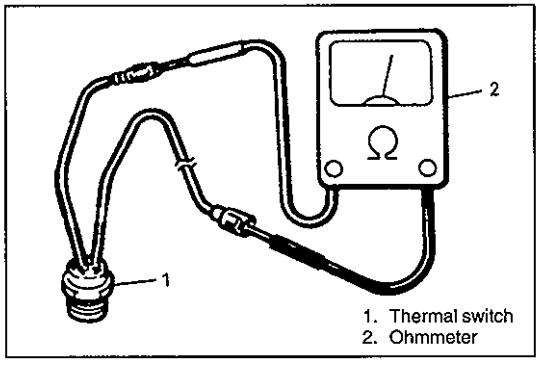
3) Install O-ring to case.
4) Apply A/C oil to lip seal and O-ring.
5) Install front head assembly.



6) Tighten front head bolt.

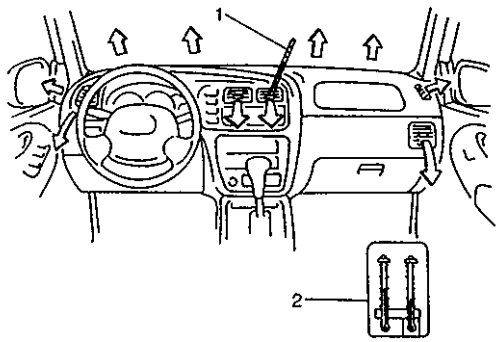
Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

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



COMPRESSOR THERMAL SWITCH

Use an ohmmeter to check thermal switch for continuity. If there 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

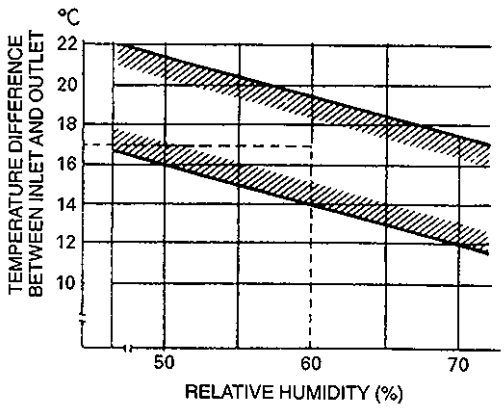
1) Connect high and low side charging hose of manifold gauge set to hose fittings of compressor.
2) Run engine, and keep compressor speed at 2,000 rpm.
3) Operate air conditioning, and set blower switch at "HI", temperature lever at "COOL".
4) Keep all windows and doors open.
5) Insert a dry bulb thermometer 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: 1.37 – 1.67 MPa
   (14 – 17 kg/cm^2, 200 – 243 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.



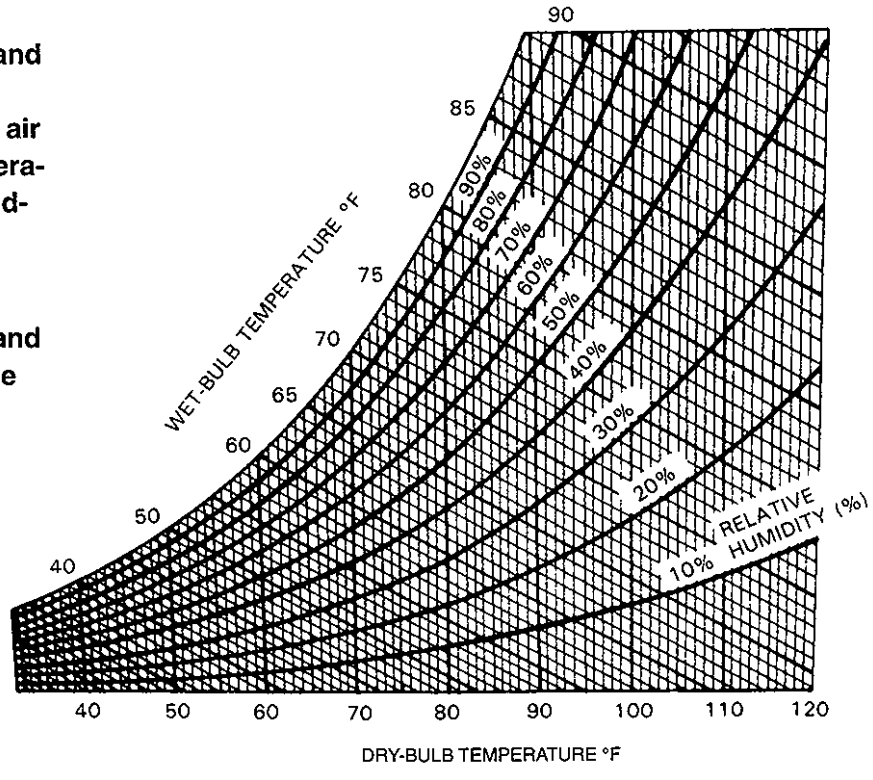
HOW TO READ THE STANDARD PERFORMANCE CURVE

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.

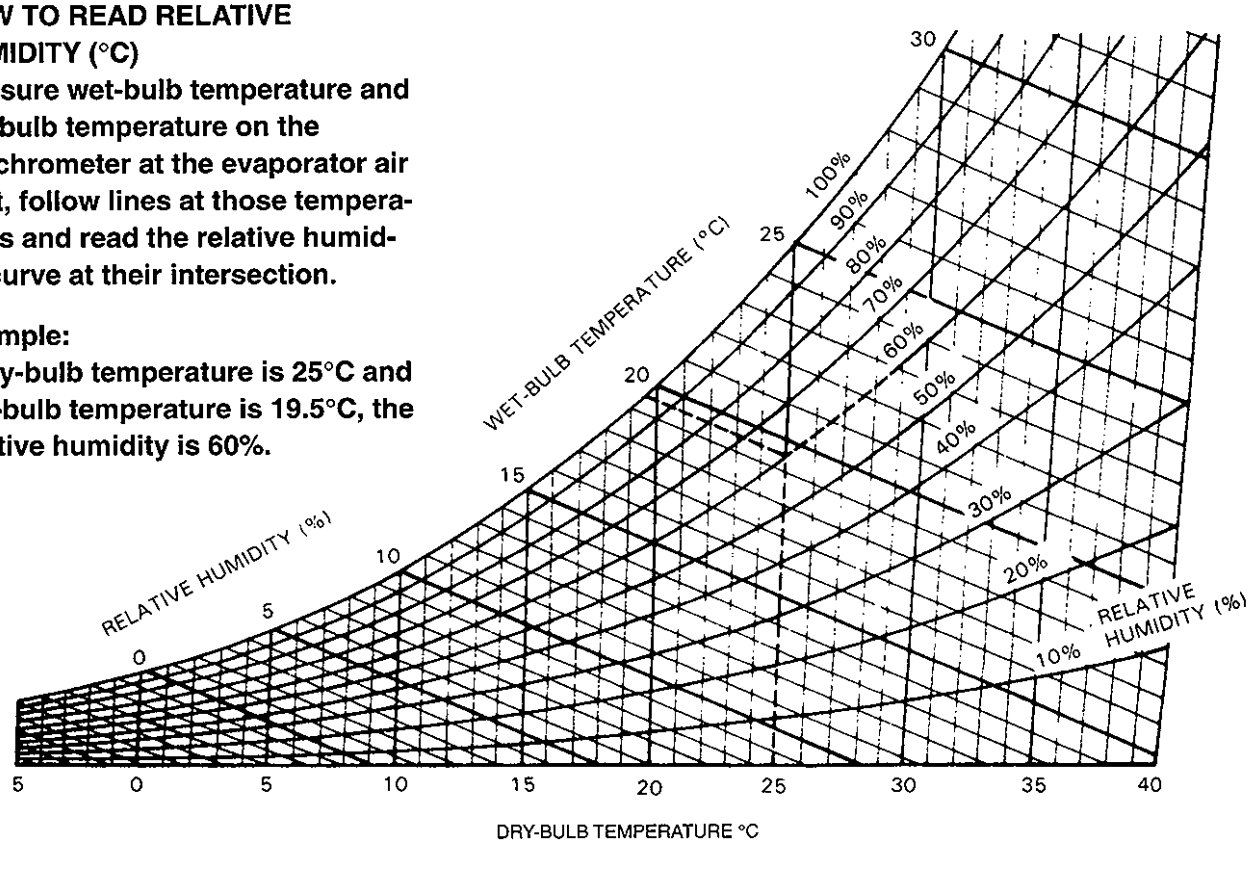
Example:
If dry-bulb temperature is 90°F and wet-bulb temperature is 78°F, the relative humidity is 60%.



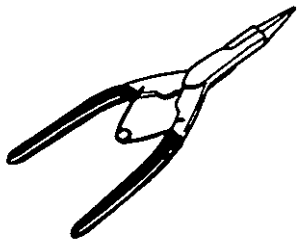
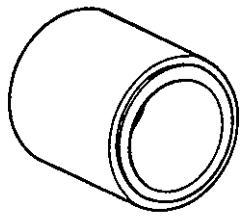
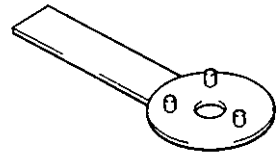
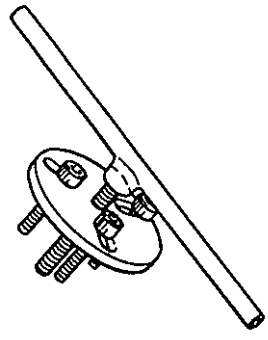
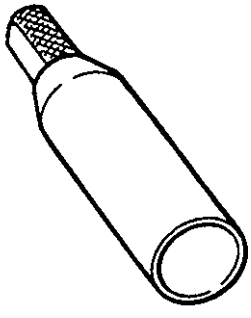
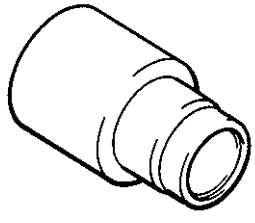
HOW TO READ RELATIVE HUMIDITY (°C)

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)	 09991-06010 Magnet clutch pulley installer	 09991-06020 Armature plate spanner	 09991-06030 Armature plate remover
 09991-06040 Lip type seal protector	 09991-06050 Lip type seal installer		

SECTION 3

STEERING, SUSPENSION, WHEELS AND TIRES

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FRONT END ALIGNMENT 3A-1
HYDRAULIC POWER STEERING (RACK AND PINION TYPE) 3B1-1
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AIR BAG STEERING WHEEL AND COLUMN 3C1-1
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WHEELS AND TIRES 3F-1

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Diagnosis Table 3-1
TIRE DIAGNOSIS 3-6
Irregular and/or Premature Wear 3-6
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Radial Tire Waddle 3-6
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 inspections and correct any defects which are found.

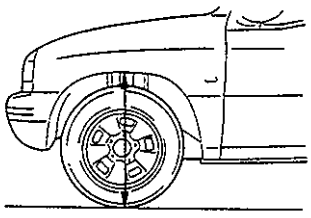
1) Inspect tires for proper pressure and uneven wear.
2) Raise vehicle on a hoist and inspect front and rear suspension and steering system for loose or damaged parts.
3) Spin front wheel. Inspect for out-of-round tires, out-of-balance tires, bent rims, loose and/or rough wheel bearings.

DIAGNOSIS TABLE

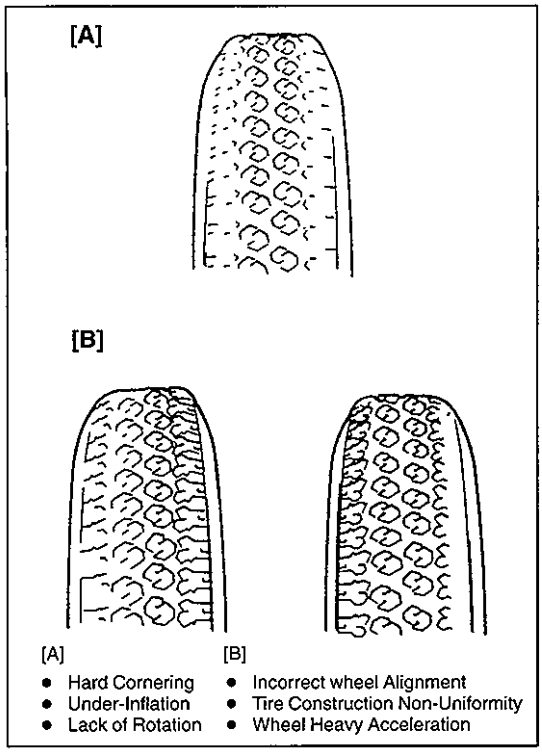
Condition	Possible Cause	Correction
Vehicle Pulls (Leads)	• Mismatched or uneven tires.	Replace tire.
	• Tires not adequately inflated.	Adjust tire pressure.
	• Broken or sagging springs.	Replace spring.
	• Radial tire lateral force.	Replace tire.
	• Disturbed front end alignment.	Check front end alignment.
	• Disturbed rear axle alignment.	Check rear axle alignment.
	• Brake dragging in one road wheel.	Repair front brake.
	• Loose, bent or broken front or rear suspension parts.	Tighten or replace suspension part.

Condition	Possible Cause	Correction
Abnormal or Excessive Tire Wear	• Sagging or broken springs.	Replace spring.
	• Tire out of balance.	Adjust balance or replace tire.
	• Disturbed front end alignment.	Check front end alignment.
	• Faulty shock absorber.	Replace shock absorber.
	• Hard driving.	Replace tire.
	• Overloaded vehicle.	Replace tire.
	• Tires not rotating.	Replace or rotate tire.
	• Worn or loose road wheel bearings.	Replace wheel bearing.
	• Wobbly wheel or tires.	Replace wheel or tire.
	• Tires not adequately inflated.	Adjust the pressure.
Wheel Tramp	• Blister or bump on tire.	Replace tire.
	• Improper shock absorber action.	Replace shock absorber.
Shimmy, Shake or Vibration	• Tire or wheel out of balance.	Balance wheels or replace tire and/or wheel.
	• Loose wheel bearings.	Replace wheel bearing.
	• Worn tie rod ends.	Replace tie rod end.
	• Worn lower ball joints.	Replace front suspension control arm.
	• Excessive wheel runout.	Repair or replace wheel and/or tire.
	• Blister or bump on tire.	Replace tire.
	• Excessively loaded radial runout of tire/wheel assembly.	Replace tire or wheel.
	• Disturbed front end alignment.	Check front end alignment.
	• Loose or worn tie-rod end.	Tighten or replace tie-rod end.
	• Loose steering gear case bolts.	Tighten case bolts.
Hard Steering	• Bind in tie rod end ball studs or lower ball joints.	Replace tie rod end or front suspension control arm.
	• Disturbed front end alignment.	Check front end alignment.
	• Rack and pinion not properly adjusted. (if equipped with manual steering gear case)	Check and adjust steering gear box.
	• Tire not adequately inflated.	Inflate tires to proper pressure.
	• Bind in steering column.	Repair or replace.
	• Low fluid level, loose drive belt or malfunction of power steering system. (if equipped with P/S)	Check and correct.

Condition	Possible Cause	Correction
Too Much Play in Steering	• Wheel bearings worn. • Loose steering gear case bolts. • Rack and pinion not properly adjusted. (if equipped with manual steering gear case) • Worn steering shaft joints. • Worn tie rod ends or tie rod inside ball joints. • Worn lower ball joints.	Replace wheel bearing. Tighten. Check and adjust rack and pinion torque. Replace joint. Replace tie rod end or steering gear case. Replace front suspension control arm.
Poor Returnability	• Bind in tie rod end ball studs. • Bind in ball joints. • Bind in steering column. • Poorly lubricated rack and pinion. (if equipped with manual steering gear case) • Disturbed front end alignment. • Rack and pinion not properly adjusted. (if equipped with manual steering gear case) • Tires not adequately inflated.	Replace tie rod end. Replace ball joint. Repair or replace. Check, repair or lubricate rack and pinion. Check and adjust front end alignment. Check and adjust rack and pinion torque. Adjust pressure.
Steering Noise (Rattle or Chuckle)	• Loose bolts and nuts. • Broken or otherwise damaged wheel bearings. • Worn or sticky tie rod ends. • Rack and pinion not properly adjusted. (if equipped with manual steering gear case)	Retighten. Replace. Replace. Check and adjust rack and pinion torque.
Abnormal Noise, Front End	• Worn, sticky or loose tie rod ends, lower ball joints, tie rod inside ball joints or drive shaft joints. • Damaged shock absorbers, struts or mountings. • Worn control arm bushings. • Loose stabilizer bar. • Loose wheel nuts. • Loose suspension bolts or nuts. • Broken or otherwise damaged wheel bearings. • Broken suspension springs. • Poorly lubricated or worn strut bearings.	Replace tie rod end, control arm, steering gear case or drive shaft joint. Replace or repair. Replace. Tighten bolts or replace bushes. Tighten wheel nuts. Tighten suspension bolts or nuts. Replace wheel bearing. Replace spring. Lubricate or replace strut bearing.

Condition	Possible Cause	Correction
Wander or Poor Steering Stability	• Mismatched or uneven tires.	Replace tire or inflate tires to proper pressure.
	• Loose ball joints and tie rod ends.	Replace suspension control arm or tie rod end.
	• Faulty shock absorbers/struts or mounting.	Replace absorber/strut or repair mounting.
	• Loose stabilizer bar.	Tighten or replace stabilizer bar or bushes.
	• Broken or sagging springs.	Replace spring.
	• Rack and pinion not properly adjusted. (if equipped with manual steering gear case)	Check or adjust rack and pinion torque.
	• Front end alignment	Check front end alignment.
Erratic Steering when Braking	• Worn wheel bearings.	Replace wheel bearing.
	• Broken or sagging springs.	Replace spring.
	• Leaking wheel cylinder or caliper.	Repair or replace wheel cylinder or caliper.
	• Warped discs.	Replace brake disc.
	• Badly worn brake linings.	Replace brake shoe lining.
	• Drum is out of round in some brakes.	Replace brake drum.
	• Wheel tires are inflated unequally.	Inflate tires to proper pressure.
	• Defective wheel cylinders.	Replace or repair wheel cylinder.
	• Disturbed front end alignment.	Check front end alignment.
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.	• Broken or sagging springs.	Replace spring.
	• Overloaded.	Check loading.
	• Incorrect springs.	Replace spring.
Ride Too Soft	• Faulty shock absorber or struts.	Replace shock absorber or strut.
Suspension Bottoms	• Overloaded.	Check loading.
	• Faulty shocks or struts.	Replace shock absorber or strut.
	• Incorrect broken or sagging springs.	Replace spring.

Condition	Possible Cause	Correction
Body Leans or Sways in Corners	● Loose stabilizer bar.	Tighten stabilizer bar bolts or replace bushes.
	● Faulty shock absorbers, struts or mounting.	Replace shock absorber, strut or tighten mounting.
	● Broken or sagging springs.	Replace spring.
	● Overloaded.	Check loading.
Cupped Tires	● Front struts defective.	Replace strut.
	● Worn wheel bearings.	Replace wheel bearing.
	● Excessive tire or wheel run-out.	Replace tire or wheel disc.
	● Worn ball joints.	Replace front suspension control arm.
	● Tire out of balance.	Adjust tire balance.



TIRE DIAGNOSIS

IRREGULAR AND/OR PREMATURE WEAR

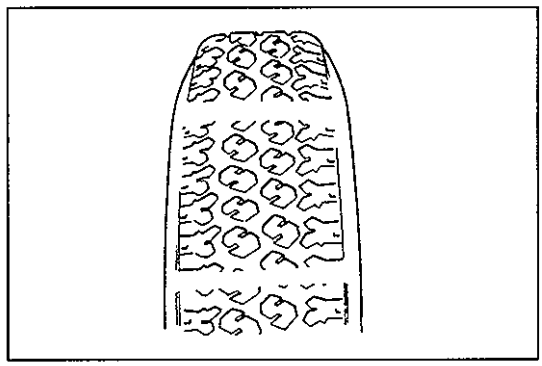
Irregular and premature wear has many possible causes. Some of them are: incorrect inflation pressures, lack of tire rotation, driving habits, improper alignment.

If the following conditions are noted, rotation is in order:

1. Front tire wear is different from rear.
2. Uneven wear exists across the tread of any tire.
3. Left front and right front tire wear is unequal.
4. Left rear and right rear tire wear is unequal.
5. There is cupping, flat spotting, etc.

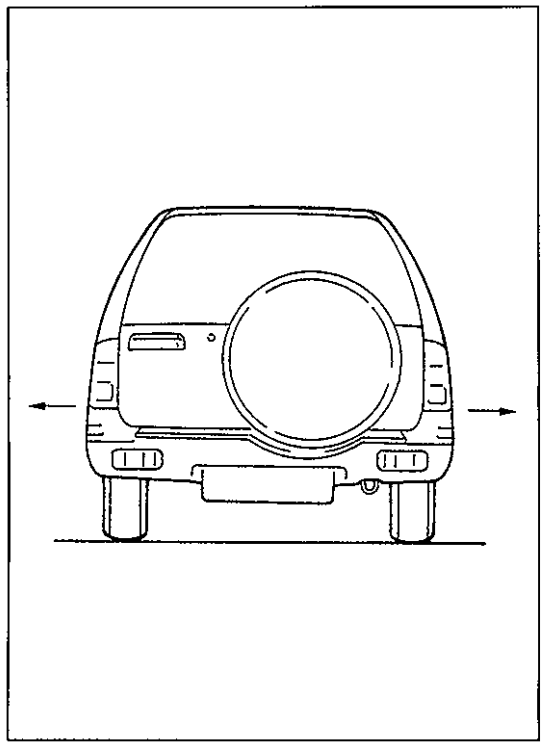
A wheel alignment check is in order if the following conditions are noted:

1. Left front and right front tire wear is unequal.
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 INDICATOR

The original equipment tires have built-in tread wear indicators to show when tires 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.



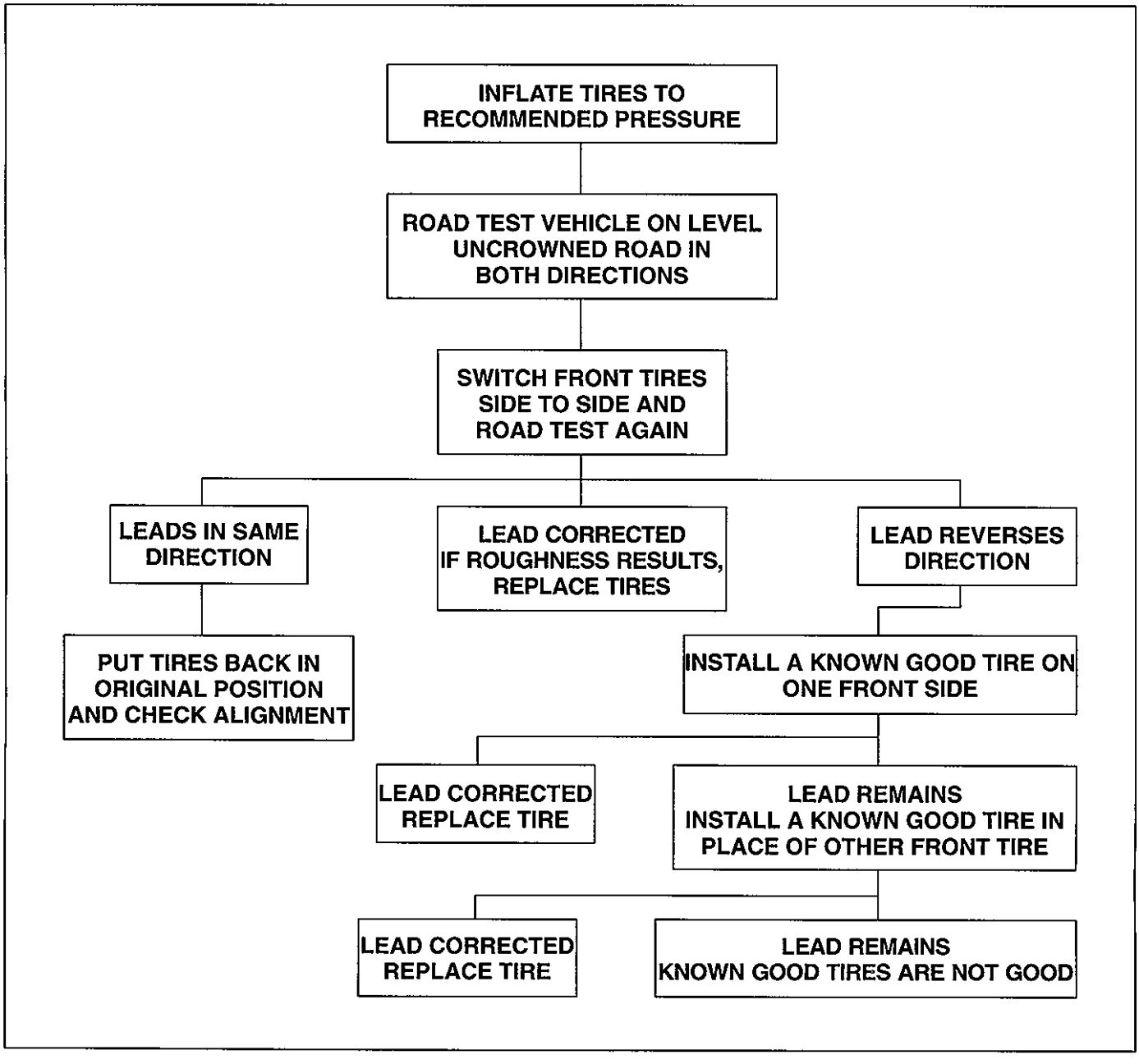
RADIAL TIRE WADDLE

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 low speed, 8 to 48 km/h (5 to 30 mph). It is possible to road test a vehicle and tell on which end of the vehicle the faulty tire is located. If the waddle tire is on the rear, the rear end of the vehicle will shake from side to side or "waddle". From the driver's seat it feels as though someone is pushing on the side of the vehicle. If the faulty tire is on the front, the waddle 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 the vehicle.

Waddle can be quickly diagnosed by using a Tire Problem Detector (TPD) and following the equipment manufacturer's recommendations.

If a TPD is not available, the more time consuming method of substituting known good tire/wheel assemblies on the problem vehicle can be used as follows:

1. Ride vehicle to determine if the waddle is coming from the front or rear.
2. Install tires and wheels that are known to be good (on similar vehicle) in place of those on the offending end of the vehicle. If the waddle cannot be isolated to front or rear, substitute the rears.
3. Road test again. If improvement is noted, install originals one at a time until offender is found. If no improvement is noted, install known good tires in place of all four. Then install originals one at a time until offender if found.



RADIAL TIRE LEAD

"Lead" is the deviation of the vehicle from a straight path on a level road with no pressure on the steering wheel.
Lead is usually caused by:
1) Incorrect alignment.
2) Uneven brake adjustment.
3) Tire construction.

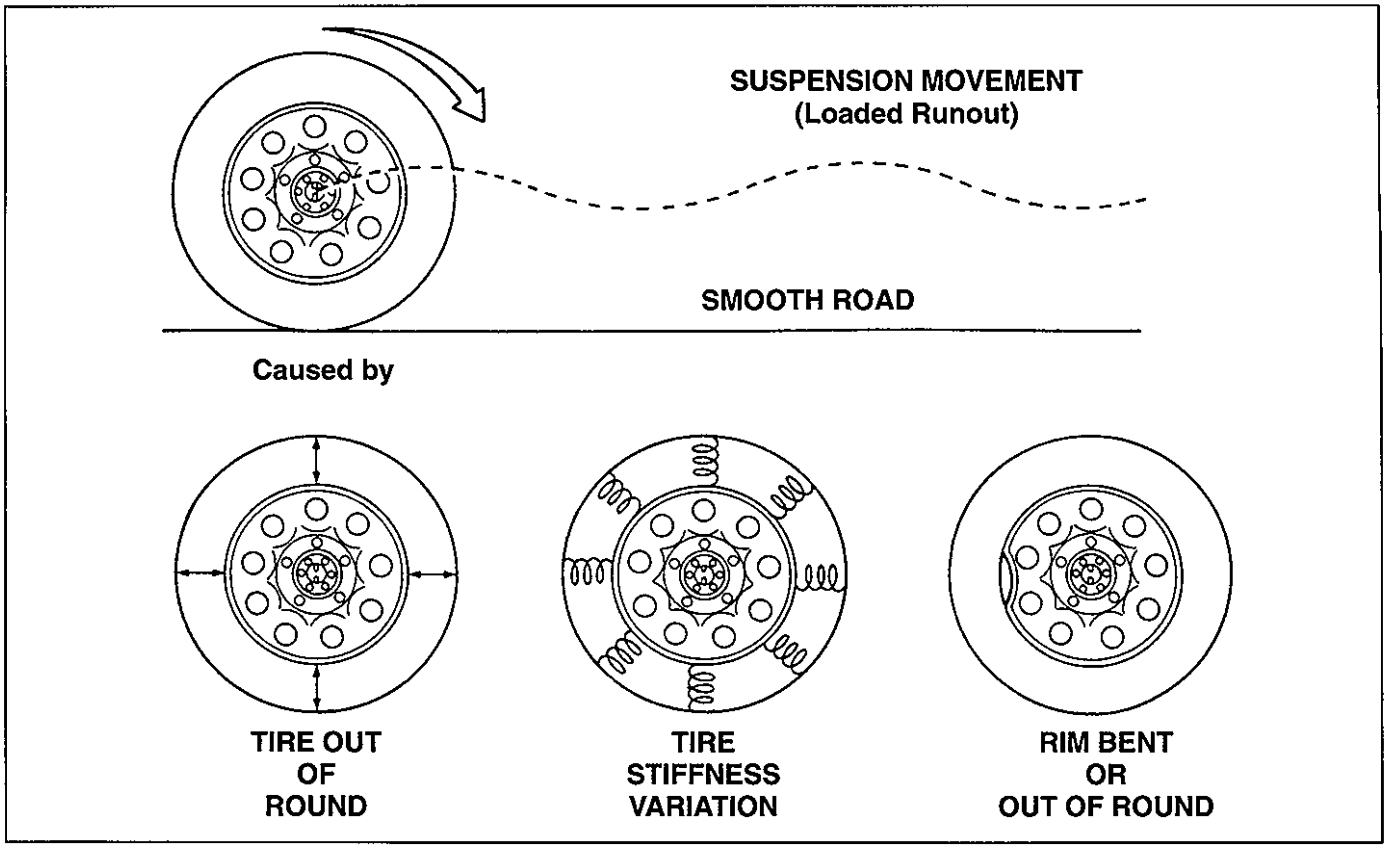
The way in which a tire is built can produce lead in a vehicle. An example of this is placement of the belt. Off center belts on radial tires can cause the tire to develop a side force while rolling straight down the road. If one side of the tire is a little larger diameter than the other, the tire will tend to roll to one side. This will develop a side force which can produce vehicle lead.
The procedure on previous page 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 tire rotation pattern currently in the owner's 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, it can be caused by three things.
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 a TPD is not available, the more time consuming method of substituting known good tire and wheel assemblies on the problem vehicle can be used.


SUSPENSION MOVEMENT
(Loaded Runout)
SMOOTH ROAD
Caused by
TIRE OUT OF ROUND
TIRE STIFFNESS VARIATION
RIM BENT OR OUT OF ROUND

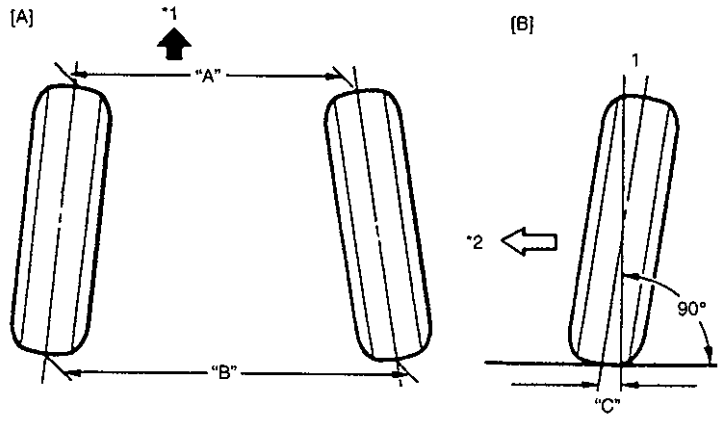
SECTION 3A

FRONT END ALIGNMENT

CONTENTS

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Toe-Setting 3A-1
Camber 3A-2
Preliminary Check Prior to Adjusting Front Alignment 3A-2
Toe Adjustment 3A-2
Camber and Caster Adjustment 3A-2
Steering Angle 3A-3

GENERAL INFORMATION



Alignment service data (without load)
Toe-in (Toe-in gauge measurement)
"B" – "A": 0 ± 2 mm (0 ± 0.08 in.)
Camber angle "C": 0' ± 1°
Caster: 2°40' ± 1°

*1. Forward [A] : Top view
*2. Body center [B] : Front view

1. Center line of wheel

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 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" front "B" as shown in above figure and therefore is given in mm (in.).

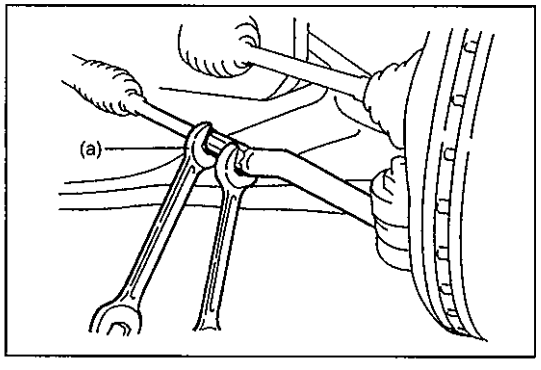
CAMBER

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 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 control 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.



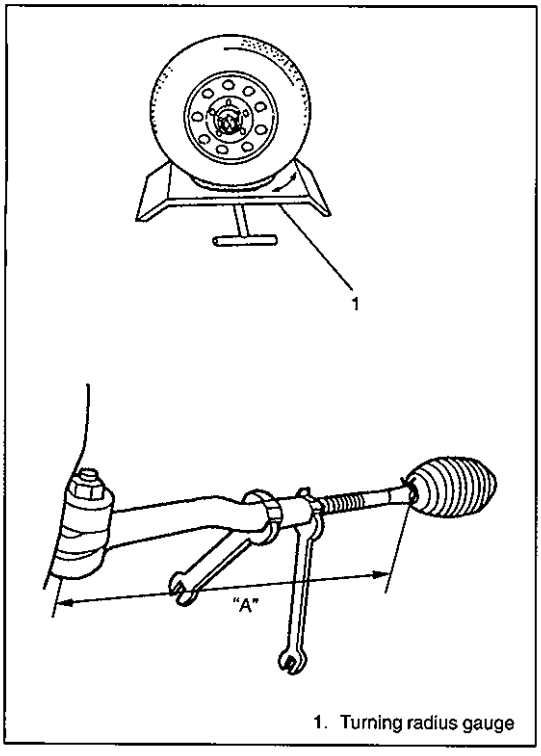
TOE ADJUSTMENT

Toe is adjusted by changing 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.
After adjustment, tighten lock nuts to specified torque.

Tightening Torque
(a): 65 N·m (6.5 kg-m, 47.0 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 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.



1. Turning radius gauge

STEERING ANGLE

When tie rod end was replaced, check toe and then also steering angle with turning radius gauges.
If steering angle is not correct, check if right and left tie-rods are equal in length ("A" in left figure).

Steering angle
inside: 34.5° ± 3°
outside: 32.5° ± 3°

NOTE:
If tie rod lengths were changed to adjust steering angle, reinspect toe-in.

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 ft)

If side slip exceeds above limit, toe-in or front wheel alignment may out not be correct.

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 "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).**

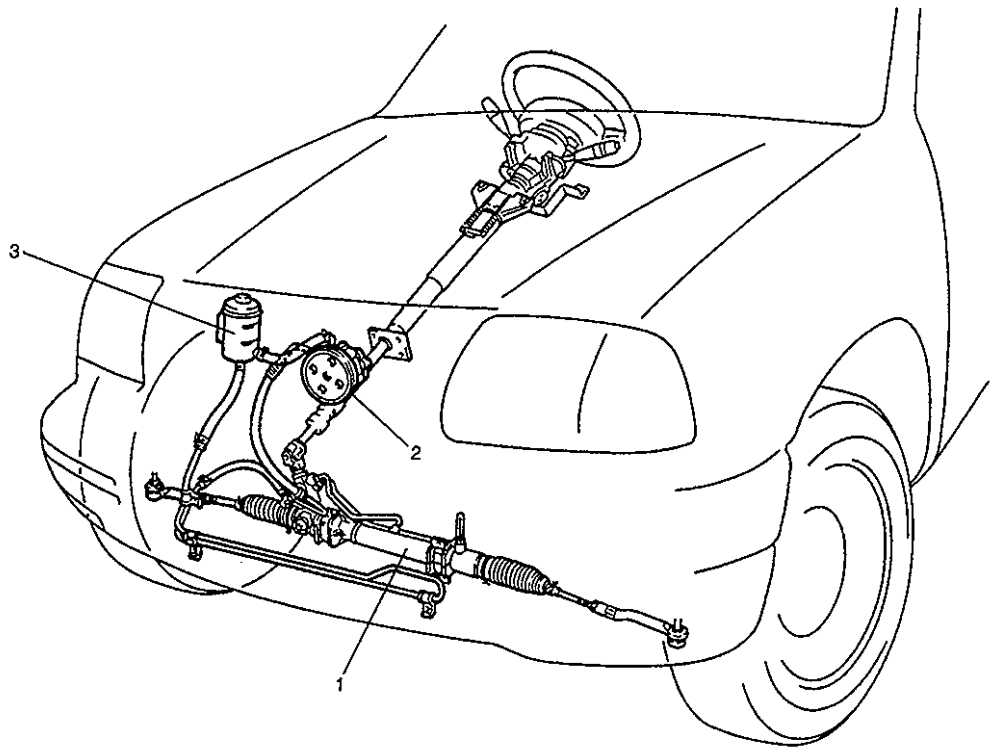
NOTE:
- **Some parts in the Power Steering Gear Box cannot be disassembled or adjusted. For detailed information, refer to the description of POWER STEERING GEAR BOX COMPONENTS under REMOVE AND INSTALL POWER STEERING GEAR BOX.**
- **All steering gear fasteners are important attaching parts in that they 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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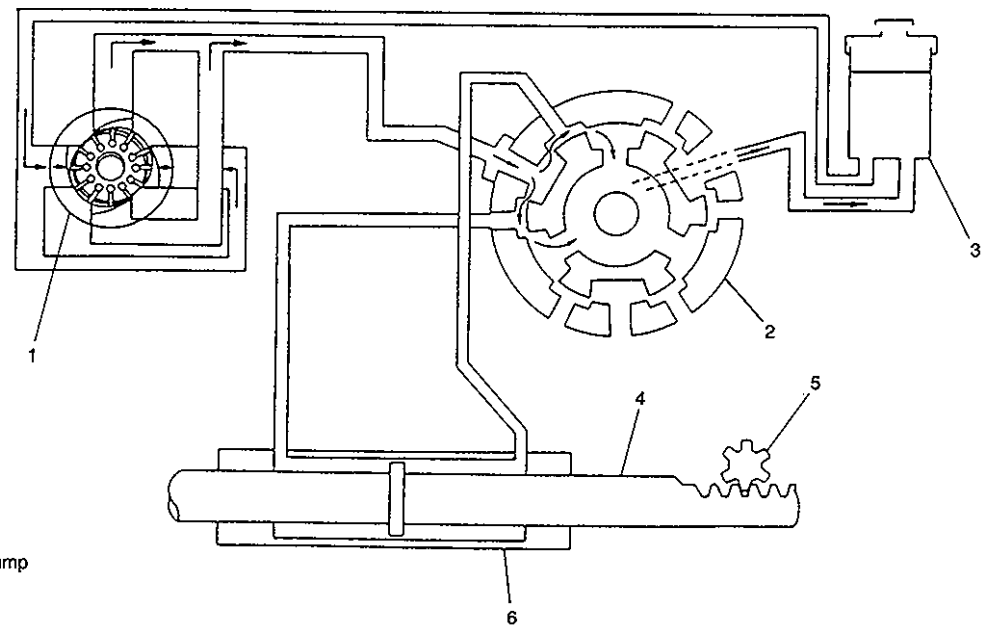
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GENERAL DESCRIPTION

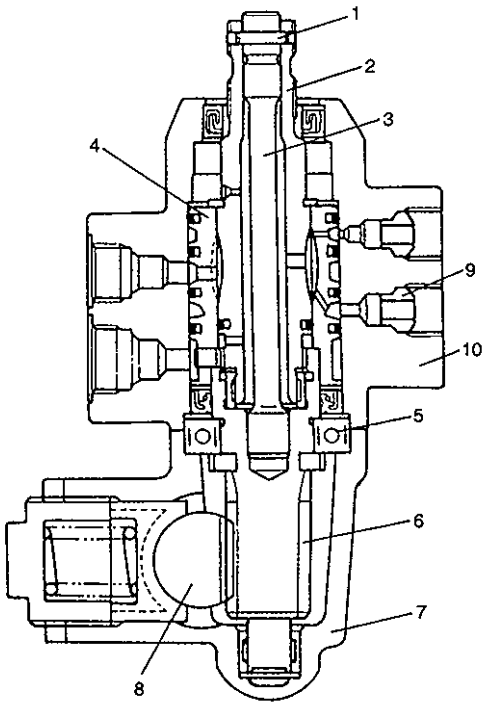
The power steering (P/S) system in this vehicle reduces the driver's effort needed in turning the steering wheel by utilizing the hydraulic pressure generated by the power steering (P/S) pump which is driven by the engine. It is an integral type with the rack and pinion gears and the control valve unit,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



1. Power steering gear box
2. Power steering pump
3. Oil tank



1. Power steering pump
2. Valve section
3. Oil tank
4. Rack
5. Pinion
6. Cylinder



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

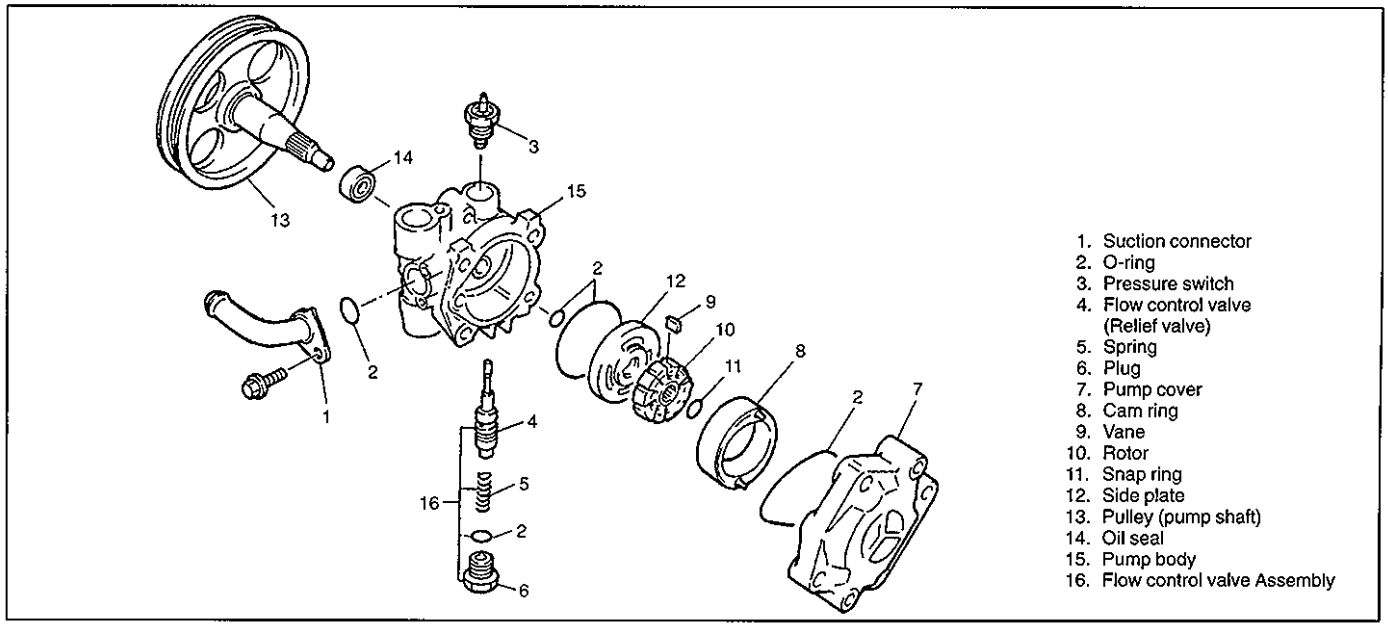
The steering gear box consists of two sections: one including a cylinder and the other a valve. Main components of the cylinder section are a gear box, a rack and a tube and those of the valve section are a valve case, a sleeve and a stub shaft. The sleeve is linked with the pinion through a pin and 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.

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	6500 kPa (65 kg/cm^2, 924 psi) ..... G16 Type engine 7000 kPa (70 kg/cm^2, 995 psi) ..... J20 Type engine 7500 kPa (75 kg/cm^2, 1066 psi) ..... H25 Type engine
	Control device	Flow control valve
		Relief valve
Power steering pressure switch		Switch turns on (closes) when the pressure is higher than 2500 – 3500 kPa (25 – 35 kg/cm^2, 356 – 498 psi). ECM uses this signal for idle speed control.
Capacity		0.70 – 0.75 ℓ (1.48/1.23 – 1.58/1.32 US/Imp. pt)
Specified fluid		DEXRON®II, DEXRON®III A/T fluid or equivalent

FLOW CONTROL VALVE

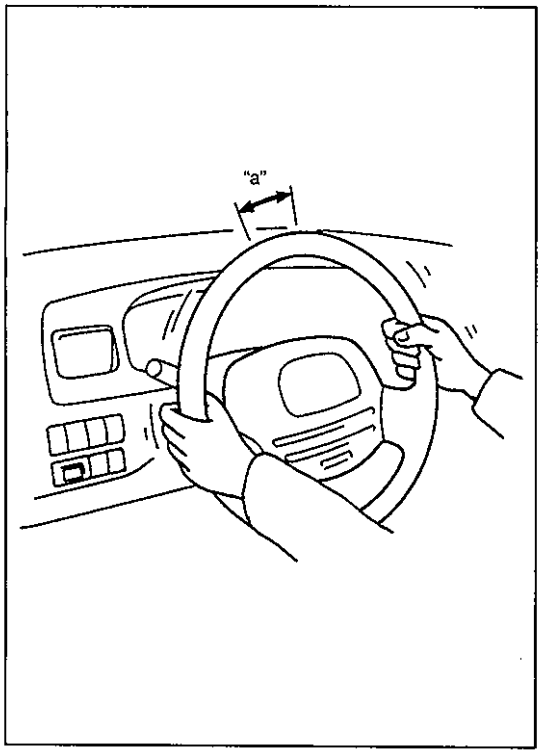
As the discharge rate of the P/S pump increases in proportion to the pump revolution speed, a flow control valve is added to control it so that the optimum amount of fluid for steering operation is supplied according to the engine speed (driving condition).

DIAGNOSIS

DIAGNOSIS TABLE

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. It 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.
	• 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.
No idle up	• Power steering pressure switch defective	Replace power steering pressure switch.



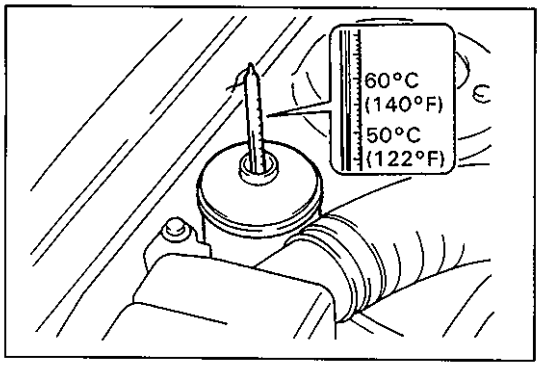
STEERING WHEEL CHECK

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.)

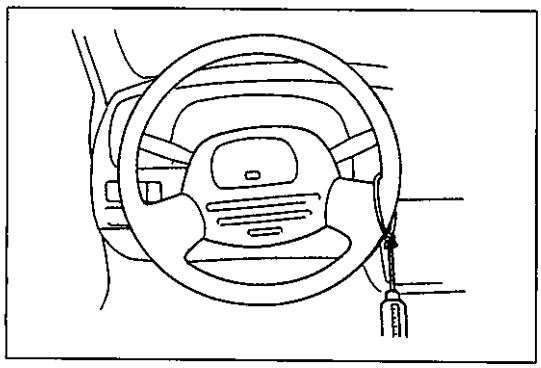
If steering wheel play is not within specification, inspect as follows and replace if found defective.

- 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



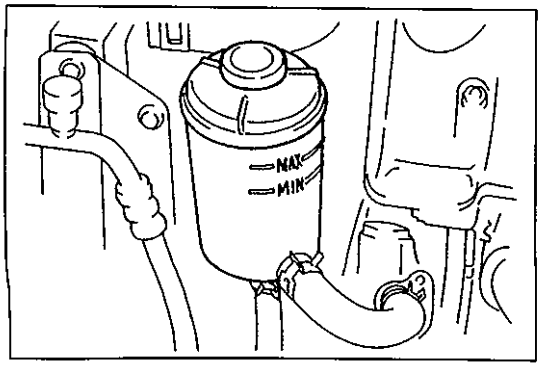
STEERING FORCE CHECK

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 to 60°C (122 to 140°F).



4) With engine idling, measure steering force by pulling spring balancer hooked on steering wheel in tangential direction.

   Steering force: Less than 50 N (5.0 kg, 11.0 lb)

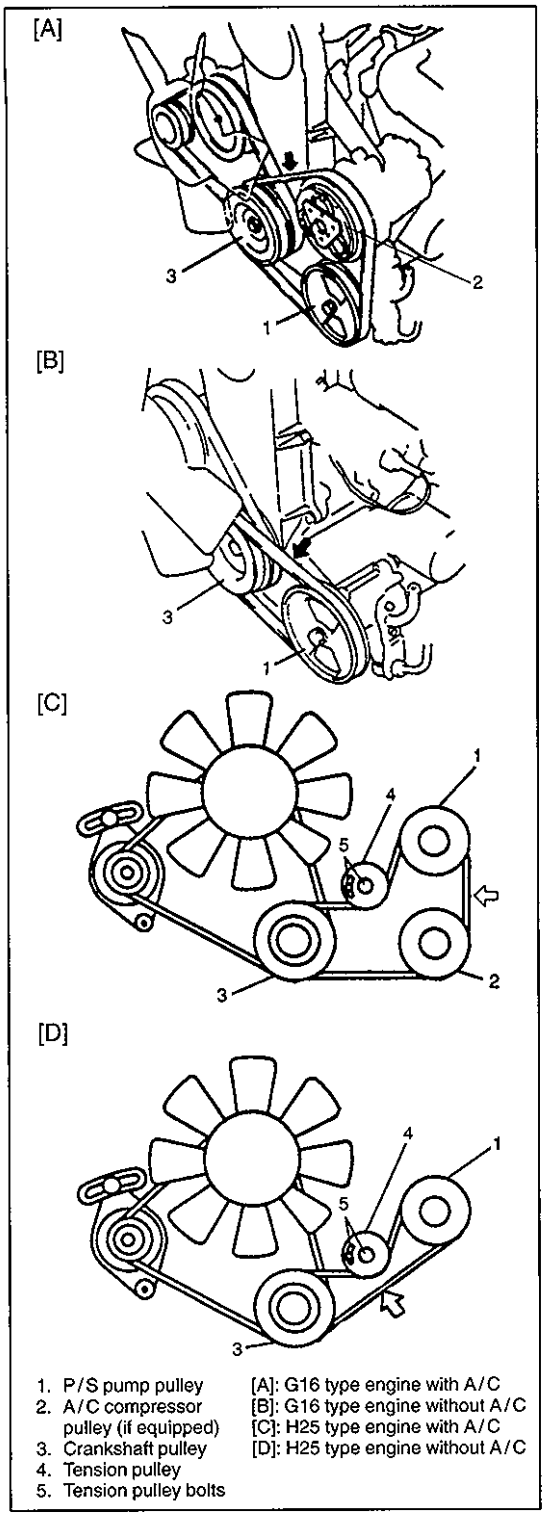


POWER STEERING FLUID LEVEL CHECK

With engine stopped, check fluid level indicated on oil tank, which should be between "MAX" and "MIN" marks. If it is lower than "MIN" mark, fill fluid up to "MAX" mark.

NOTE:

- **Be sure to use an specified power steering fluid.**
- **Fluid level should be checked when fluid is cool.**



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

[A]: G16 type engine with A/C
[B]: G16 type engine without A/C
[C]: H25 type engine with A/C
[D]: H25 type engine without A/C

STEERING BELT CHECK AND ADJUSTMENT

NOTE:
For J20 Type engine, refer to Section 6H "GENERATOR BELT" in this manual.

- Check that belt is free from any damage and properly fitted in pulley groove.
- Check belt tension by measuring how much it deflects when pushed at intermediate point between pulleys with about 10 kg (22 lb) force.

Deflection of P/S belt:
6 – 9 mm (0.24 – 0.35 in.) ..... G16 Type engire
4 – 9 mm (0.16 – 0.35 in.) ..... H25 Type engire

[For G16 Type engine]

a) To adjust P/S belt tension, use adjusting bolt of compressor for A/C equipped vehicles and that of P/S pump for vehicles without A/C.
b) Adjust belt tension to above specification.
c) Then tighten adjusting and mounting bolts to specified torque.

[For H25 Type engine]

a) To adjust P/S belt tension, loosen tension pulley bolts and turn tension pulley using hexagon wrench.
b) Adjust belt tension to above specification.
Then tighten tension pulley bolts to specified torque.

Tightening Torque
Tension pulley bolts: 25 N·m (2.5 kg-m, 18.5 lb-ft)

[For J20 Type engine]

To adjust P/S belt tension, refer to "GENERATOR BELT" in section 6H.

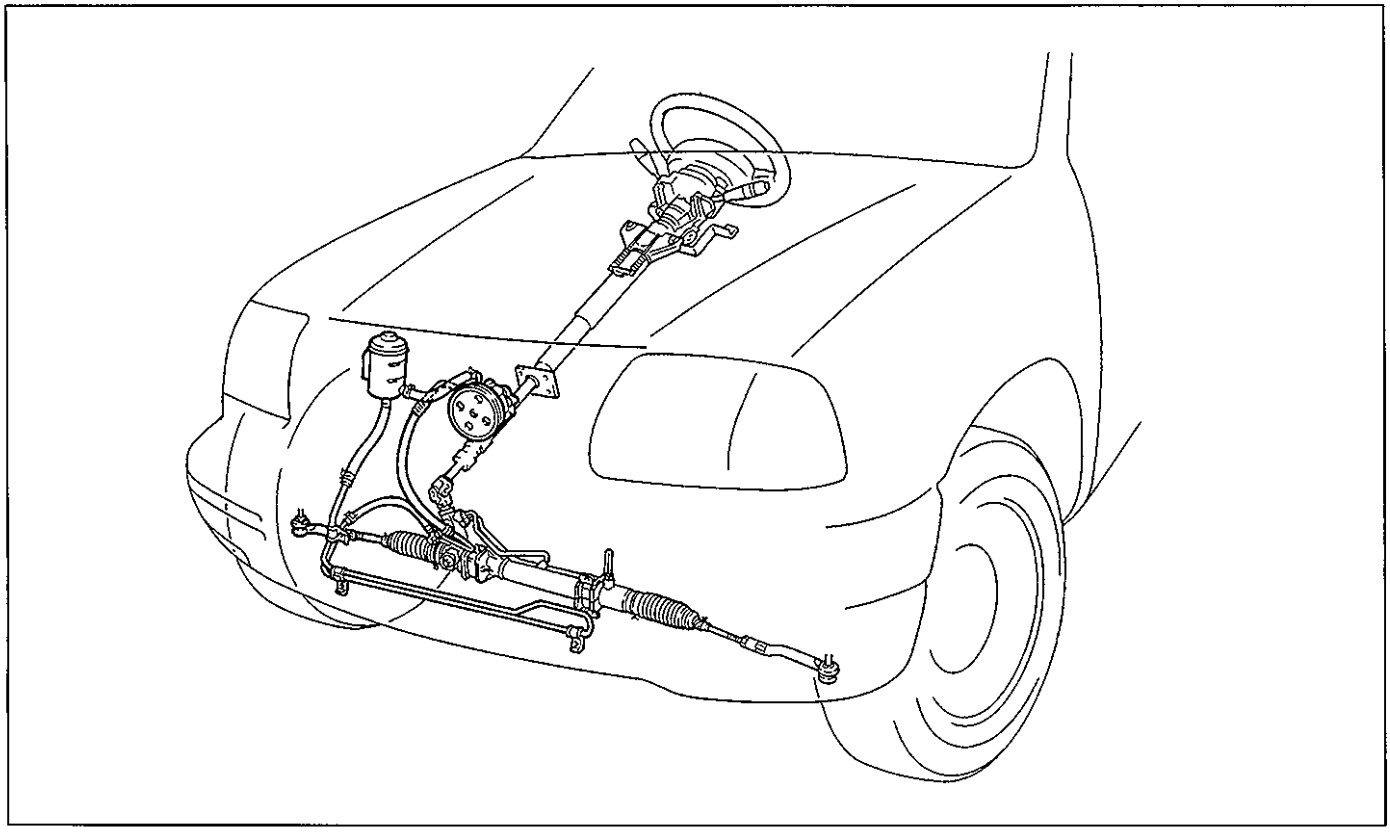
IDLE UP SYSTEM CHECK

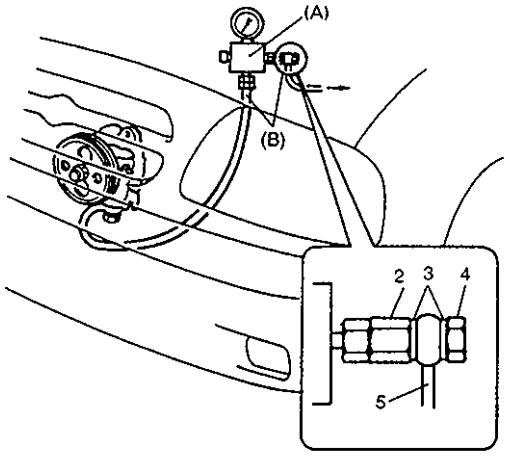
1) Warm up engine to normal operating temperature.
2) Turn A/C switch OFF, if equipped.
3) Turn steering wheel fully and check idle speed.
Engine idle speed drops a little momentarily when steering wheel is turned fully but returns to its specified level immediately. If power steering pressure switch 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.

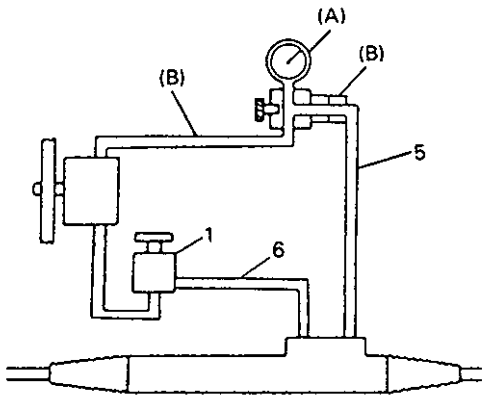
FLUID LEAKAGE CHECK

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 oil tank themselves and each joint of their connecting pipes for leakage.

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







1. Oil tank
2. Attachment
3. Gasket
4. Union bolt
5. High pressure side
6. Low pressure side

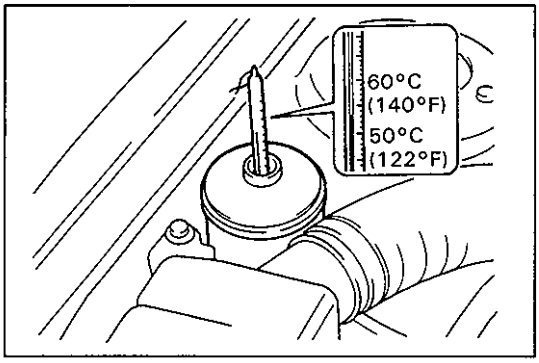
HYDRAULIC PRESSURE IN P/S CIRCUIT CHECK

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.

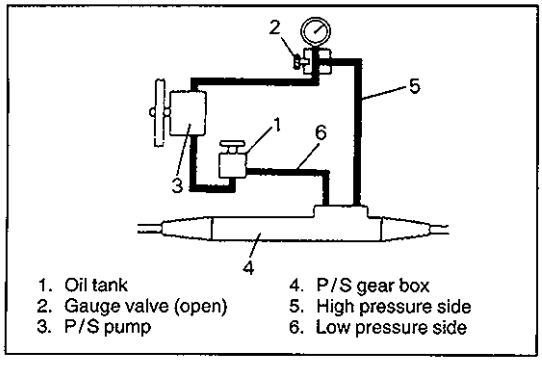
CAUTION:
Take care not to cause damage to A/C condenser during service operation, if equipped.

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

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).

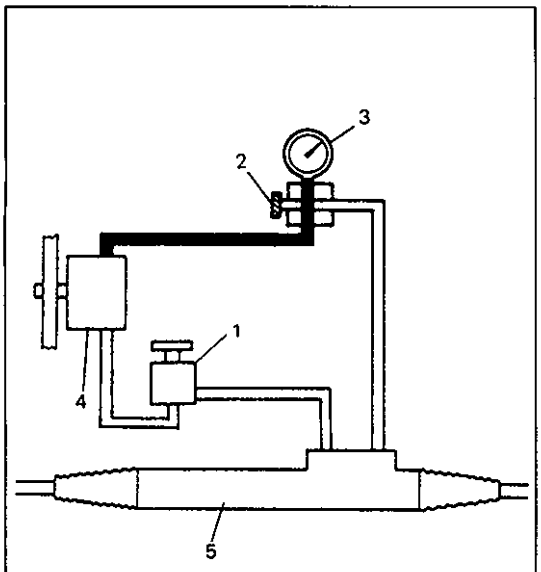


1. Oil tank
2. Gauge valve (open)
3. P/S pump
4. P/S gear box
5. High pressure side
6. Low pressure side

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. Oil tank
2. Gauge valve (shut)
3. Oil pressure gauge
4. P/S pump
5. P/S gear box

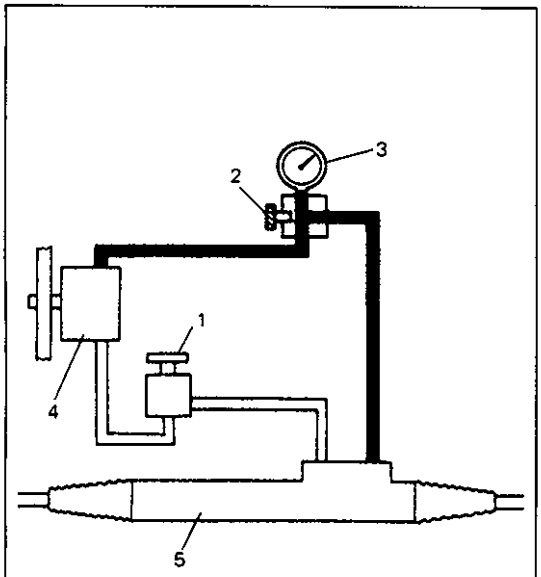
5) Check relief pressure

- 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:
6200 – 7000 kPa
(62 – 70 kg/cm², 882 – 995 psi) ..... G16 Type engine
6700 – 7500 kPa
(67 – 75 kg/cm², 953 – 1067 psi) ..... J20 Type engine
7200 – 8000 kPa
(72 – 80 kg/cm², 1024 – 1138 psi) ..... H25 Type engine

- 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.



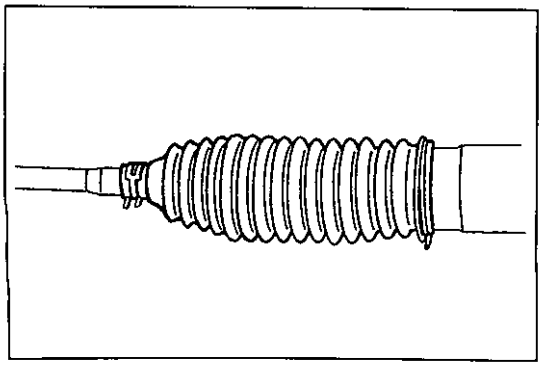
1. Oil tank
2. Gauge valve (open)
3. Oil pressure gauge
4. P/S pump
5. P/S gear box

- 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:
6200 – 7000 kPa
(62 – 70 kg/cm², 882 – 995 psi) ..... G16 Type engine
6700 – 7500 kPa
(67 – 75 kg/cm², 953 – 1067 psi) ..... J20 Type engine
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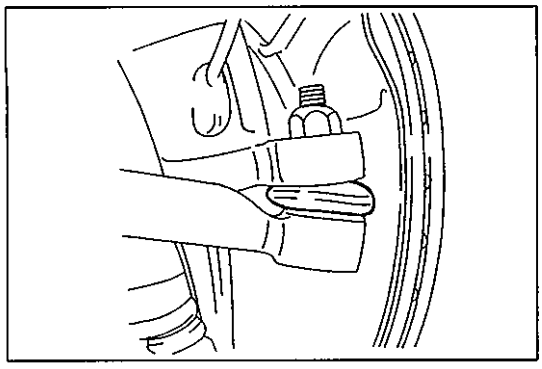
- When it is higher than specified values, possible cause is malfunction of relief valve.
- When it is lower than specified values, possible cause is failure in steering gear box. Replace gear box.

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



STEERING RACK BOOT CHECK

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.
Check steering rack boot for dent or breakage.
If there is a dent, keep boot in most compressed state for some seconds to correct dent.



TIE-ROD END BOOT CHECK

Check boot for crack and damage and if any, replace it with a new one.

AIR BLEEDING PROCEDURE

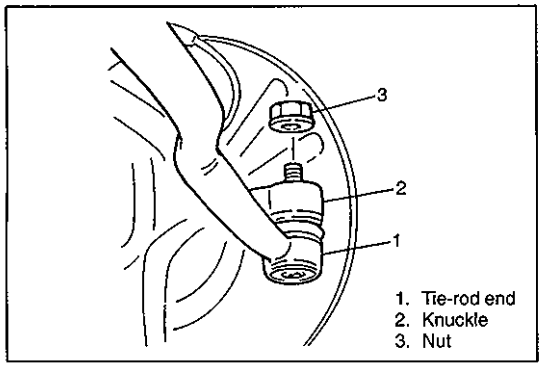
1) Jack up the front end of vehicle and apply safety stands.
2) Fill oil tank with fluid up to specified level.

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 oil tank 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.

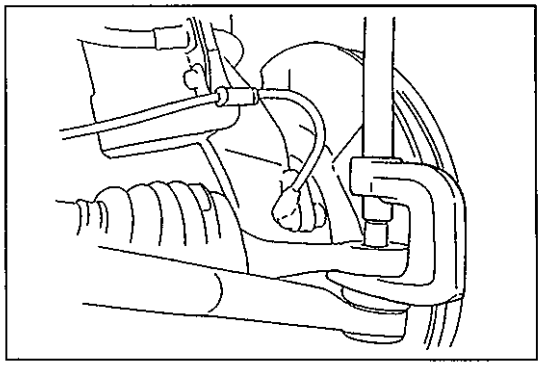


ON-VEHICLE SERVICE

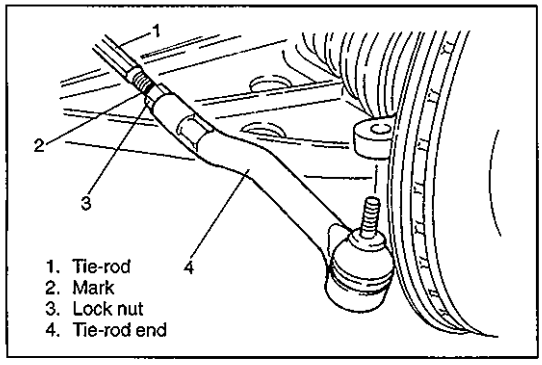
TIE-ROD END

REMOVAL

1) Jack up vehicle and remove wheel.
2) Remove tie-rod end nut.



3) Disconnect tie-rod end by using puller.

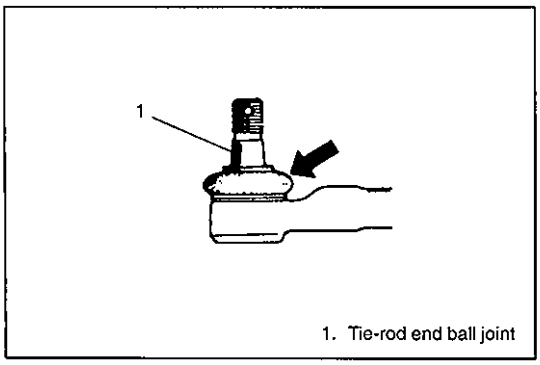


4) To facilitate adjustment after installation, put a mark on tie-rod thread indicating position of tie-rod end lock nut. Then loosen lock nut and remove tie rod end from tie rod.

INSPECTION

Tie-rod End Ball Joint

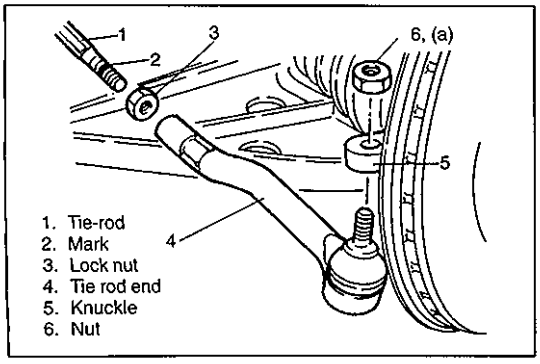
Inspect for play in tie-rod end ball joint. If found defective, replace.

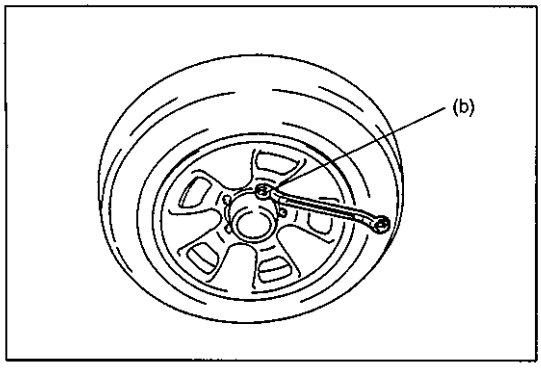


INSTALLATION

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 tie-rod end nut to specified torque.

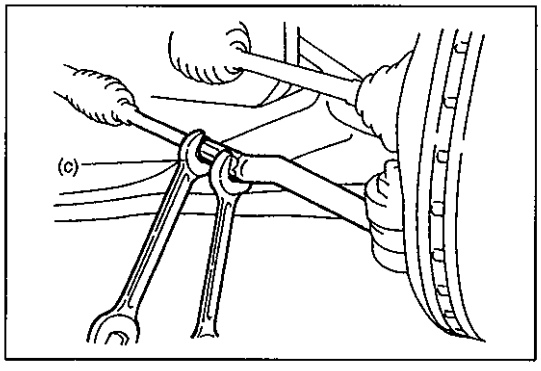
Tightening Torque
(a): 48 N·m (4.8 kg-m, 35.0 lb-ft)





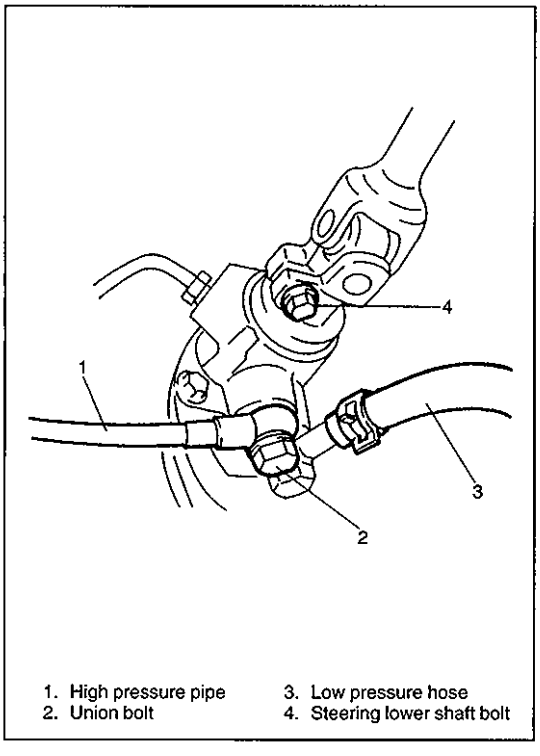
3) After installing wheels, lower vehicle and tighten wheel nuts to specified torque.

Tightening Torque
(b): 95 N·m (9.5 kg-m, 69.0 lb-ft)



4) Check that proper amount of toe-in is obtained. (Refer to FRONT WHEEL ALIGNMENT.)
5) After confirming proper amount of toe-in, tighten tie-rod end lock nut to specified torque.

Tightening Torque
(c): 65 N·m (6.5 kg-m, 47.0 lb-ft)



1. High pressure pipe
2. Union bolt
3. Low pressure hose
4. Steering lower shaft bolt

POWER STEERING GEAR BOX ASSEMBLY

REMOVAL

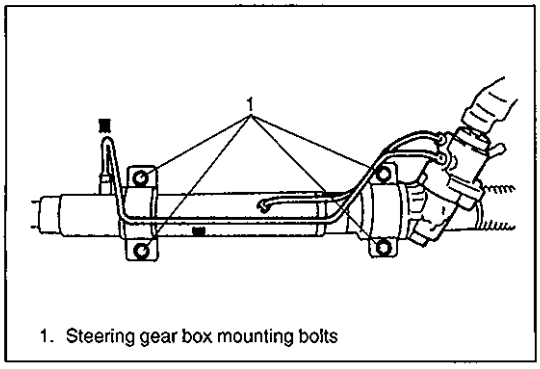
1) Take out fluid in oil tank with syringe or such.
2) Disconnect high pressure pipe from steering gear box by removing union bolt.

NOTE:
As fluid flows out of disconnected joints, put a receptacle under joints or a plug to pipe.

3) Disconnect low pressure hose from steering gear box.

NOTE:
As fluid flows out of disconnected joints, put a receptacle under joints or a plug to hose.

4) Remove steering lower shaft bolt.
5) Jack up vehicle and remove both right and left wheels.
6) Disconnect both right and left tie rod ends from knuckle, refer to steps 2) to 3) of item TIE-ROD END REMOVAL in this section.



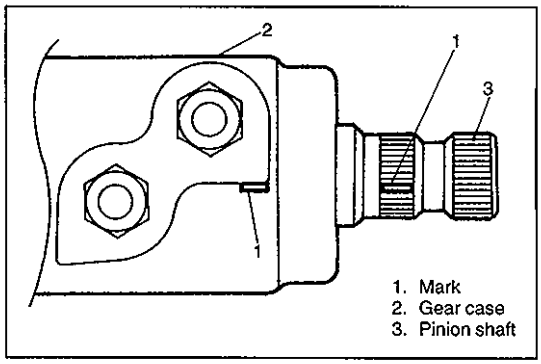
1. Steering gear box mounting bolts

7) Remove steering gear box mounting bolts and then remove steering gear box from vehicle.
Steering gear box found to be in defective condition should be replaced with a new one.

NOTE:
Don't disassemble P/S gear box.

INSTALLATION

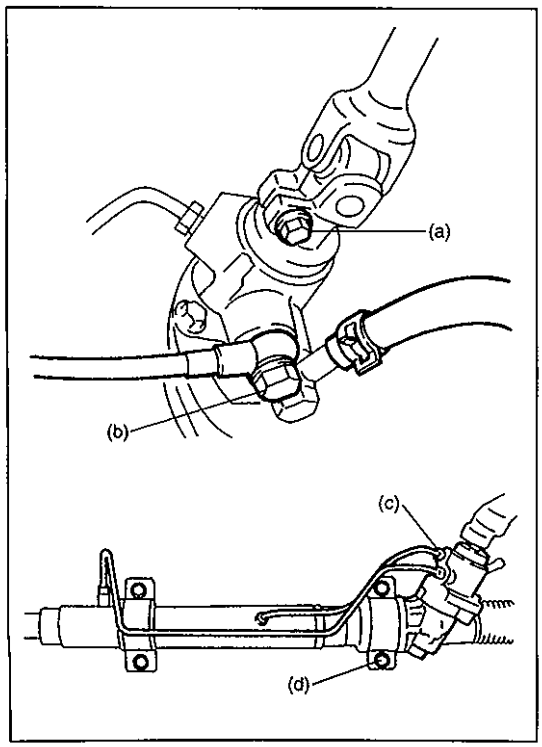
Reverse removal procedure for installation of steering gear box noting following points.



1. Mark
2. Gear case
3. Pinion shaft

- After confirming that front tire is in straight position, install steering gear box to body temporarily. Next, with tie-rod end installed to knuckle, set rack in position close to neutral. Then obtain the neutral state by aligning match marks on pinion shaft and steering gear case and insert steering lower joint into pinion shaft.

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.

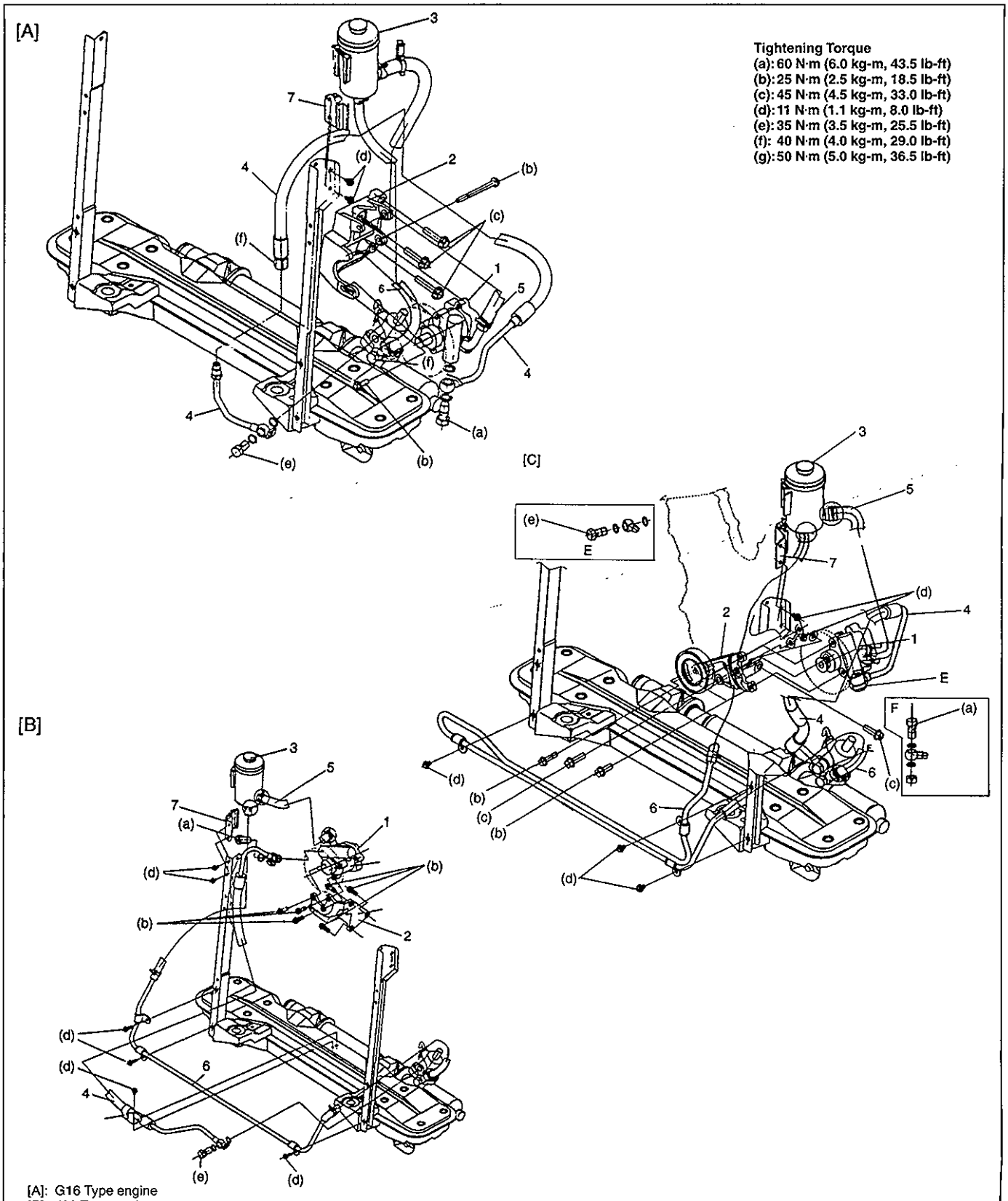


- If a plug was put to disconnected pipe when removing steering gear box, remove that plug before reconnecting pipe.
- Use specified torque as given below.

Tightening Torque
(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)
(b): 40 N·m (4.0 kg-m, 29.0 lb-ft)
(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)
(d): 55 N·m (5.5 kg-m, 40.0 lb-ft)

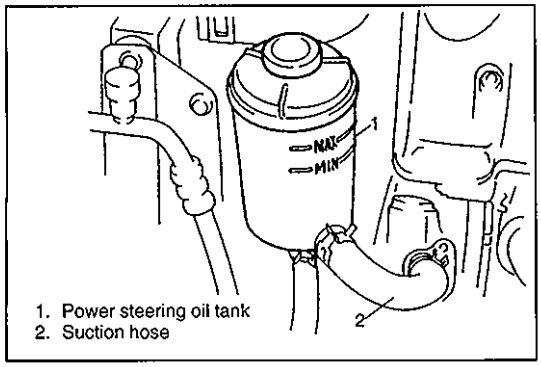
- After installation, be sure to fill specified power steering fluid and bleed air.
- Check toe setting. Adjust as required. (Refer to Front End Alignment.)

POWER STEERING PUMP



[A]: G16 Type engine
[B]: J20 Type engine
[C]: H25 Type engine

1. Power steering pump assembly
2. Bracket
3. Power steering oil tank
4. High pressure hose & pipe
5. Suction hose
6. Low pressure return hose
7. Oil tank bracket



1. Power steering oil tank
2. Suction hose

REMOVAL

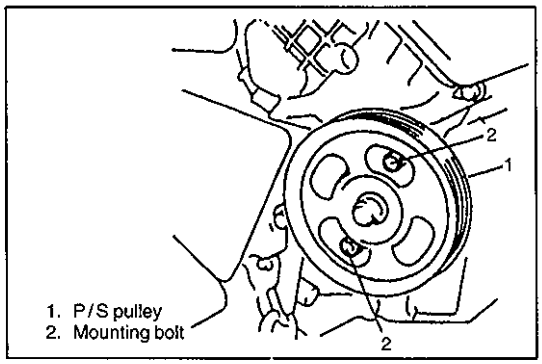
NOTE:
Be sure to clean each joint of suction and discharge sides thoroughly before removal.

1) Remove suction hose from pump, then disconnect battery negative cable.
2) Remove oil tank with suction hose.

3) Remove union bolt. Then disconnect high pressure pipe from pump.

   NOTE:
   As fluid flows out of disconnected joints, put a receptacle under joints or a plug to pipe.

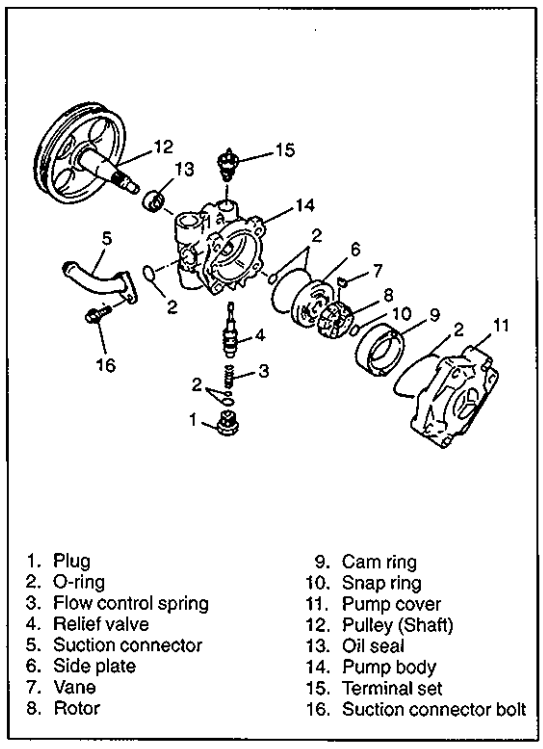
4) Disconnect pressure switch lead wire at switch terminal.
5) Loosen related bolts and remove power steering belt.



1. P/S pulley
2. Mounting bolt

6) Remove P/S pump mounting bolt (s).
7) Remove P/S pump.

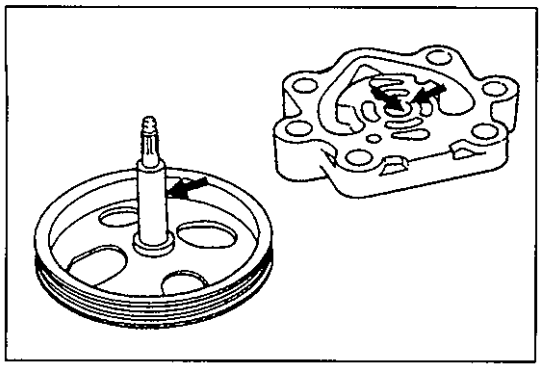
   NOTE:
   Plug each port of removed pump to prevent dust or any other foreign matter from entering.



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. Suction connector bolt

DISASSEMBLY

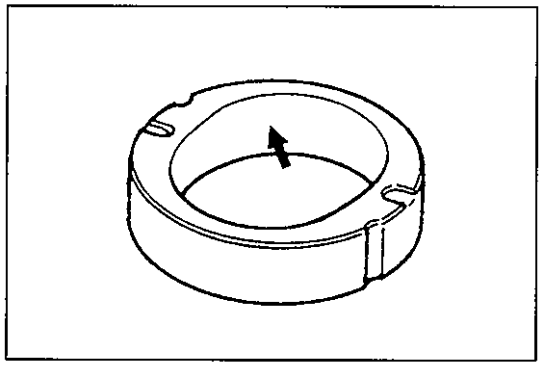
1) Clean its exterior thoroughly.
2) With aluminum plates placed on vise first, grip pump body with it.
3) Remove suction connector bolt, suction connector and O-ring from pump body.
4) Remove power steering pressure switch (terminal set) from pump body.
5) Remove plug, flow control spring and relief 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

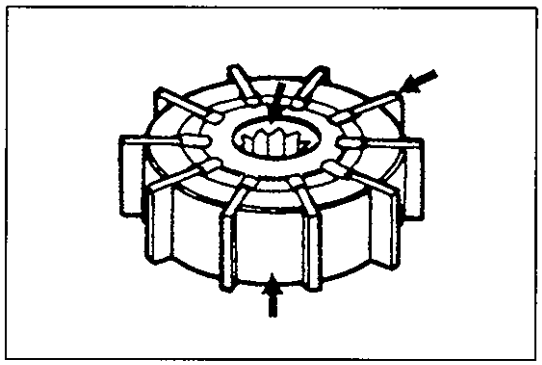
Pump Body, Cover, Side Plate and Shaft

Check sliding surfaces of each part for wear and damage.
If any defect is found, replace pump assembly.



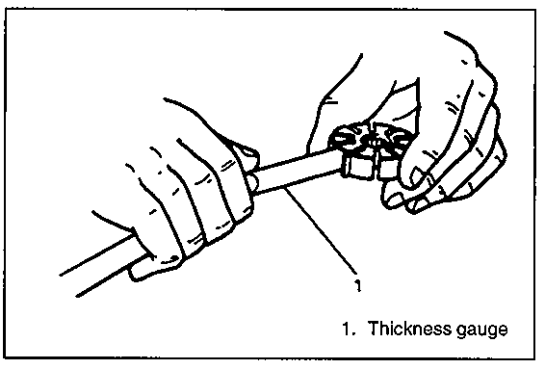
Cam Ring

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.

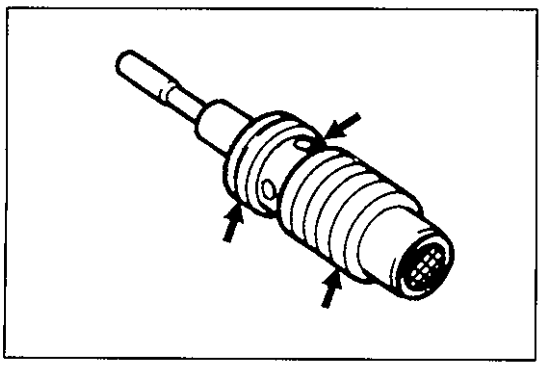


1. Thickness gauge

- Check clearance between rotor and vane.

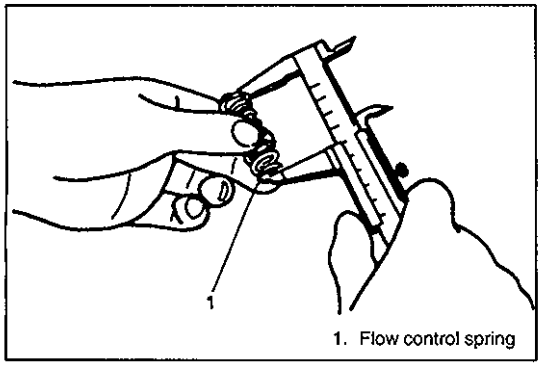
Clearance: Standard 0.015 mm (0.0006 in.)
Limit 0.027 mm (0.0011 in.)

Replace pump assembly if any defect is found in above checks.



Relief Valve (Flow Control Valve) and Its Spring

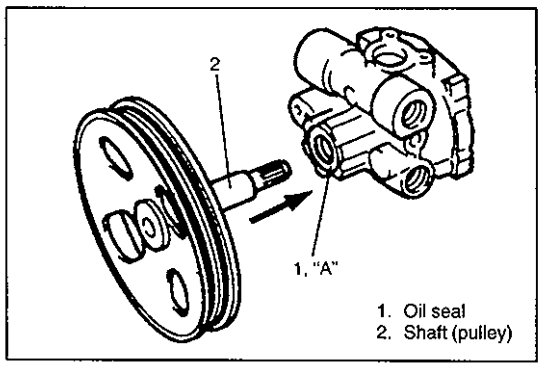
- Check fluid passage of relief valve and orifice of connector for obstruction (clogged).
- Check sliding surface of relief valve for wear and damage.



- 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.

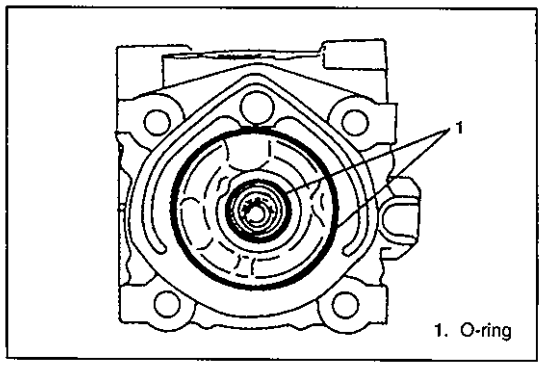


ASSEMBLY

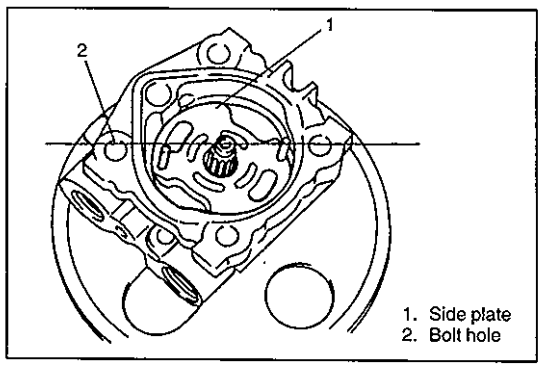
Reverse disassembly procedure for assembly, noting the following.

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

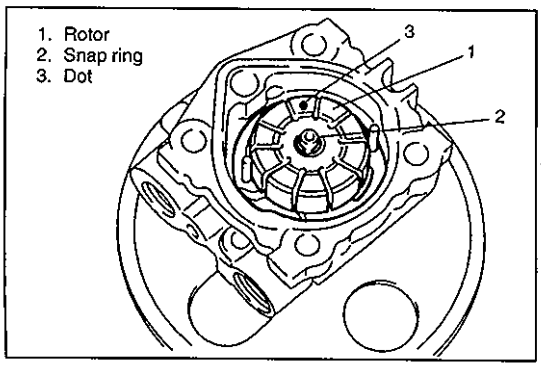


2) Apply power steering fluid to O-rings and fit them to pump body.



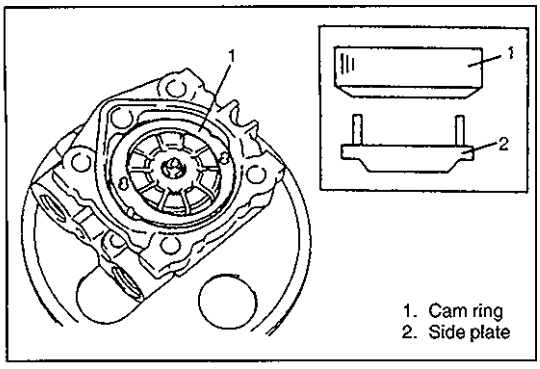
3) Install side plate to pump body.

NOTE:
Carefully align the dowel pins on the side plate at bolt hole as shown in figure.

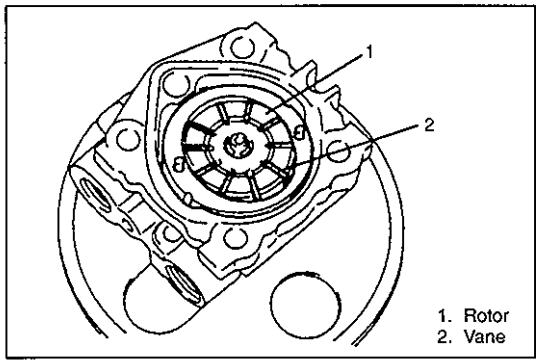


4) Apply power steering fluid to sliding surface of rotor.
5) Install rotor to shaft, directing dot marked side of rotor facing up.
6) Install new snap ring to shaft, then make sure to fit snap into shaft groove securely.

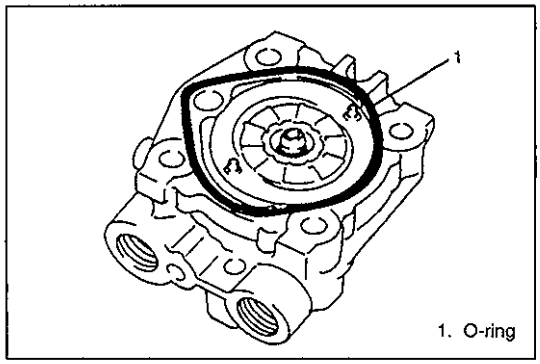
NOTE:
Never reuse the removed snap ring.



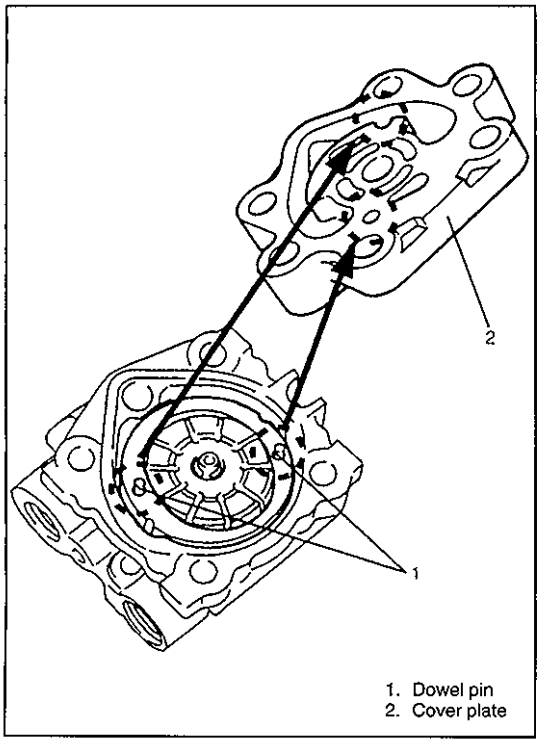
7) Apply power steering fluid to sliding surface of cam ring.
8) Install cam ring to pump body. The tapered end of cam ring should face the side plate.



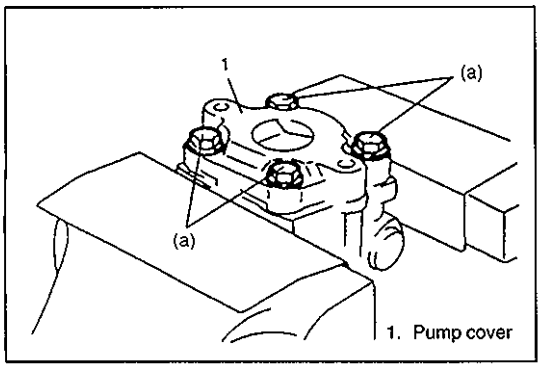
9) Apply power steering fluid to each vane.
10) Install vanes (10 pieces) to rotor.



11) Apply power steering fluid to O-ring.
12) Install O-ring to pump body.



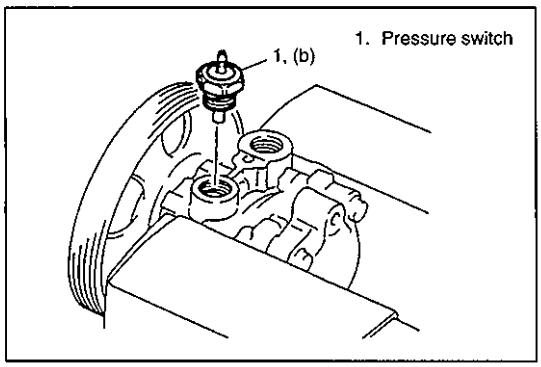
13) Apply power steering fluid to sliding surface of pump cover and rotor.
14) Match the dowel pins to the holes of the cover plate as shown and install pump cover to pump body.



15) Gradually tighten pump cover bolts to specified torque.

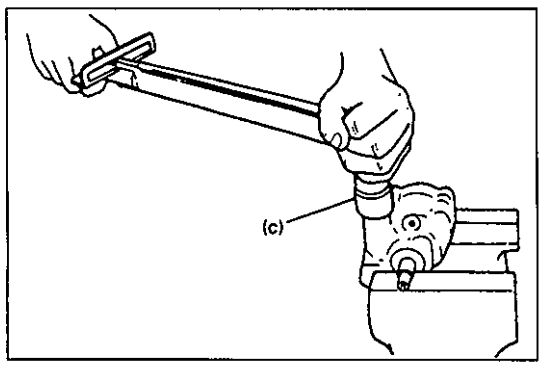
NOTE:
After installing pump cover, check to make sure that shaft can be turned by hand.

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



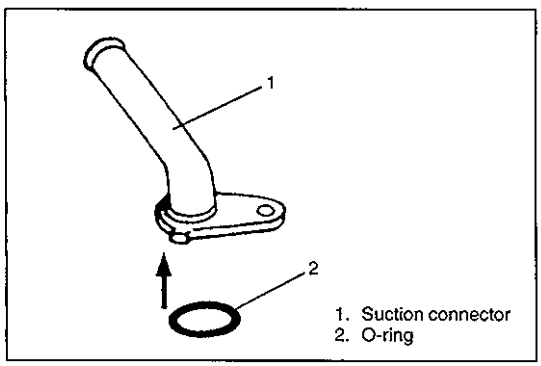
16) Apply power steering fluid to O-ring of terminal switch.
17) Install pressure switch to pump body.

Tightening Torque
(b): 28 N·m (2.8 kg-m, 20.0 lb-ft)

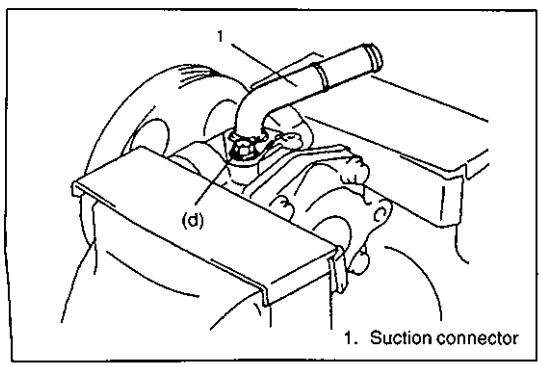


18) Apply power steering fluid to relief valve (flow control valve).
19) Install relief valve (flow control valve) to pump body.
20) Install flow control spring.
21) Apply power steering fluid to O-rings of plug.
22) Install O-rings to plug.
23) Tighten plug to specified torque.

Tightening Torque
(c): 60 N·m (6.0 kg-m, 43.5 lb-ft)



24) Apply power steering fluid to O-ring of suction connector.
25) Install O-ring to suction connector.



26) Install suction connector to pump body as shown in figure. Tighten suction connector bolts to specified torque.

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

INSTALLATION

Reverse removal procedure.

NOTE:

- **Fill specified power steering fluid after installation and bleed air without failure. (Refer to item AIR BLEEDING PROCEDURE in this section)**
- **For tightening torques, refer to structural diagram on previous page.**

ADJUSTMENT

Refer to item POWER STEERING BELT CHECK and ADJUSTMENT in this section.

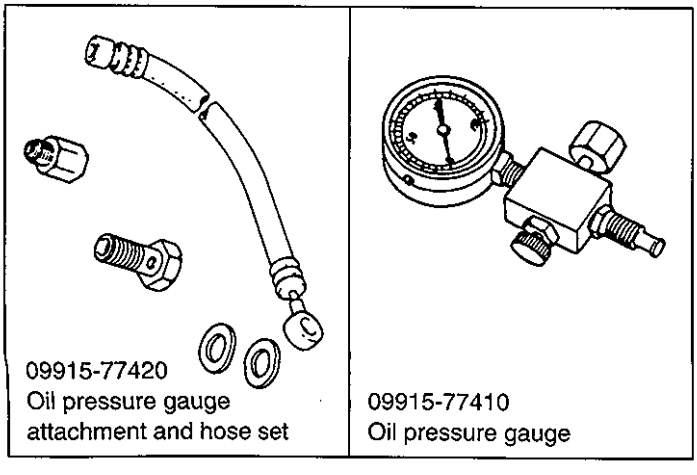
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
Gear box mounting bolts		55	5.5	40.0
Gear box cylinder pipe flare nuts		29	2.9	21.0
Gear box low pressure pipe union bolt		40	4.0	29.0
Gear box high pressure pipe union bolt		35	3.5	25.5
Tie-rod end lock nut		65	6.5	47.0
Pump bracket bolt	G16 Type engine	45	4.5	32.5
	J20 Type engine	25	2.5	18.5
	H25 Type engine	45	4.5	32.5
Pump union bolt		60	6.0	43.5
Oil pump mount bolts		25	2.5	18.5
Pipe clamp bolt/Reservoir bracket bolt		11	1.1	8.0
Steering shaft joint bolt		25	2.5	18.0
High pressure flare nuts		40	4.0	29.0
Pump cover bolts		23	2.3	17.0
Plug		60	6.0	43.5
Pressure switch (Terminal)		28	2.8	20
Suction connector bolt		10	1.0	7.5
Tie-rod end nut		48	4.8	35.0

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUPER GREASE (A) (99000-25010)	• Oil seal lip of P/S pump pulley shaft
Power steering fluid	An equivalent of DEXRON®-III or DEXRON®-II	• To fill oil tank • Parts lubrication when installing

SPECIAL TOOLS



09915-77420
Oil pressure gauge attachment and hose set

09915-77410
Oil pressure gauge

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.

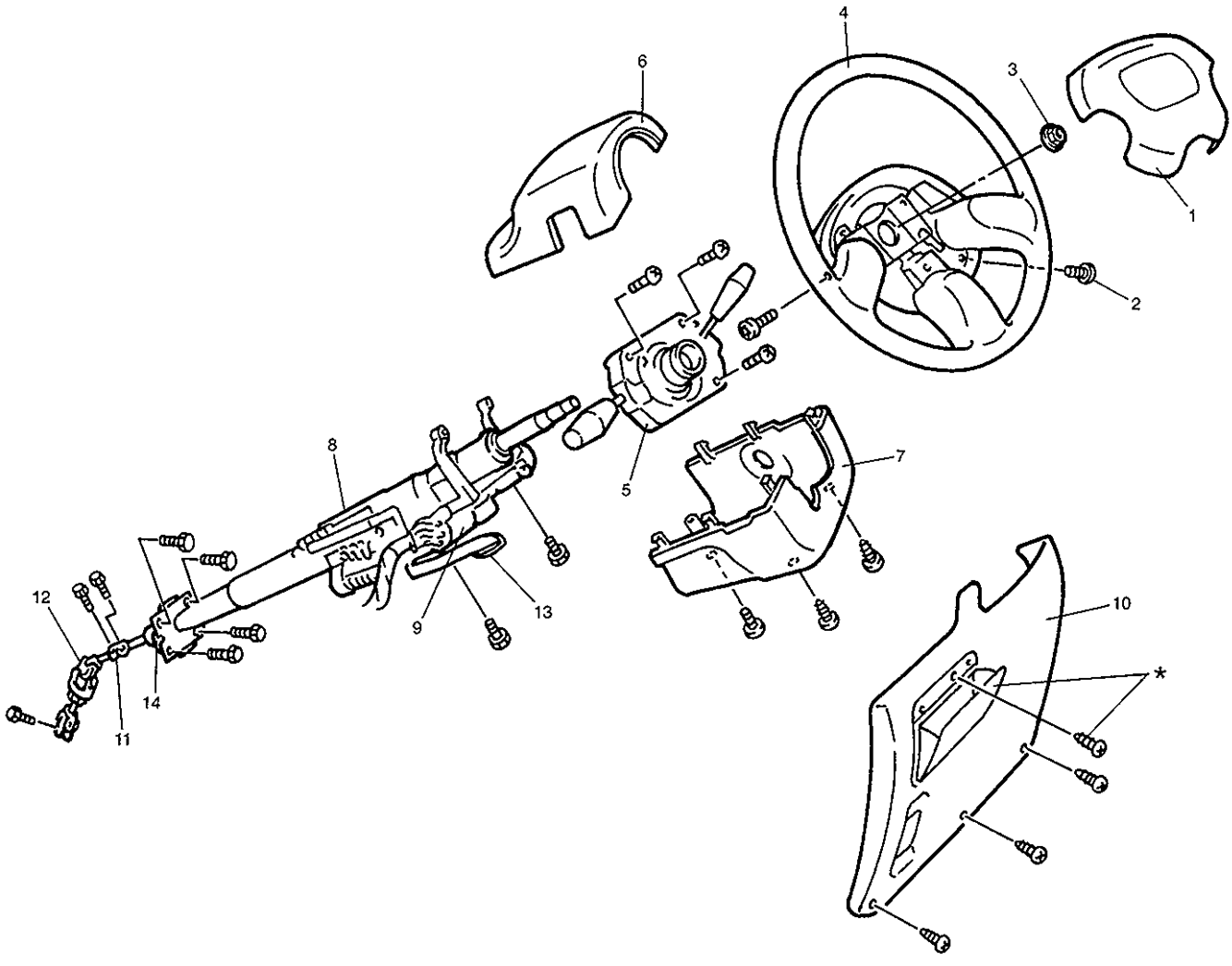
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TIGHTENING TORQUE SPECIFICATIONS 3C-14
SPECIAL TOOL 3C-14

GENERAL DESCRIPTION

This double tube type steering column has following three important features in addition to the steering function:
- The column is energy absorbing, designed to compress 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.

To insure the energy absorbing action, it is important that only the specified bolts 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 and position.



1. Steering wheel pad
2. Steering wheel pad screw
3. Steering wheel nut
4. Steering wheel
5. Combination switch
6. Steering column upper cover
7. Steering column lower cover
8. Steering column assembly
9. Steering lock assembly
10. Steering column hole cover
11. Steering shaft joint
12. Steering shaft lower assembly
13. Adjustable steering column release lever
14. Steering column lower seal

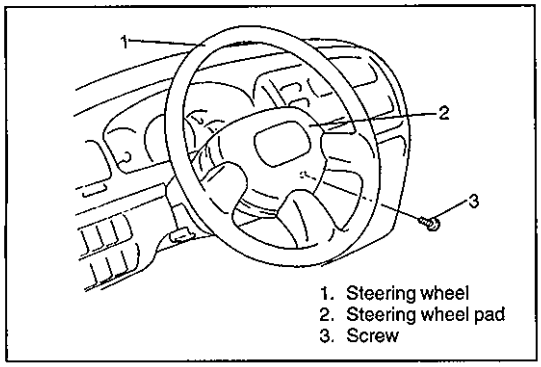
*: If equipped

DIAGNOSIS

For diagnosis of the steering wheel, steering column and steering shaft lower assembly, refer to SECTION 3.

INSPECTION AND REPAIR REQUIRED AFTER ACCIDENT

After an accident, be sure to perform checks, inspections and repairs described under "Checking Steering Column For Accident Damage" in this section.



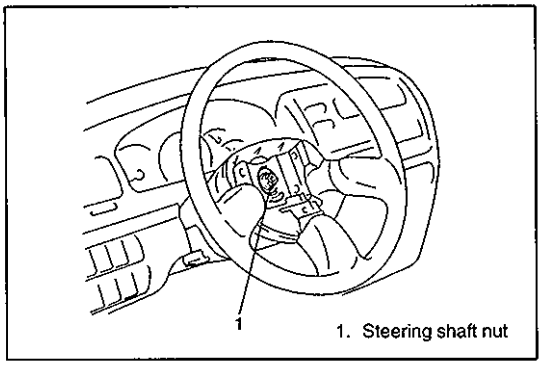
1. Steering wheel
2. Steering wheel pad
3. Screw

ON-VEHICLE SERVICE

STEERING WHEEL

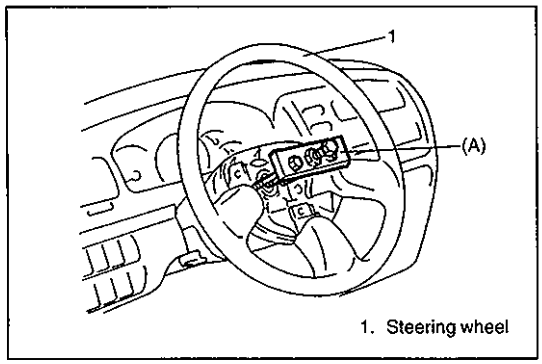
REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Remove steering wheel pad screw.
3) Remove steering wheel pad and disconnect horn harness.



1. Steering shaft nut

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.

Special Tool
(A): 09944-36011

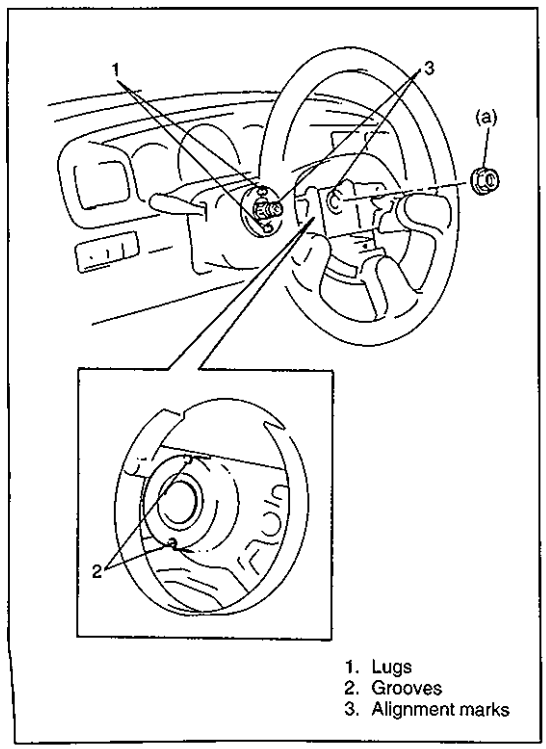
CAUTION:
Do not hammer the end of the shaft. Hammering it will loosen the plastic shear pins which maintain the column length and impair the collapsible design of the column.

INSTALLATION

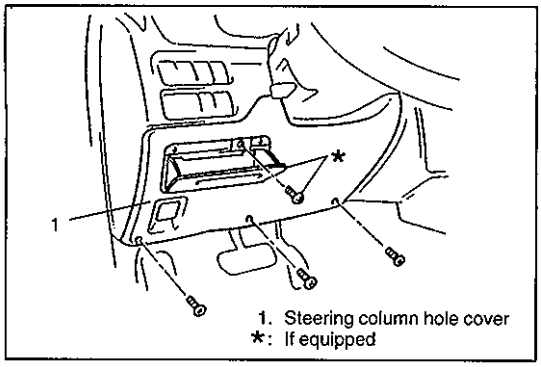
1) Install steering wheel to steering shaft with 2 lugs on combination switch fitted in two grooves in the back of steering wheel and also aligning marks on steering wheel and steering shaft.
2) Tighten steering shaft nut to specified torque.

Tightening Torque
(a): 33 N·m (3.3 kg-m, 23.5 lb-ft)

3) Connect horn harness and install steering wheel pad.
4) Tighten steering wheel pad screw.
5) Connect negative battery cable.



1. Lugs
2. Grooves
3. Alignment marks

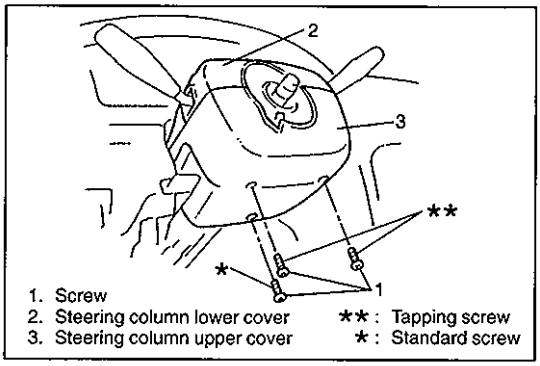


1. Steering column hole cover
*: If equipped

COMBINATION SWITCH

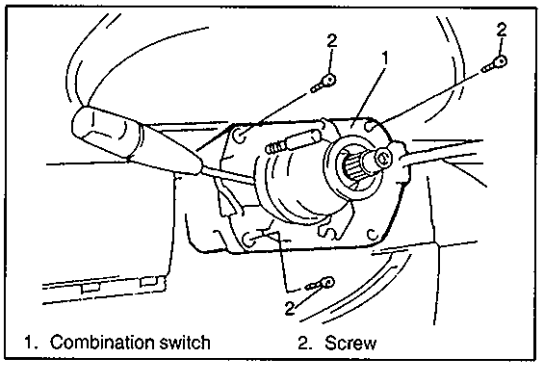
REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Remove steering wheel from steering column. Refer to "Steering Wheel" earlier in this section.
3) Remove steering column hole cover.



1. Screw
2. Steering column lower cover
3. Steering column upper cover
**: Tapping screw
*: Standard screw

4) Remove steering column cover screws (3 pcs).
5) Separate upper cover and lower cover, then remove them.
6) Disconnect all connectors for combination switch.

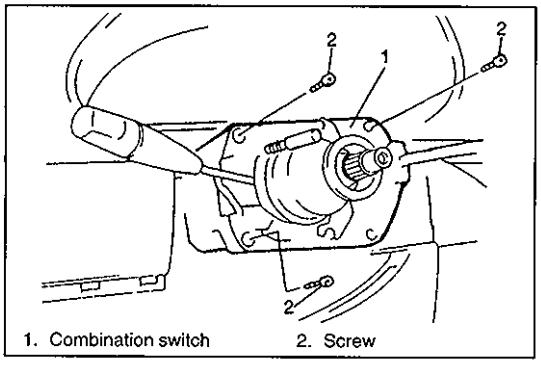


1. Combination switch
2. Screw

7) Remove combination switch from steering column.

INSPECTION

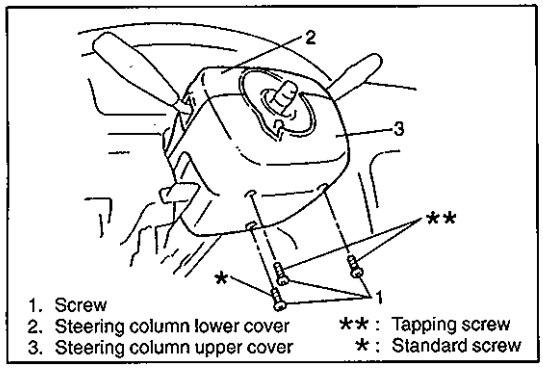
Check combination switch wire harness for any signs of scorching, melting or other damage. If it is damaged, replace.



1. Combination switch
2. Screw

INSTALLATION

1) Install combination switch to steering column.
2) Connect all connectors that have been removed in "Removal".

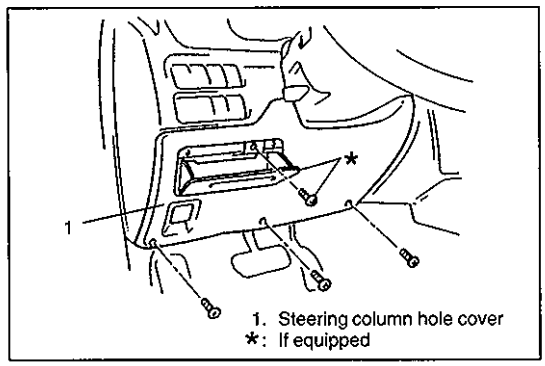


1. Screw
2. Steering column lower cover
3. Steering column upper cover

**: Tapping screw
*: Standard screw

3) Install steering column upper and lower cover.
4) Tighten steering column cover screws.

CAUTION:
When installing lower cover and upper cover, be careful so that combination switch lead wire is not caught between covers.



1. Steering column hole cover

*: If equipped

5) Install steering column hole cover.
6) Install steering wheel to steering column. Refer to "Steering Wheel" earlier in this section.
7) Connect battery negative cable.

STEERING COLUMN ASSEMBLY

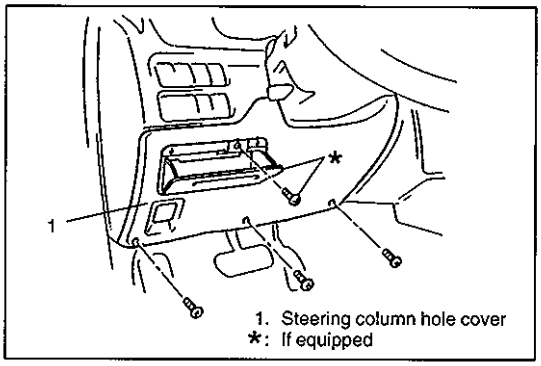
CAUTION:
Once the steering column is removed from the vehicle, the column is extremely susceptible to damage.
Dropping the column assembly on its end could collapse the steering shaft or loosen the plastic shear pins which maintain column length. Leaning on the column assembly could cause it to bend or deform.
Any of the above damage could impair the column's collapsible design.
When loosening steering column mounting bolts, make sure that steering column assembly and steering shaft lower assembly have been separated. Loosening them with steering column assembly and steering shaft lower assembly assembled could cause damage to bearing in steering shaft lower assembly.

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

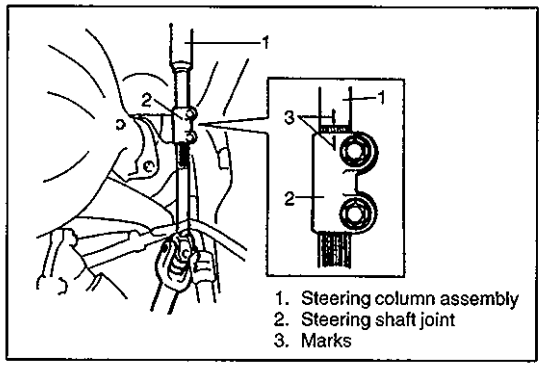
1) Disconnect negative battery cable at battery terminal.

2) Remove steering wheel and combination switch, if necessary. Refer to "Steering Wheel" and "Combination Switch" earlier in this section.
   Perform the following procedure if not removing steering wheel and/or combination switch.
   i) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
   ii) Turn ignition switch to "LOCK" position and remove key.



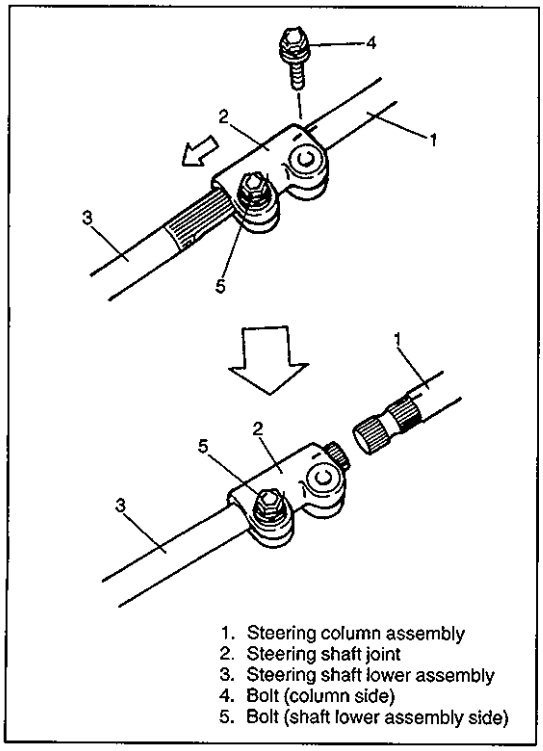
1. Steering column hole cover
*: If equipped

3) Remove steering column hole cover.
4) Disconnect all connectors for following parts.
   - Combination switch
   - Ignition switch
   - Immobilizer control system parts (if equipped)



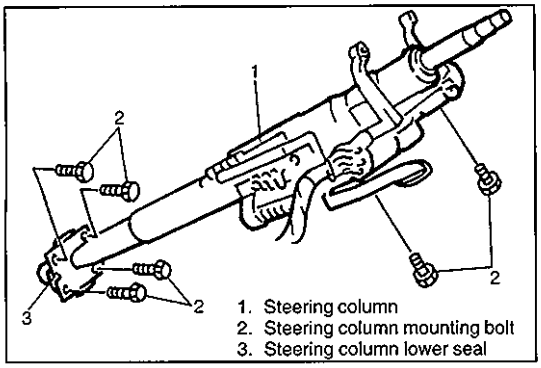
1. Steering column assembly
2. Steering shaft joint
3. Marks

5) Make alignment marks on shaft joint and shaft (column side) for a guide during reinstallation.



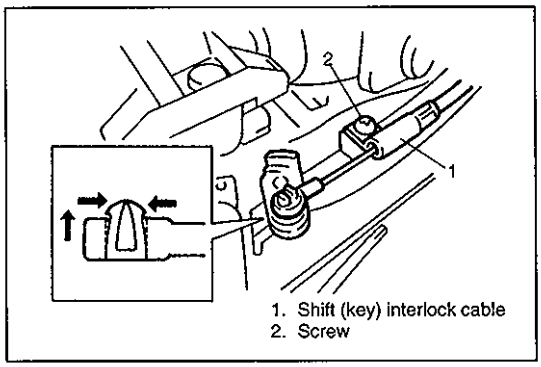
1. Steering column assembly
2. Steering shaft joint
3. Steering shaft lower assembly
4. Bolt (column side)
5. Bolt (shaft lower assembly side)

6) After removing bolt on column side of shaft joint and loosening bolt on its shaft lower assembly side, move shaft joint to shaft lower assembly side (in arrow direction in the figure).



1. Steering column
2. Steering column mounting bolt
3. Steering column lower seal

7) Remove steering column mounting bolts (6 pcs).

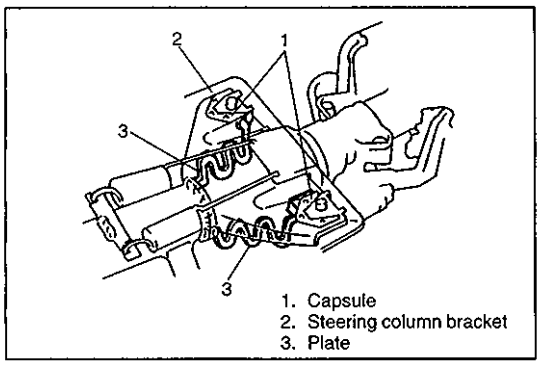


1. Shift (key) interlock cable
2. Screw

8) If equipped with shift (key) interlock cable, remove shift (key) interlock cable screw and then disconnect its cable from ignition switch.
9) Remove steering column from vehicle.

INSPECTION

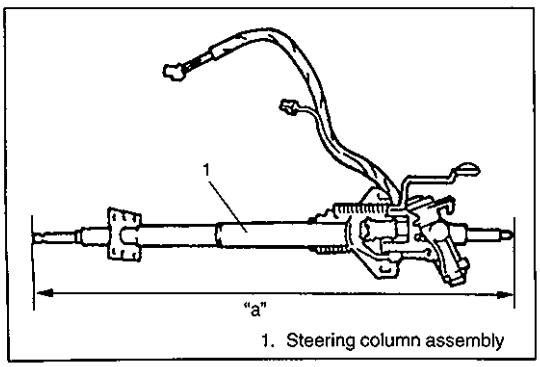
NOTE:
Vehicles involved in accidents resulting in body damage, where steering column has been impacted or air bag deployed, may have a damaged or misaligned steering column.



1. Capsule
2. Steering column bracket
3. Plate

CHECKING PROCEDURE

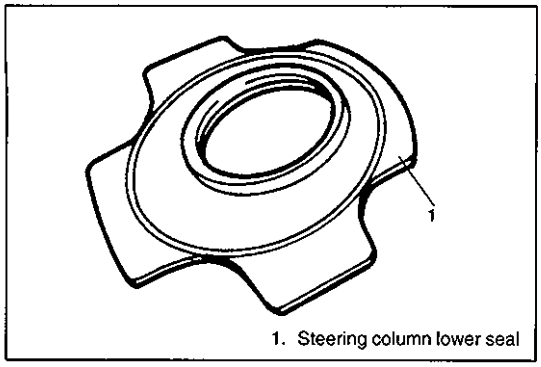
1) Check that two capsules are attached to steering column bracket securely. Check clearance between capsules and steering column bracket. Clearance should be 0.0 mm (0.0 in.) on both sides. If found loose or clearance, replace steering column assembly.
2) Check two plates for any damages such as crack or breakage. If anything is found faulty, replace as steering column assembly.



1. Steering column assembly

3) Take measurement "a" as shown. If it is shorter than specified length, replace column assembly with new one.

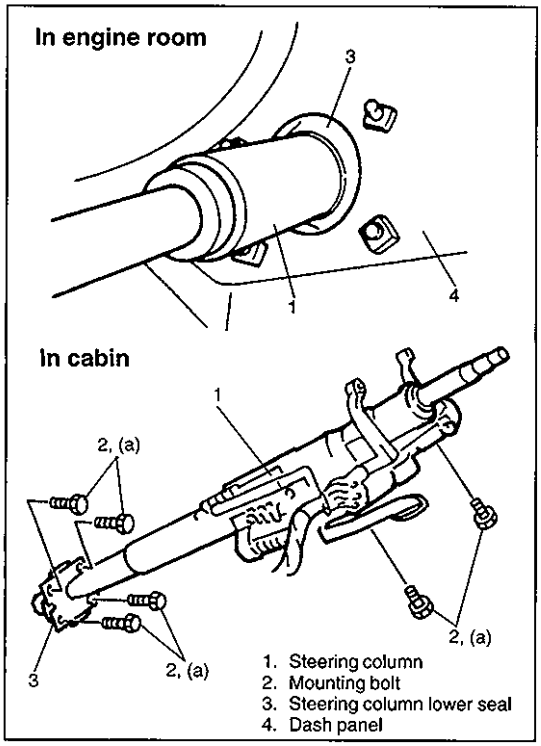
Length "a": 895 ± 0.8 mm (35.24 ± 0.03 in.)



1. Steering column lower seal

4) Check steering column lower seal for breakage or deformation.
If found defective, replace.

5) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play.
If anything is found faulty, replace as steering shaft lower assembly or steering column assembly.
6) Check steering shaft for smooth rotation.
If found defective, replace as column assembly.
7) Check steering shaft and column for bend, cracks or deformation.
If found defective, replace as column assembly.



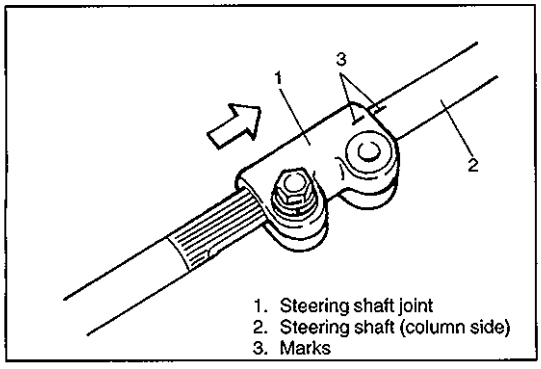
1. Steering column
2. Mounting bolt
3. Steering column lower seal
4. Dash panel

INSTALLATION

CAUTION:
After tightening steering column mounting bolts, steering shaft joint bolts should be tightened.

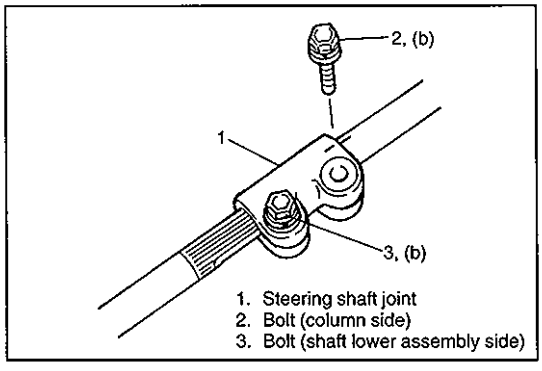
1) Be sure that front wheels and steering wheel are in straightforward state.
2) If equipped with shift (key) interlock cable, install shift (key) interlock cable to ignition switch.
3) Install steering column assembly to dash panel and upper bracket so that boss of steering column lower seal and all around it project out of hole in dash panel into engine room. Tighten steering column lower bolts (4 pcs) first and then upper bolts (2 pcs) to specified torque.

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



1. Steering shaft joint
2. Steering shaft (column side)
3. Marks

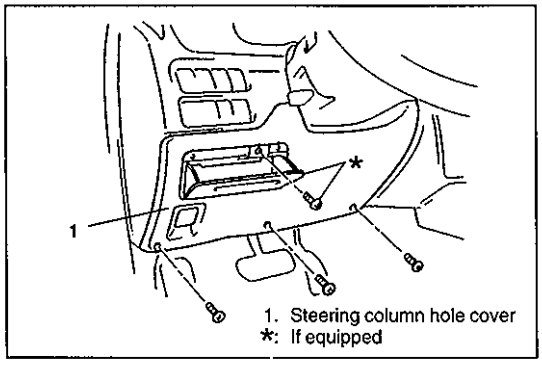
4) Install steering shaft joint to steering shaft by matching it to marks made before removal.



1. Steering shaft joint
2. Bolt (column side)
3. Bolt (shaft lower assembly side)

5) Install shaft joint bolt (column side) to steering shaft joint. Tighten shaft joint bolt (column side) to specified torque first and then shaft joint bolt (shaft lower assembly side) to specified torque.

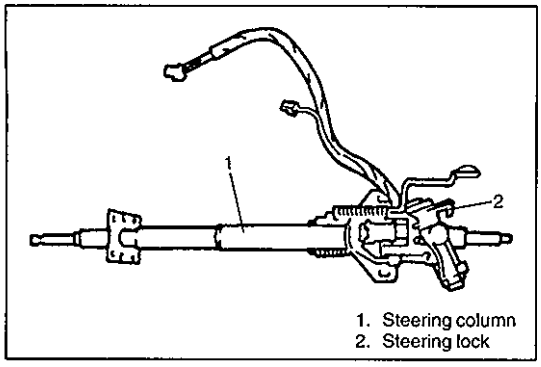
Tightening Torque
(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)



1. Steering column hole cover
*: If equipped

6) If combination switch is removed, install combination switch. Refer to "Combination Switch" earlier in this section.
7) Connect all connectors that have been removed in "Removal".
8) Install steering column hole cover.

9) If steering wheel is removed, install steering wheel. Refer to "Steering Wheel" earlier in this section.
10) Connect negative battery cable.

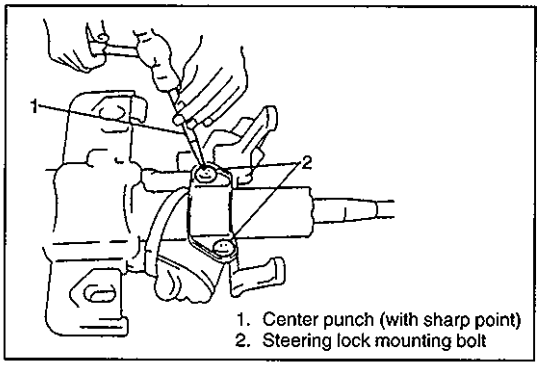


1. Steering column
2. Steering lock

STEERING LOCK ASSEMBLY (IGNITION SWITCH)

REMOVAL

1) Remove steering column. Refer to "Steering Column" earlier in this section.



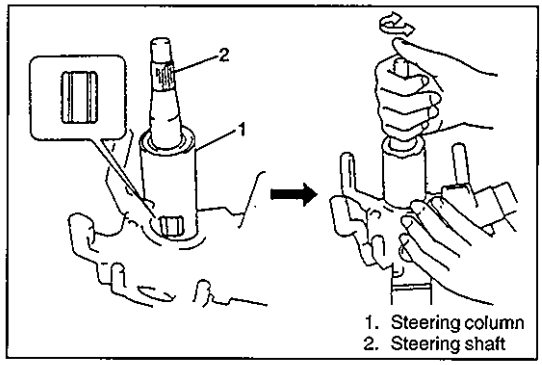
1. Center punch (with sharp point)
2. Steering lock mounting bolt

2) 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.

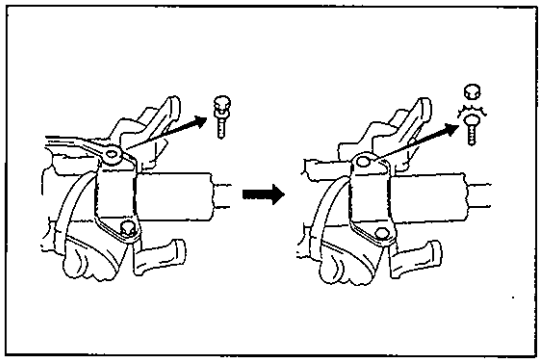
3) Turn ignition key to "ACC" or "ON" position and remove steering lock assembly from steering column.

INSTALLATION

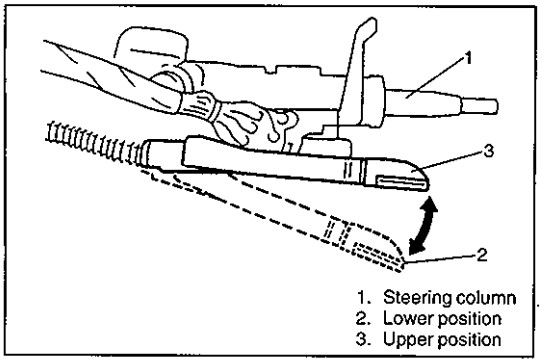


1. Steering column
2. Steering shaft

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 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.



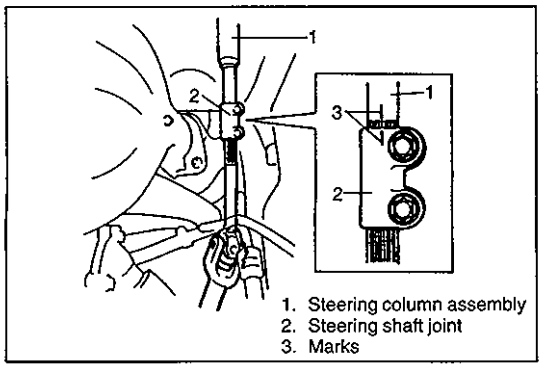
1. Steering column
2. Lower position
3. Upper position

ADJUSTABLE STEERING COLUMN RELEASE LEVER

INSPECTION

Check to make sure that following:

- Steering column moves smoothly when adjustable steering column release lever is at lower position (i.e., steering column is not locked).
- Steering column is fixed securely when adjustable steering column release lever is at higher position (i.e., steering column is locked).

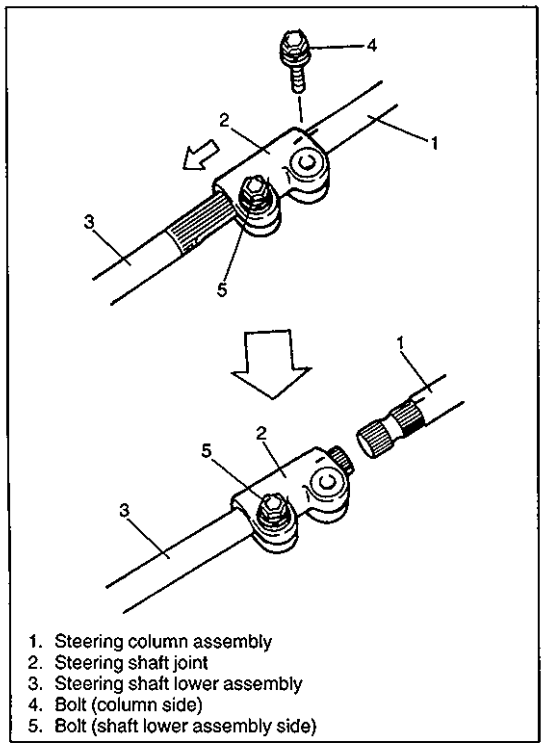


1. Steering column assembly
2. Steering shaft joint
3. Marks

STEERING SHAFT LOWER ASSEMBLY

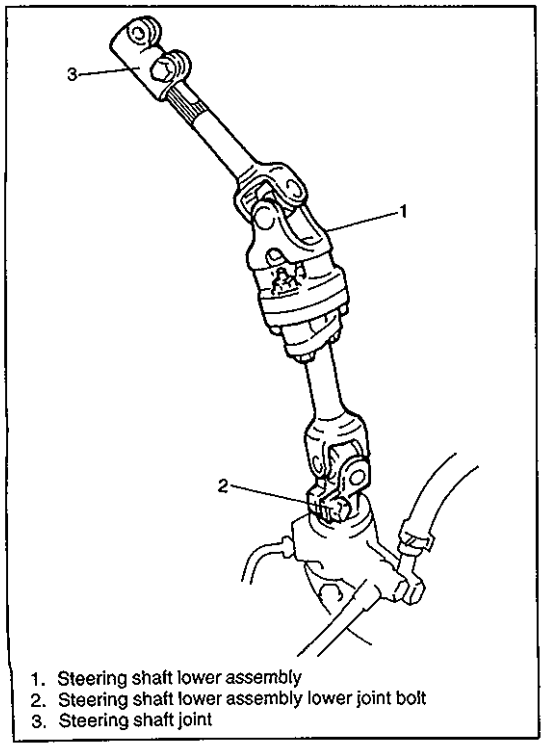
REMOVAL

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) Make alignment marks on shaft joint and shaft (column side) for a guide during reinstallation.



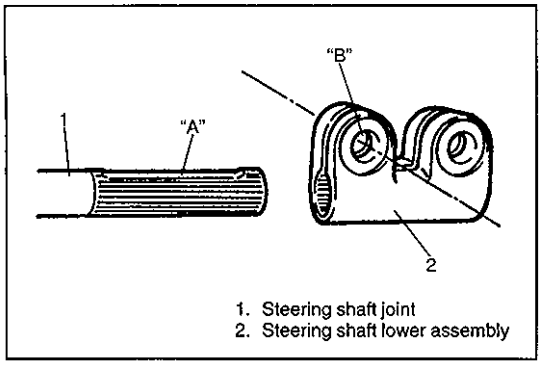
1. Steering column assembly
2. Steering shaft joint
3. Steering shaft lower assembly
4. Bolt (column side)
5. Bolt (shaft lower assembly side)

4) After removing bolt on column side of shaft joint and loosening bolt on its shaft lower assembly side, move shaft joint to shaft lower assembly side (in arrow direction in figure).



1. Steering shaft lower assembly
2. Steering shaft lower assembly lower joint bolt
3. Steering shaft joint

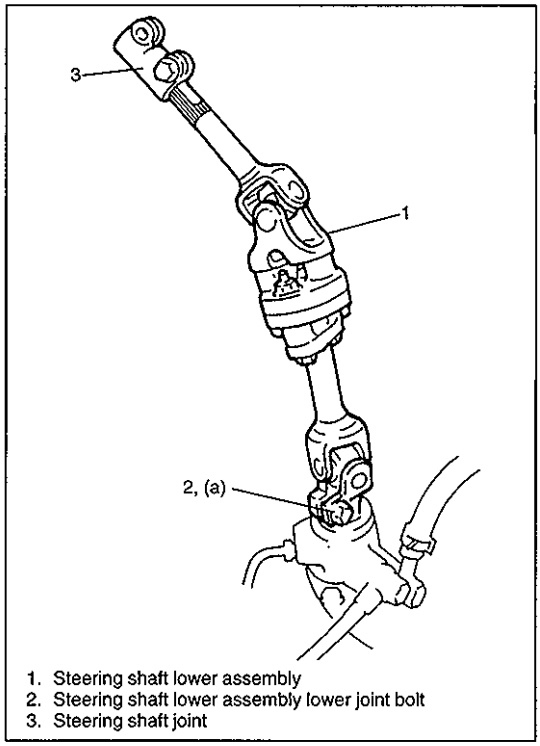
5) Make alignment marks on shaft lower assembly lower joint and pinion shaft for a guide during reinstallation.
6) Remove shaft lower assembly lower joint bolt and then remove shaft lower assembly.
7) Remove shaft joint bolt (shaft lower assembly side) from shaft joint and then remove shaft joint from shaft lower assembly.



1. Steering shaft joint
2. Steering shaft lower assembly

INSTALLATION

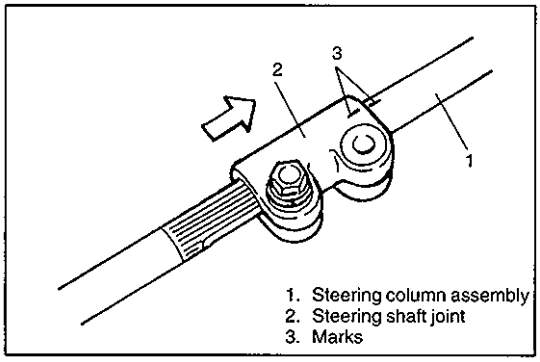
1) Be sure that front wheels and steering wheel are in straightforward state.
2) Align flat part "A" of shaft lower assembly with bolt hole "B" of shaft joint as shown. Then insert shaft joint into shaft lower assembly.
3) Install shaft joint bolt (shaft lower assembly side) to shaft joint. Then tighten it by hand.



1. Steering shaft lower assembly
2. Steering shaft lower assembly lower joint bolt
3. Steering shaft joint

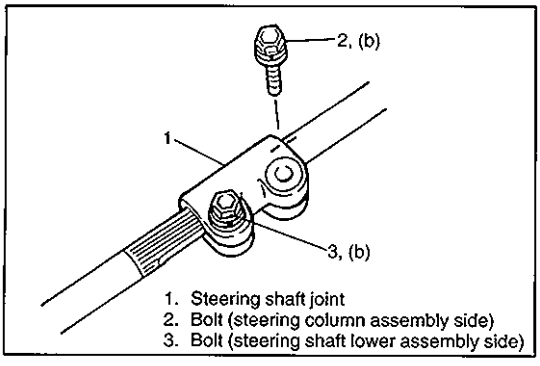
4) Insert pinion shaft into shaft lower assembly lower joint by matching it to marks made before removal. And then install shaft lower assembly lower joint bolt to shaft lower assembly lower joint. Tighten it to specified torque.

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



1. Steering column assembly
2. Steering shaft joint
3. Marks

5) Install steering shaft joint to steering shaft by matching it to marks made before removal.



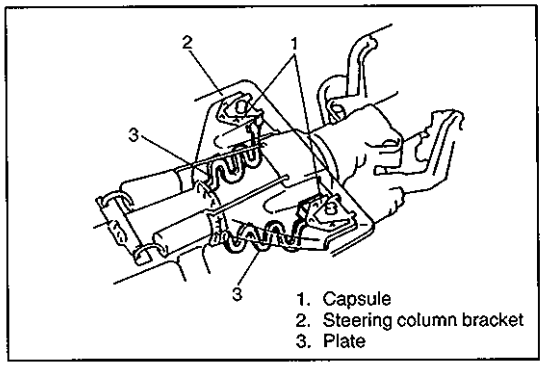
1. Steering shaft joint
2. Bolt (steering column assembly side)
3. Bolt (steering shaft lower assembly side)

6) Install shaft joint bolt (column side) to shaft joint. Tighten shaft joint bolt (column side) to specified torque first and then shaft joint bolt (shaft lower assembly side) to specified torque.

Tightening Torque
(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)

CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

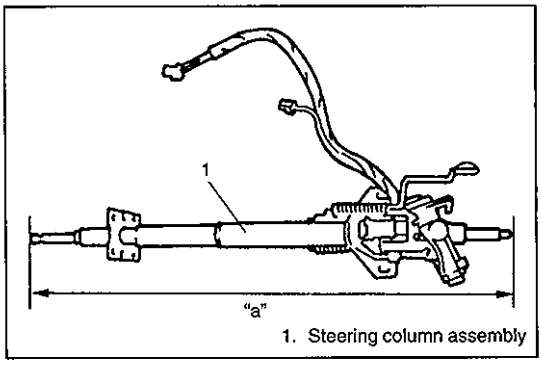
NOTE:
Vehicles involved in accidents resulting in body damage, where steering column has been impacted or air bag deployed, may have a damaged or misaligned steering column.



1. Capsule
2. Steering column bracket
3. Plate

CHECKING PROCEDURE

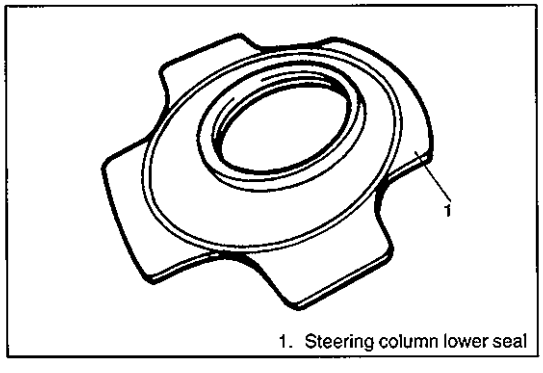
1) Check that two capsules are attached to steering column bracket securely. Check clearance between capsules and steering column bracket. Clearance should be 0.0 mm (0.0 in.) on both sides. If found loose or clearance, replace steering column assembly.
2) Check two plates for any damages such as crack or breakage. If anything is found faulty, replace as steering column assembly.



1. Steering column assembly

3) Take measurement "a" as shown. If it is shorter than specified length, replace column assembly with new one.

   Length "a": 895 ± 0.8 mm (35.24 ± 0.03 in.)



1. Steering column lower seal

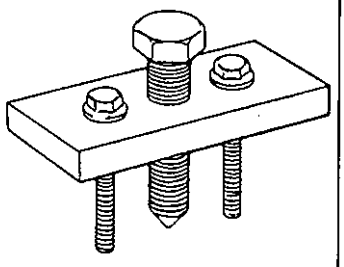
4) Check steering column lower seal for breakage or deformation. If found defective, replace.

5) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play.
   If anything is found faulty, replace as steering shaft lower assembly or steering column assembly.
6) Check steering shaft for smooth rotation.
   If found defective, replace as column assembly.
7) Check steering shaft and column for bend, cracks or deformation.
   If found defective, replace as column assembly.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Steering shaft nut	33	3.3	23.5
Steering column mounting bolt	23	2.3	17.0
Steering shaft joint bolt	25	2.5	18.0
Steering shaft lower assembly lower joint bolt	25	2.5	18.0

SPECIAL TOOL



09944-36011
Steering wheel remover

SECTION 3C1

AIR BAG STEERING WHEEL AND COLUMN

WARNING:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. 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.**
- **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.**

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.

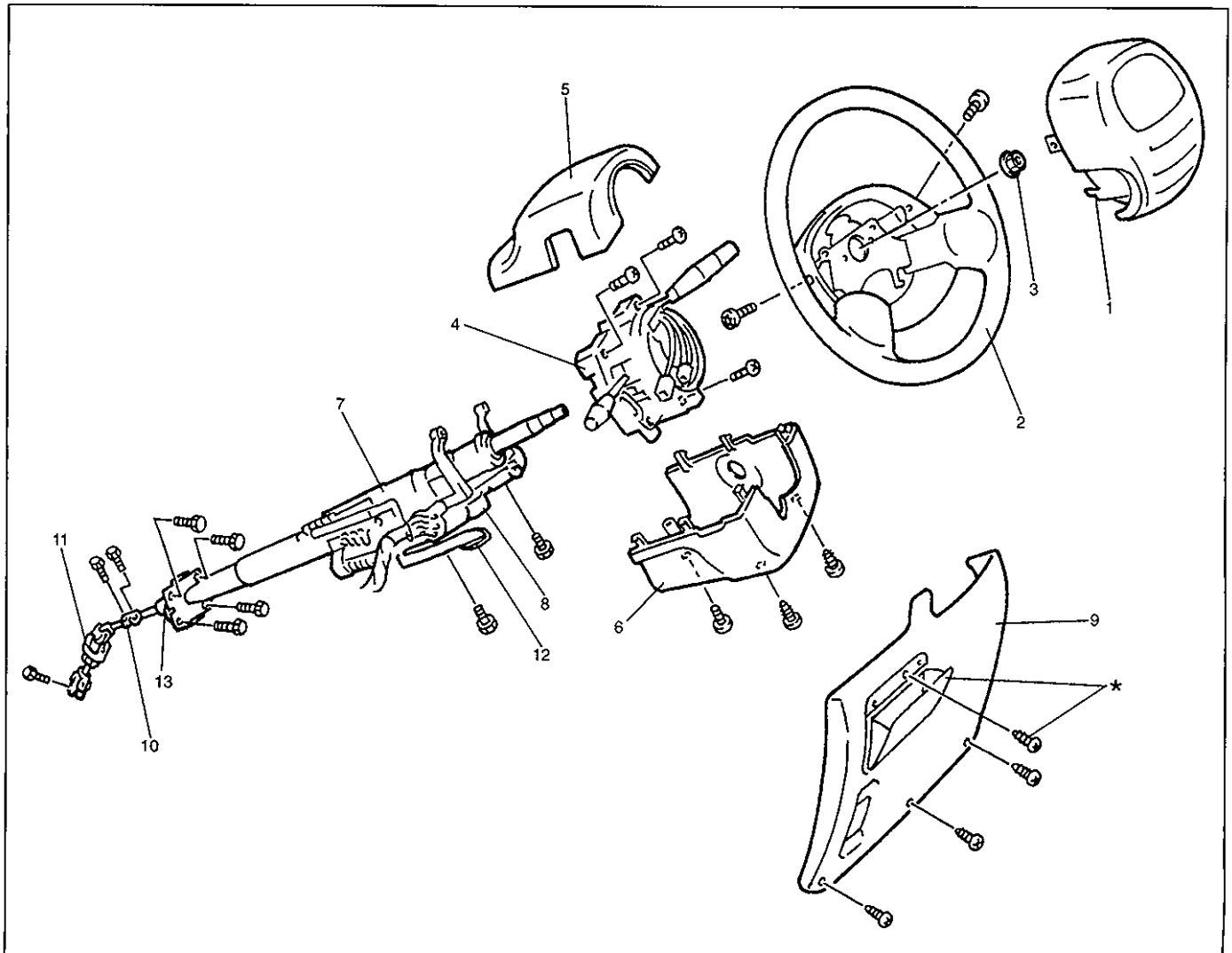
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GENERAL DESCRIPTION

This double tube type steering column has following three important features in addition to the steering function:
- The column is energy absorbing, designed to compress 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.

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 and position.
The driver air bag (inflator) module is one of the supplemental 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 passenger's seat belts by deploying the air bags. The air bag (inflator) module should be handled with care to prevent accidental deployment. When servicing, be sure to observe all WARNINGS in this section. Refer to "Service Precautions" in SECTION 10B.



1. Driver air bag (inflator) module
2. Steering wheel
3. Steering wheel nut
4. Contact coil and combination switch assembly
5. Steering column upper cover
6. Steering column lower cover
7. Steering column assembly
8. Steering lock assembly
9. Steering column hole cover
10. Steering shaft joint
11. Steering lower shaft assembly
12. Adjustable steering column release lever
13. Steering column lower seal

*: If equipped

DIAGNOSIS

For diagnosis of the steering wheel and steering column, refer to SECTION 3. For diagnosis of the air bag system, refer to SECTION 10B.

INSPECTION AND REPAIR REQUIRED AFTER ACCIDENT

After an accident, whether the air bag has been deployed or not, be sure to perform checks, inspections and repairs described under "Checking Steering Column For Accident Damage" in this section as well as "Repairs And Inspections Required After Accident" in SECTION 10B.

ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

For service precautions, refer to "Service Precautions" under "On-Vehicle Service" in SECTION 10B.

DIAGNOSIS AND SERVICING

For diagnosis and servicing, refer to "Diagnosis And Servicing" under "Service Precautions" in SECTION 10B.

DISABLING AIR BAG SYSTEM

For disabling air bag system, refer to "Disabling Air Bag System" under "Service Precautions" in SECTION 10B.

ENABLING AIR BAG SYSTEM

For enabling air bag system, refer to "Enabling Air Bag System" under "Service Precautions" in SECTION 10B.

HANDLING AND STORAGE

For handling and storage, refer to "Handling And Storage" under "Service Precautions" in SECTION 10B.

DISPOSAL

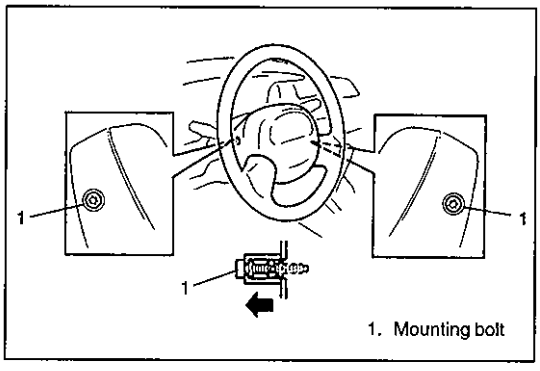
For disposal, refer to "Disposal" under "Service Precautions" in SECTION 10B.

DRIVE AIR BAG (INFLATOR) MODULE

WARNING:
When handling an air bag (inflator) module, be sure to read "Service Precautions" under "On-Vehicle Service" in SECTION 10B and observe each instruction. Failure to follow them could cause a damage to the air bag (inflator) module or result in personal injury.

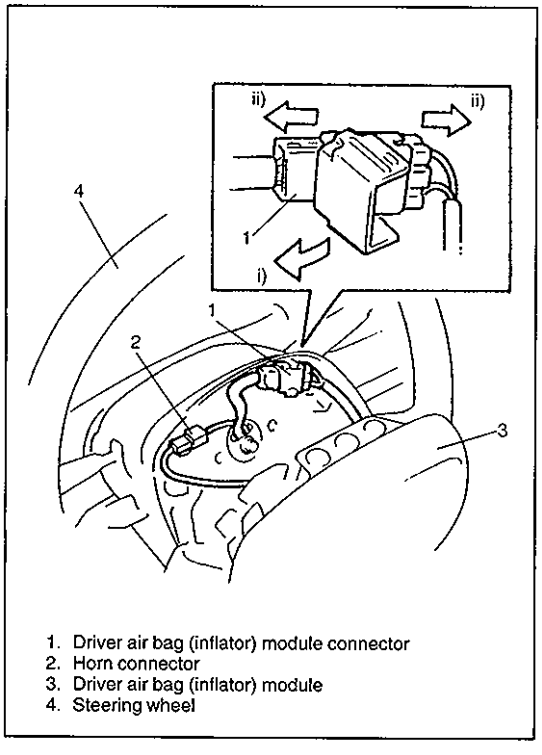
REMOVAL

1) Disconnect negative battery cable at battery terminal.
2) Disable air bag system. Refer to "Disabling Air Bag System" under "Service Precautions" in SECTION 10B.



1. Mounting bolt

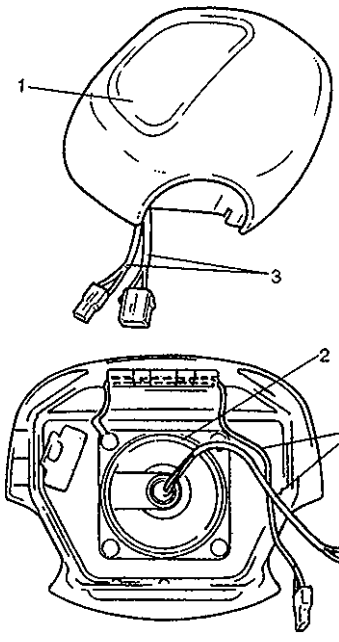
3) Loosen 2 bolts mounting driver air bag (inflator) module till it turns freely, pull them out and fix them to bolt clamps.
4) Remove air bag (inflator) module from steering wheel.



1. Driver air bag (inflator) module connector
2. Horn connector
3. Driver air bag (inflator) module
4. Steering wheel

5) Remove driver air bag (inflator) module (yellow) connector and horn connector from steering wheel.
6) Disconnect driver air bag (inflator) module (yellow) connector of driver air bag (inflator) module and horn connector as shown in the figure.
   i) Release locking of lever.
   ii) After unlocked, disconnect connector.

WARNING:
Special care is necessary when handling and storing a live (undeployed) air bag (inflator) module. Observe "Service Precautions" under "On-Vehicle Service" in SECTION 10B. Otherwise, personal injury may result.



1. Trim cover (pad surface)
2. Inflator case
3. Wire harness

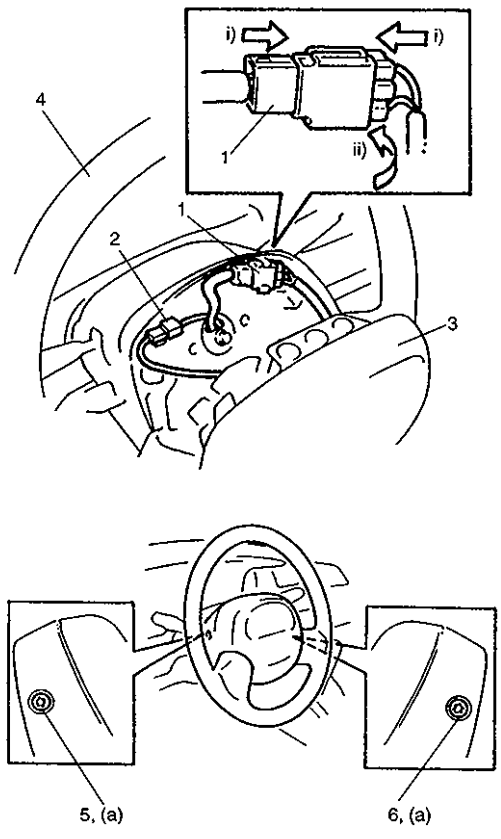
INSPECTION

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 90 cm (3 ft) or more, it should be replaced.

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)



1. Driver air bag (inflator) module connector
2. Horn connector
3. Driver air bag (inflator) module
4. Steering wheel
5. Mounting bolt (left side)
6. Mounting bolt (right side)

INSTALLATION

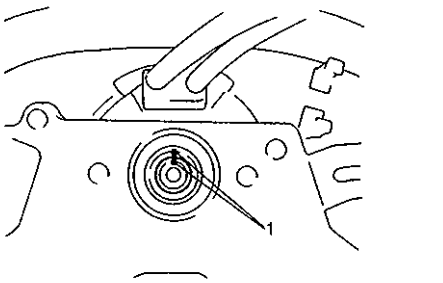
1) Connect horn connector securely.
2) Connect yellow connector of driver air bag (inflator) module connector as shown in the figure securely.
   i) Connect connector.
   ii) Lock connector with lock lever.
3) Install horn connector and driver air bag (inflator) module connector.
4) Install driver air bag (inflator) module to steering wheel, taking care so that no part of wire harness is caught between them.
5) Make sure that clearance between module and steering wheel is uniform all the way.
6) Tighten driver air bag (inflator) module mounting bolt (left side) to specified torque first and then driver air bag (inflator) module mounting bolt (right side) to specified torque.

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

7) Connect negative battery cable.
8) Enable air bag system. Refer to "Enabling Air Bag System" under "Service Precautions" in SECTION 10B.

STEERING WHEEL

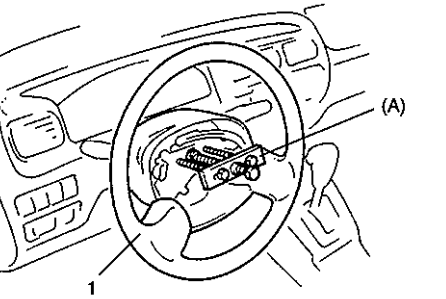
CAUTION:
Removal of the steering wheel allows the contact coil to turn freely but do not turn the contact coil (on the combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.



1. Make alignment marks

REMOVAL

1) Remove driver air bag (inflator) module from steering wheel referring to "Driver Air Bag (Inflator) Module" earlier in this section.
2) Remove steering shaft nut.
3) Make alignment marks on steering wheel and shaft for a guide during reinstallation.

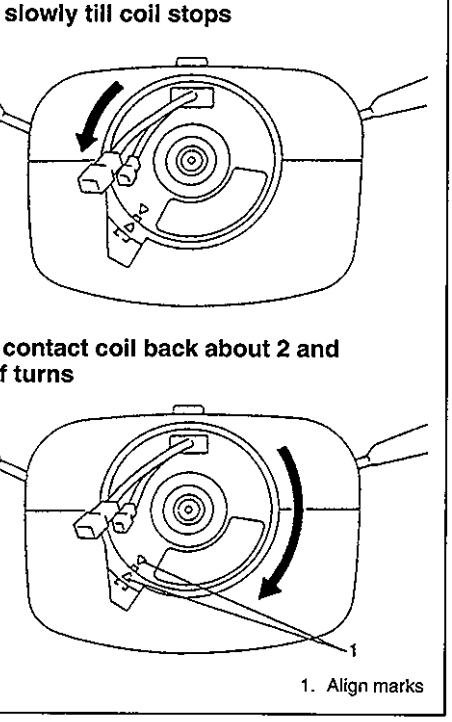


1. Steering wheel

4) Remove steering wheel with special tool.

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.



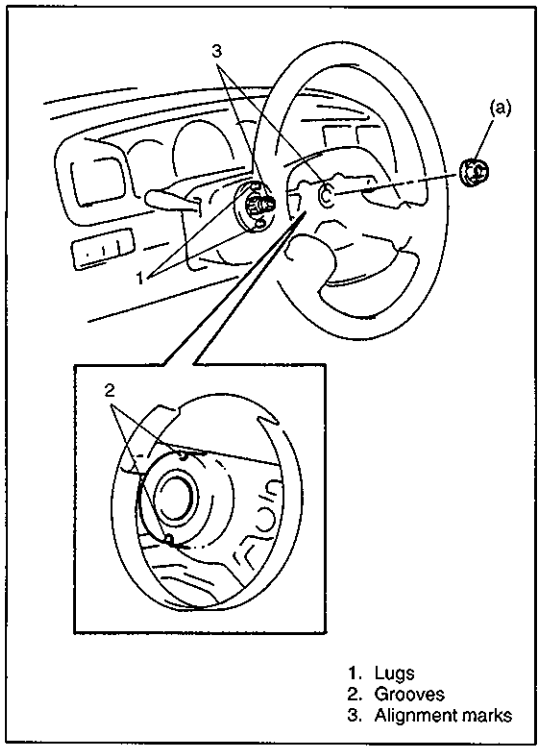
1. Align marks

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.
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.

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.

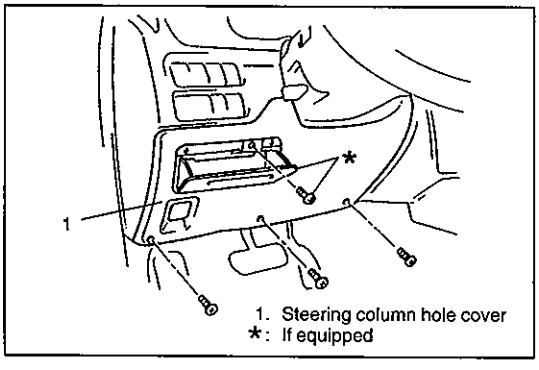
2) Install steering wheel to steering shaft with 2 lugs on contact coil fitted in two grooves in the back of steering wheel and also aligning marks on steering wheel and steering shaft.
3) Tighten steering shaft nut to specified torque.

Tightening Torque
(a): 33 N·m (3.3 kg-m, 23.5 lb-ft)

4) Install driver air bag (inflator) module to steering wheel. Refer to "Driver Air Bag (Inflator) Module" earlier in this section.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

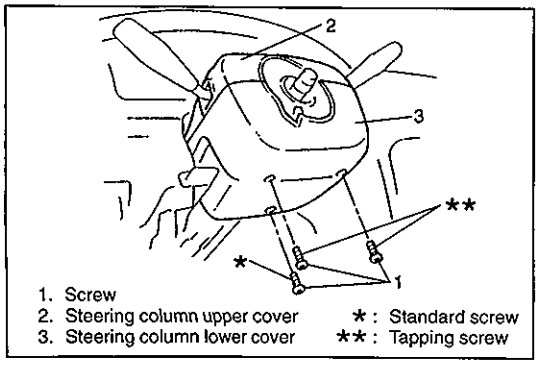
CAUTION:
Do not turn contact coil (on combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.



1. Steering column hole cover
*: If equipped

REMOVAL

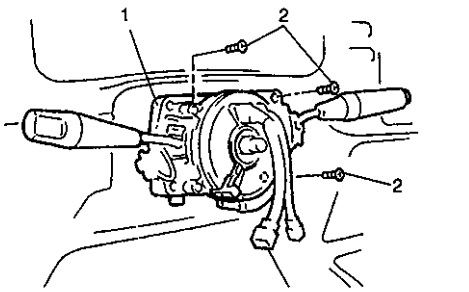
1) Remove steering wheel from steering column. Refer to "Steering Wheel" earlier in this section.
2) Remove steering column hole cover.



1. Screw
2. Steering column upper cover
3. Steering column lower cover

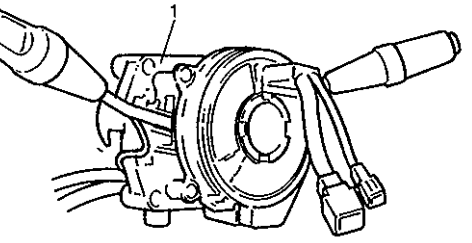
*: Standard screw
**: Tapping screw

3) Remove steering column cover screws (3 pcs).
4) Separate upper cover and lower cover, then remove them.
5) Disconnect all connectors for contact coil and combination switch assembly.



1. Contact coil and combination switch assembly
2. Screw

6) Remove contact coil and combination switch assembly from steering column.



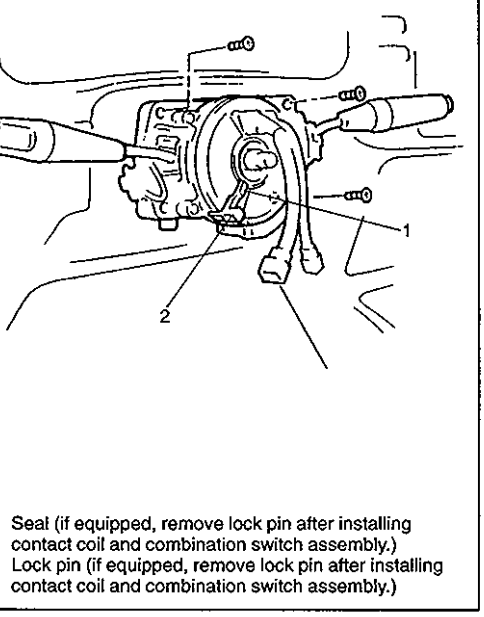
1. Contact coil and combination switch assembly

INSPECTION

Check contact coil and combination switch wire harness for any signs of scorching, melting or other damage. If it is damaged, replace.

INSTALLATION

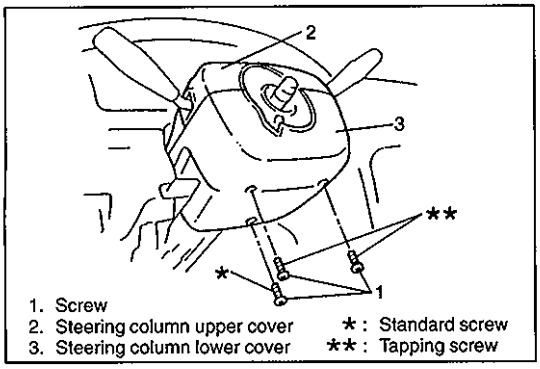
1) Check to make sure that vehicle's front tires are set at straight-ahead position and then ignition switch is at "LOCK" position.



1. Seal (if equipped, remove lock pin after installing contact coil and combination switch assembly.)
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.

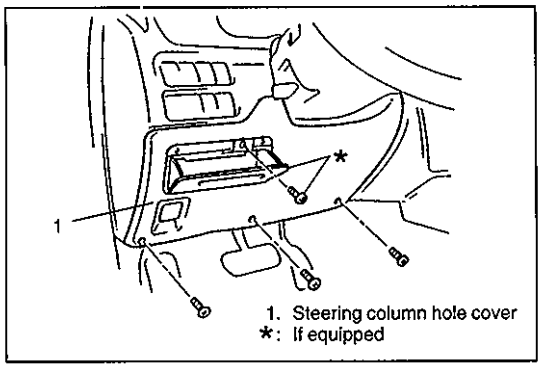


1. Screw
2. Steering column upper cover
3. Steering column lower cover

*: Standard screw
**: Tapping screw

3) Connect all connectors that have been removed in "Removal".
4) Install steering column upper and lower cover, and then tighten steering column cover screws.

CAUTION:
When installing lower cover and upper cover, be careful so that contact coil and combination switch lead wire is not caught between covers.



1. Steering column hole cover

*: If equipped

5) Install steering column hole cover.
6) Install steering wheel to steering column. Refer to "Steering Wheel" 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 or 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.
When loosening steering column mounting bolts, make sure that steering column assembly and steering shaft lower assembly have been separated. Loosening them with steering column assembly and steering shaft lower assembly assembled could cause damage to bearing in steering shaft lower assembly.

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

WARNING:
Never rest a steering column assembly on the steering wheel with air bag (inflator) module face down and column vertical. Otherwise personal injury may result.

1) Disconnect negative battery cable at battery terminal.
2) Disable air bag system. Refer to "Disabling Air Bag System" under "Service Precautions" in SECTION 10B.
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. Perform the following procedure if not removing steering wheel and/or combination switch.
   i) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
   ii) Turn ignition switch to "LOCK" position and remove key.
4) Refer to "Removal" steps 3) to 9) under "Steering Column" of "On-Vehicle Service" in SECTION 3C.

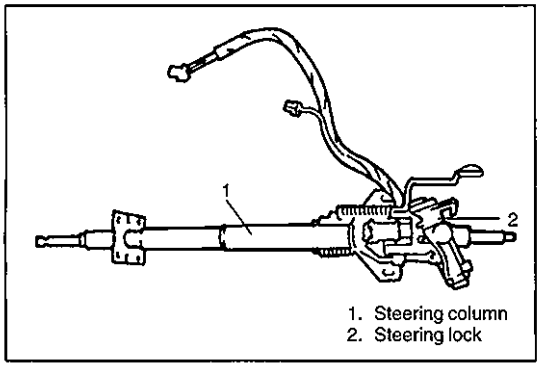
INSPECTION

Refer to "Inspection" under "Steering Column" of "On-Vehicle Service" in SECTION 3C.

INSTALLATION

Noting the followings, refer to "Installation" under "Steering Column" of "On-Vehicle Service" in SECTION 3C.

- If contact coil and combination switch assembly is removed, install it, referring to "Contact Coil And Combination Switch Assembly" earlier in this section.
- If steering wheel is removed, install it, referring to "Steering Wheel" earlier in this section.
- After installing steering column assembly, be sure to enable air bag system by referring to "Enabling Air Bag System" under "Service Precautions" in SECTION 10B.



1. Steering column
2. Steering lock

STEERING LOCK ASSEMBLY (IGNITION SWITCH)

REMOVAL

1) Remove steering column. Refer to "Steering Column" earlier in this section.
2) Refer to "Removal" steps 2) to 3) under "Steering Lock (Ignition Switch)" of "On-Vehicle Service" in SECTION 3C.

INSTALLATION

1) Refer to "Installation" steps 1) to 6) under "Steering Lock (Ignition Switch)" of "On-Vehicle Service" in SECTION 3C.
2) Install steering column. Refer to "Steering Column" earlier in this section.

ADJUSTABLE STEERING COLUMN RELEASE LEVER

Refer to "Adjustable Steering Column Release Lever" under "On-Vehicle Service" in SECTION 3C.

STEERING SHAFT LOWER ASSEMBLY

CAUTION:
Never turn steering wheel while steering shaft lower assembly 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 assembly, Refer to "Steering Shaft Lower Assembly" under "On-Vehicle Service" in SECTION 3C.

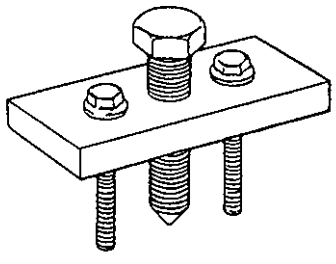
CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

Refer to "Checking Steering Column For Accident Damage" under "On-Vehicle Service" in SECTION 3C.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Driver air bag (inflator) module bolt	9	0.9	6.5
Steering shaft nut	33	3.3	23.5
Steering column mounting bolt	23	2.3	17.0
Steering shaft joint bolt	25	2.5	18.0
Steering shaft lower assembly lower joint bolt	25	2.5	18.0

SPECIAL TOOL



09944-36011
Steering wheel remover

SECTION 3D

FRONT SUSPENSION

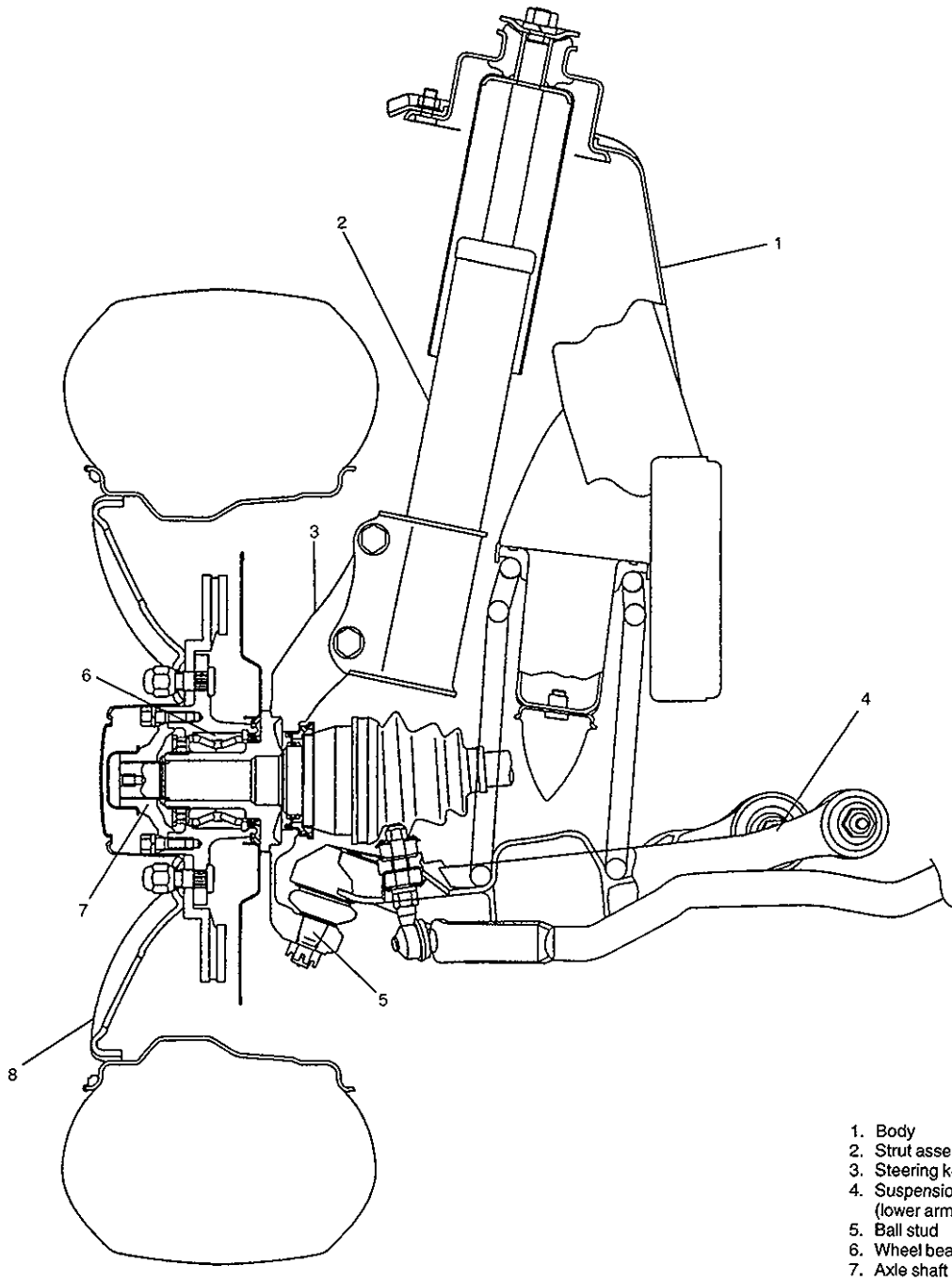
CAUTION:
- **All front suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. 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.**

CONTENTS

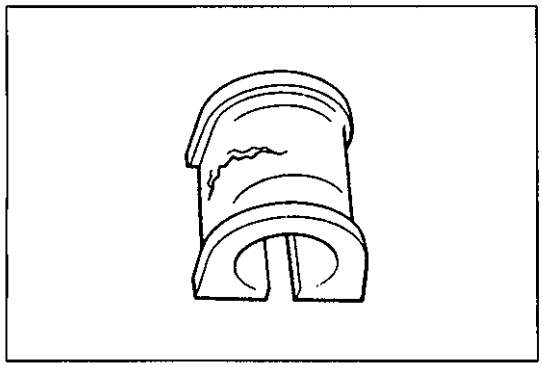
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GENERAL DESCRIPTION

The front suspension is the strut type independent suspension. The upper end of a strut is anchored to the body by a 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 a steering knuckle and lower end of knuckle is attached to the stud of a ball joint which is incorporated in a unit with a suspension control arm. And this steering knuckle is connected to 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.



1. Body
2. Strut assembly
3. Steering knuckle
4. Suspension control arm (lower arm)
5. Ball stud
6. Wheel bearing
7. Axle shaft drive flange
8. Wheel



DIAGNOSIS

DIAGNOSIS TABLE

Refer to Section 3.

STABILIZER BAR AND BUSHING CHECK

BAR

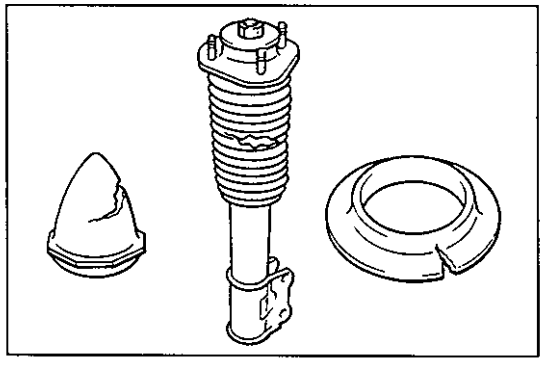
Inspect for damage or deformation. If defective, replace.

BUSHING

Inspect for damage, wear or deterioration. If defective, replace.

STRUT DAMPER AND/OR COIL SPRING CHECK

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 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 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, 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.

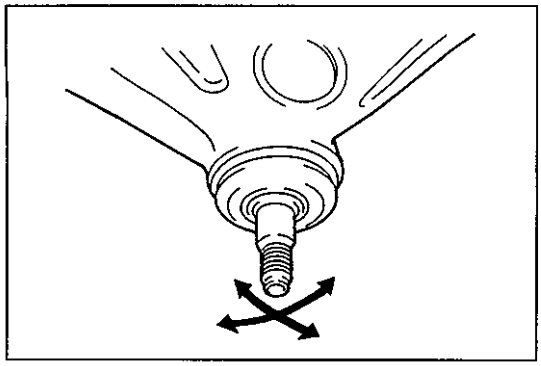


3) Inspect for damage or deformation.
4) Inspect strut boot for damage or crack.
5) Inspect for cracks or deformation in spring seat.
6) Inspect for deterioration of bump stopper.
7) Inspect strut mount for wear, cracks or deformation.

Replace any parts found defective in steps 2) – 7).

SUSPENSION ARM/KNUCKLE CHECK

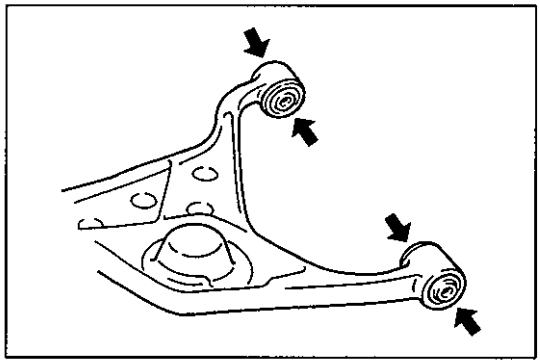
Inspect for cracks, deformation or damage.



SUSPENSION CONTROL ARM JOINT CHECK

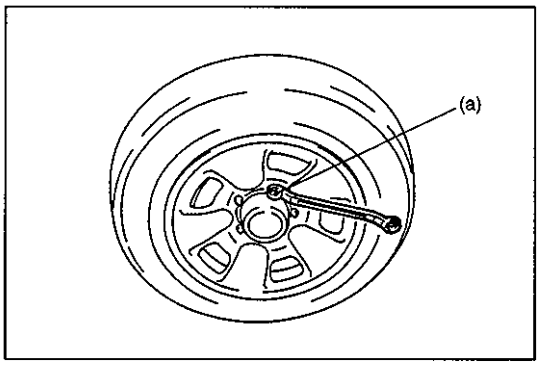
1) Check for smoothness of rotation.
2) Inspect ball stud for damage.
3) Inspect dust cover for damage.

Replace any parts found defective in steps 1) – 3).



SUSPENSION CONTROL ARM BUSHING CHECK

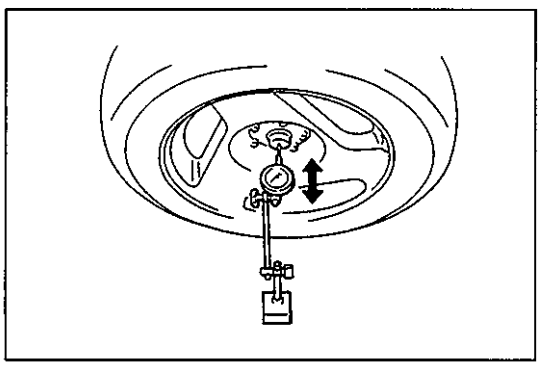
Inspect for damage, wear or deterioration.



WHEEL DISC, NUT & BEARING CHECK

1) Inspect each wheel disc for dents, distortion and cracks.
   Disc in badly damaged condition must be replaced.
2) Check wheel nuts for tightness and as necessary, retighten them to specification.

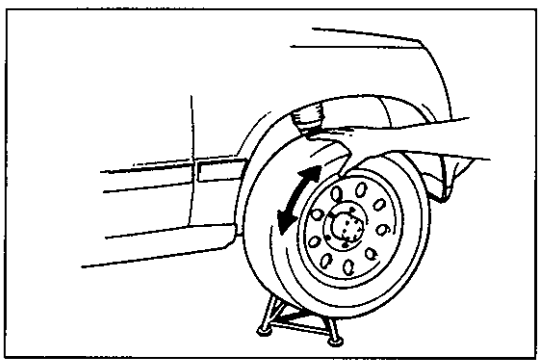
   Tightening Torque
   (a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



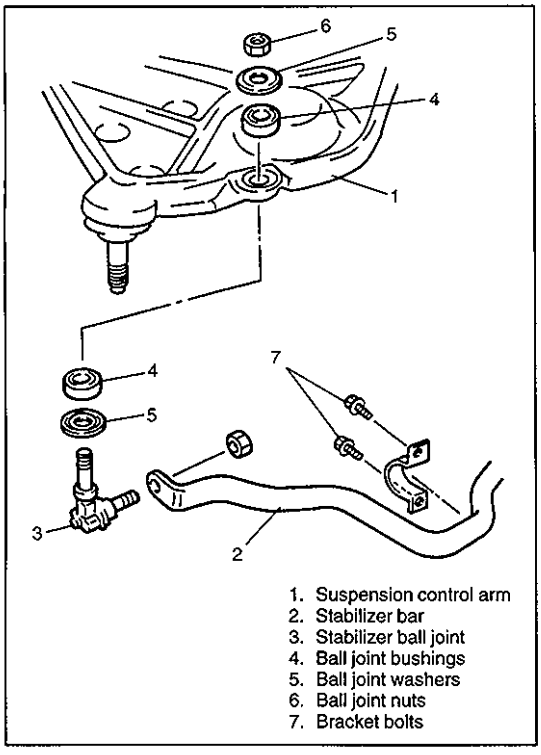
3) Check wheel bearing for wear. After retightening lock nut to specified torque, apply dial gauge to wheel hub center and measure thrust play.

   Thrust play limit: 0.05 mm (0.002 in.)

   When measurement exceeds limit, replace bearing.



4) By rotating wheel actually, check wheel bearing for noise and smooth rotation. If defective, replace bearing.



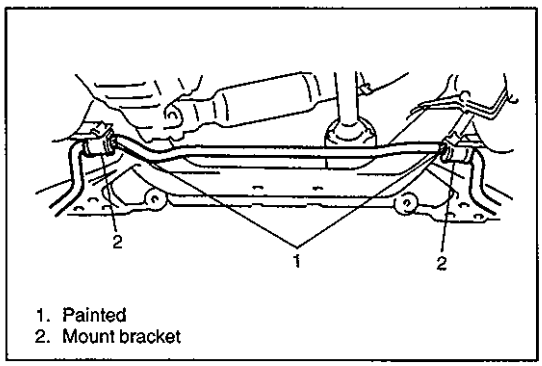
1. Suspension control arm
2. Stabilizer bar
3. Stabilizer ball joint
4. Ball joint bushings
5. Ball joint washers
6. Ball joint nuts
7. Bracket bolts

ON-VEHICLE SERVICE

STABILIZER BAR/BUSHINGS

REMOVAL

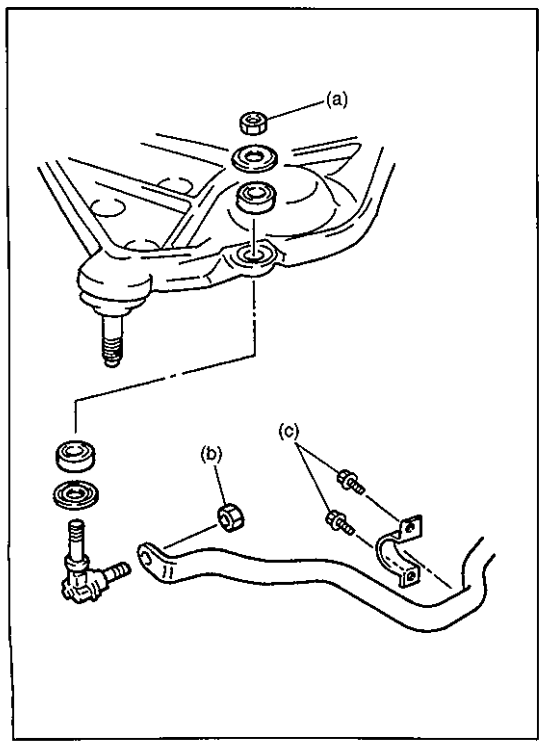
1) Hoist vehicle.
2) Remove stabilizer bar mount bush bracket bolts.
3) Remove stabilizer ball joint nuts, washers and bushings.
4) Remove stabilizer bar with its ball joints.
5) Disconnect stabilizer ball joints from stabilizer bar.



1. Painted
2. Mount bracket

INSTALLATION

NOTE:
For correct installation of stabilizer bar, side-to-side, be sure that color paint on stabilizer bar aligns with mount bush, both right and left, as shown. And face color paint to lower side.

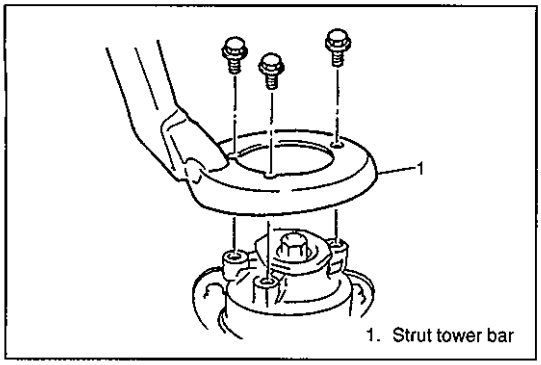


1) Connect stabilizer ball joints and stabilizer bar.
2) Install stabilizer ball joints to lower arms.

NOTE:
Do not tighten stabilizer ball joint nuts completely.

3) Install stabilizer bar mount bush brackets.
4) When installing stabilizer, loosely assemble all components while insuring that stabilizer is centered, side-to-side.
   Check that ball joint is set at neutral position seeing from body upper side.
5) Tighten stabilizer bracket bolts and stabilizer ball joint nuts to specified torque.

Tightening Torque
(a): 29 N·m (2.9 kg-m, 21.0 lb-ft)
(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

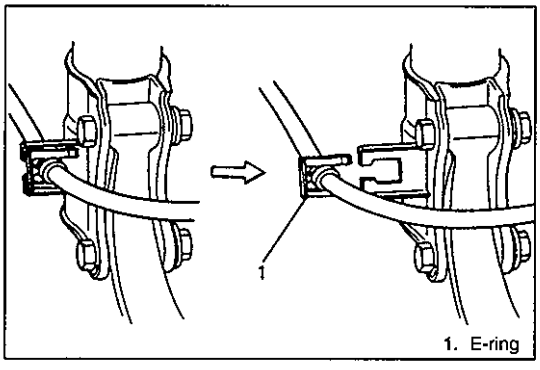


1. Strut tower bar

STRUT DAMPER

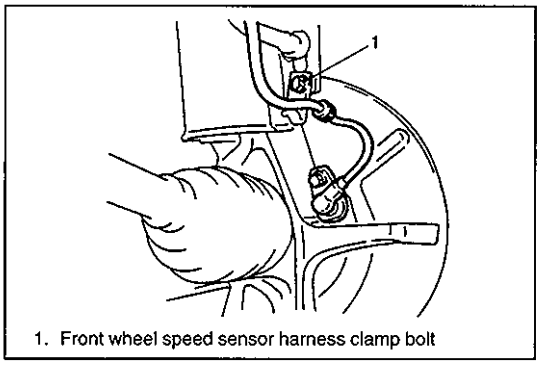
REMOVAL

1) Remove strut tower bar. (If equipped)



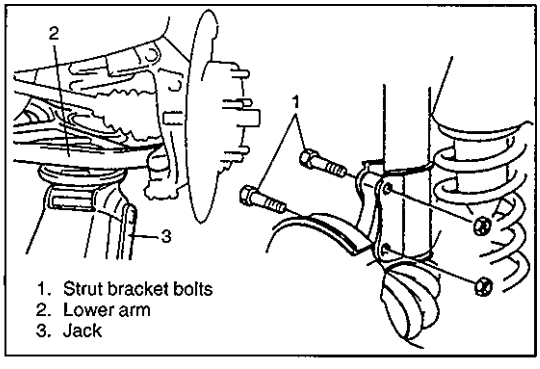
1. E-ring

2) Hoist vehicle, allowing front suspension to hang free.
3) Remove wheel.
4) Remove E-ring securing brake hose and take brake hose off strut bracket as shown.



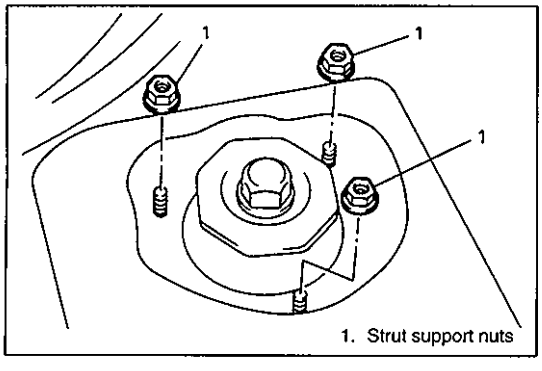
1. Front wheel speed sensor harness clamp bolt

5) If equipped with ABS, remove front wheel speed sensor harness clamp bolt.



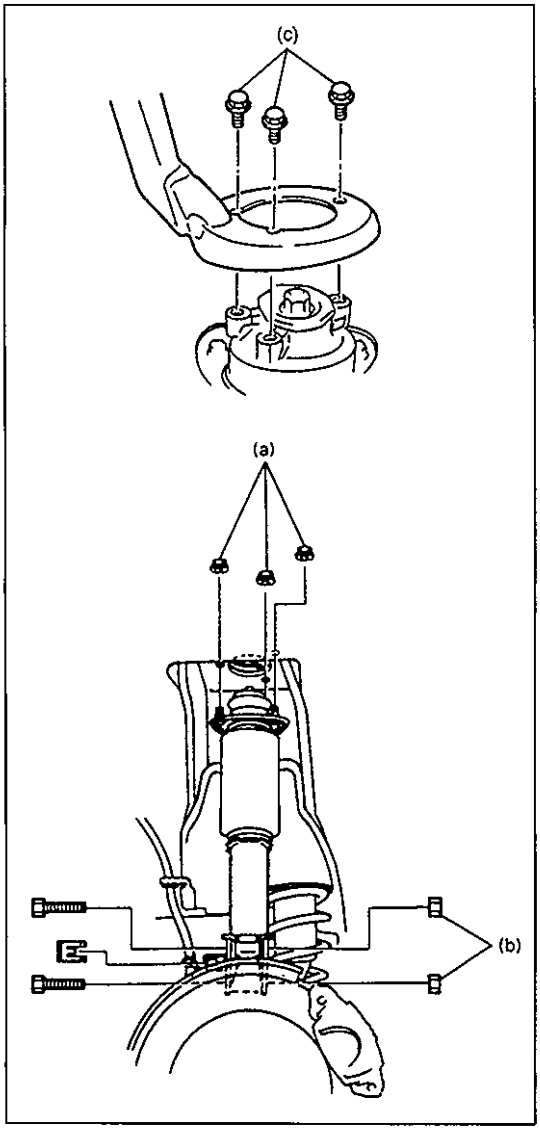
1. Strut bracket bolts
2. Lower arm
3. Jack

6) Remove strut bracket bolts, then support lower arm with jack.



1. Strut support nuts

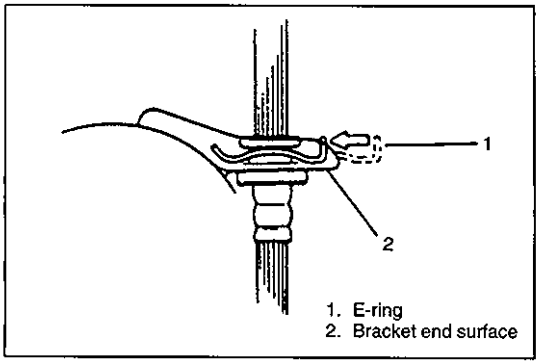
7) Remove strut support nuts.
Hold strut by hand so that it will not fall off.
8) Remove strut.



INSTALLATION

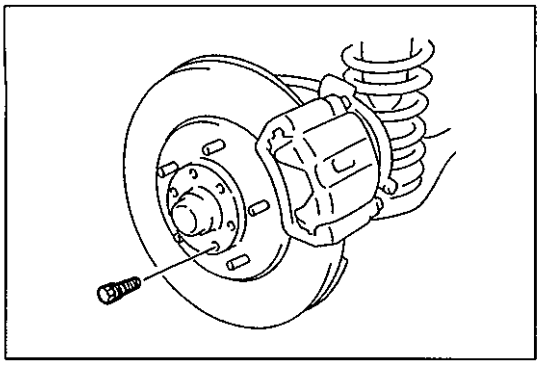
1) Install strut by reversing Removal steps 1) – 8). Insert bolts in such a direction as shown.
2) Torque all fasteners to specifications.

Tightening Torque
(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(b): 95 N·m (9.5 kg-m, 69.0 lb-ft)
(c): 50 N·m (5.0 kg-m, 36.5 lb-ft)



1. E-ring
2. Bracket end surface

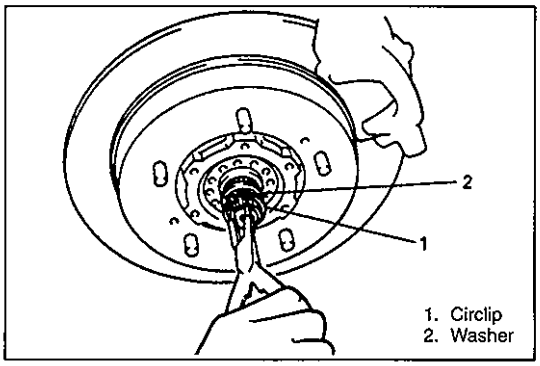
NOTE:
Brake hose installation.
Don't twist hose when installing it. Install E-ring as far as bracket end surface as shown.



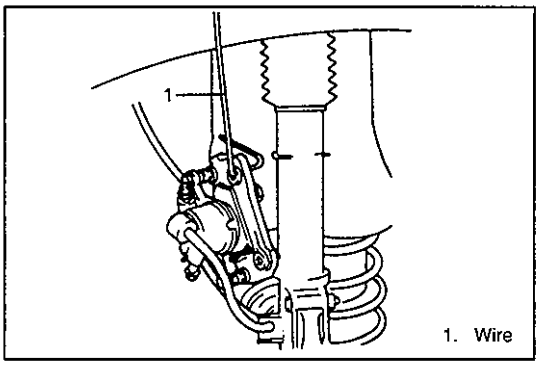
COIL SPRING

REMOVAL

1) Hoist vehicle, allowing front suspension to hang free.
2) Remove wheels.
3) Remove axle shaft drive flange.

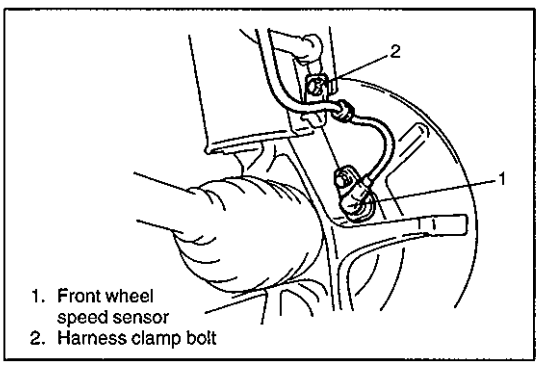


4) Remove front drive shaft circlip and washer.



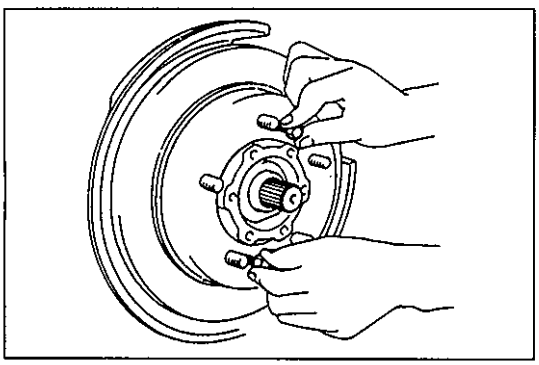
5) Remove caliper bolts and suspend caliper with a wire hook.

CAUTION:
Hang removed caliper with a wire hook so as to prevent brake hose from bending and twisting excessively or being pulled.
Don't operate brake pedal with pads removed.



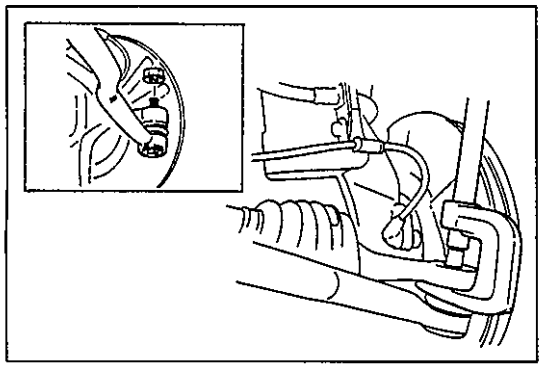
6) If equipped with ABS, remove harness clamp bolt and remove front wheel speed sensor from knuckle.

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.**

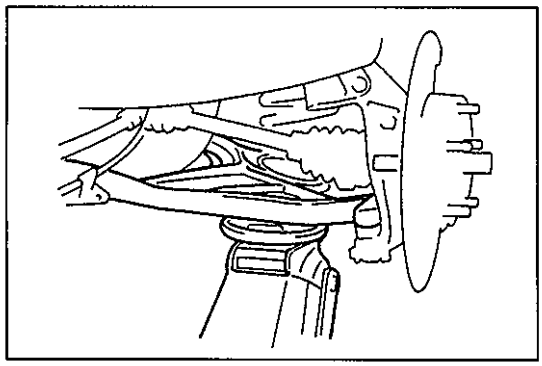


7) Remove brake disc.

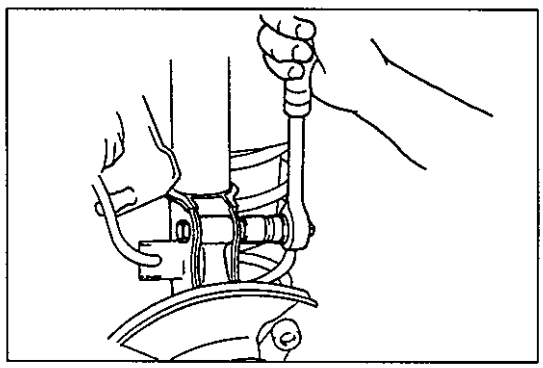
NOTE:
If brake disc can not be removed by hand, use 8 mm bolts as shown.



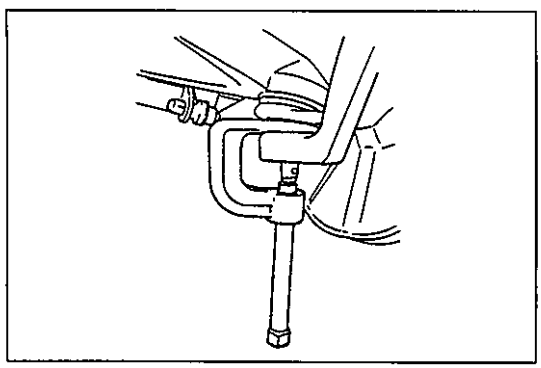
8) Remove stabilizer bar, refer to steps 2) to 5) of item STABILIZER BAR/BUSHINGS REMOVAL in this section.
9) Disconnect tie rod end from knuckle by using puller.



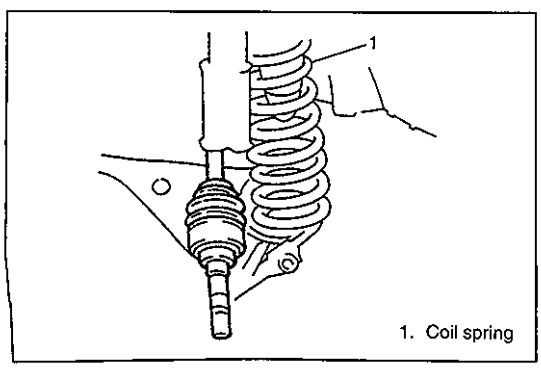
10) Support lower arm, using jack as shown.



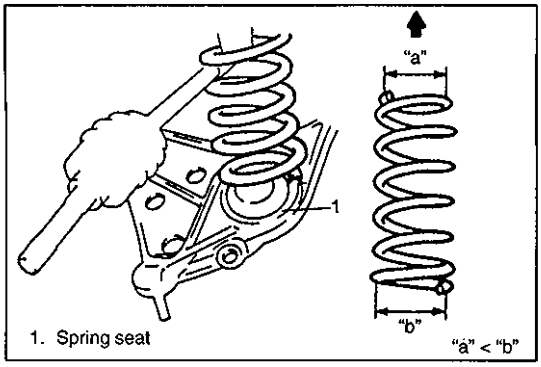
11) Remove strut bracket bolts.



12) Remove ball stud castle nut.
13) Using puller, disconnect knuckle from ball stud.



14) Remove knuckle and wheel hub comp, while lowering jack.
15) Remove coil spring.

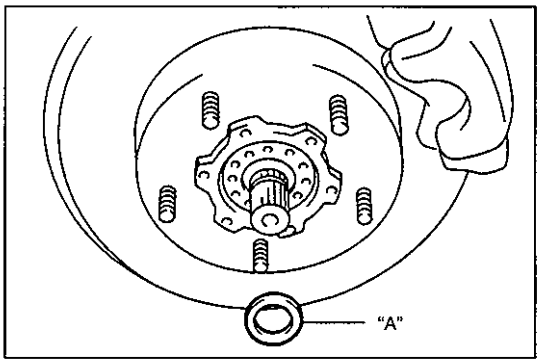


INSTALLATION

Reverse removal procedure to install coil spring.

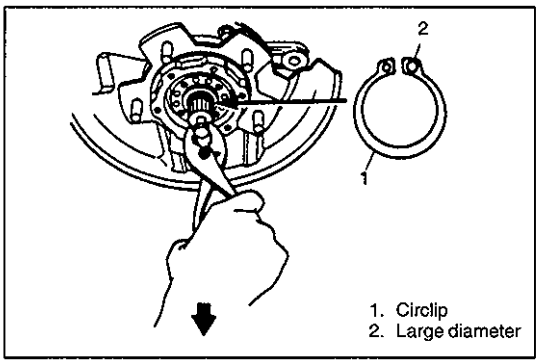
NOTE:
Upper and lower diameters of coil spring are different. Bring larger diameter end at bottom and set its open end in place on spring seat.

- Be sure to use specified torque for tightening each fastener.
- Refer to torque specification chart at the end of this section.
- As for ball stud nut, be sure to insert split pin and bend it after tightening it.
- Tighten tie-rod end nut with pushing ball stud to upper side so as not ball stud to be rotated.

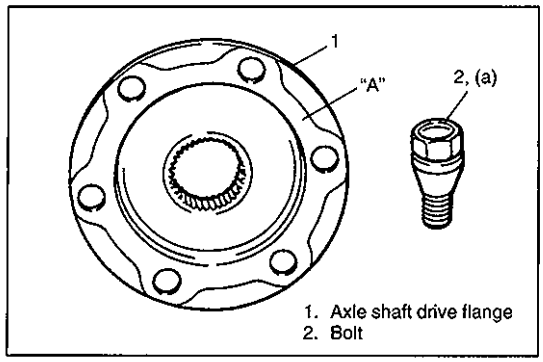


- Apply lithium grease to front drive shaft washer and front wheel spindle outer.

"A": Grease 99000-25010



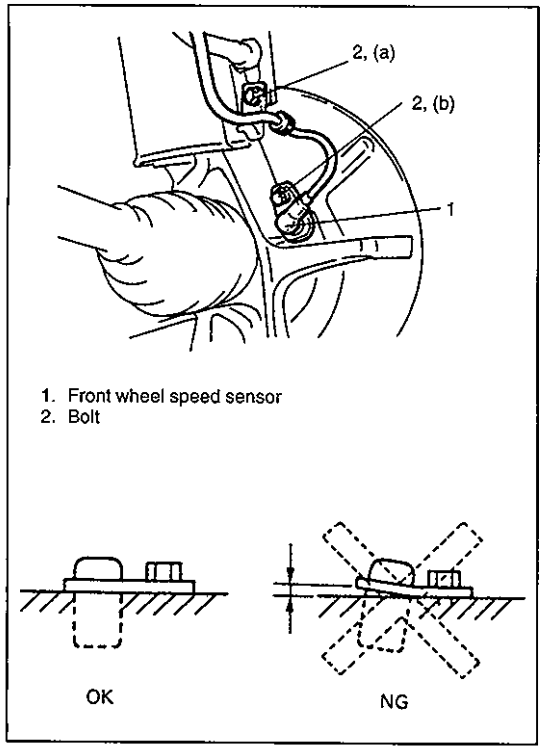
- When installing circlip to drive shaft, utilize screw hole in drive shaft to pull it out and bring large diameter of circlip at right as shown.



- When installing axle shaft drive flange to wheel hub, apply sealant to mating surface of axle shaft drive flange and tighten flange bolt to specified torque.

"A": Sealant 99000-31090

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



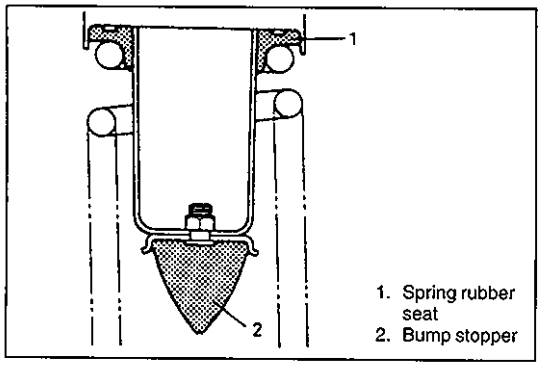
1. Front wheel speed sensor
2. Bolt

- Check that no foreign material is attached to sensor and rotor. Install wheel speed sensor and its harness clamp.

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)

CAUTION:
- **Do not pull wire harness or twist more than necessary when installing front wheel speed sensor.**
- **Fit harness grommet to inner fender securely.**

- Check that there is no clearance between sensor and knuckle.

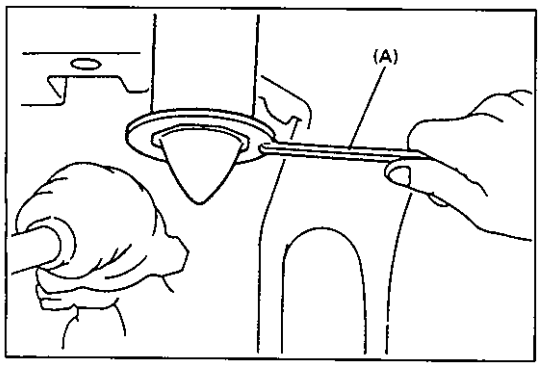


1. Spring rubber seat
2. Bump stopper

BUMP STOPPER/SPRING RUBBER SEAT

REMOVAL

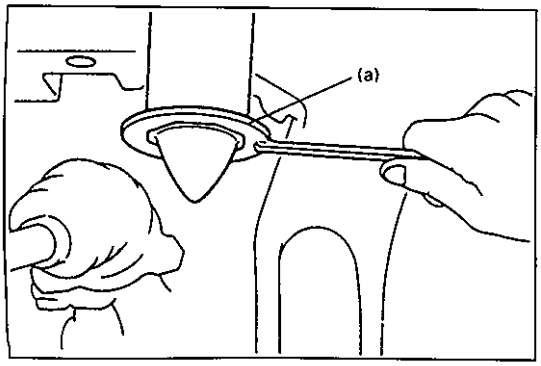
1) Remove coil spring. Refer to steps 1) to 15) of item COIL SPRING REMOVAL in this section.
2) Remove spring rubber seat.



3) Remove bump stopper, using special tool.

Special Tool
(A): 09941-66010

INSTALLATION



1) Tighten bump stopper to specified torque, using special tool.

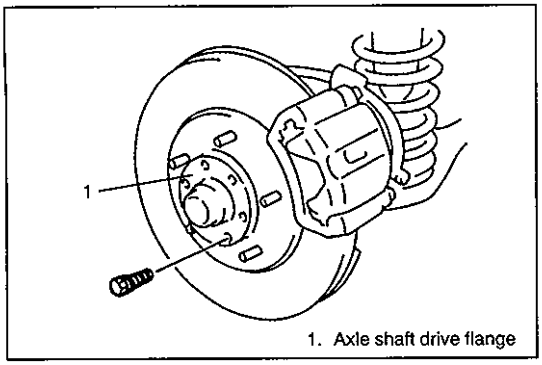
Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

2) Install spring rubber seat.
3) Install coil spring. Refer to item COIL SPRING INSTALLATION in this section.

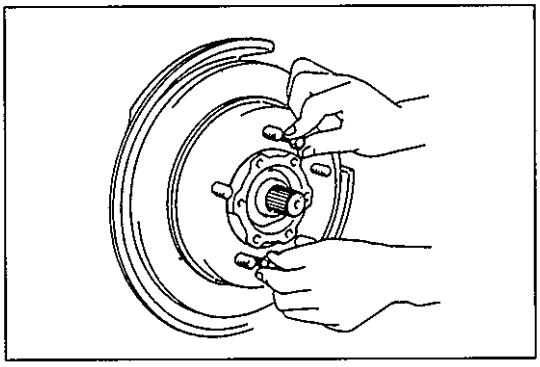
WHEEL HUB/BEARING/OIL SEAL

REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove axle shaft drive flange.



1. Axle shaft drive flange

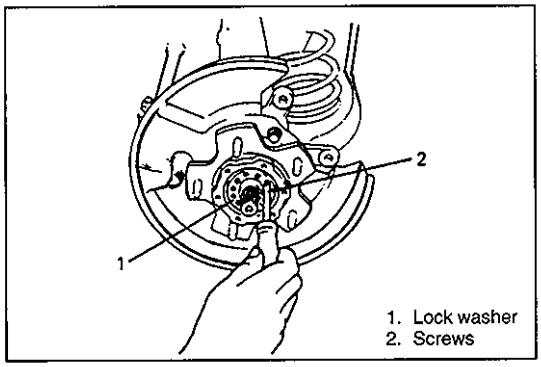


3) If equipped with ABS, remove wheel speed sensor from knuckle and harness clamp from strut.
4) Remove caliper bolt and suspend caliper.

CAUTION:
Hang removed caliper with a wire hook of the like so as to prevent brake hose from bending and twisting excessively or being pulled.
Don't operate brake pedal with pads removed.

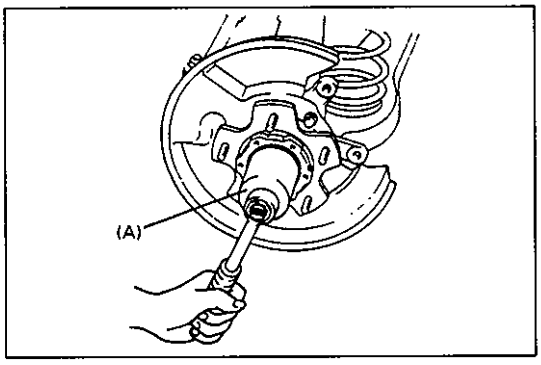
5) Remove brake disc.

NOTE:
If brake disc can not be removed by hand, use 8 mm bolts as shown.



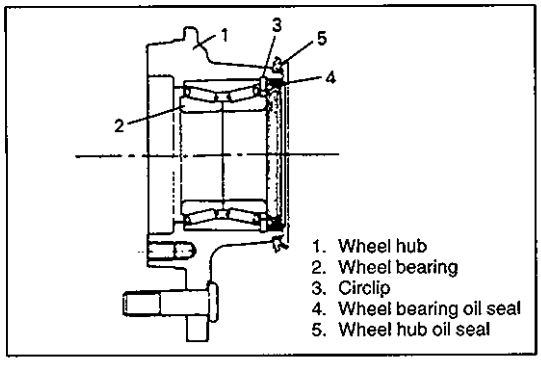
1. Lock washer
2. Screws

6) Remove front wheel bearing lock washer by loosening 4 screws.



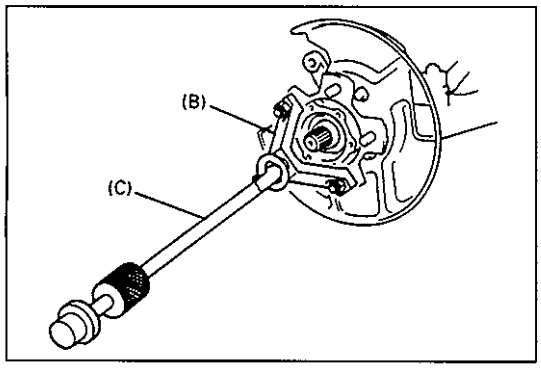
7) Remove front wheel bearing lock nut by using special tool.

Special Tool
(A): 09951-16050



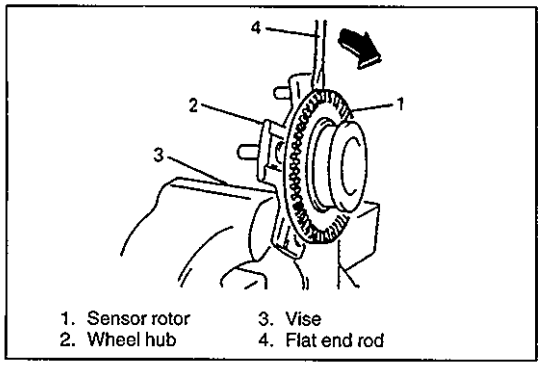
1. Wheel hub
2. Wheel bearing
3. Circlip
4. Wheel bearing oil seal
5. Wheel hub oil seal

8) Remove front wheel bearing washer.
9) Remove wheel hub complete with bearings and oil seals.



NOTE:
If wheel hub can not be removed by hand, use special tools as shown.

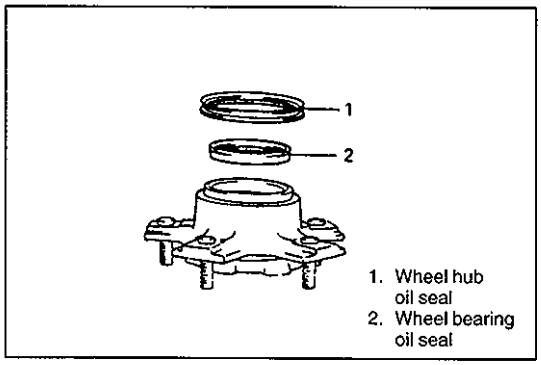
Special Tool
(B): 09943-35511
(C): 09942-15510



1. Sensor rotor
2. Wheel hub
3. Vise
4. Flat end rod

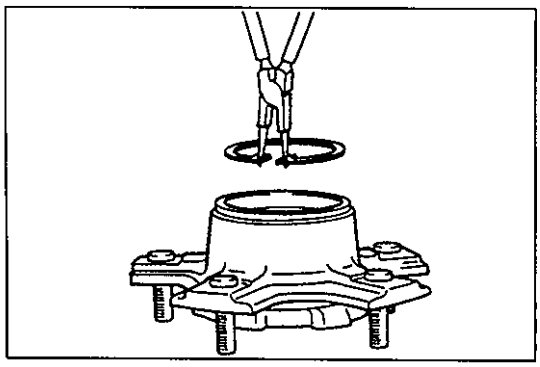
10) Remove sensor rotor from wheel hub as shown (if equipped with ABS).

CAUTION:
Pull out sensor rotor from wheel hub gradually and evenly.
Attempt to pull it out partially may cause it to be deformed.

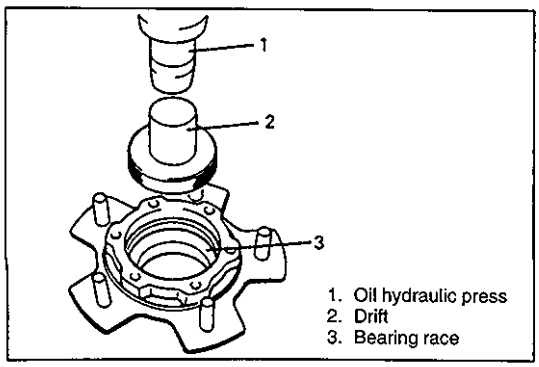


1. Wheel hub oil seal
2. Wheel bearing oil seal

11) Remove oil seals.



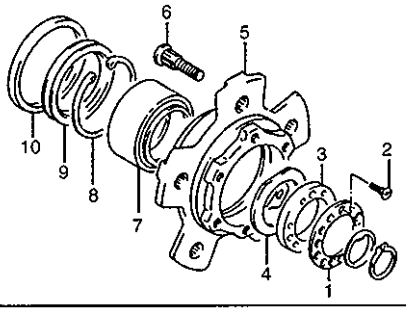
12) Remove bearing circlip.



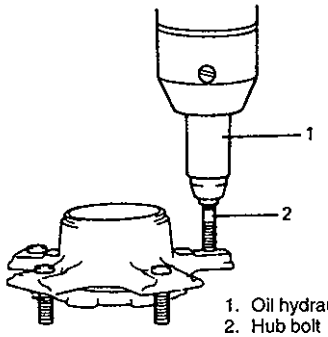
1. Oil hydraulic press
2. Drift
3. Bearing race

13) Using hydraulic press and drift, remove bearing race.
14) Remove hub bolts from hub.

INSTALLATION

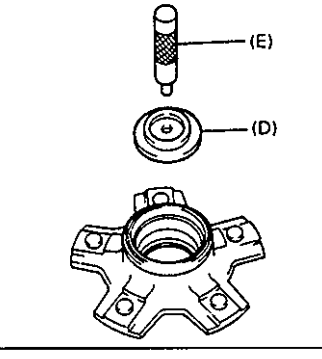


1. Bearing lock washer
2. Screw
3. Bearing lock nut
4. Wheel bearing washer
5. Wheel hub
6. Bolt
7. Wheel bearing
8. Circlip
9. Wheel bearing oil seal
10. Wheel hub oil seal



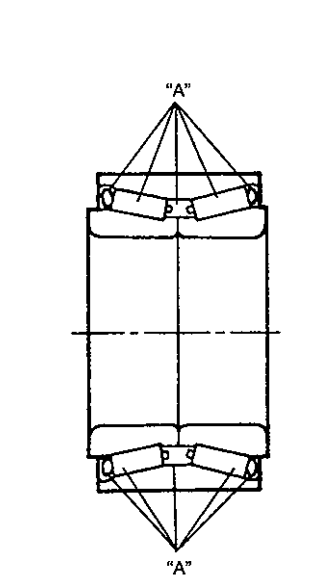
1. Oil hydraulic press
2. Hub bolt

1) Insert new stud in hub hole. Rotate stud slowly to assure serrations are aligned with those made by original bolt.



2) Using special tools, press-fit bearing outer race until its end contacts stepped surface of wheel hub.

Special Tool
(D): 09944-68210
(E): 09924-74510



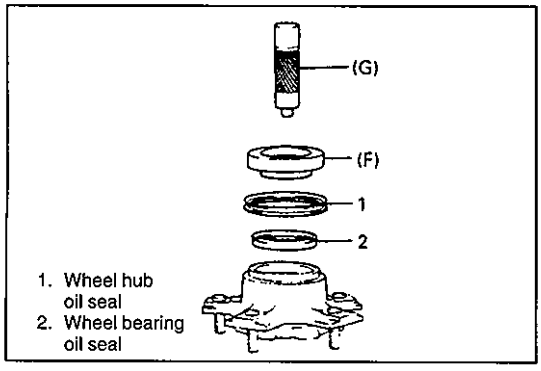
Cassette type double taper roller bearing

3) Install front wheel bearing

NOTE:
- **As front wheel bearing is cassette type double taper roller bearing, it must be replaced as whole unit when replacement becomes necessary.**
- **Cassette type double taper roller bearing is so designed as to provide proper pre-load as long as it is tightened to specified torque.**
  Therefore, it requires no pre-load check after installation, unlike conventional taper roller bearing.
- **Apply wheel bearing grease between bearings.**

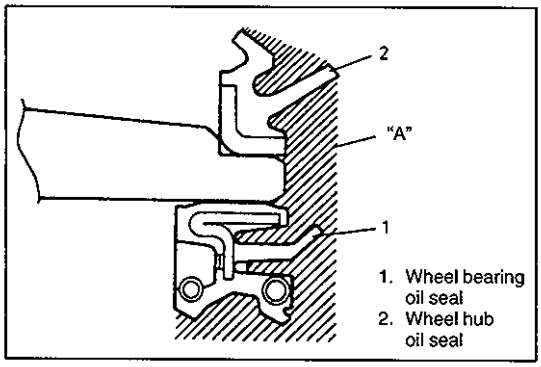
"A": Grease 99000-25010

4) Install bearing circlip.



5) Drive in oil seals by using special tools.

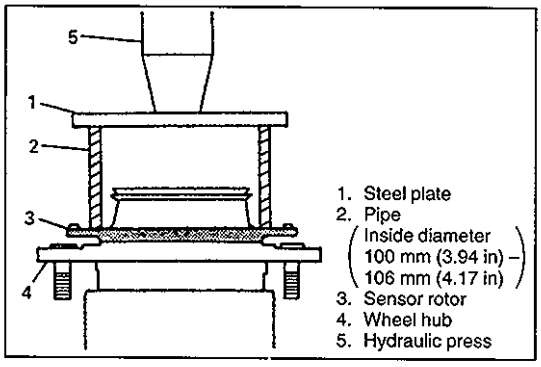
Special Tool
(F): 09944-66010
(G): 09924-74510



6) Apply lithium grease to lip portion and hollow of oil seal.

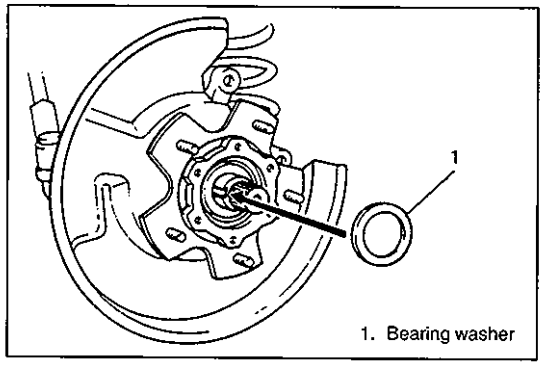
NOTE:
Amount of grease applied to hollow in oil seal should be more than 60% of its vacant space.

"A": Grease 99000-25010

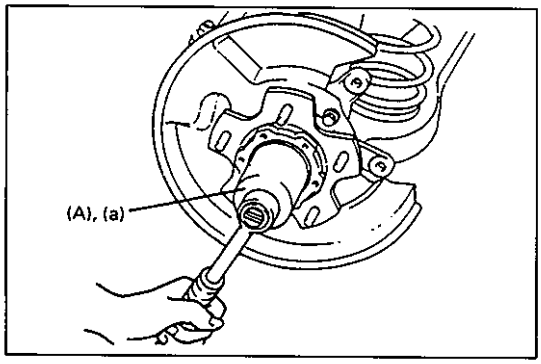


7) Install sensor rotor as shown (if equipped with ABS).

NOTE:
- **Pipe used here should have inner diameter of 100 mm (3.94 in.) – 106 mm (4.17 in.) and its out side should not contact teeth of sensor rotor.**
- **Use care not to insert wheel hub diagonally.**



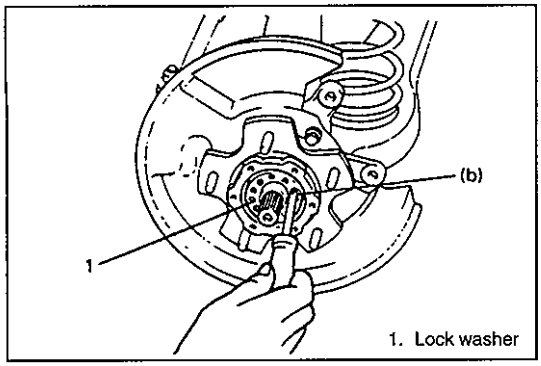
8) Install wheel hub complete with bearings and oil seals onto front wheel spindle.
9) Install bearing washer.



10) Tighten wheel bearing lock nut to specified torque while turning wheel hub by hand.

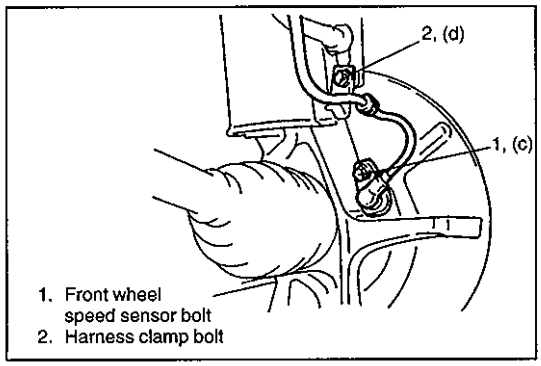
Special Tool
(A): 09951-16050

Tightening Torque
(a): 216 N·m (21.6 kg-m, 157 lb-ft)



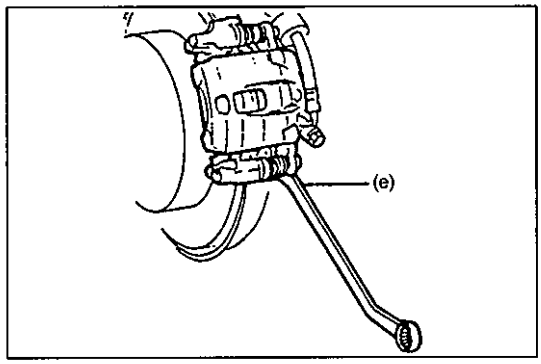
11) Using lock washer, lock bearing lock nut. If lock screw hole is not aligned with screw hole in lock nut, turn lock nut in tightening direction till they align.

Tightening Torque
(b): 1.5 N·m (0.15 kg-m, 1.1 lb-ft)



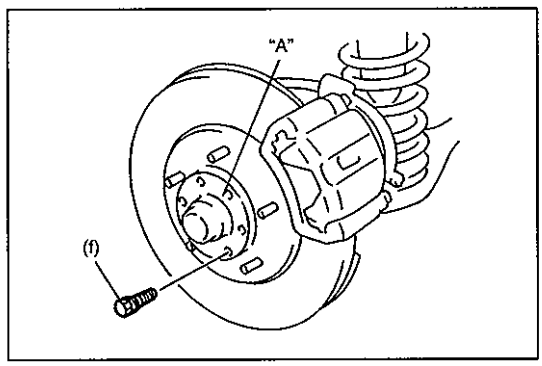
12) Apply lithium grease to front drive shaft joint washer and front wheel spindle outer. (Refer to COIL SPRING INSTALLATION).
13) Install circlip to drive shaft and drive flange to wheel hub, referring to COIL SPRING INSTALLATION.
14) If equipped with ABS, install front wheel speed sensor and harness clamp.

Tightening Torque
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)
(d): 10 N·m (1.0 kg-m, 7.5 lb-ft)



15) Install brake disc and caliper assembly.

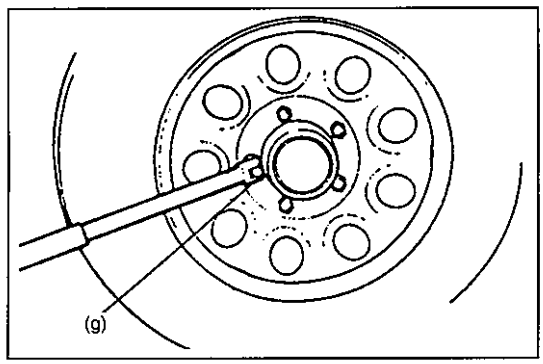
Tightening Torque
(e): 85 N·m (8.5 kg-m, 61.5 lb-ft)



16) Apply sealant mating surface of axle shaft drive flange, then install axle shaft drive flange and tighten flange bolt to specified torque.

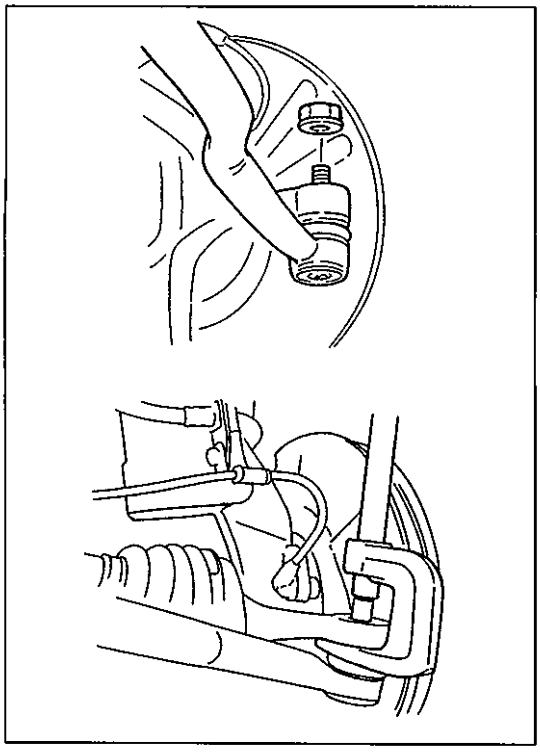
Tightening Torque
(f): 25 N·m (2.5 kg-m, 18.0 lb-ft)

"A": Sealant 99000-31090



17) Install wheel.

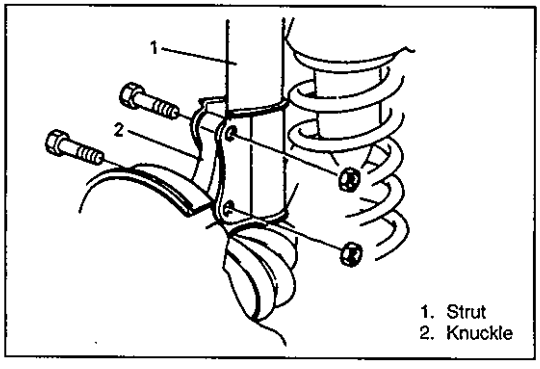
Tightening Torque
(g): 95 N·m (9.5 kg-m, 69.0 lb-ft)



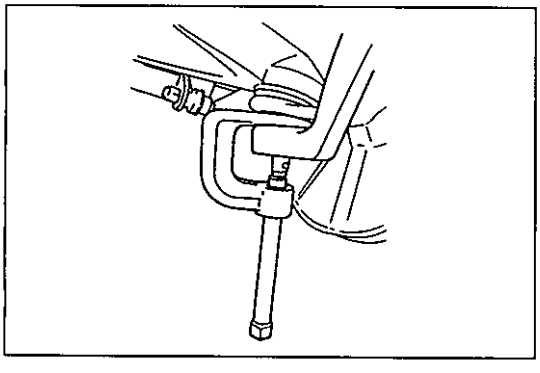
KNUCKLE/WHEEL SPINDLE

REMOVAL

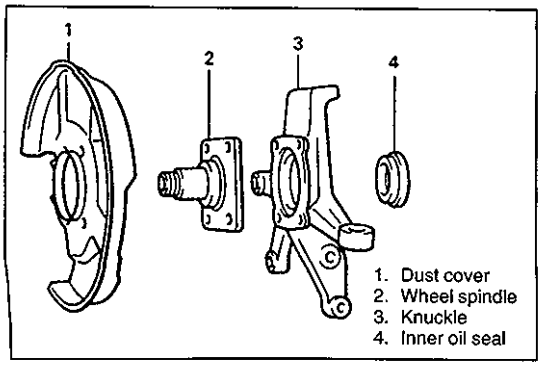
1) Hoist vehicle and remove wheel.
2) Remove axle shaft drive flange, drive shaft circlip and washer. Refer to steps 3) to 4) of item COIL SPRING REMOVAL in this section.
3) Remove wheel hub. Refer to steps 3) to 9) of item WHEEL HUB/BEARING/OIL SEAL REMOVAL in this section.
4) Disconnect tie-rod end from knuckle.



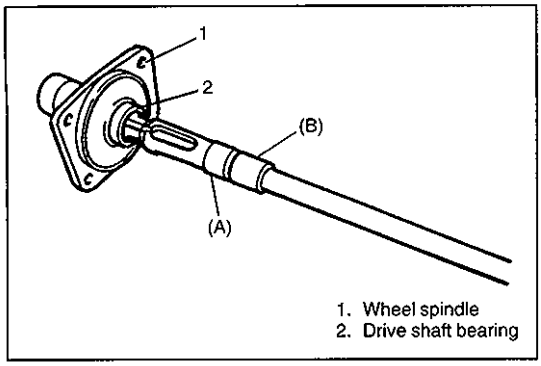
5) Remove ball stud nut.
6) Support lower arm with jack.
7) Remove strut bracket bolts from strut bracket.



8) By using puller, disconnect knuckle from ball stud.



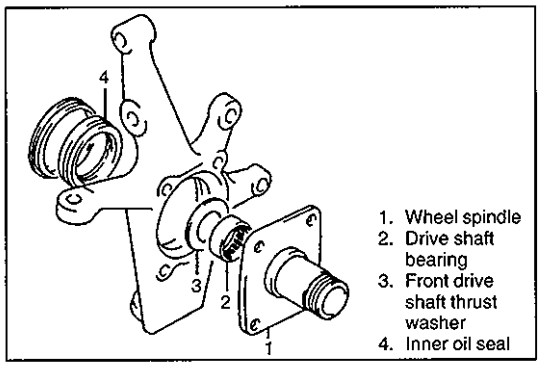
9) While lowering jack, remove knuckle/wheel spindle comp.
10) Remove inner oil seal, dust cover and wheel spindle.



1. Wheel spindle
2. Drive shaft bearing

11) Remove drive shaft bearing by using special tool.

Special Tool
(A): 09923-74510
(B): 09930-30102

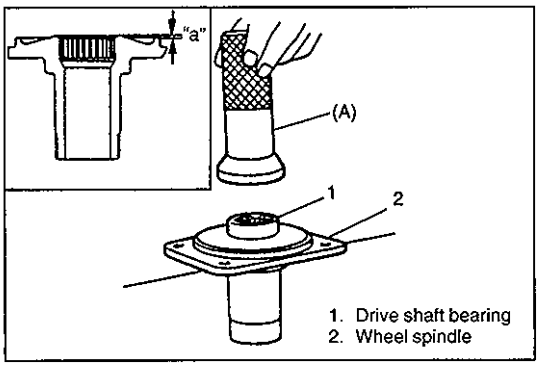


1. Wheel spindle
2. Drive shaft bearing
3. Front drive shaft thrust washer
4. Inner oil seal

INSTALLATION

Reverse removal sequence to install knuckle, wheel spindle oil seal and drive shaft bearing,noting following points.

- Install front drive shaft thrust washer with its chanfered side facing to drive shaft side.

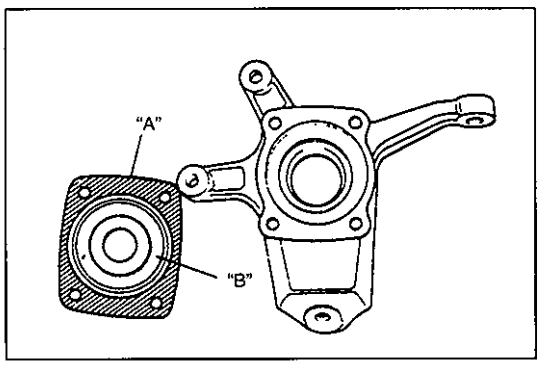


1. Drive shaft bearing
2. Wheel spindle

- Install drive shaft bearing by using special tool.

Special Tool
(A): 09913-76010

Dimension "a": 0 – 1 mm (0 – 0.04 in.)



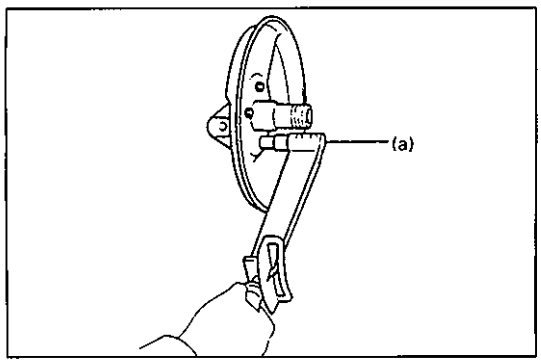
NOTE:

- **When installing wheel spindle to knuckle, coat their mating surfaces with sealant.**

  "A": Sealant 99000-31110

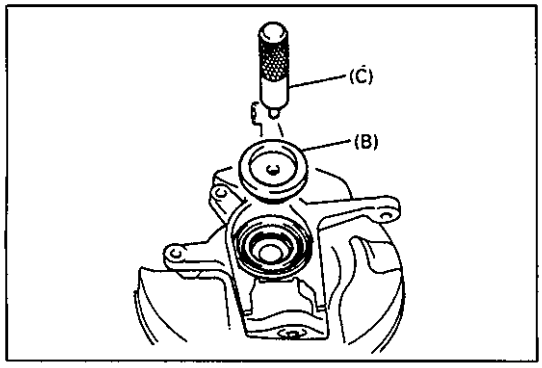
- **Also, fill recess in wheel spindle with about 10 g lithium grease.**

  "B": Grease 99000-25010



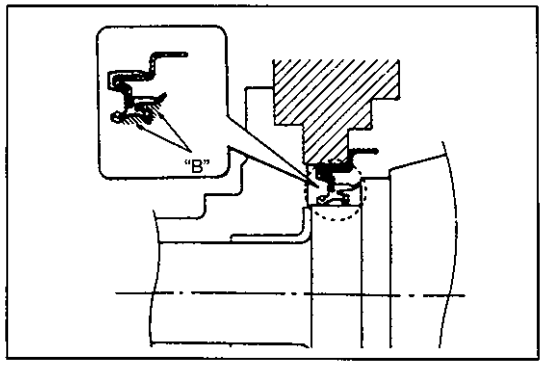
- Tighten wheel spindle nut to specified torque.

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



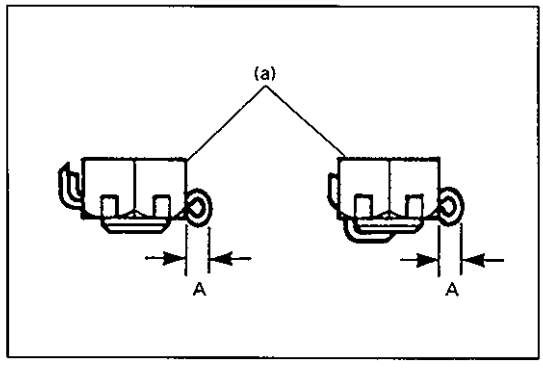
- Press-fitting inner oil seal.
  Drive in inner oil seal until its end contacts stepped surface of knuckle using special tools.

  Special Tool
  (B): 09944-66010
  (C): 09924-74510



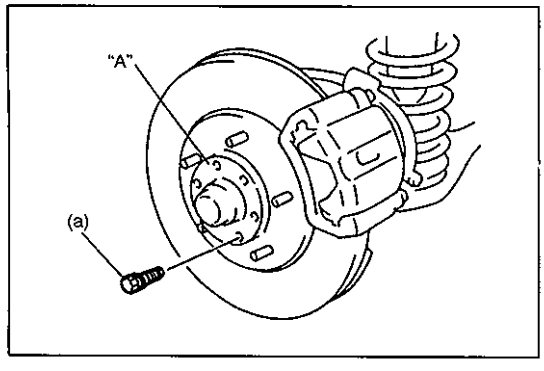
- Apply lithium grease to oil seal lip and into its hollow to fill more than 60% of its vacant space.

  "B": Grease 99000-25010



- Bending ball stud split pin.
  After tightening ball stud castle nut, bend split pin so that it is in close contact with stud head or castle nut as shown. Also, be sure to insert its bent end so that its projection ("A" in figure) is made as small as possible.

  Tightening Torque
  (a): 55 N·m (5.5 kg-m, 39.0 lb-ft)

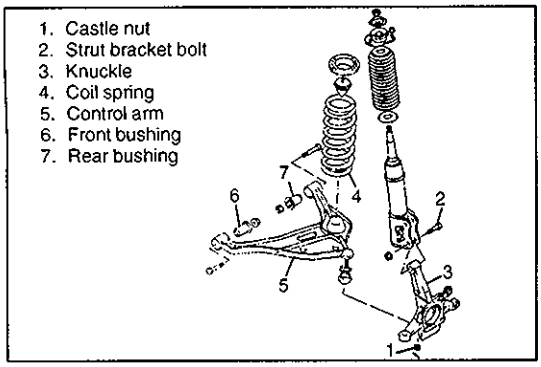


- When installing axle shaft drive flange to wheel hub, apply sealant to mating surface of axle shaft drive flange.

  "A": Sealant 99000-31090

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

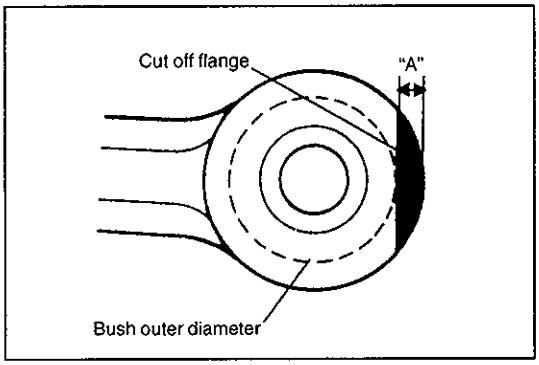
- For installation procedures following the above, refer to WHEEL HUB/BEARING/OIL SEAL INSTALLATION of this section.
- Tightening torque.
  For any tightening torque other than those specified in text, refer to torque specification table at the end of this section.



SUSPENSION CONTROL ARM/BUSHINGS

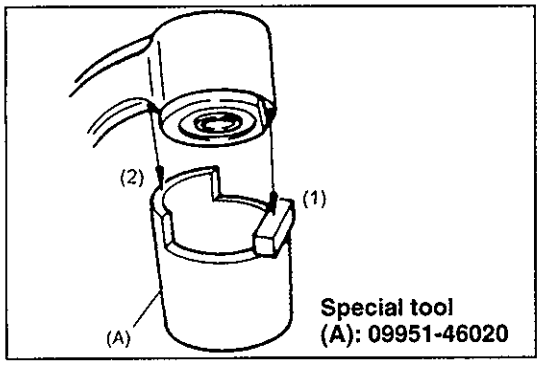
REMOVAL

1) To remove suspension control arm, use the same procedure as that for COIL SPRING REMOVAL described previously. Then proceed as follows.
2) Remove control arm bolts and nuts.
3) Remove control arm.



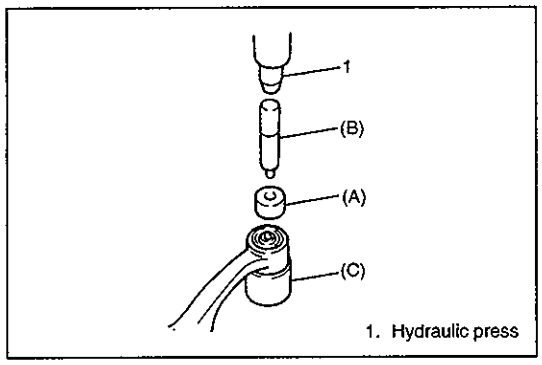
3-1) Cut flange part of control arm bush (rubber and steel) with using care not to damage control arm end surface.

Dimension
"A": approx. 6 mm (0.236 in.)



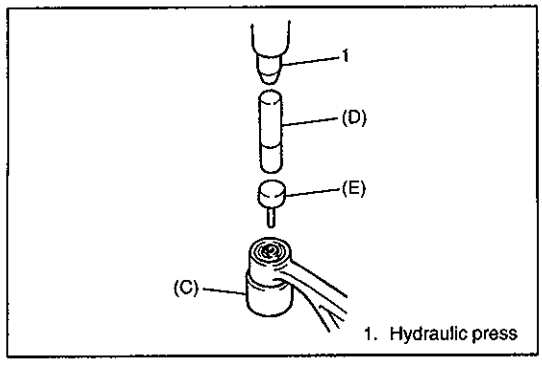
3-2) Place control arm and special tool on hydraulic press. Set control arm cutting flange to welded part (1) of the special tool and control arm joint side to the stepped part (2) of special tool.

CAUTION:
Use special care in driving out control arm bush to press it vertically.
Or it may cause personally injury.



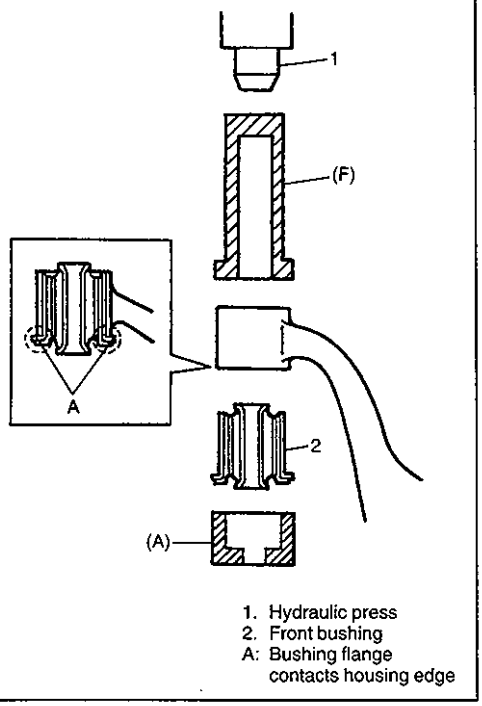
4) Remove front bushing by using hydraulic press and special tools, pull out bushing.

Special Tool
(A): 09951-16060
(B): 09924-74510
(C): 09951-46020



5) Remove rear bushing by using hydraulic press and special tools, pull out bushing.

Special Tool
(C): 09951-46020
(D): 09913-80112
(E): 09925-58210



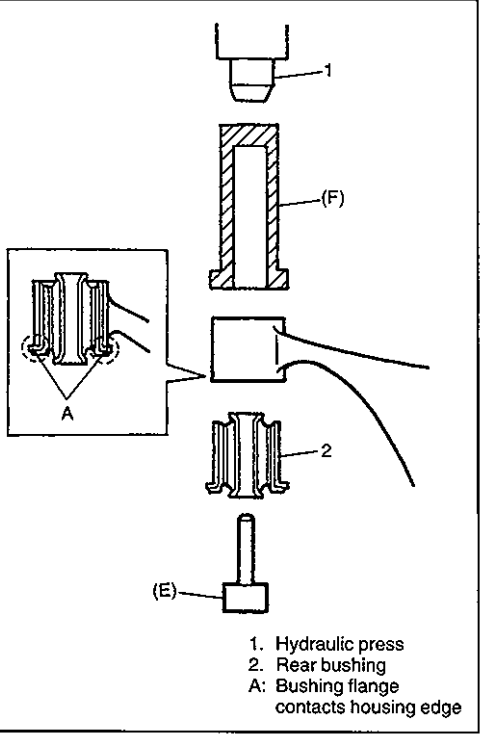
1. Hydraulic press
2. Front bushing
A: Bushing flange contacts housing edge

INSTALLATION

1) Front bushing
Press-fit front bushing until its flange contacts housing edge of control arm, use special tools as shown.

Special Tool
(A): 09951-16060
(F): 09913-85210

NOTE:
When press-fitting bushing, compounding oil or soap water applied to inside of control arm housing will facilitate work.

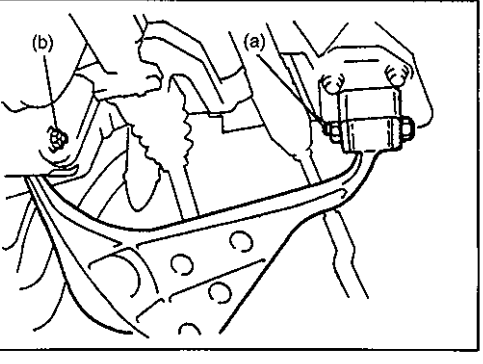


1. Hydraulic press
2. Rear bushing
A: Bushing flange contacts housing edge

2) Rear bushing
Press-fit rear bushing until its flange contacts housing edge of control arm, use special tools as shown.

Special Tool
(E): 09925-58210
(F): 09913-85210

NOTE:
When press-fitting bushing, compounding oil or soap water applied to inside of control arm housing will facilitate work.



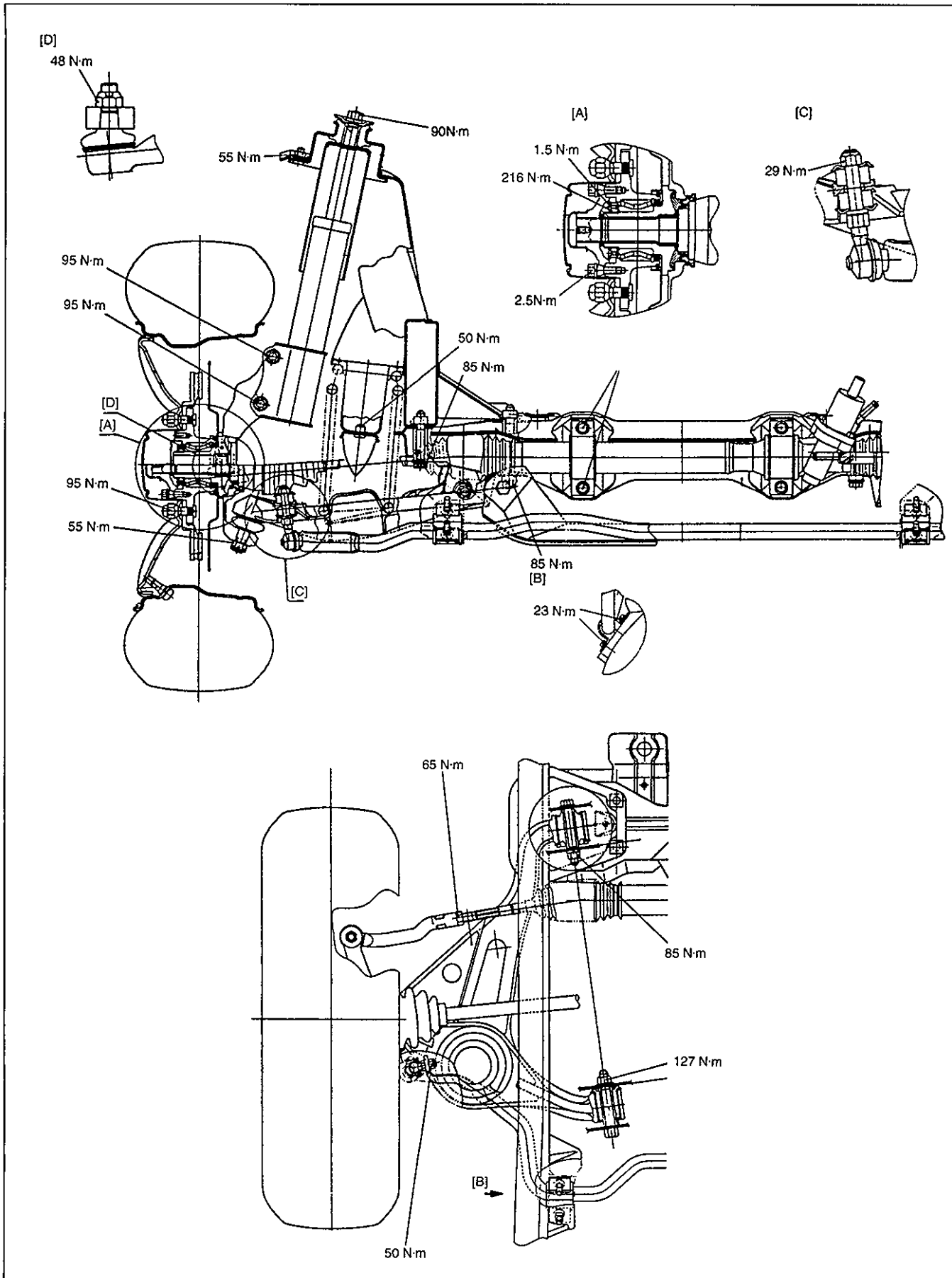
3) Install control arm to chassis.
Tighten suspension arm nut to specified torque after lowering hoist and vehicle in non-loaded condition.

Tightening Torque
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)
(b): 127 N·m (12.7 kg-m, 92.0 lb-ft)

4) As installation procedure hereafter is the same as that for coil spring, refer to that section.

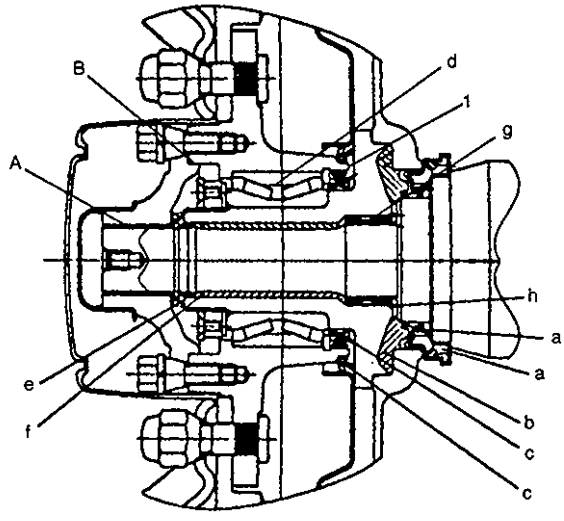
NOTE:
For any tightening torque other than those specified in text, refer to torque specification table at the end of this section.

TIGHTENING TORQUE SPECIFICATIONS

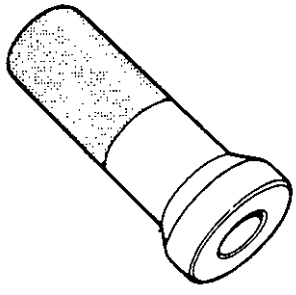


REQUIRED SERVICE MATERIALS

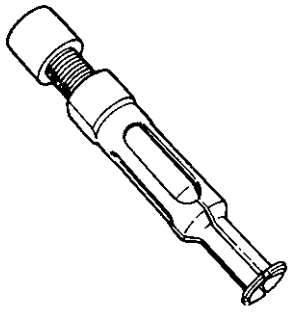
MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE	NO.
Lithium grease	SUZUKI SUPER GREASE (A) (99000-25010)	Bearing inner oil seal/drive shaft oil seal Recess of wheel spindles Wheel hub oil seal/Bearing oil seal Wheel bearing Spindle outer washer Spindle part of drive shaft Spindle bush (inside and flange part) Spindle inner washer	a b c d e f g h
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Mating surfaces of wheel spindle and knuckle	1
Sealing compound	SUZUKI SEALING COMPOUND 366E (99000-31090)	Front axle cap Mating surfaces of wheel hub and drive flange	A B



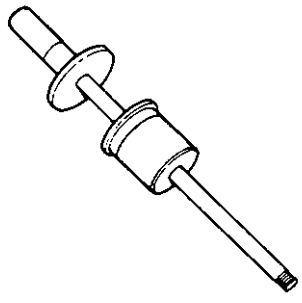
SPECIAL TOOLS



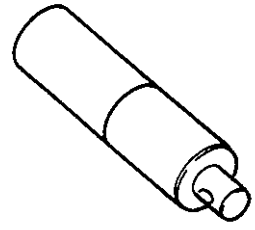
09913-76010
Bearing installer



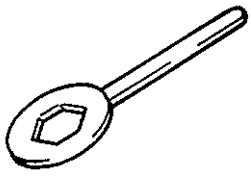
09923-74510
Bearing remover



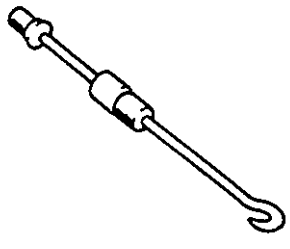
09930-30102
Sliding shaft



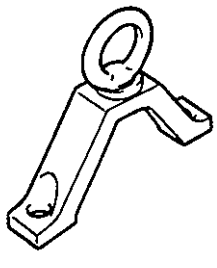
09924-74510
Bearing installer handle



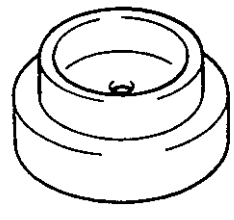
09941-66010
Bump stopper wrench



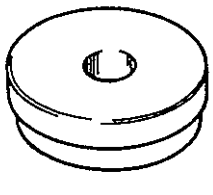
09942-15510
Sliding hammer



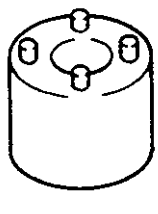
09943-35511
Brake drum remover



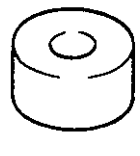
09944-66010
Wheel hub/knuckle oil seal installer



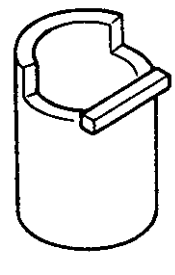
09944-68210
Bearing & oil seal installer



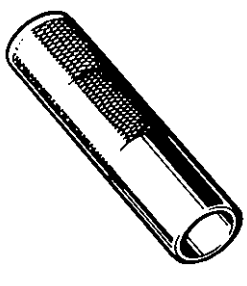
09951-16050
Wheel bearing tightening tool



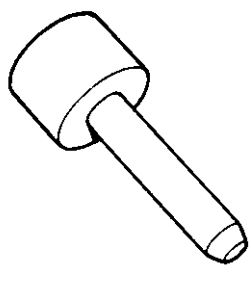
09951-16060
Control arm bush remover (front)



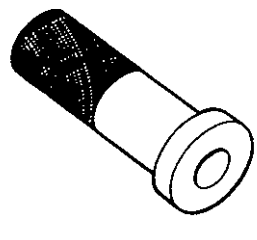
09951-46020
Control arm remover support



09913-80112
Bearing installer



09925-58210
Oil seal installer



09913-85210
Oil seal installer

SECTION 3E

REAR SUSPENSION

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.**

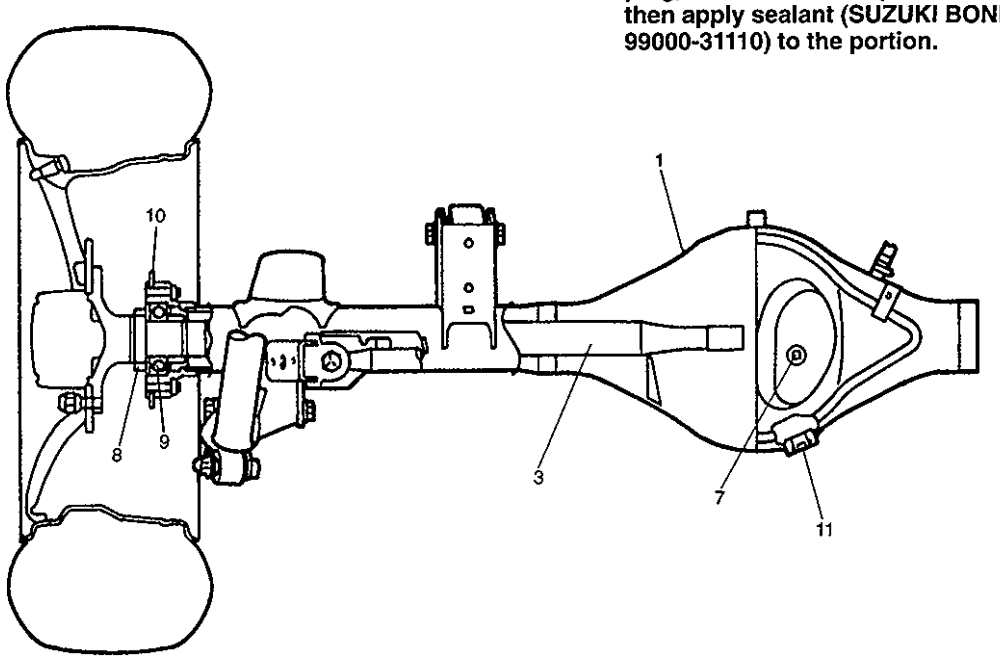
CONTENTS

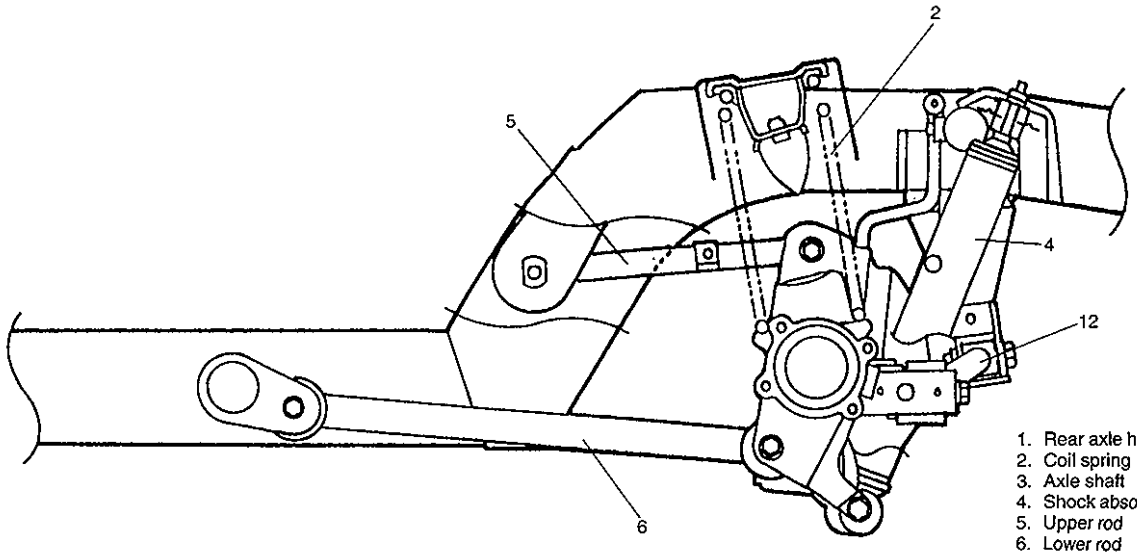
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GENERAL DESCRIPTION

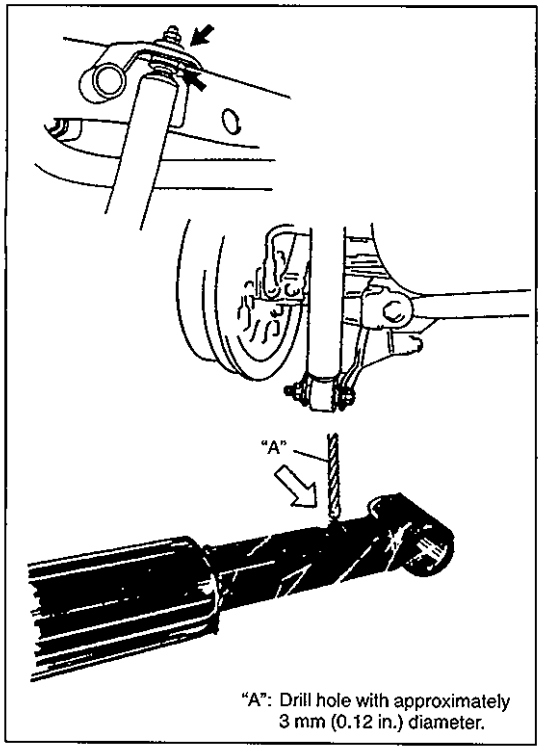
Rear suspension is 5 link type of rigid axle which consists of coil springs, rear axle, shock absorbers, upper rods, lower rods and lateral rod.
The lower rod and upper rod are connected with the axle and body by using bushes so that axle moves up and down with bushes as their supporting points.
The shock absorber is installed between the body and axle to absorb up-and-down movement of the vehicle body.

NOTE:
When installing differential gear oil drain plug, clean the thread portion of the plug and then apply sealant (SUZUKI BOND No. 1215, 99000-31110) to the portion.





1. Rear axle housing
2. Coil spring
3. Axle shaft
4. Shock absorber
5. Upper rod
6. Lower rod
7. Oil level plug
8. Wheel bearing retainer
9. Rear wheel bearing
10. Brake back plate
11. Oil drain plug
12. Lateral rod



"A": Drill hole with approximately 3 mm (0.12 in.) diameter.

DIAGNOSIS

DIAGNOSIS TABLE

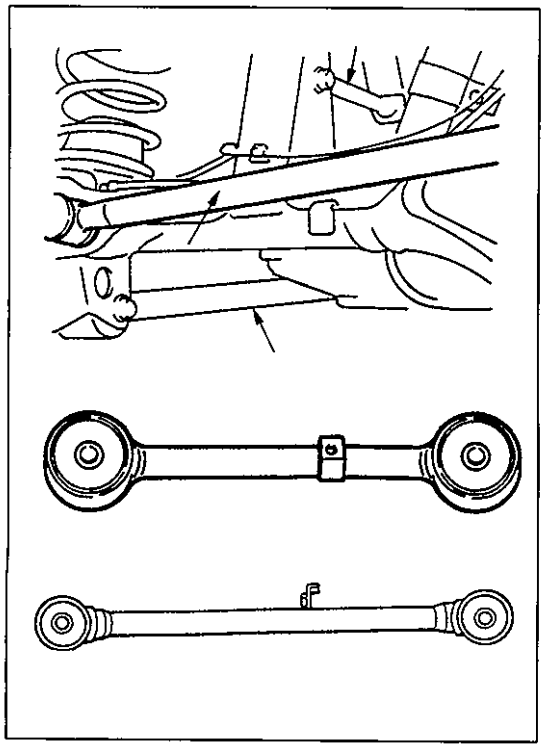
Refer to SECTION 3.

SHOCK ABSORBER CHECK

- Inspect for deformation or damage.
- Inspect bushings for wear or damage.
- Inspect for evidence of oil leakage.

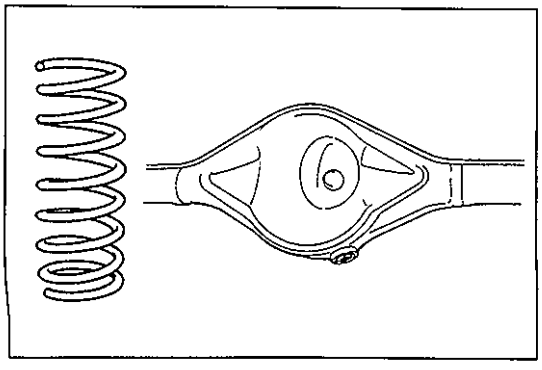
Replace any defective part.

WARNING:
When handling rear shock absorber in which high-pressure gas is sealed, make sure to observe the following precautions.
1) Don't disassemble it.
2) Don't put it into the fire.
3) Don't store it where it gets hot.
4) Before disposing it, be sure to drill a hole in it where shown by an arrow in the figure and let gas and oil out. Lay it down sideways for this work.
5) The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. Therefore, be sure to wear goggle.



LOWER ROD, UPPER ROD, LATERAL ROD CHECK

Inspect for cracks, deformation or damage.
Replace any defective part.
Inspect each bush for wear and breakage. If found defective, replace.

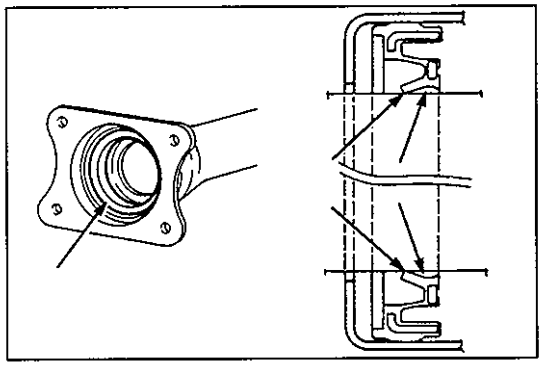


AXLE HOUSING AND COIL SPRING CHECK

Inspect for cracks, deformation or damage.
Inspect for evidence of oil leakage at axle housing.
If any, replace defective part.

REAR SUSPENSION FASTENERS

Check each bolt and nut fastening suspension parts for tightness. Tighten loose one, if any, to specified torque, referring to "TIGHTENING TORQUE SPECIFICATIONS" of this section.



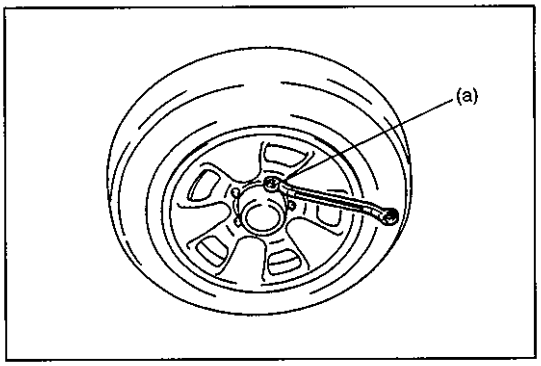
BEARING RETAINER AND AXLE SHAFT INNER OIL SEAL CHECK

- When brake drum has been removed, check inside of brake drum for gear oil leakage.
- Also, check backside of brake back plate for oil leakage.

If oil leakage is found, replace defective oil seal.

- Whenever it is possible to check oil seal during disassembly, check its lip for wear.

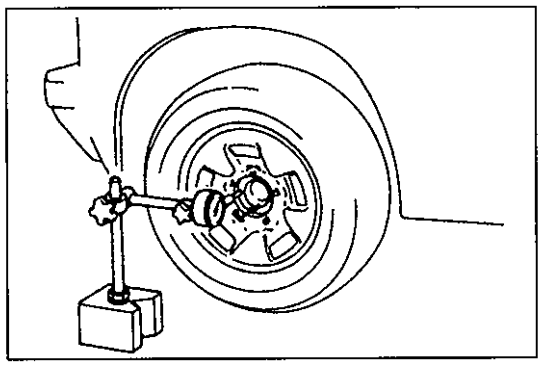
If oil leakage or worn lip is found, replace defective oil seal.



WHEEL DISC, NUT & BEARING CHECK

- 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.

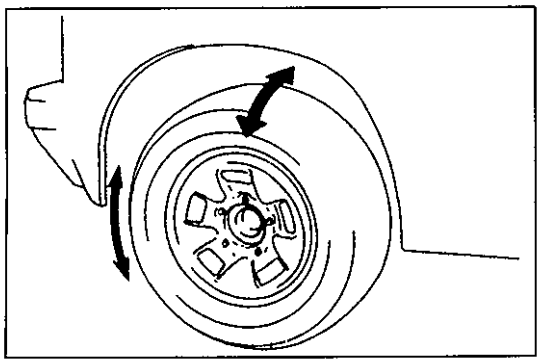
Tightening Torque
(a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



- Check wheel bearings for wear. When measuring thrust play, apply a dial gauge to axle shaft center after removing wheel center cap from wheel.

Thrust play limit	Rear	0.8 mm (0.03 in)

When measurement exceeds limit, replace bearing.

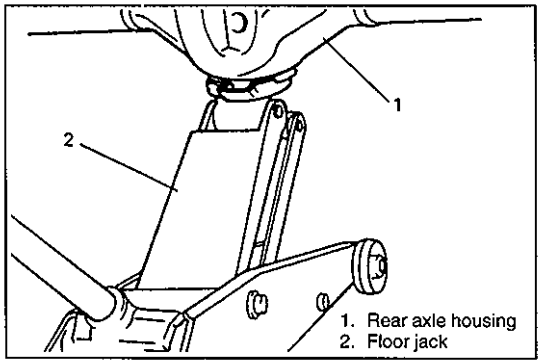


- By rotating wheel actually, check wheel bearing for noise and smooth rotation. If it is defective, replace bearing.

ON-VEHICLE SERVICE

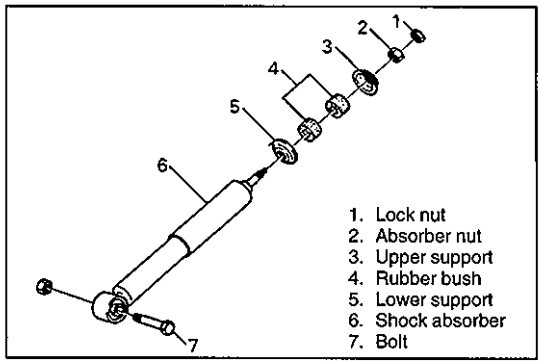
SHOCK ABSORBER

The shock absorber is non-adjustable, non-refillable, and cannot be disassembled. The only service the shock absorber requires is replacement when it has lost its resistance, is damaged, or leaking fluid.

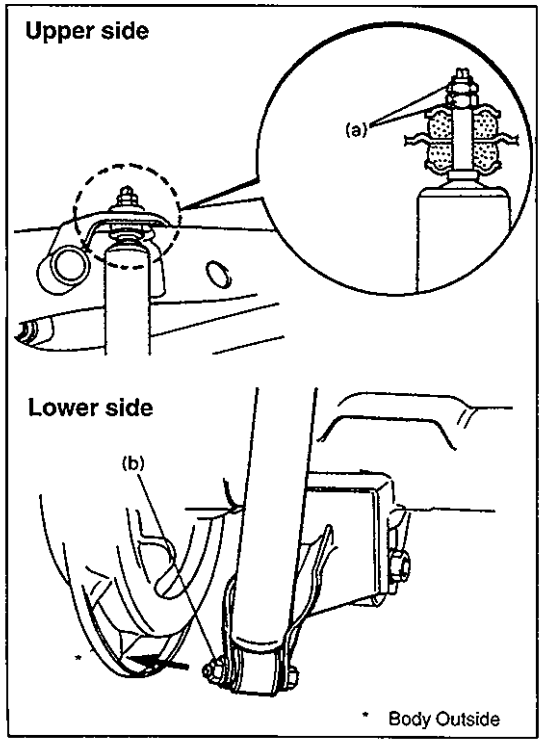


REMOVAL

1) Hoist vehicle and remove rear wheel.
2) Support rear axle housing by using floor jack to prevent it from lowering.



3) Remove upper mounting lock nut and absorber nut.
4) Remove lower mounting bolt.
5) Remove shock absorber

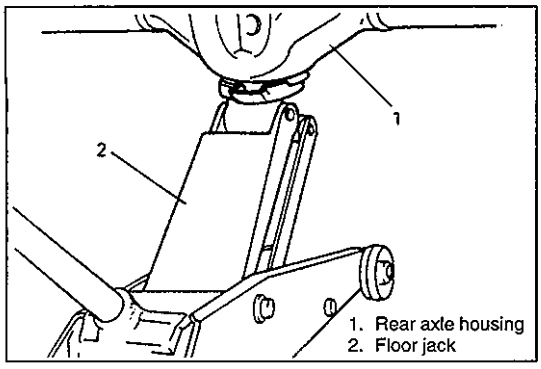


INSTALLATION

1) Install shock absorber. Refer to figure for proper installing direction of lower mounting bolt.
2) Remove floor jack.
3) Lower hoist.
4) Tighten nuts to specified torque.

NOTE:
Tighten lower nut with vehicle off hoist and in non-loaded condition.

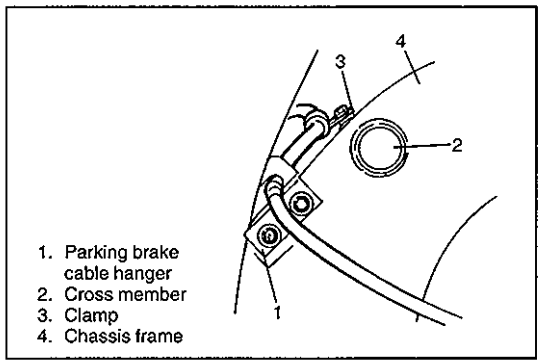
Tightening Torque
(a): 29 N·m (2.9 kg-m, 21.0 lb-ft)
(b): 85 N·m (8.5 kg-m. 61.5 lb-ft)



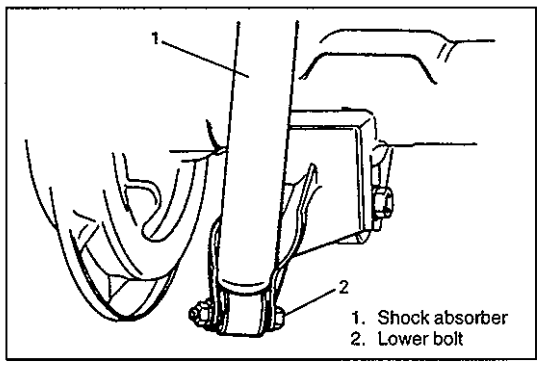
COIL SPRING

REMOVAL

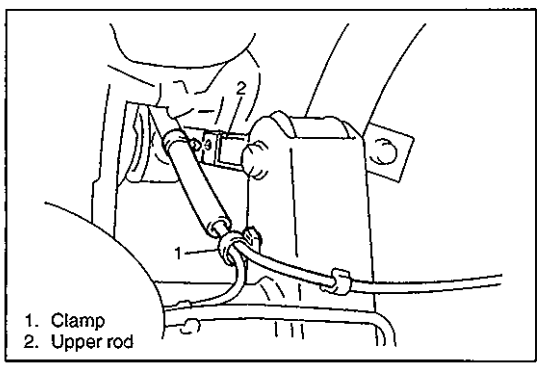
1) Hoist vehicle and remove rear wheel.
2) Support rear axle housing by using floor jack.



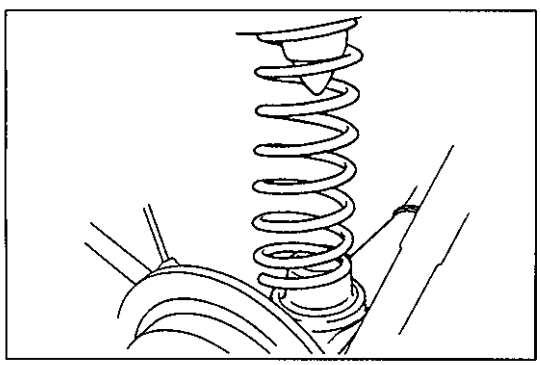
3) Disconnect parking brake cable hanger from chassis frame and clamp from cross member.



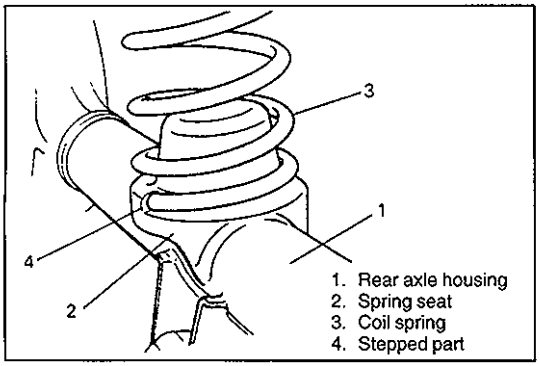
4) Remove shock absorber lower mounting bolt.



5) Remove wheel speed sensor clamps from upper rod and axle housing, if equipped with ABS.
   For right side, remove E-ring for fixing brake pipe from cross member and disconnect breather hose from axle housing.



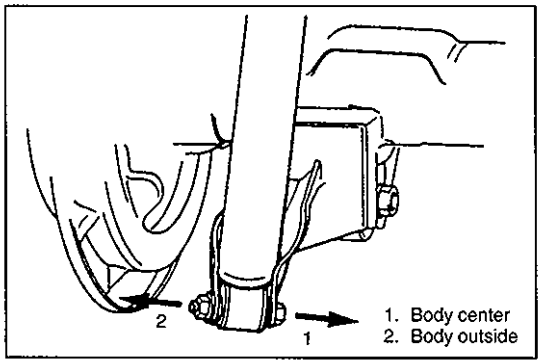
6) Lower rear axle housing gradually as far down as where coil spring can be removed.
7) Remove coil spring.



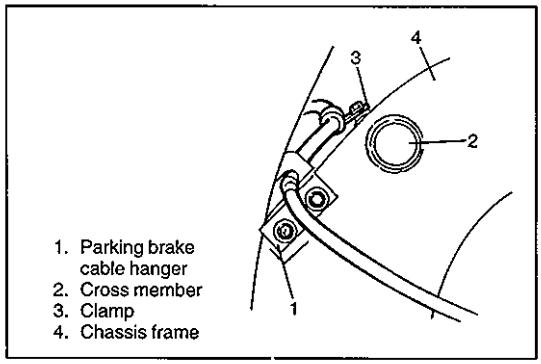
INSTALLATION

1) Install coil spring on spring seat of axle housing and then raise axle housing.

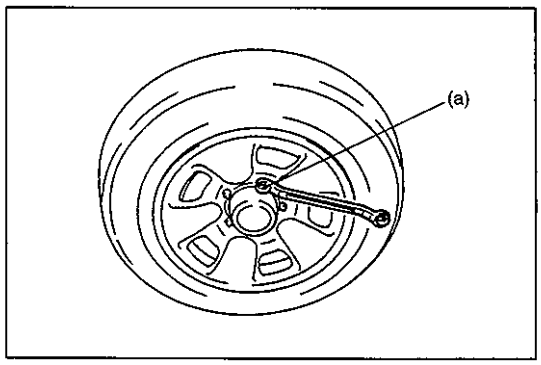
NOTE:
When seating coil spring, mate spring end with stepped part of rear axle spring seat as shown.



2) Install shock absorber lower bolt. For its proper installing direction, refer to figure.
Nut should not be tightened.

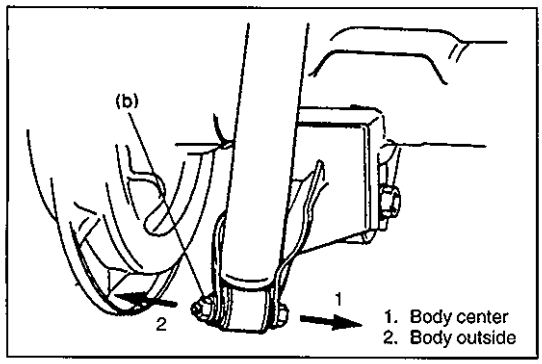


3) Install wheel speed sensor clamp (if equipped) and E-ring, and connect breather hose to axle housing.
4) Connect cable hanger to chassis frame and clamp to cross member. Remove floor jack from axle housing.



5) Install wheel and tighten wheel nuts to specified torque.

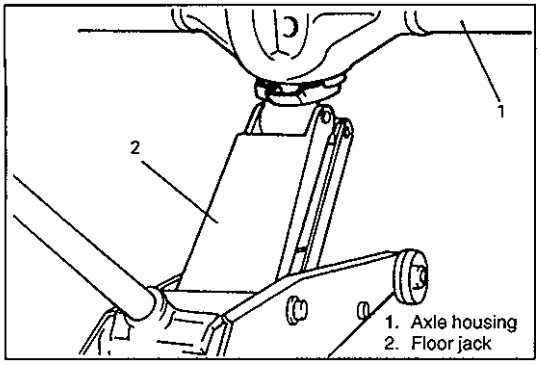
Tightening Torque
(a): 95 N·m (9.5 kg-m, 69.0 lb-ft)



6) Lower hoist and tighten absorber lower nut to specified torque.

Tightening Torque
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

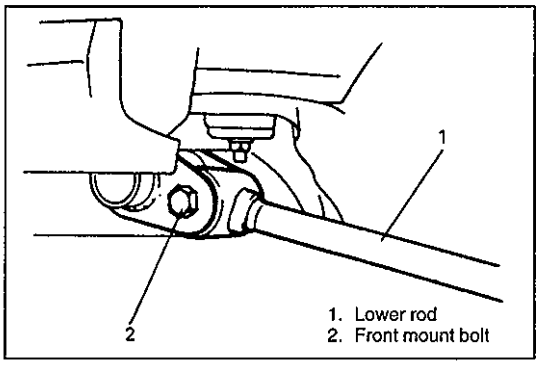
NOTE:
For tightening of lower nut, refer to NOTE given under SHOCK ABSORBER INSTALLATION in this section.



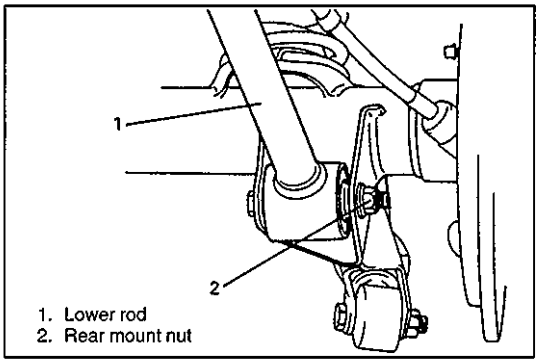
LOWER ROD

REMOVAL

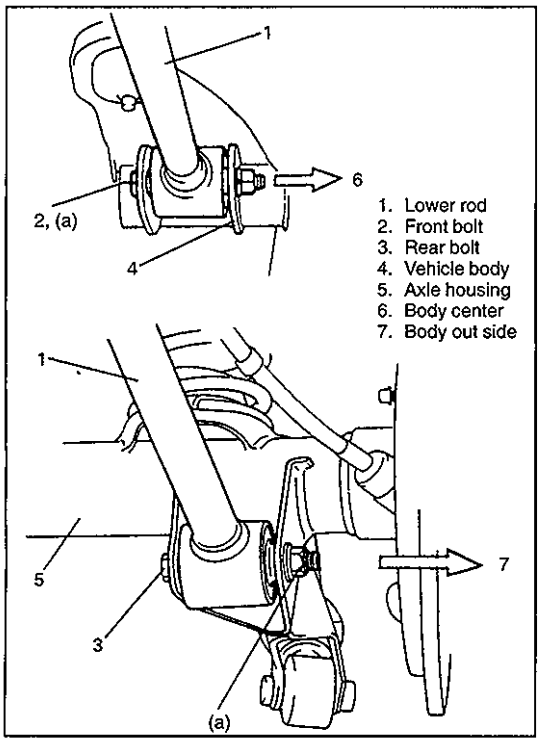
1) Hoist vehicle and remove rear wheel.
2) Support rear axle housing by using floor jack.



3) Remove lower rod front mount bolt.



4) Remove lower rod rear mount bolt.



INSTALLATION

1) Install lower rod to chassis frame and axle housing, referring to figure for proper installing direction of bolts.

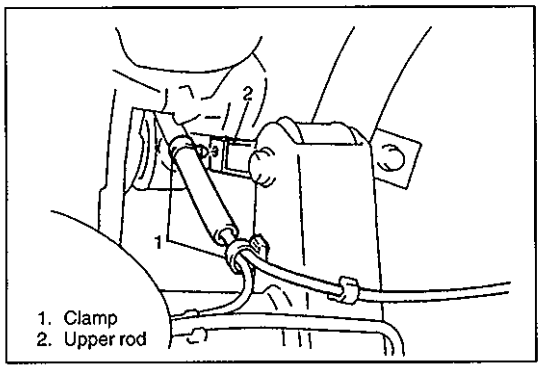
   Nuts should not be tightened.

2) Remove floor jack from rear axle housing.
3) Install wheel and tighten wheel nuts to specified torque.

   Tightening Torque for wheel nuts
   95 N·m (9.5 kg-m, 69.0 lb-ft)

4) Lower hoist and with vehicle in non loaded condition, tighten front bolts and rear bolts and nuts of lower rod to specified torque.

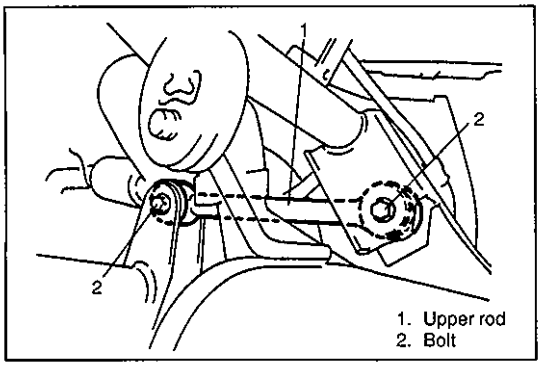
   Tightening Torque
   (a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



UPPER ROD

REMOVAL

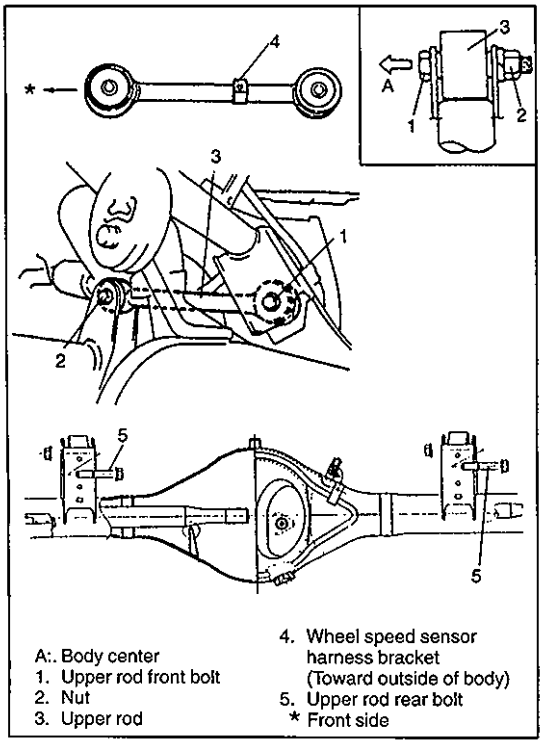
1) Hoist vehicle and remove rear wheel.
2) If equipped with ABS, disconnect wheel speed sensor harness clamp from left upper rod.

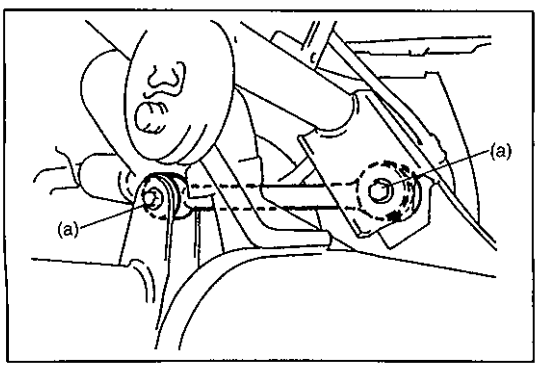


3) Remove upper rod.

INSTALLATION

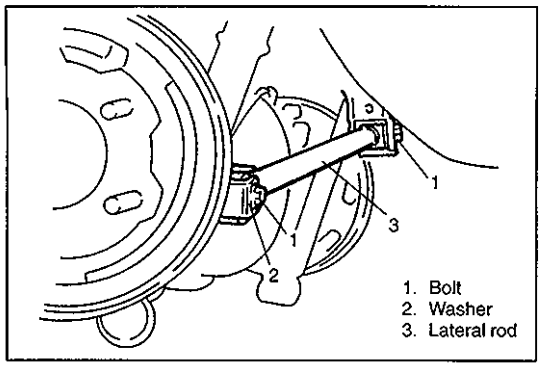
1) Install upper rod to chassis frame and axle housing, referring to figure for installing direction of bolts.
   Nuts should not be tightened.
2) See figure for distinction of installing direction of left side upper rod for vehicle equipped with ABS.
3) Connect wheel speed sensor harness clamp to upper rod (if equipped with ABS).





4) Lower hoist and with vehicle in no loaded condition, tighten front and rear bolts and nuts to specified torque.

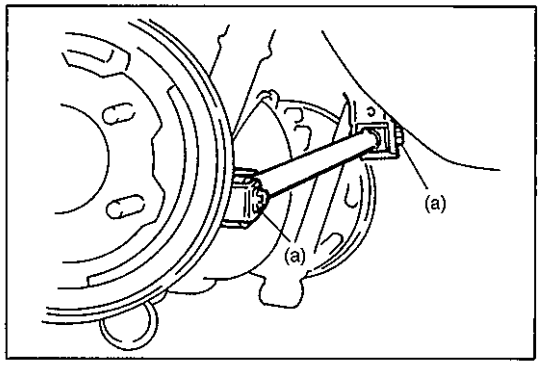
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65 lb-ft)



LATERAL ROD

REMOVAL

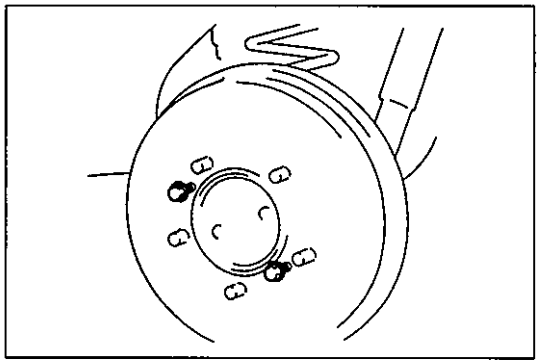
1) Hoist vehicle.
2) Remove lateral rod mounting bolts.
3) Remove lateral rod.



INSTALLATION

1) Install lateral rod to rear axle, and vehicle body.
2) Lower hoist.
3) Tighten lateral rod mounting bolts to specified torque.

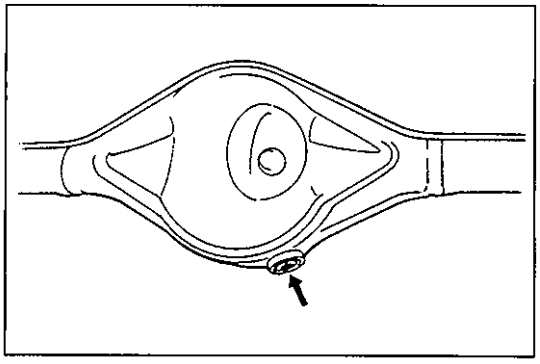
Tightening Torque
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



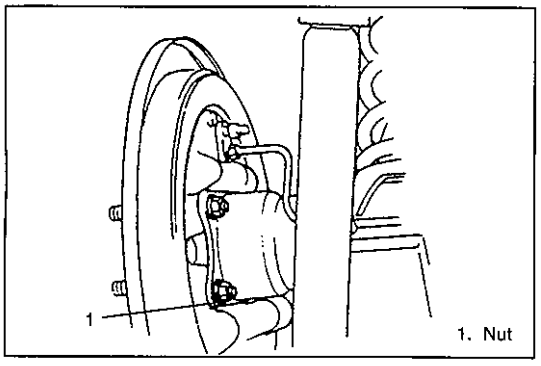
REAR AXLE SHAFT AND WHEEL BEARING

REMOVAL

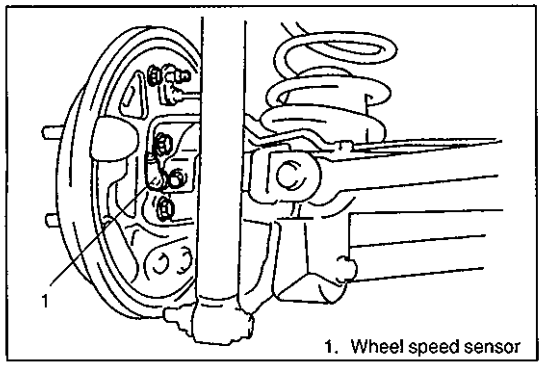
1) Remove rear brake drum. For details, refer to REAR BRAKE DRUM REMOVAL of SECTION 5C.



2) Drain gear oil from rear axle housing by loosening drain plug.

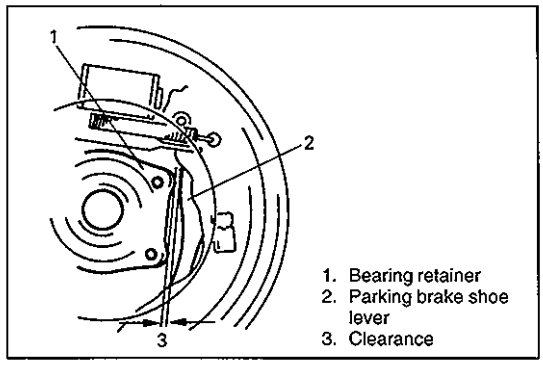


3) Remove rear wheel bearing retainer nuts from axle housing.

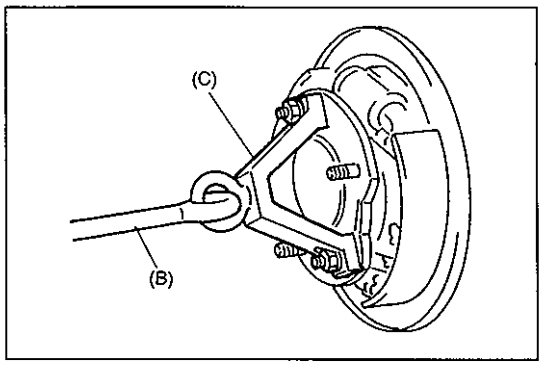


4) Remove wheel speed sensor from rear axle housing (if equipped with ABS).

CAUTION:
- **Do not pull wire harness or twist more than necessary 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.**



5) Check to ensure that there is clearance between rear wheel bearing retainer and parking brake shoe lever. If no clearance is found, loosen cable locking nut further to obtain clearance.

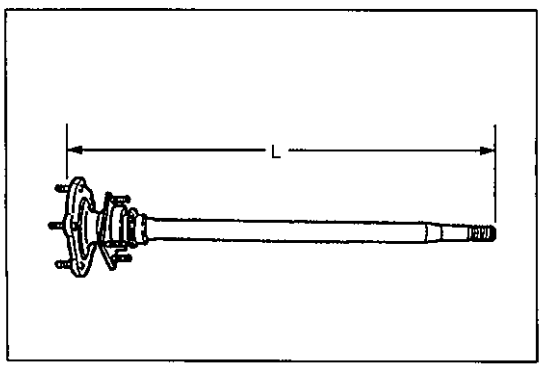


6) Using special tools (B) & (C) indicated below, draw out axle shaft.

NOTE:
Use care not to pull brake back plate along with shaft.

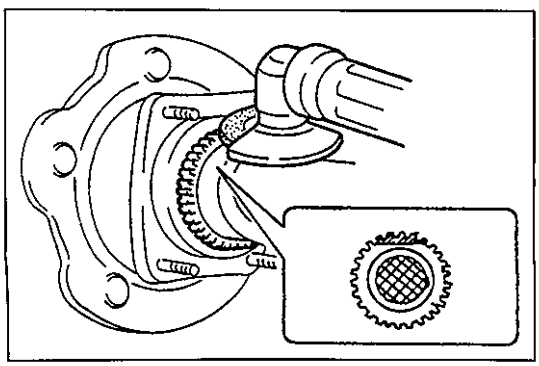
CAUTION:
Pull out axle shaft using care so that upper and lower brake struts and parking cable are not caught.

Special Tool
(C): 09943-35511
(B): 09942-15510

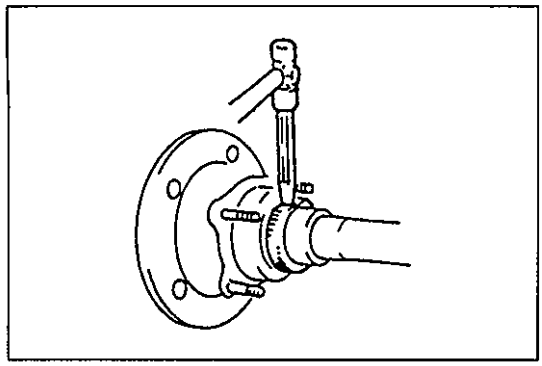


7) Rear axle shaft that was drawn out.

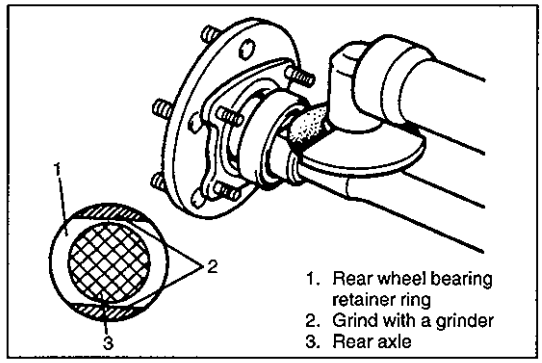
Shaft length "L":
Left side: 711.5 mm (28.0 in.)
Right side: 757.5 mm (29.8 in.)



8) If equipped with ABS, in order to remove sensor rotor from retainer ring, grind with a grinder one part of the sensor rotor as illustrated till it becomes thin.



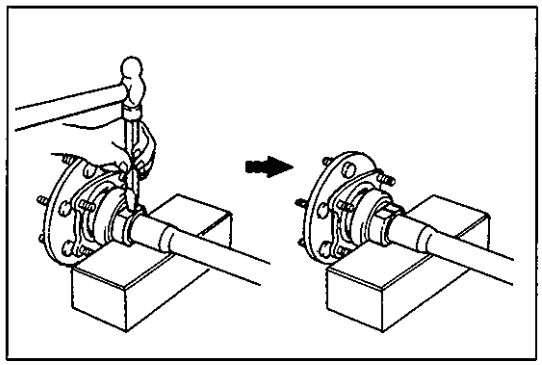
9) Break with a chisel the thin ground sensor rotor, and it can be removed (if equipped with ABS).



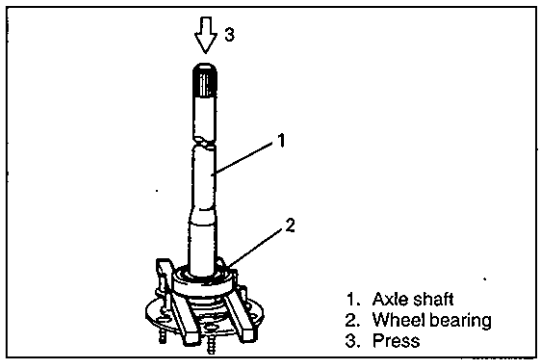
1. Rear wheel bearing retainer ring
2. Grind with a grinder
3. Rear axle

10) In order to remove the retainer ring from the shaft, grind with a grinder two parts of the bearing retainer ring as illustrated till it becomes thin.

CAUTION:
Be careful not to grind too far not to damage the shaft.

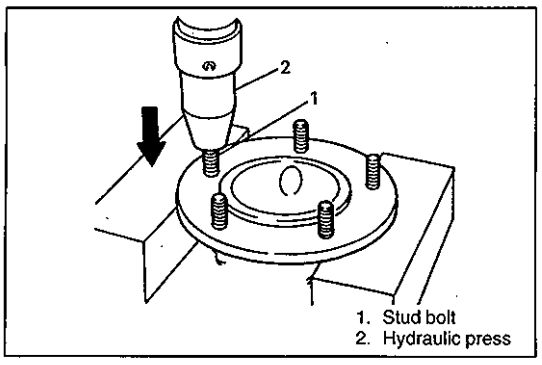


11) Break with a chisel the thin ground retainer ring, and it can be removed.



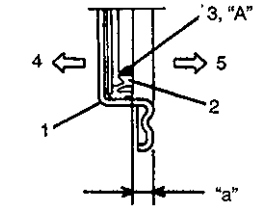
1. Axle shaft
2. Wheel bearing
3. Press

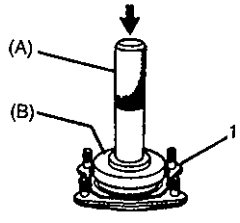
12) Remove bearing from shaft by using hydraulic press.
13) Remove bearing retainer.



1. Stud bolt
2. Hydraulic press

14) Remove stud bolt(s) by using hydraulic press.





1. Bearing retainer
2. Oil seal
3. Oil seal lip
4. Wheel side
5. Differential side

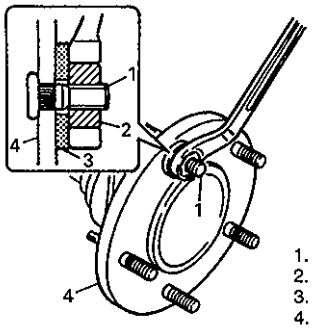
INSTALLATION

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

1) To install bearing retainer oil seal, be sure to apply small amount of grease to its periphery and press-fit it by using special tools (A & B). Be careful to press-fit in proper direction, to proper extent and evenly. For its proper installing direction and extent, refer to figure.
   Apply grease to oil seal lip as shown and install it to axle shaft.

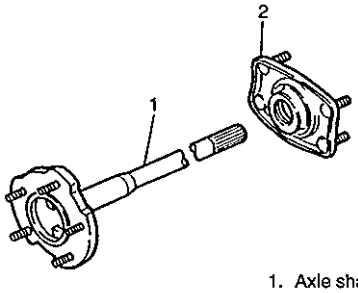
   Special Tool
   (A): 09924-74510
   (B): 09926-88310
   "A": Grease 99000-25010

   Clearance "a": 6.3 – 7.7 mm (0.25 – 0.30 in.)



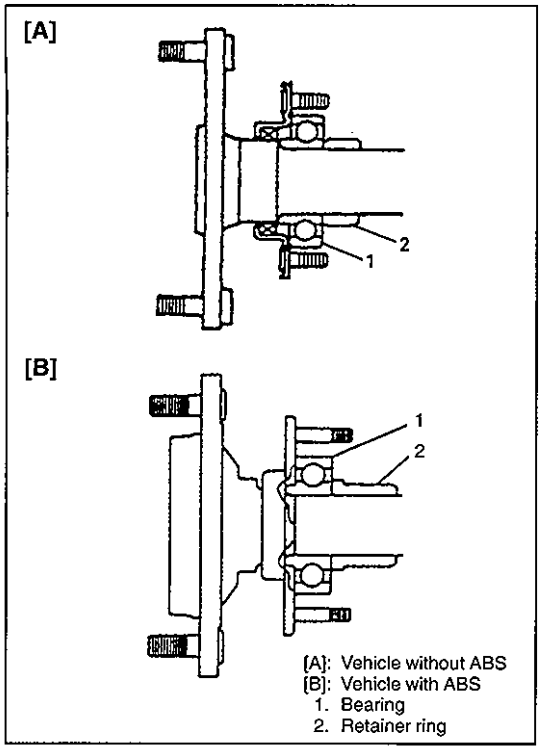
1. Stud bolt
2. Nut
3. Washer
4. Flange of axle shaft

2) Aligning serrations between new stud bolt(s) and flange, install new stud bolt(s) by tightening nut as shown.



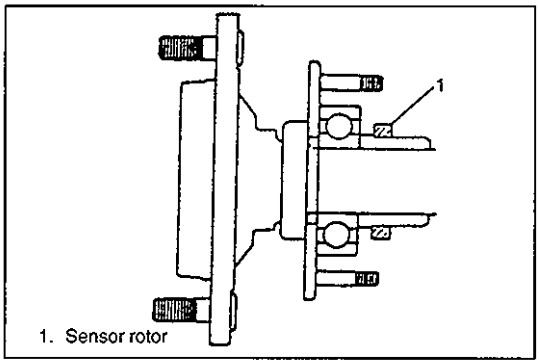
1. Axle shaft
2. Bearing retainer

3) Install bearing retainer to shaft.



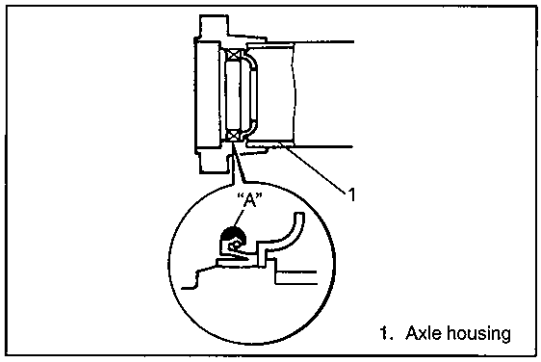
4) Press-fit wheel bearing and retainer ring as shown.

NOTE:
- **Use care not to cause any damage to outside of retainer ring.**
- **Refer to figure so that wheel bearing is installed in proper direction.**



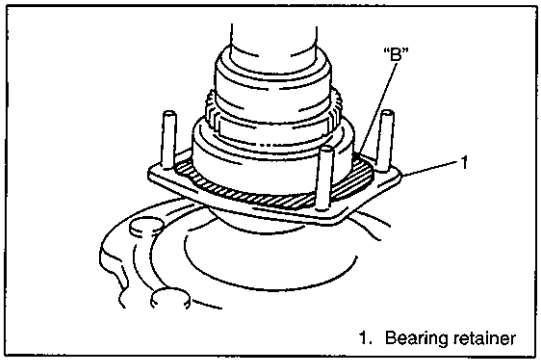
5) For vehicle with ABS, press-fit new sensor rotor as shown.

NOTE:
Use care not to cause any damage to outside of retainer ring.



6) Apply grease to axle shaft inner oil seal lip as shown.

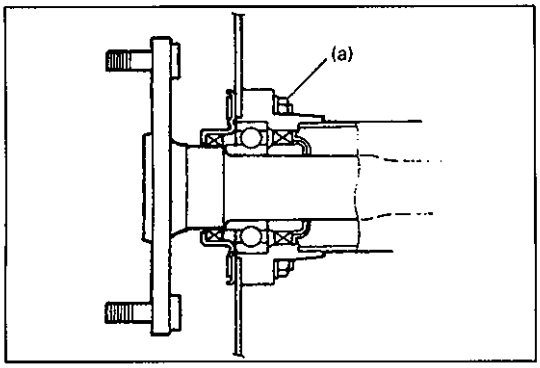
"A": Grease 99000-25010



7) Apply sealant to mating surface of bearing retainer with brake back plate.

NOTE:
Make sure to remove old sealant before applying it anew.

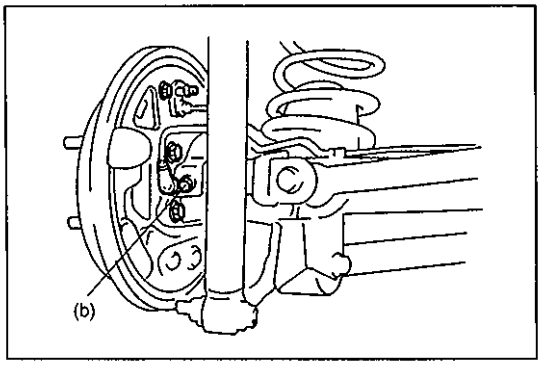
"B": Sealant 99000-31110



8) Install rear axle shaft to rear axle housing and tighten bearing retainer nuts to specified torque.

NOTE:
When installing rear axle shaft, be careful not to cause damage to oil seal lip in axle housing.

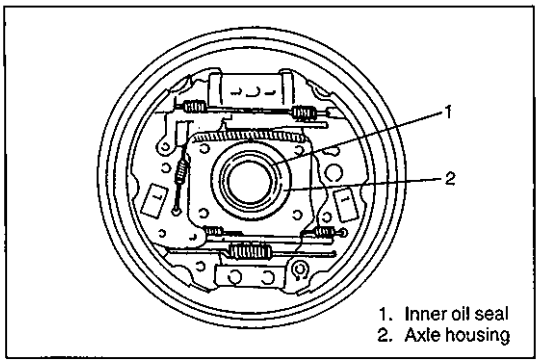
Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



9) Tighten wheel speed sensor bolt to specified torque (if equipped with ABS).

Tightening Torque
(b): 21 N·m (2.1 kg-m, 15.5 lb-ft)

10) Refill rear axle (differential) housing with new specified gear oil. Refer to SECTION 7F for refill.
11) Install brake drum. (For details, refer to BRAKE DRUM INSTALLATION of SECTION 5.)



1. Inner oil seal
2. Axle housing

REAR AXLE SHAFT INNER OIL SEAL

REMOVAL

1) Remove rear axle shaft. For details, refer to steps 1) to 7) of REAR AXLE SHAFT REMOVAL in this section.
2) Fix brake back plate by inserting screwdriver to the hole for bearing retainer mounting.
3) Remove rear axle shaft inner oil seal.

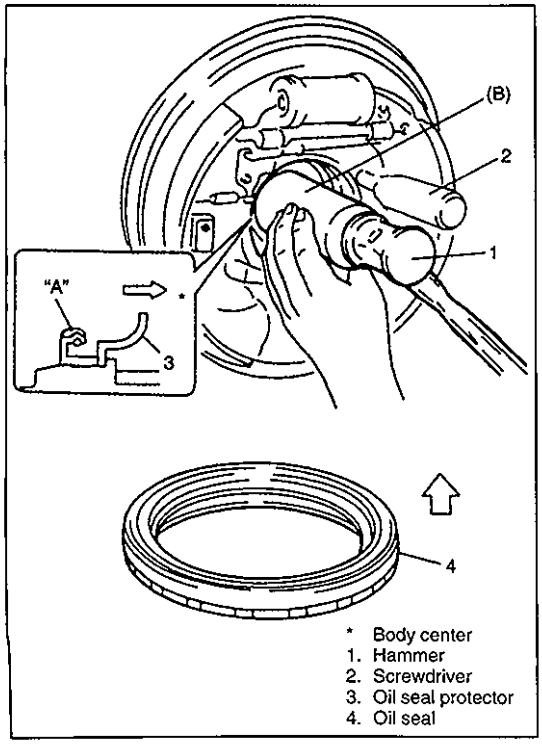
NOTE:
Take care not to bend the brake pipe.

INSTALLATION

1) Using special tool drive in oil seal until it contacts oil seal protector in axle housing.

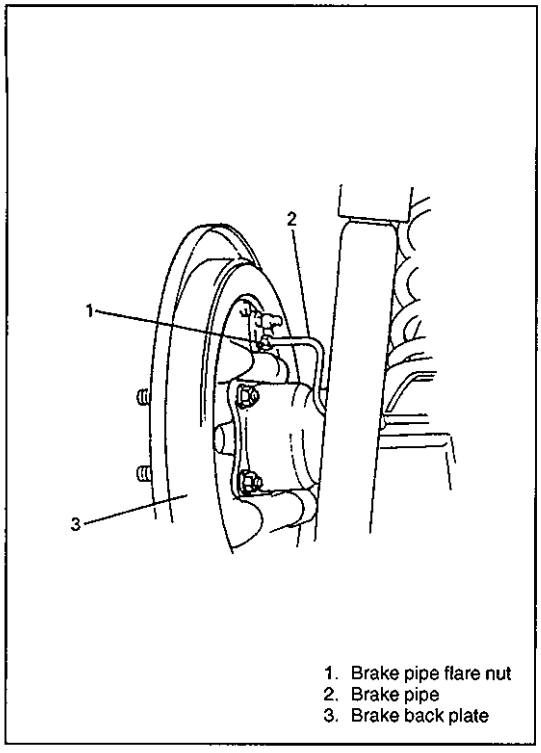
NOTE:
- **Make sure that oil seal is free from inclination as it is installed.**
- **Refer to figure so that oil seal is installed in proper direction.**

Special Tool
(B): 09913-85210
"A": Grease 99000-25010



* Body center
1. Hammer
2. Screwdriver
3. Oil seal protector
4. Oil seal

2) For procedure hereafter, refer to steps 6) to 11) of REAR AXLE SHAFT INSTALLATION in this section.

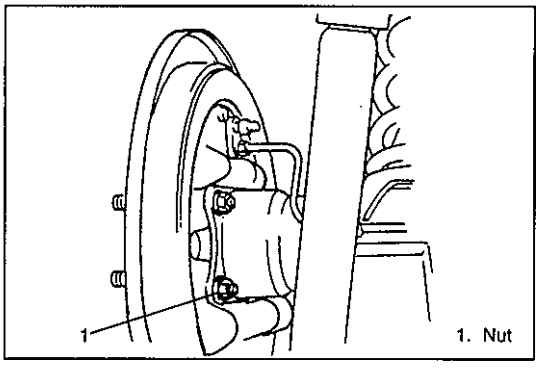


1. Brake pipe flare nut
2. Brake pipe
3. Brake back plate

REAR AXLE HOUSING

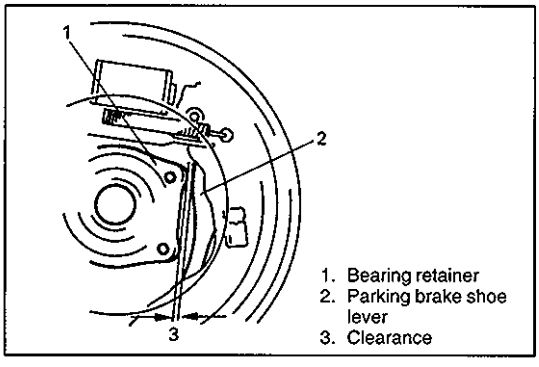
REMOVAL

1) Drain differential gear oil.
   Carry out steps 2) to 8) and 16) to 19) on both right and left wheels.
   Note that left wheel and its related parts are used in illustrations in this section.
2) Remove rear brake drum. (Refer to steps 1) to 5) of BRAKE DRUM REMOVAL.)
3) Disconnect brake pipe from wheel cylinder. With right side wheel cylinder, disconnect 2 brake pipes.



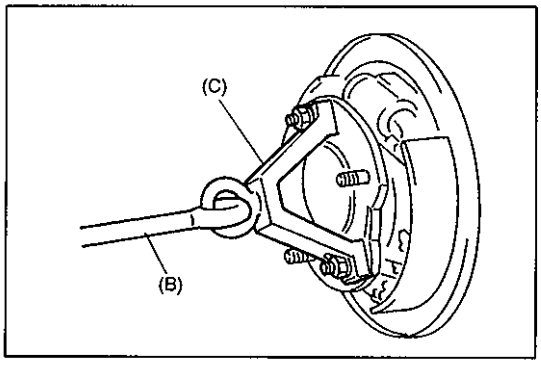
1. Nut

4) Remove rear wheel bearing retainer nuts from rear axle housing.



1. Bearing retainer
2. Parking brake shoe lever
3. Clearance

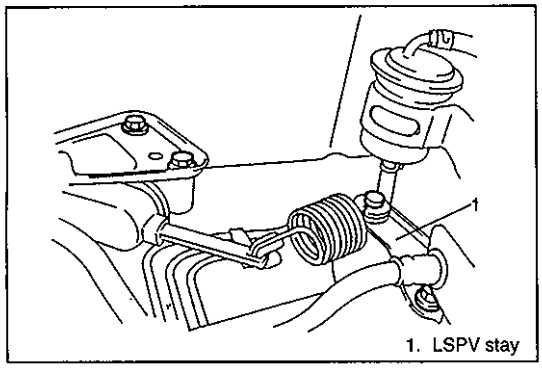
5) Check to ensure that there is clearance between rear wheel bearing retainer and parking brake shoe lever. If no clearance is found, loosen cable locking nut further to obtain clearance.



6) Using special tools (B) & (C) indicated below, draw out axle shafts. For vehicle equipped with ABS, remove wheel speed sensor from axle housing before drawing out axle shaft.

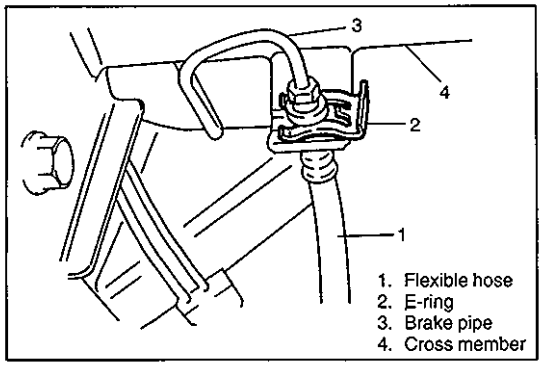
NOTE:
Use care not to pull brake back plate along with shaft.

Special Tool
(C): 09943-35511
(B): 09942-15510



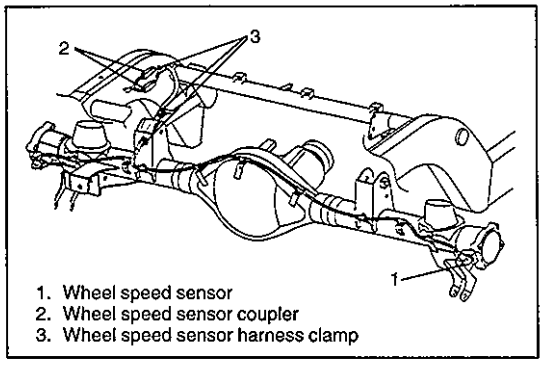
1. LSPV stay

7) Remove LSPV stay from axle housing (if equipped with LSPV).



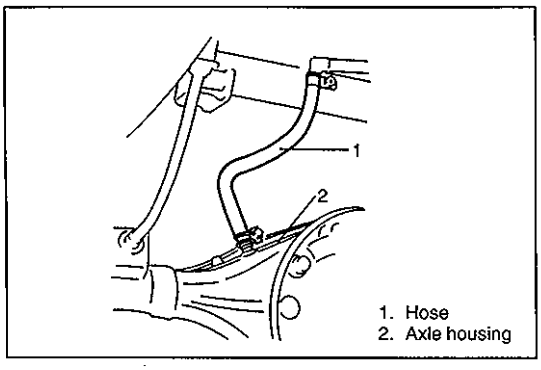
1. Flexible hose
2. E-ring
3. Brake pipe
4. Cross member

8) Remove brake back plate from rear axle housing.
9) Disconnect brake pipe from flexible hose and remove E-ring (front side).



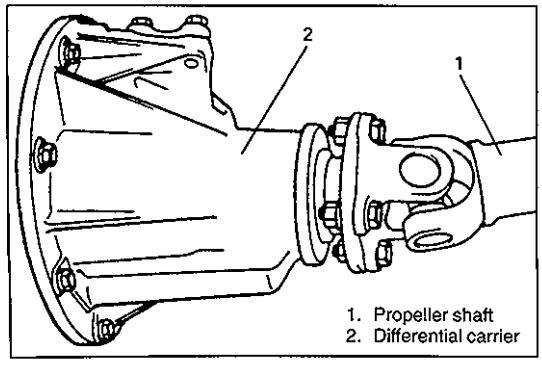
1. Wheel speed sensor
2. Wheel speed sensor coupler
3. Wheel speed sensor harness clamp

10) For vehicle with ABS, disconnect wheel speed sensor coupler and remove harness clamp from chassis frame.



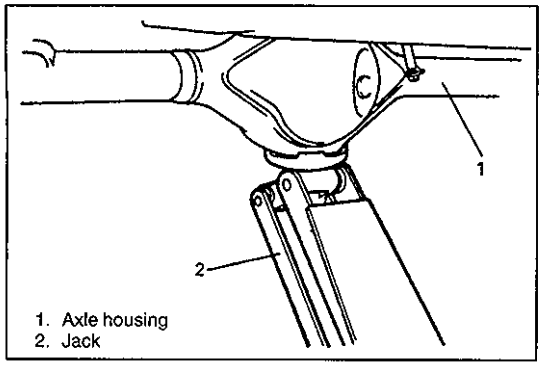
1. Hose
2. Axle housing

11) Remove brake pipe clamps and pipes from axle housing and disconnect breather hose from axle housing.

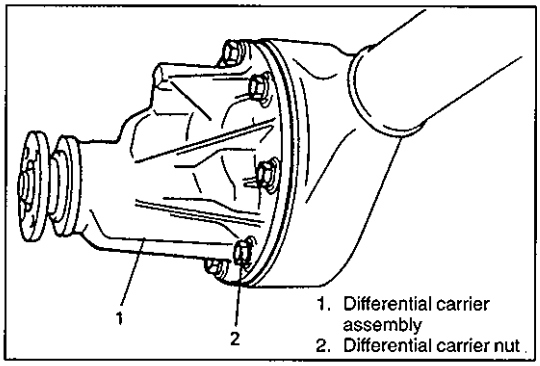


1. Propeller shaft
2. Differential carrier

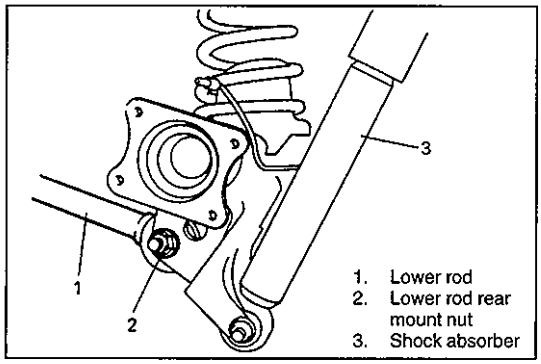
12) Disconnect propeller shaft and remove propeller shaft from transmission.



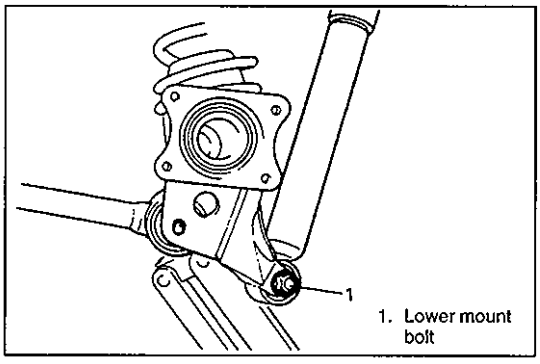
13) For jobs hereafter, support rear axle housing by using floor jack under axle housing.



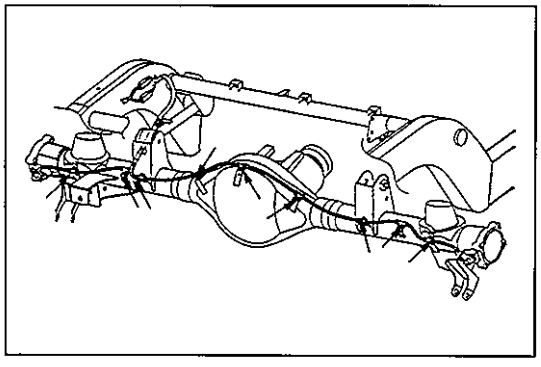
14) Remove differential carrier assembly.



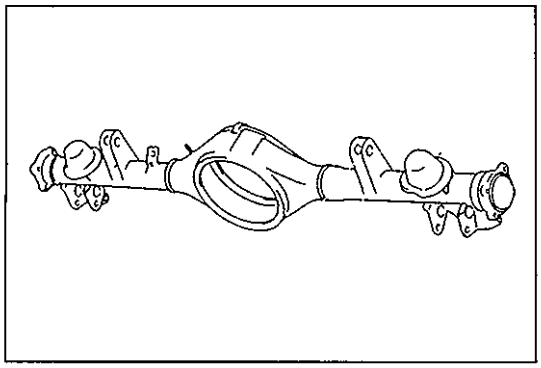
15) Loosen rear mount nut of upper rod but don't remove bolt.
16) Loosen rear mount nut of lower rod but don't remove bolt.



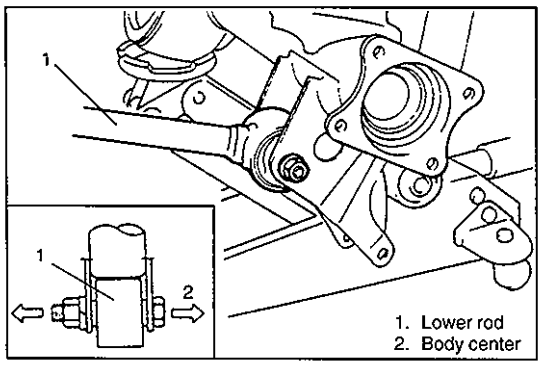
17) Remove rear axle side lateral rod mount bolt.
18) Remove shock absorber lower mount bolt.



19) Remove wheel speed sensor harness from axle housing, if equipped with ABS.



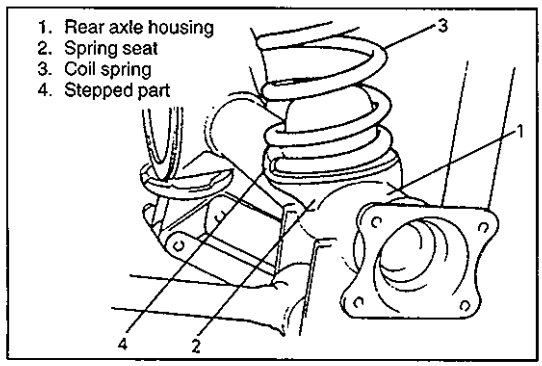
20) Lower floor jack until tension of suspension coil spring becomes a little loose and remove rear mount bolt of upper , lower and lateral rod.
21) Lower rear axle housing gradually.
22) Remove axle housing.



INSTALLATION

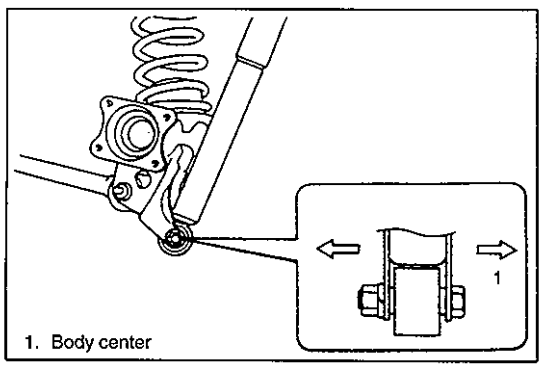
Install removed parts in reverse order of removal, noting the following.

1) Place rear axle housing on floor jack. Then install upper/lower rod rear mounting bolts (right & left) in proper direction as shown. At this time, mount nuts but don't tighten them.

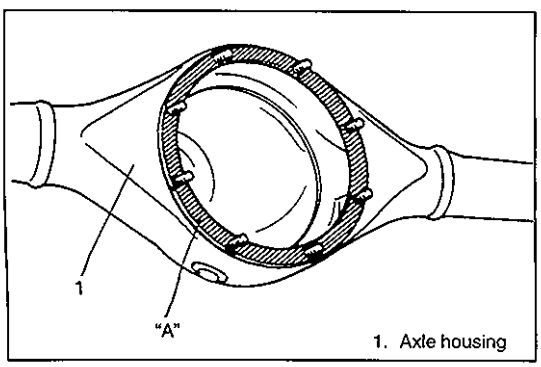


2) Install coil spring (right & left) on spring seat of axle housing and raise axle housing.

NOTE:
When seating coil spring, mate spring end with stepped part of rear axle spring seat as shown.

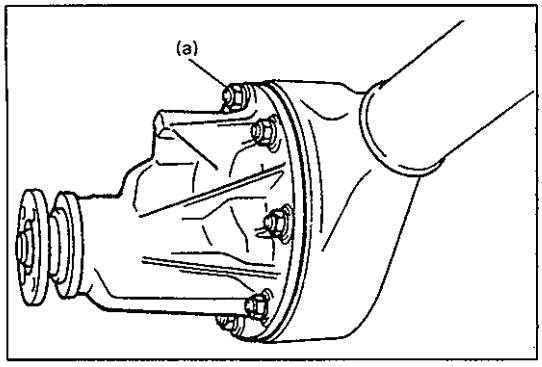


3) Install lateral rod to rear axle housing.
4) Install lower part of shock absorber to right and left sides of axle housing and install bolts in proper direction as shown in figure. At this time, mount nuts but don't tighten them.



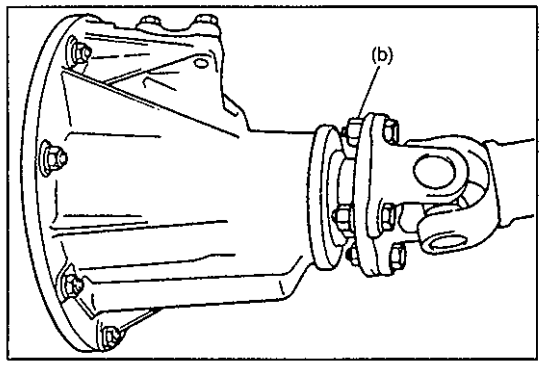
5) Clean mating surfaces of axle housing and differential carrier and apply sealant to housing side.

"A": Sealant 99000-31110



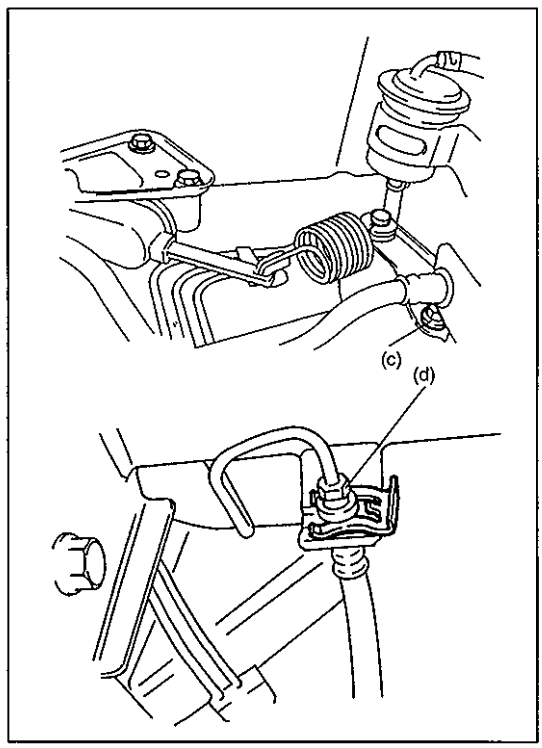
6) Install differential carrier assembly to axle housing and tighten carrier nuts to specified torque.

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



7) For vehicle with ABS, connect wheel speed sensor coupler and install harness.
8) Install propeller shaft and torque nuts to specification.

Tightening Torque
(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

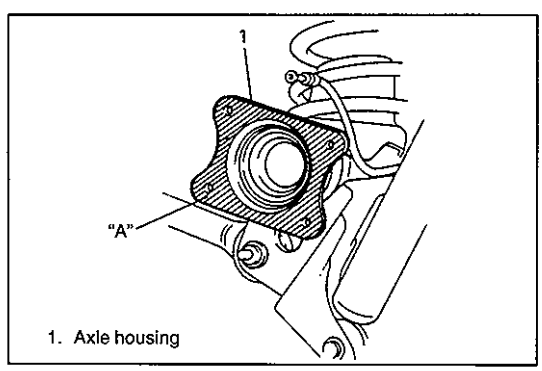


9) Remove floor jack from axle housing and connect breather hose onto axle housing and clamp it securely.
10) Connect brake pipes onto axle housing and clamp them securely.
For clamping positions, refer to SECTION 5A of this manual.
11) Connect brake flexible hose to bracket on axle housing and secure it with E-ring.
12) Install LSPV stay to axle housing, tighten LSPV stay bolt to specified torque.
And adjust LSPV referring to LSPV ASSEMBLY INSPECTION AND ADJUSTMENT in Section 5A.

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

13) Connect brake pipe to brake flexible hose and tighten brake pipe flare nut to specified torque.

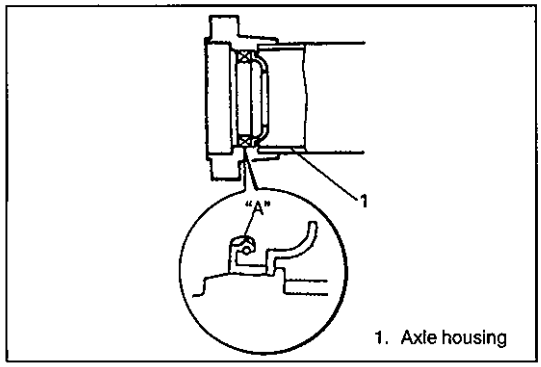
Tightening Torque
(d): 16 N·m (1.6 kg-m, 11.5 lb-ft)



1. Axle housing

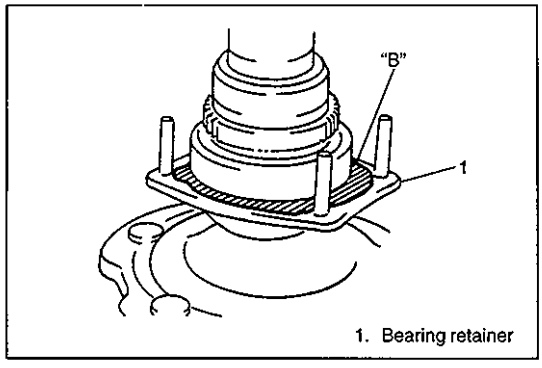
14) Clean mating surface of axle housing (right & left) and brake back plate, then apply sealant as shown.

"A": Sealant 99000-31110



15) Apply grease to axle shaft inner oil seal lip as shown.

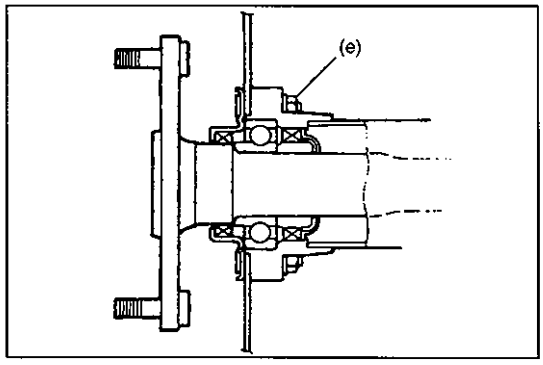
"A": Grease 99000-25010



16) Apply sealant to mating surface of bearing retainer with brake back plate.

NOTE:
Make sure to remove old sealant before applying it anew.

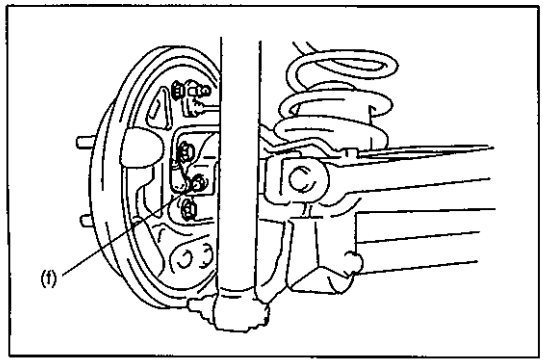
"B": Sealant 99000-31110



17) Install rear axle shaft to rear axle housing and tighten bearing retainer nuts to specified torque.

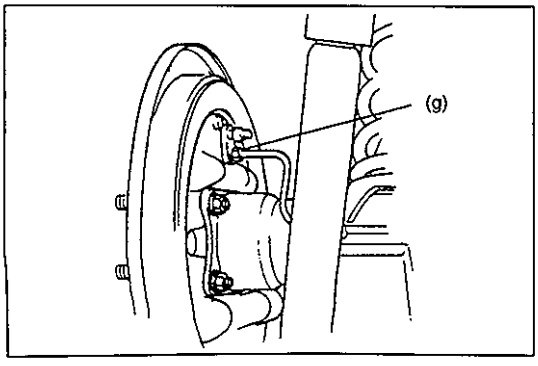
NOTE:
When installing rear axle shaft, be careful not to cause damage to oil seal lip in axle housing.

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



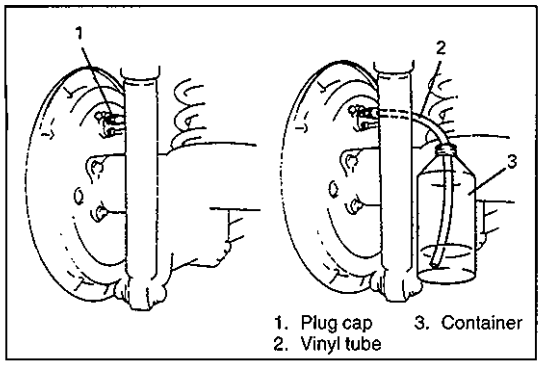
18) Tighten wheel speed sensor bolt to specified torque.

Tightening Torque
(f): 21 N·m (2.1 kg-m, 15.5 lb-ft)

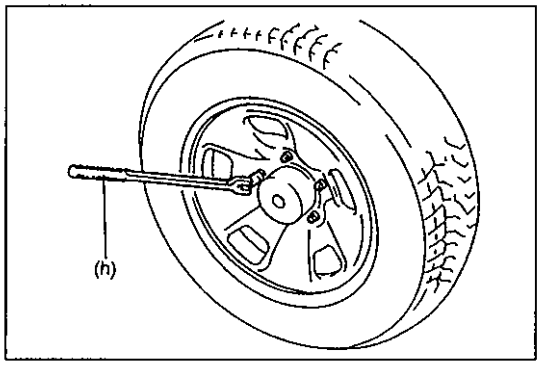


19) Connect brake pipes to wheel cylinders (right & left) and tighten brake pipe flare nuts to specified torque.

Tightening Torque
(g): 16 N·m (1.6 kg-m, 11.5 lb-ft)



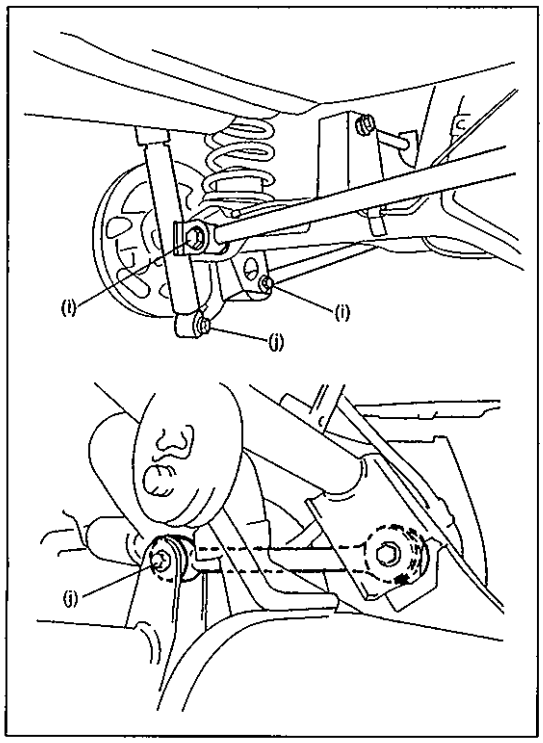
20) Install brake drum (right & left). For details, refer to Section 5C BRAKE DRUM INSTALLATION.
21) Refill differential gear housing with new specified gear oil. Refer to "ON-VEHICLE SERVICE" in SECTION 7F for refill.
22) Fill reservoir with brake fluid and bleed brake system.(For bleeding operation, see SECTION 5.)



23) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque
(h): 95 N·m (9.5 kg-m, 69.0 lb-ft)

24) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to ten times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable (for adjustment, see SECTION 5C of this manual.)
25) Tighten parking brake lever cover screws.
26) Lower hoist.



27) Tighten right and left lower/upper rod nuts lateral rod mount bolt and shock absorber nuts to specified torque.

NOTE:
When tightening these nuts, be sure that vehicle is off hoist and in non loaded condition.

Tightening Torque
(i): 90 N·m (9.0 kg-m, 65.0 lb-ft)
(j): 85 N·m (8.5 kg-m, 61.5 lb-ft)

28) Check to ensure that brake drum is free from dragging and proper braking is obtained.
29) Perform brake test (foot brake and parking brake).
30) Check each installed part for oil leakage.

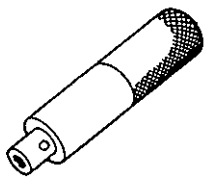
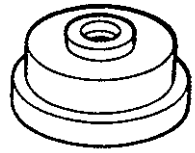
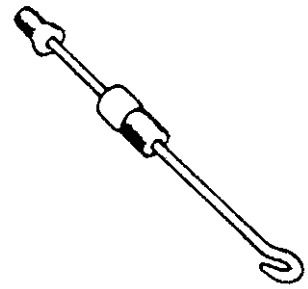
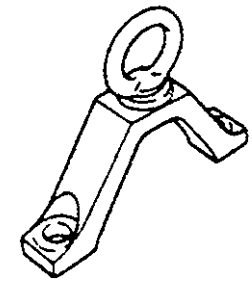
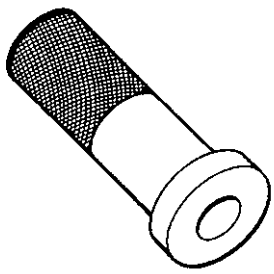
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	Kg-m	lb-ft
Shock absorber lock nut		29	2.9	21.0
Shock absorber nut		29	2.9	21.0
Shock absorber lower nut		85	8.5	61.5
Lower rod nut (front & rear)		90	9.0	65.0
Upper rod nut (front & rear)				
Lateral rod bolt				
Lateral rod nut				
Differential carrier nut		55	5.5	40.0
Propeller shaft nut				
Brake pipe flare nut		16	1.6	11.5
Bearing retainer nut		23	2.3	17.0
Differentiation gear oil filler & drain plug	Filler plug	50	5.0	36.5
	Drain plug	27	2.7	16.0
Wheel nut		95	9.5	69.0

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lip
Brake fluid	DOT 3	Brake reservoir tank
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	• Joint seam of axle and brake back plate • Joint seam of bearing retainer and brake back plate • Joint seam of differential carrier and axle housing • Drain plug
Gear oil	For gear oil information, refer to SECTION 7E of this manual	Differential gear (Refer axle housing)

SPECIAL TOOLS

 09924-74510 Bush remover handle	 09926-88310 Oil seal installer	 09942-15510 Sliding hammer	 09943-35511 Brake drum remover
 09913-85210 Oil seal installer			

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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TIGHTENING TORQUE SPECIFICATIONS 3F-8

GENERAL DESCRIPTION

TIRES

This vehicle is equipped with following tire, depending on vehicle specification.
195/80 R15, 215/65 R16 or 235/60 R16
The tires are of tubeless type. The tires are designed to operate satisfactorily with loads up to the full rated load capacity when inflated to the recommended inflation pressure.
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 following steel wheels.
15 x 5 1/2 JJ, 16 x 6 1/2 J or 16 x 7 JJ

REPLACEMENT TIRES

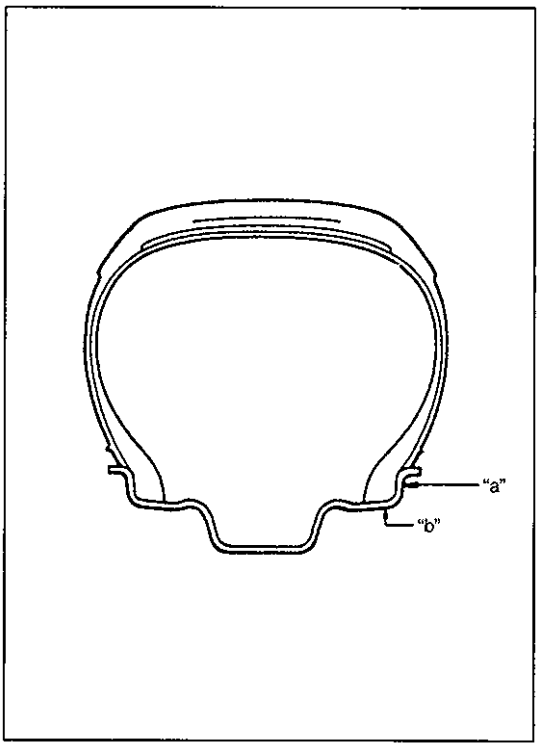
When replacement is necessary, the original equipment type tire should be used. Refer to the Tire Placard. Replacement tires should be of the same size, load range and construction as those originally on the vehicle. Use of any other size or type tire may affect ride, handling, speedometer/odometer calibration, vehicle ground clearance and tire or snow chain clearance to the body and chassis.

NOTE:
Do not mix different types of tires on the same vehicle such as radial, bias and bias-belted tires except in emergencies, because vehicle 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.

kPa	kgf/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
320	3.2	47
340	3.4	50
Conversion:	1 psi = 6.895 kPa 1 kgf/cm^2 = 98.066 kPa	

The metric term for tire inflation pressure is the kilopascal (kPa). Tire pressures will usually be printed in both kPa and psi on the Tire Placard. Metric tire gauges are available from tool suppliers. The chart, left table, converts commonly used inflation pressures from kPa to psi.



WHEELS REPLACEMENT

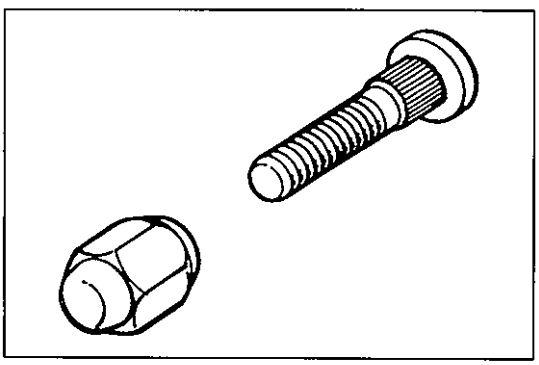
Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, leak air through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in left figure may cause objectional vibrations.

Wheels for replacement must be equivalent to the originally equipped wheels in load capacity, diameter, rim width, off-set and mounting configuration. A wheel of improper size or type may affect wheel and bearing life, brake cooling, speedometer/odometer calibration, ground clearance to the body and chassis.

To measure the wheel runout, it is necessary to use 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 dial indicator set in place securely, turn the wheel one full revolution slowly and record every reading of the indicator.

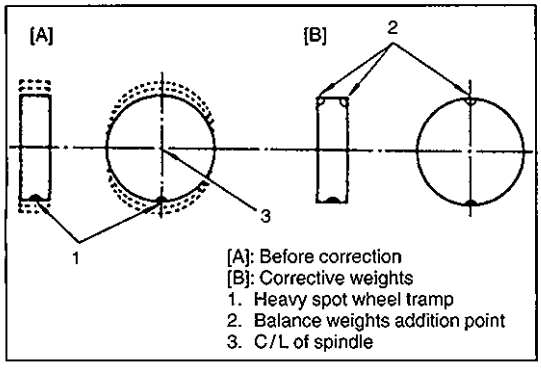
When the measured runout exceeds the specification and correction by the balancer adjustment is impossible, replace the wheel. If the reading is affected by welding, paint or scratch, it should be ignored.

Lateral runout limit "a": 1.20 mm (0.047 in.)
Radial runout limit "b": 1.20 mm (0.047 in.)

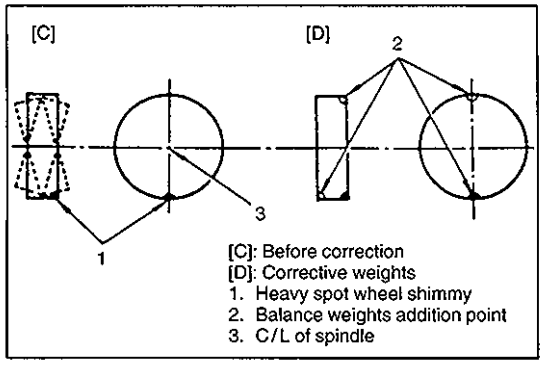


METRIC LUG NUTS AND WHEEL STUDS

All models use metric lug nuts and wheel studs (size M12 x 1.25).



[A]: Before correction
[B]: Corrective weights
1. Heavy spot wheel tramp
2. Balance weights addition point
3. C/L of spindle



[C]: Before correction
[D]: Corrective weights
1. Heavy spot wheel shimmy
2. Balance weights addition point
3. C/L of spindle

DIAGNOSIS

DIAGNOSIS TABLE

Refer to SECTION 3.

BALANCING WHEELS

There are two types of wheel and tire balance: static and dynamic. Static balance, as shown in left figure, is equal distribution of weight around wheel. Wheels that are statically unbalanced cause bouncing action called tramp. This condition will eventually cause uneven tire wear.

Dynamic balance, as shown in left figure, is equal distribution of weight on each side of 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 PROCEDURE

Deposits of mud, etc. must be cleaned from inside of rim.

WARNING:
Stones should be removed from tread in order to avoid operator injury during spin balancing and to obtain good balance.

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 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.

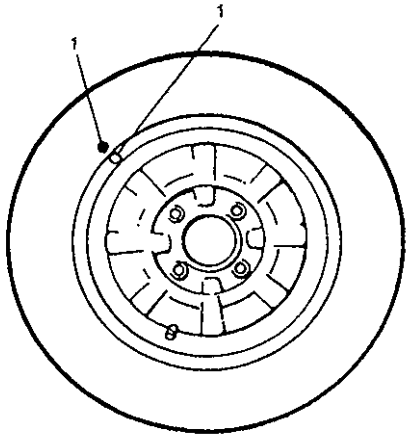
MAINTENANCE AND MINOR ADJUSTMENTS

WHEEL AND TIRE

Wheel repairs that use welding, heating, or peening are not approved. All damaged wheels should be replaced.

STUDS

If a broken stud is found, see Section 3E (rear) or Section 3D (front) for Note and Replacement procedure.



1. Paint

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 smothest 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 side of instrument panel.
It is normal for tire pressure increase 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

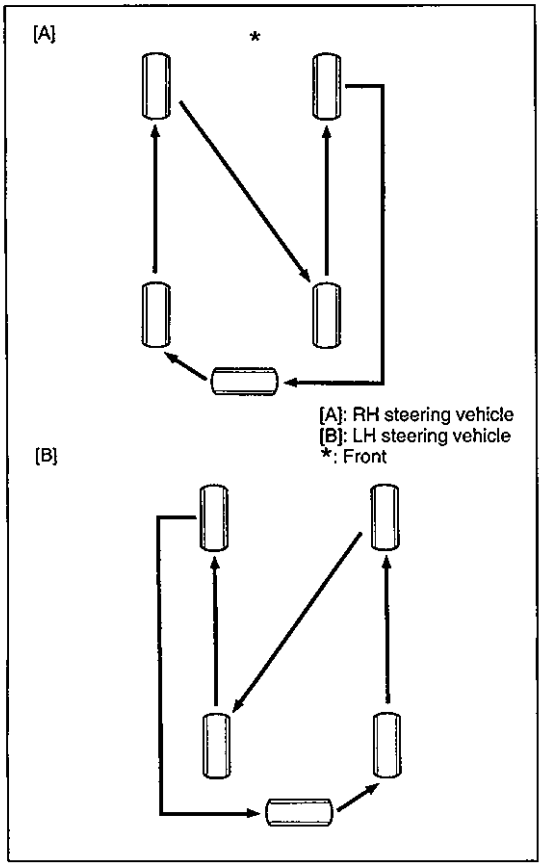
Valve caps should be kept on valves to keep dust and water out.

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 temperatures
7. Reduced handling
8. High fuel consumption

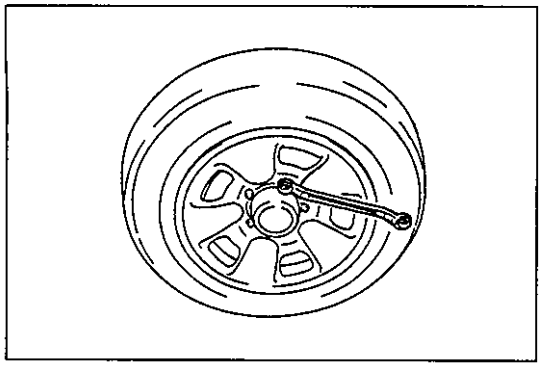
TIRE PLACARD

The tire placard is located on the driver's side door 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 periodically as shown in figure.



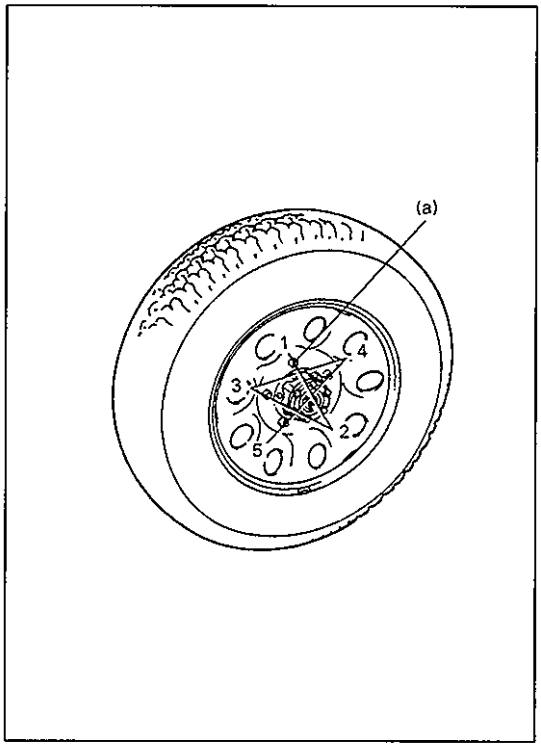
ON-VEHICLE SERVICE

WHEEL

REMOVAL

1) Loosen wheel nuts by approximately 180° (half a rotation).
2) Hoist vehicle.
3) Remove wheel.

NOTE:
Never use heat to loosen tight wheel because application of heat to wheel can shorten life of wheel and damage wheel bearings.



INSTALLATION

Wheel nuts must be tightened in sequence and to proper torque to avoid bending wheel or brake drum or disc as in figure.

NOTE:
Before installing wheels, remove any build-up of corrosion on wheel mounting surface and brake drum or 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 wheel to come off while vehicle is moving.

Tightening Torque
(a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

TIRE

MOUNTING AND DEMOUNTING

Use 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 wire brush or coarse steel wool to remove lubricants, old rubber and light rust. Before mounting or demounting tire, bead area should be well lubricated with approved tire lubricant.

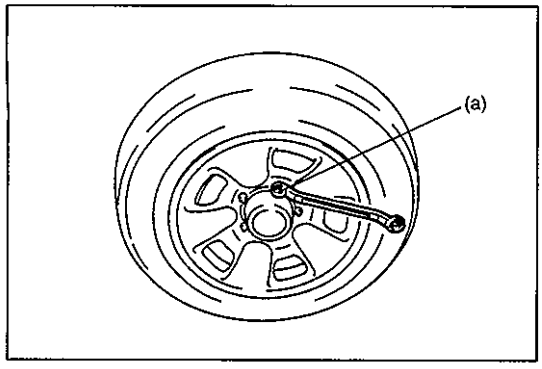
After mounting, inflate to specified pressure shown on tire placard so that beads are completely seated.

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 240 kPa (35 psi) pressure when inflating. If 240 kPa (35 psi) 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 the tire manufacturer.



TIGHTENING TORQUE SPECIFICATIONS

Tightening Torque for wheel nut
(a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

SECTION 4A2

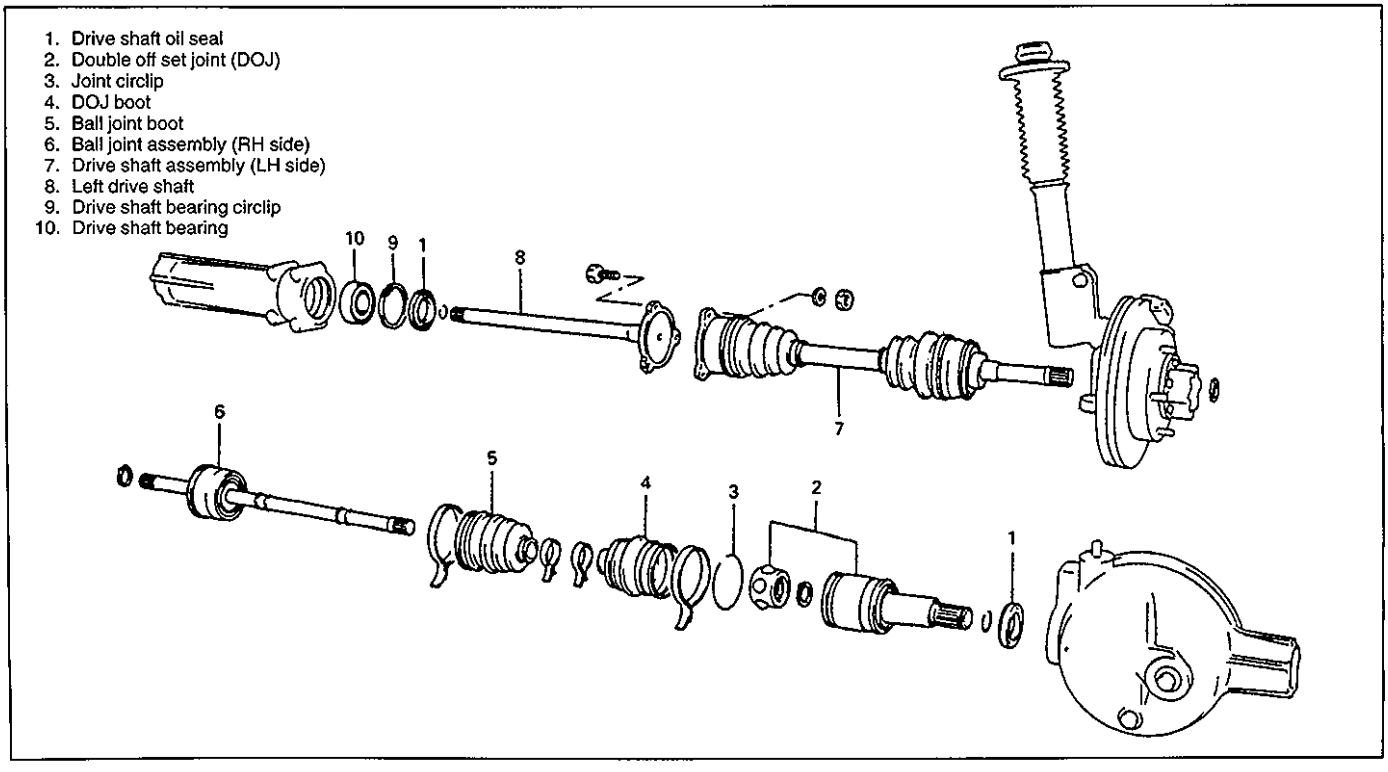
FRONT DRIVE SHAFT/SHAFT BEARING, OIL SEAL

CONTENTS

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DIAGNOSIS 4A2- 2
Diagnosis Table 4A2- 2
Drive Shaft Boot And Joint Check 4A2- 2
ON-VEHICLE SERVICE 4A2- 3
Drive Shaft 4A2- 3
Shaft Bearing/Oil Seal 4A2- 9
TIGHTENING TORQUE SPECIFICATIONS 4A2-11
REQUIRED SERVICE MATERIALS 4A2-11
SPECIAL TOOLS 4A2-11

GENERAL DESCRIPTION

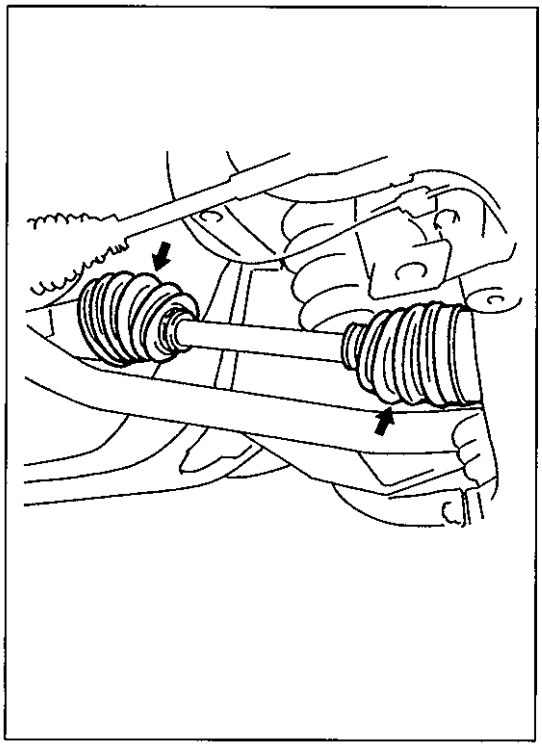
The drive shaft joint is a constant velocity joint (C.V. joint) which sides in the axial direction. The joint is composed of an outer race, cage, inner race and balls. In the turning direction, the joint rotates in the same way as a ball bearing. The balls lock rotation completely and transmit drive. In addition this vehicle is also characterized by a function that the shaft can slide through the balls in the grooves of the outer race in the extension/contraction direction of the drive shaft.



DIAGNOSIS

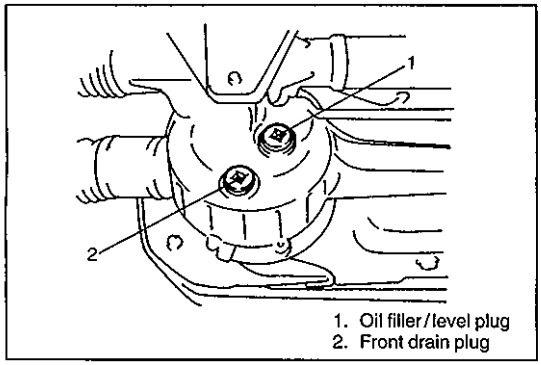
DIAGNOSIS TABLE

Condition	Possible Cause	Correction
When starting: Abnormal Noise	● Loose wheel nuts. ● Loose drive shaft flange bolts. ● Broken or otherwise damaged wheel bearing.	Tighten wheel nuts. Tighten drive shaft flange bolts. Replace or change.
When making turns: Abnormal Noise	● Grease leakage from drive shaft joint boot. ● Worn or broken drive shaft joint.	Replace joint boot and apply grease. Replace drive shaft joint.
When running: Abnormal Noise	● Broken drive shaft joint. ● Poorly lubricated or worn drive shaft joint. ● Loose drive shaft flange bolts. ● Deformed drive shaft oil seal.	Replace drive shaft joint. Lubricate or replace joint. Tighten drive shaft flange bolts. Replace.
Vibration	● Worn drive shaft joint. ● Deformed drive shaft oil seal. ● Deformed drive shaft.	Replace drive shaft joint. Replace. Replace.



DRIVE SHAFT BOOT AND JOINT CHECK

Check drive shaft boot for tear. If even a small tear is noted, replace with new one.
Check drive shaft joint for wear, breakage and other damage and replace if any defect exists.



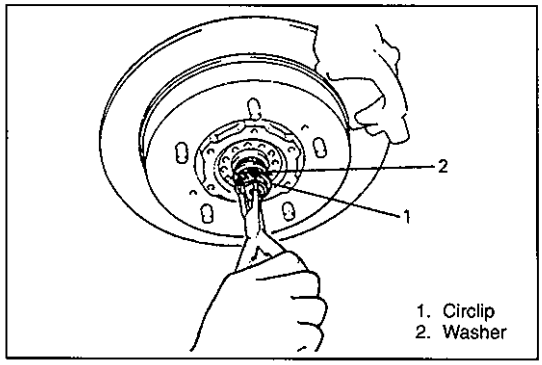
1. Oil filler/level plug
2. Front drain plug

ON-VEHICLE SERVICE

DRIVE SHAFT

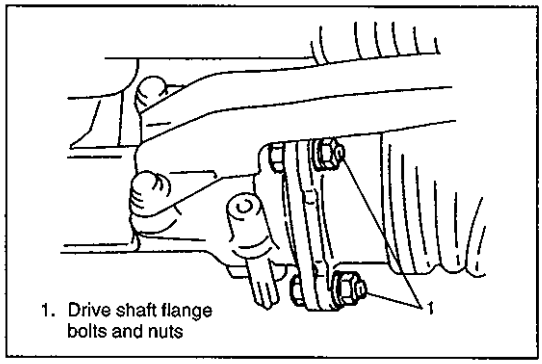
REMOVAL (LEFT SIDE)

1) Hoist vehicle and remove wheel.



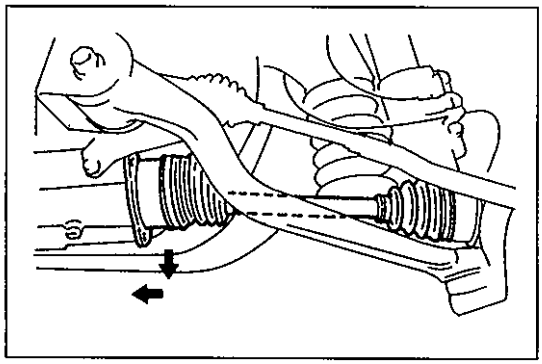
1. Circlip
2. Washer

2) Remove axle shaft drive flange.
3) Remove drive shaft circlip and washer.



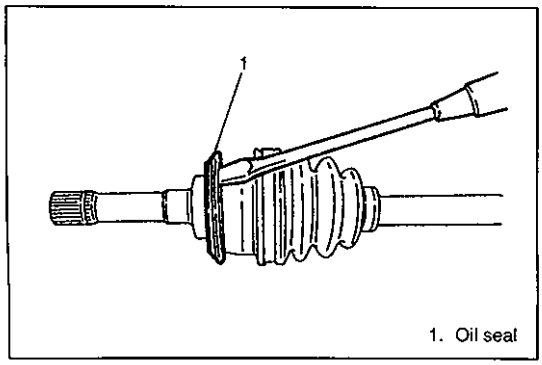
1. Drive shaft flange bolts and nuts

4) Remove drive shaft flange bolts and nuts.



5) Remove drive shaft assembly to differential side as shown in left figure.

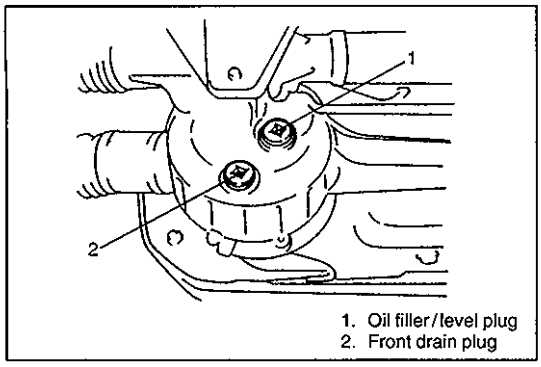
CAUTION:
To prevent breakage of boots (wheel side and differential side), be careful not to bring them into contact with other parts when removing drive shaft assembly.



1. Oil seal

6) Remove drive shaft oil seal as shown in figure.

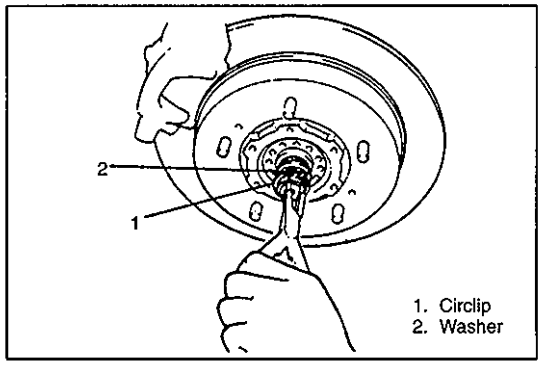
CAUTION:
Be careful not to cause damage to drive shaft joint.



1. Oil filler/level plug
2. Front drain plug

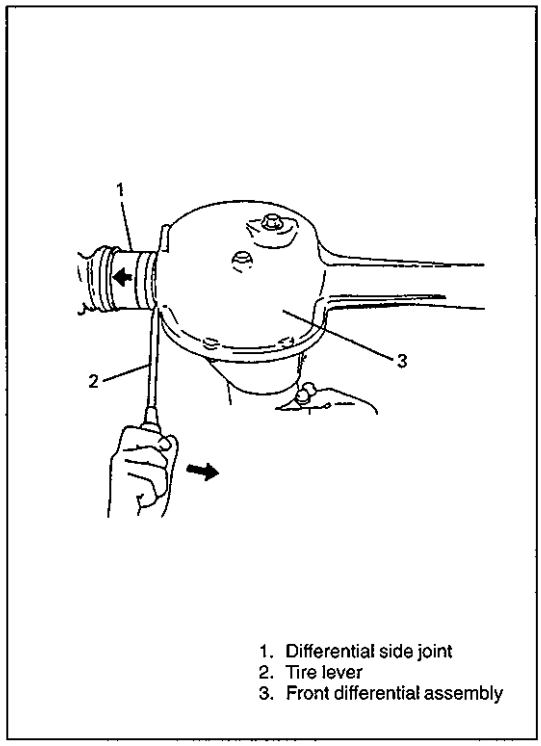
REMOVAL (RIGHT SIDE)

1) Hoist vehicle and remove wheel.
2) Drain differential gear oil.



1. Circlip
2. Washer

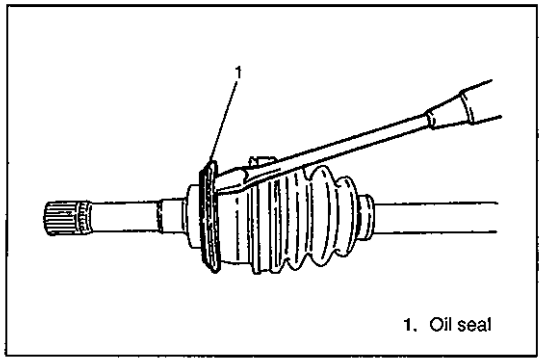
3) Remove axle shaft drive flange.
4) Remove drive shaft circlip and washer.
5) Remove knuckle and wheel hub comp, refer to steps 5) to 7) and 9) to 14) of item COIL SPRING REMOVAL in Section 3D.



1. Differential side joint
2. Tire lever
3. Front differential assembly

6) Remove drive shaft assembly.
To detach snap ring fitted on the spline of differential side joint (inboard joint) from differential side gear, pull inboard joint by using a tire lever.

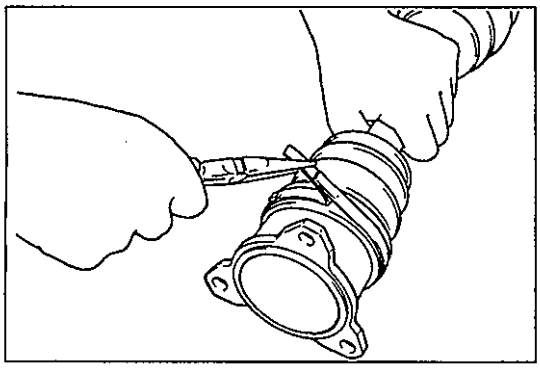
CAUTION:
To prevent breakage of boots (wheel side and differential side), be careful not to bring them into contact with other parts when removing drive shaft assembly.



1. Oil seal

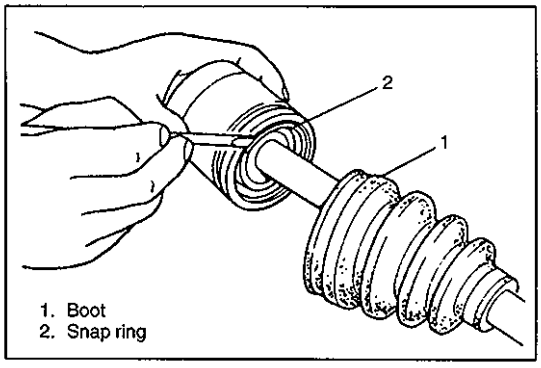
7) Remove drive shaft oil seal as shown in figure.

CAUTION:
Be careful not to cause damage to drive shaft joint.

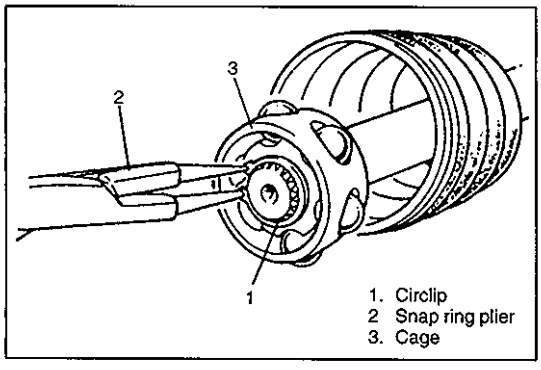


DISASSEMBLY

1) Remove boot band of differential side joint.



2) Slide boot toward the center of shaft and remove snap ring from outer race, then take shaft out of outer race.



3) Remove circlip and then cage.
4) Remove inside and outside boots from shaft.

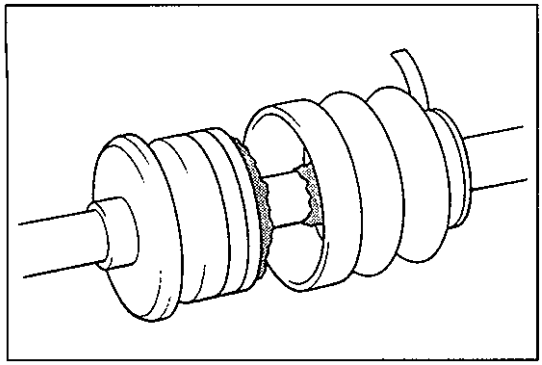
CAUTION:
- **Do not disassemble wheel side joint (outboard joint). If any malcondition is found in joint, replace it as assembly.**
- **Do not disassemble ball joint of differential side joint. If any malcondition is found in ball joint, replace differential side joint assembly.**

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.

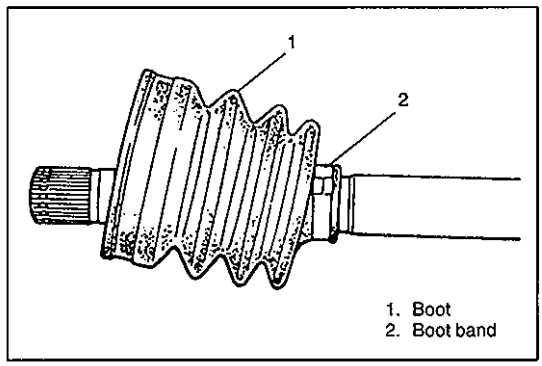
CLEANING

- Wash disassembled parts (except boots) in degreaser. After washing, dry parts completely by blowing air.
- Clean boots with cloth. DO NOT wash boots in degreaser, such as gasoline or kerosene, etc..
  Washing in degreaser causes deterioration of boot.



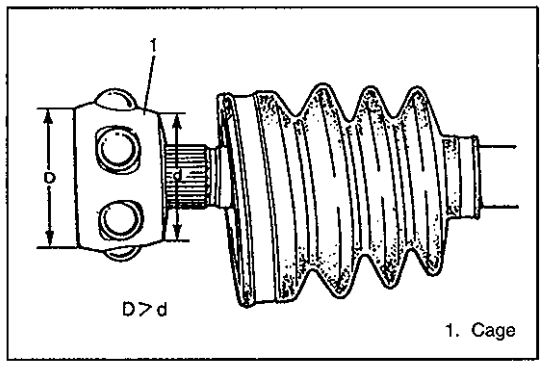
ASSEMBLY

1) Fully apply joint grease to wheel side joint.
   Use joint grease in the tube included in spare part or joint grease (99000-25120).
2) Fit wheel side boot on shaft.
   Fill up inside of boot with joint grease of about 90 gram.
   Before fixing boot band, insert screwdriver into boot on joint side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.
3) Fixing boot band.
4) Install boot onto drive shaft till its small diameter side fits to shaft groove and fix there with boot band.

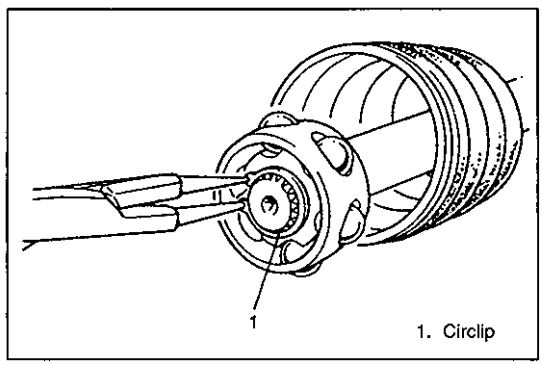


5) Install cage to shaft.

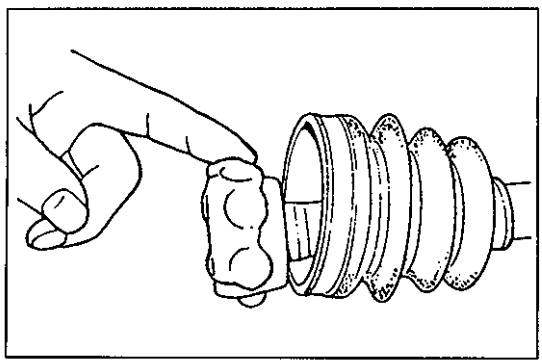
CAUTION:
Install cage directing smaller outside diameter side to shaft end.

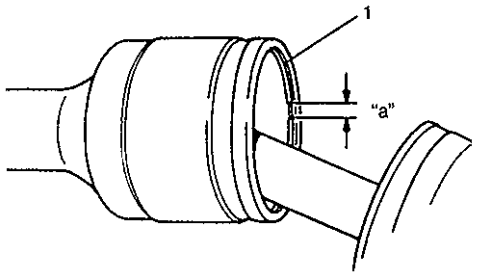


6) Install circlip by using snap ring plier.



7) Apply grease to entire surface of cage.
   Use joint grease in tube included in spare part or joint grease (99000-25120).

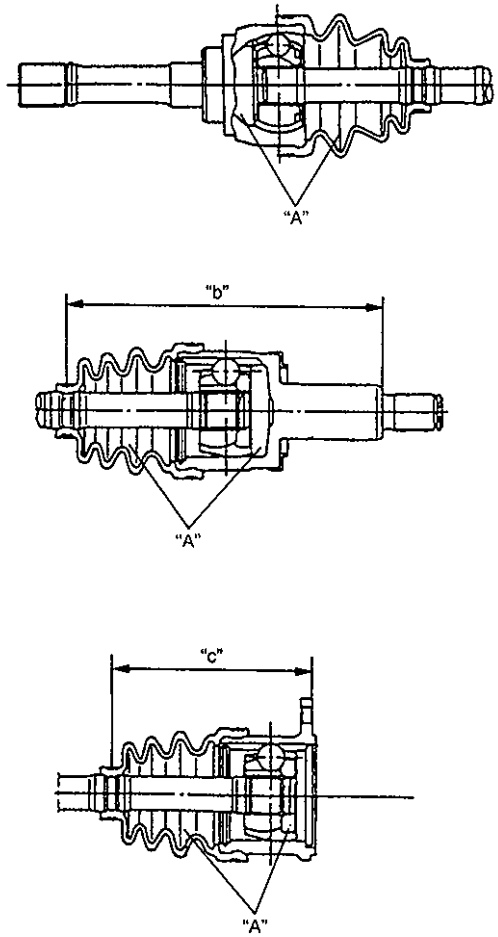




1. Circlip

8) Insert cage into outer race and fit circlip into groove of outer race.

CAUTION:
Position opening of circlip "a" so that it will not be lined up with a ball.



"A": Fill grease 90 g (3.2 oz)

9) Apply grease to inside of outer race, and fit boot to outer race. Fill up inside of boot with joint grease.

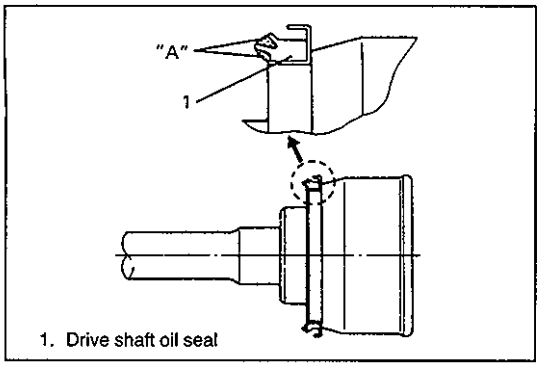
"A": Joint Grease 99000-25120

10) Fitting boot to outer race, adjust so that measurements "b" and "c" become as indicated in figure.

Length "b": 203.2 – 213.2 mm (8.00 – 8.40 in.)
196.8 – 206.8 mm (7.75 – 8.14 in.) (SQ625 M/T)
"c": 125.5 – 135.5 mm (4.94 – 5.33 in.)
127.5 – 137.5 mm (5.02 – 5.41 in.) (SQ625 M/T)

Before fixing boot band, insert screwdriver into boot on joint side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

11) Clamp boot band. Check boots for distortion or dent.



1. Drive shaft oil seal

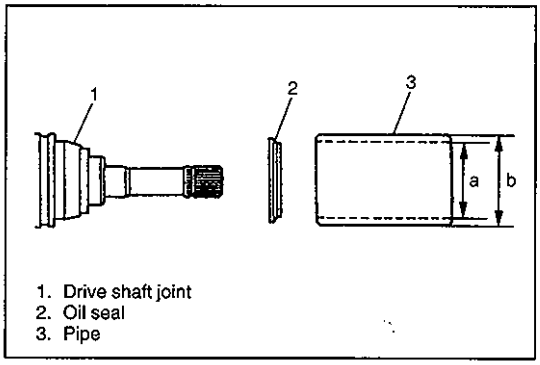
INSTALLATION

Install drive shaft assembly by reversing removal procedure and noting following points.

- Clean front drivershaft oil seal and then apply lithium grease to oil seal and DOJ shaft.

  "A": Grease 99000-25010

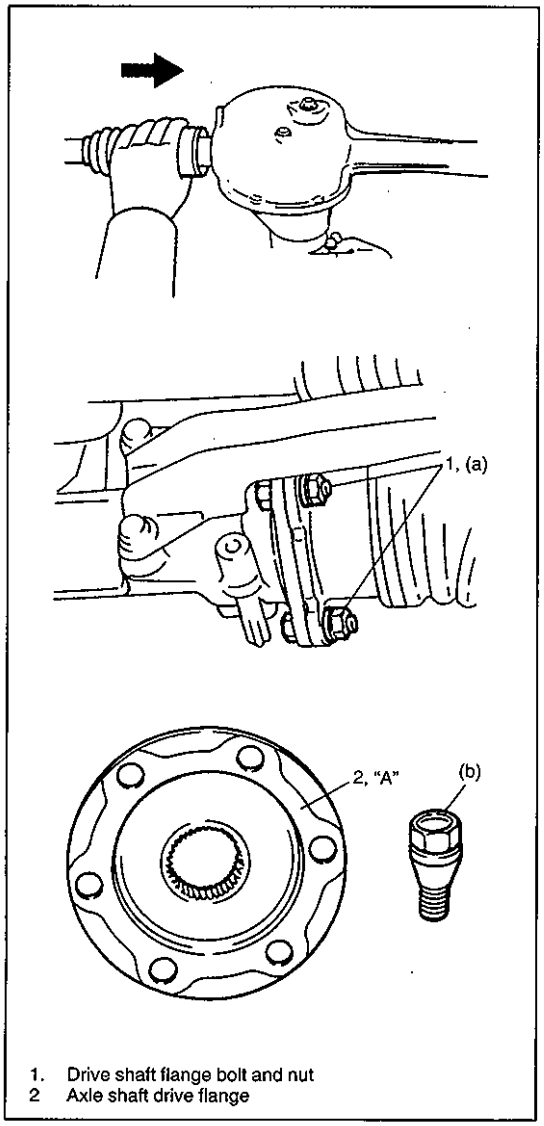
- Check oil seal for breakage or deterioration.
  Replace it as necessary.



1. Drive shaft joint
2. Oil seal
3. Pipe

- Drive in oil seal until its end contacts stopped surface of drive shaft joint by using a pipe whose inner diameter is 76 mm (2.992 in.) or more and outer diameter is 80 mm (3.150 in.) or less.

  Diameter "a": 76 mm (2.992 in.) or more
  Diameter "b": 80 mm (3.150 in.) or less



1. Drive shaft flange bolt and nut
2. Axle shaft drive flange

- RH Side
  Push differential side joint by hand until it is positioned by snap ring fitted to its spline.

  LH Side
  Connect drive shaft flange bolts and nuts.

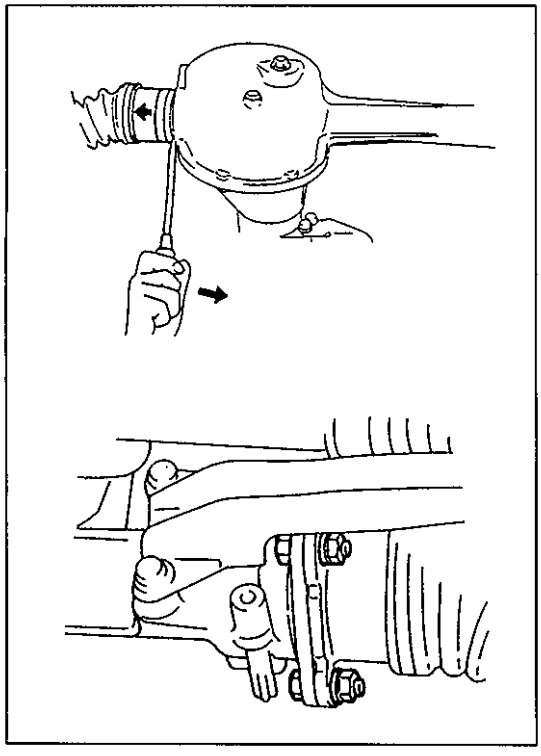
  Tightening Torque
  (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

- When installing axle shaft drive flange to wheel hub, apply sealant to mating surface of axle shaft drive flange.

  "A": Sealant 99000-31090
  Tightening Torque
  (b): 25 N·m (2.5 kg-m, 18.0 lb-ft)

CAUTION:
- **To prevent breakage of boots (wheel side and differential side), be careful not to bring them into contact with other parts when installing drive shaft assembly.**
- **Do not pull housing of differential side joint. If housing is pulled, it may be detached from drive shaft.**
- **Apply chassis grease to spline of sliding yoke.**

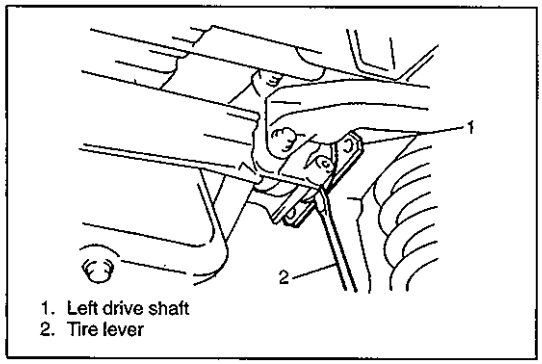
- Fill specified differential gear oil into differential case to specified level.



SHAFT BEARING/OIL SEAL

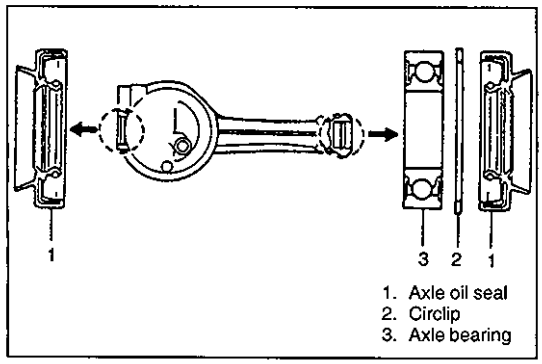
REMOVAL

1) Remove drive shaft assembly.
   Refer to item DRIVE SHAFT REMOVAL (LEFT and RIGHT) in this section.
   For right side shaft bearing/oil seal removal, drain differential gear oil.



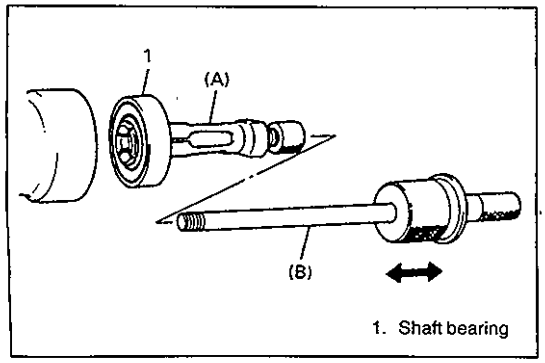
1. Left drive shaft
2. Tire lever

2) Remove left drive shaft by using tire lever.
3) Remove left side strut. Refer to steps 1) and 4) to 8) of item STRUT DAMPER REMOVAL in Section 3D.



1. Axle oil seal
2. Circlip
3. Axle bearing

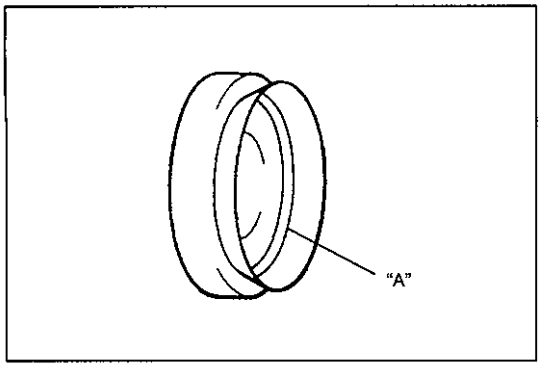
4) Remove oil seal, using plain screw driver.
5) Remove circlip.



1. Shaft bearing

6) Remove bearing, using special tools (A) and (B).

Special Tool
(A): 09941-64510
(B): 09930-30102

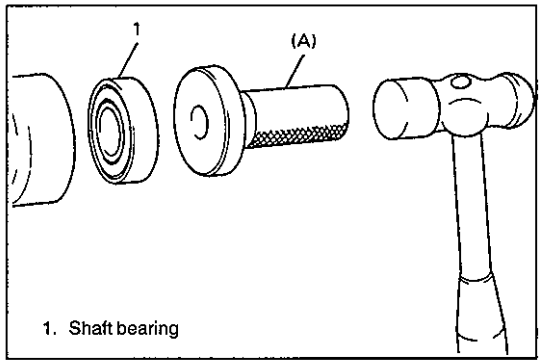


INSTALLATION

1) Clean drive shaft oil seal and then apply lithium grease.

   "A": Grease 99000-25010

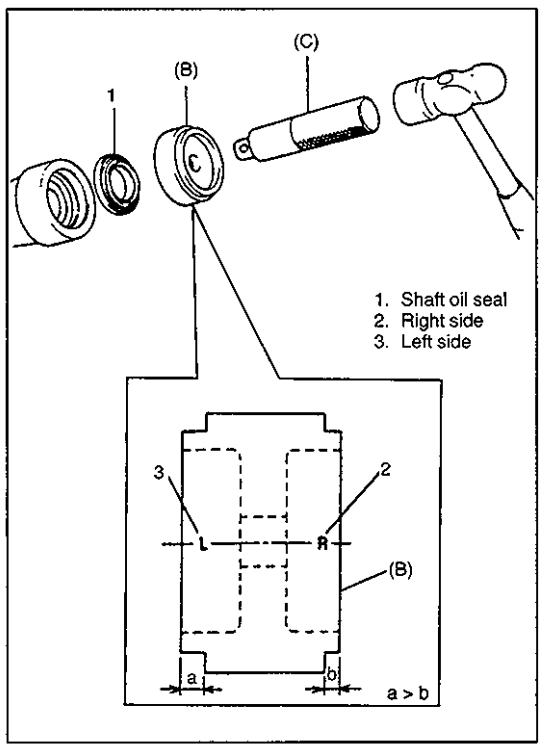
   Check oil seal for breakage or deterioration.
   Replace it as necessary.



2) Drive in drive shaft bearing with special tool (A) (on left hand side).

   Special Tool
   (A): 09913-75520

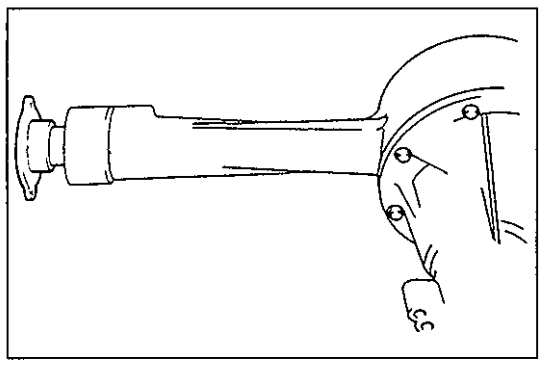
3) Install circlip.



4) Drive in oil seal with special tools (B) and (C).

   Special Tool
   (B): 09951-16090
   (C): 09924-74510

   NOTE:
   As depth to which oil seal should be driven into axle housing is different between the left and right, be sure to check stamped marks on special tool (B) and drive each oil seal to corresponding mark.



5) Install left drive shaft.
6) Install left side strut. Refer to steps 1) to 2) of item STRUT DUMPER INSTALLATION in Section 3D.
7) Install drive shaft assembly.
   Refer to DRIVE SHAFT INSTALLATION in this section.
8) Fill specified differential gear oil into differential case to specified level.

TIGHTENING TORQUE SPECIFICATIONS

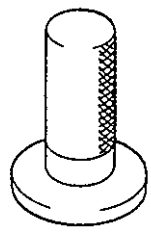
Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Drive shaft flange nut (Dif. side)	50	5.0	36.5
Oil level plug	40	4.0	29.0
Drain plug	25	2.5	18.0
Axle shaft drive flange bolt	48	4.8	35.0

NOTE:
Refer to standard tightening torque specifications, if no description or specification is provided.

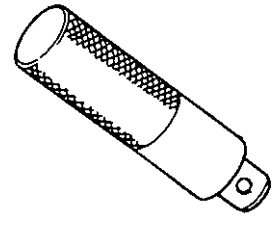
REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Joint grease (Molybdenum grease)	SUZUKI SUPER GREASE H (99000-25120)	Drive axle joint
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Drive shaft oil seal Wheel spindle part of differential side drive shaft (RH)

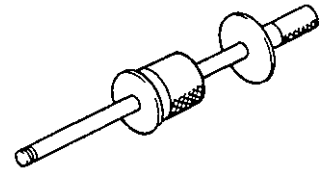
SPECIAL TOOLS



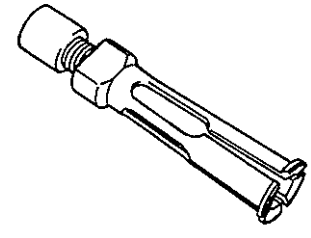
09913-75520
Bearing installer



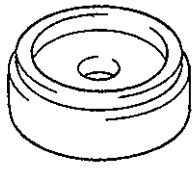
09924-74510
Installer attachment



09930-30102
Sliding shaft



09941-64510
Bearing remover



09951-16090
Oil seal installer

SECTION 4B

PROPELLER SHAFTS

NOTE:

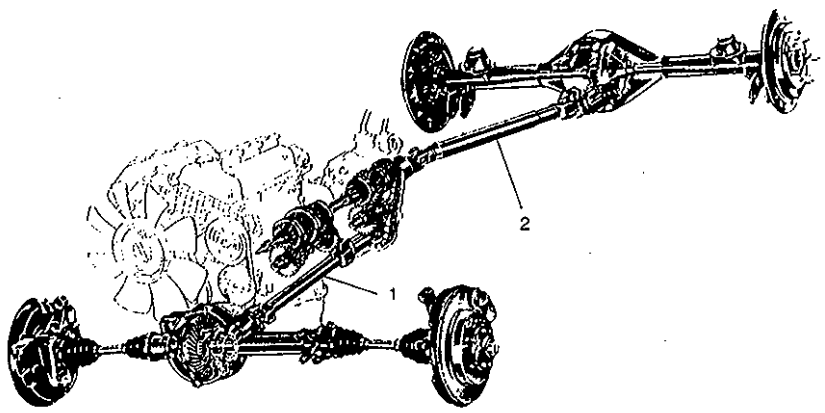
- **All propeller shaft fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not 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 propeller shaft part. Replace it with a new part, or damage to the part may result.**

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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 replaced.
The propeller shaft is a balanced unit. Handle it carefully so that balance can be maintained.

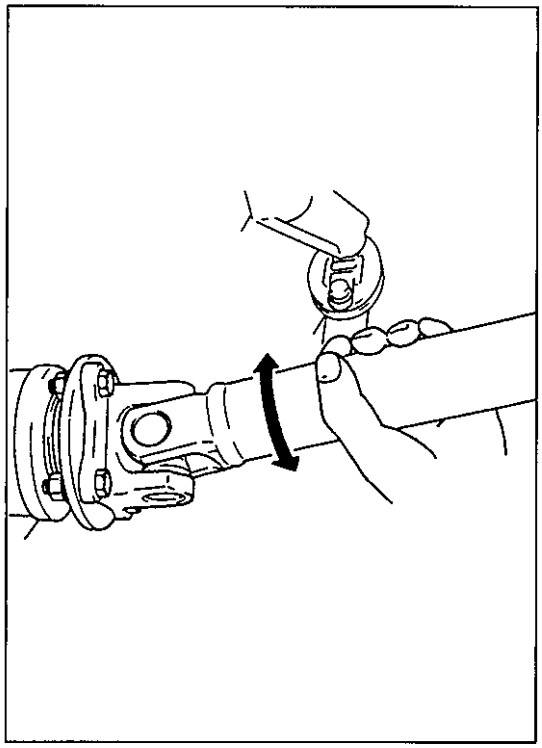


1. Front propeller shaft
2. Rear propeller shaft

DIAGNOSIS

DIAGNOSIS TABLE

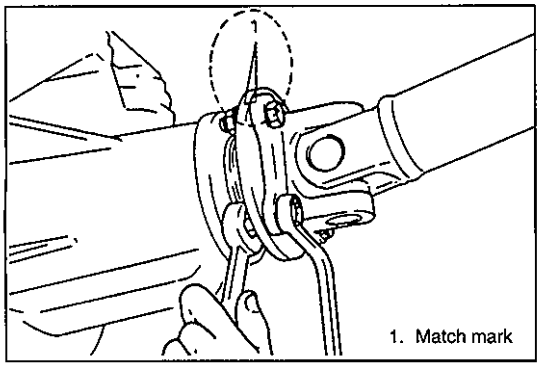
Condition	Possible Cause	Correction
Abnormal noise	• Loose universal joint bolt. • Spider bearing worn out or stuck. • Wear spider.	Tighten universal joint bolt. Replace. Replace propeller shaft.
Vibration	• Performed propeller shaft.	Replace.



PROPELLER SHAFT JOINT CHECK

If universal joints are suspected of producing chattering or rattling noise, inspect them for wear. Check to see if cross spider rattles in yokes or if splines are worn down and replace defective propeller shaft with new one.

Noise coming from universal joint can be easily distinguished from other noises because rhythm of chattering or rattling is in step with cruising speed. Noise is pronounced particularly on standing start or in coasting condition (when braking effect of engine is showing in the drive line).



ON-VEHICLE SERVICE

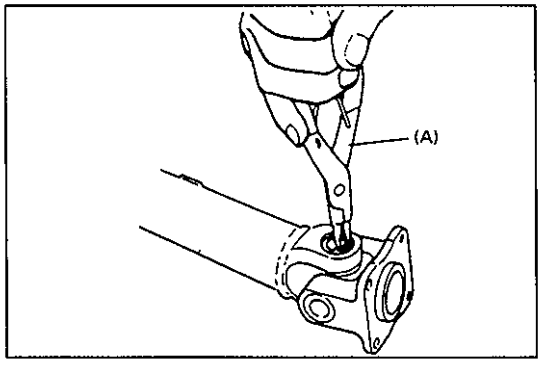
PROPELLER SHAFT

REMOVAL

1) Hoist vehicle.
2) Drain transfer oil only when servicing front propeller shaft.
3) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown.
4) Remove propeller shaft.

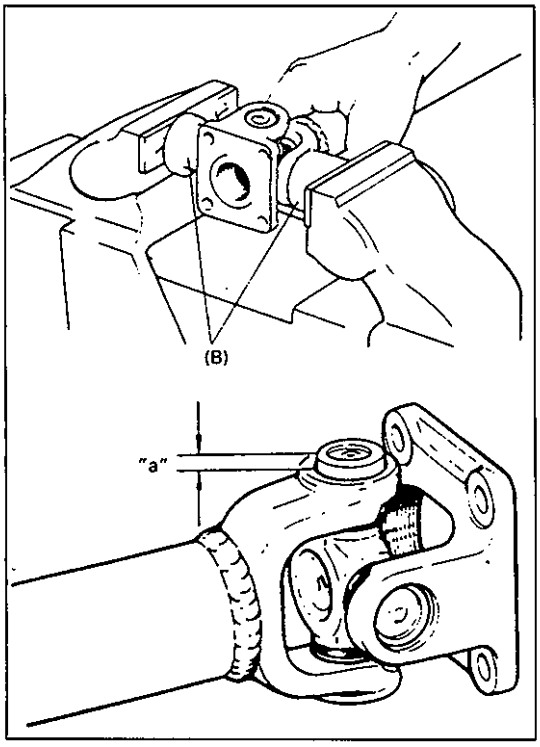
DISASSEMBLY

1) Using special tool(A), remove 2 circlips.



Special Tool
(A): 09900-06108

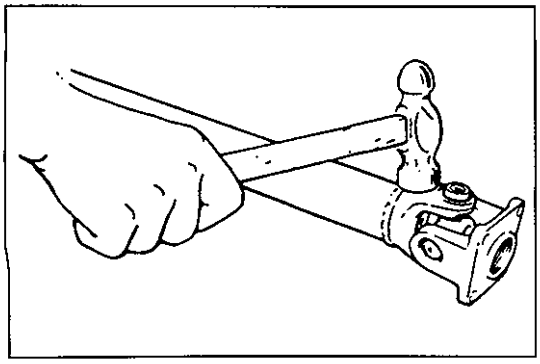
2) Using special tool(B), push spider bearing race out 3 – 4 mm (0.12 – 0.16 in.) from shaft yoke race.



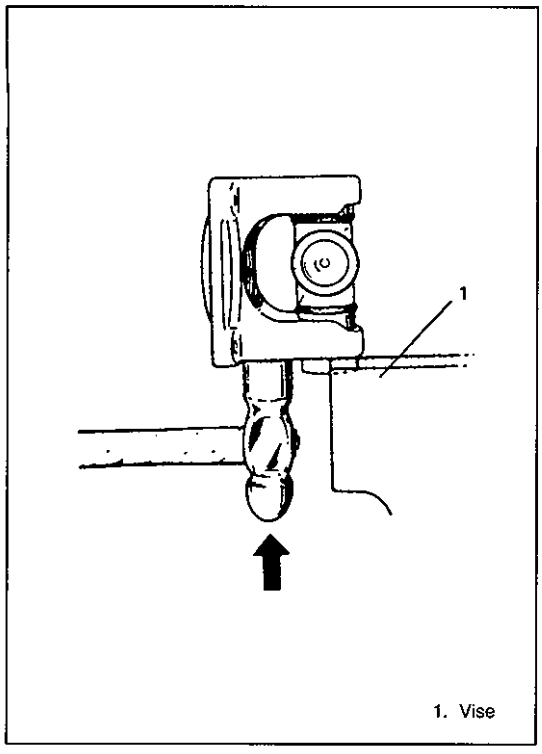
NOTE:
Before pushing it out, apply penetrate lubricant between bearing race and yoke race.

Special Tool
(B): 09926-48010

Length "a": 3 – 4 mm (0.12 – 0.16 in.)



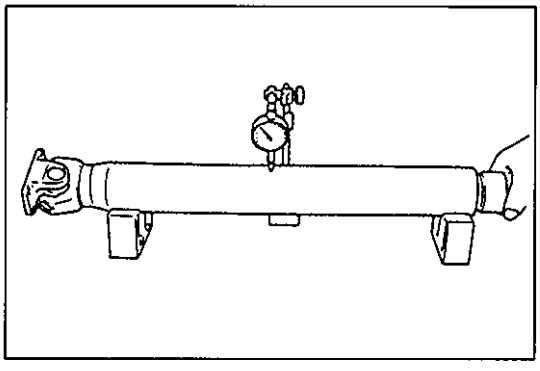
3) Tapping yoke with a hammer, completely remove bearing race.
4) Take out bearing race on the other side in the same way as in 2) and 3).



1. Vise

5) Push out bearing race on flange yoke side as described in 1) and 2), and then, holding bearing race in a vise, tap flange yoke and take out race. (Refer to the figure.)
Remove bearing race on the opposite side in the same way.

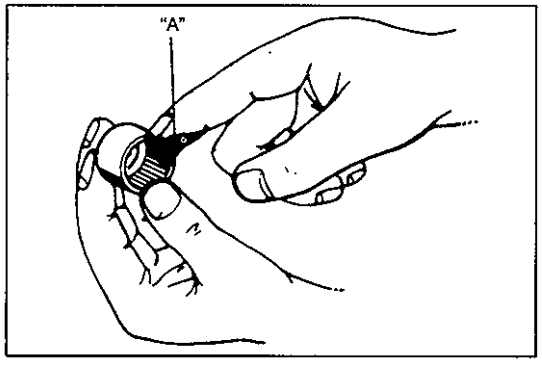
NOTE:
- **Take care not to lose rollers in spider bearing race when removing it.**
- **Fit removed bearings temporarily in spider so that they can be reinstalled in their original positions.**



INSPECTION

Inspect propeller shaft and flange yoke for damage, and propeller shaft for runout.
If damage is found or shaft runout exceeds its limit, replace.

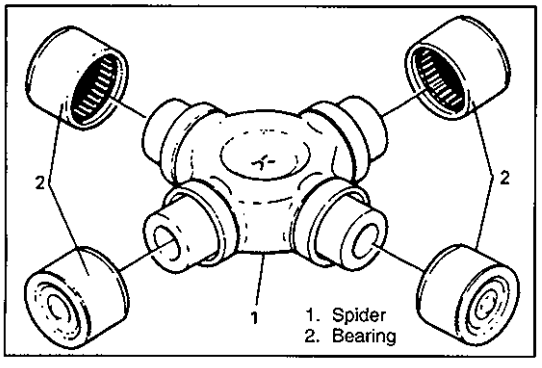
Runout limit: 0.8 mm (0.031 in.)



ASSEMBLY

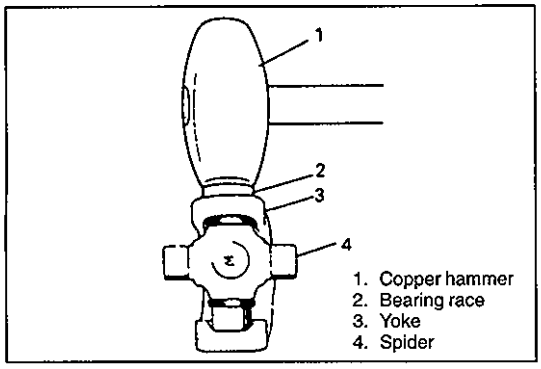
NOTE:
- **Make sure that rollers inside spider bearing race are all in place.**
- **Make sure to apply grease to spider bearing race.**

"A": Grease 99000-25030

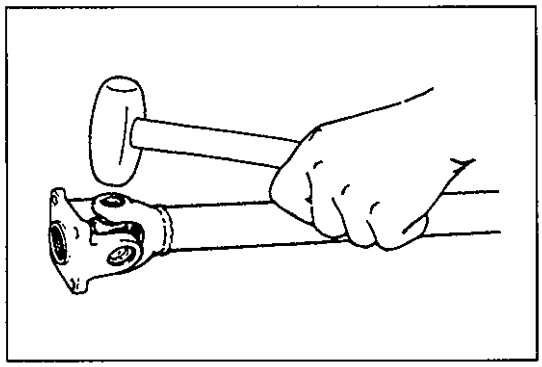


1. Spider
2. Bearing

CAUTION:
In assembly, be sure to use new circlips, spider and bearings. Reuse of circlips, spider and bearings once assembled is prohibited.



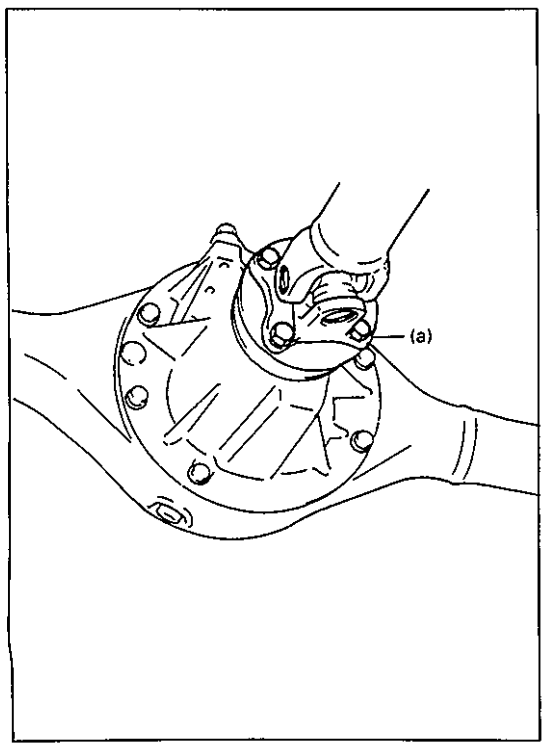
1) Insert bearing race into yoke, tapping it with a hammer, until it is flush with yoke face. When doing this, insert spider into bearing race to prevent rollers in bearing race from coming out.



2) Insert the other bearing race on the opposite side into yoke, tapping with a hammer until it is flush with yoke face.
3) Insert bearing races on the flange yoke side in the same way as described in 1) and 2) above.

4) Place a metal plate on bearing races when tapping them in to avoid damaging yoke.
5) Securely fit 4 circlips to shaft and flange yoke.

NOTE:
- **After assembly, check to ensure that both shaft yoke and flange yoke move smoothly.**
- **Make sure that each circlip is fitted in groove securely.**



INSTALLATION

Reverse removal procedure to install propeller shaft.

- Use following specification to torque universal joint flange.

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

- When installing propeller shaft, align the match marks. Otherwise, vibration may occur during driving.

NOTE:
If transfer oil was drained for front propeller shaft removal, pour specified gear oil into transfer case to specified level.

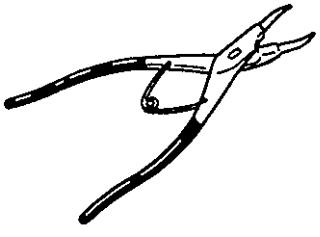
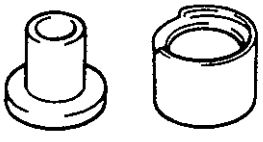
TIGHTENING TORQUE SPECIFICATION

Fastener	Tightening torque		
	N·m	kg-m	lb-ft
Propeller shaft nut	50	5.0	36.5

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUPER GREASE C (99000-25030)	To apply to spider bearing race.

SPECIAL TOOLS

	
09900-06108 Snap ring pliers (Closing type)	09926-48010 Universal joint disassembling tool set

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 "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 inspecting and servicing vehicle equipped with ABS, be sure to refer to section 5E1 first.**
- **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.**

DIAGNOSIS 5–3
BRAKE PIPE/HOSE/MASTER CYLINDER 5A–1
FRONT BRAKE 5B–1
PARKING AND REAR BRAKE 5C–1

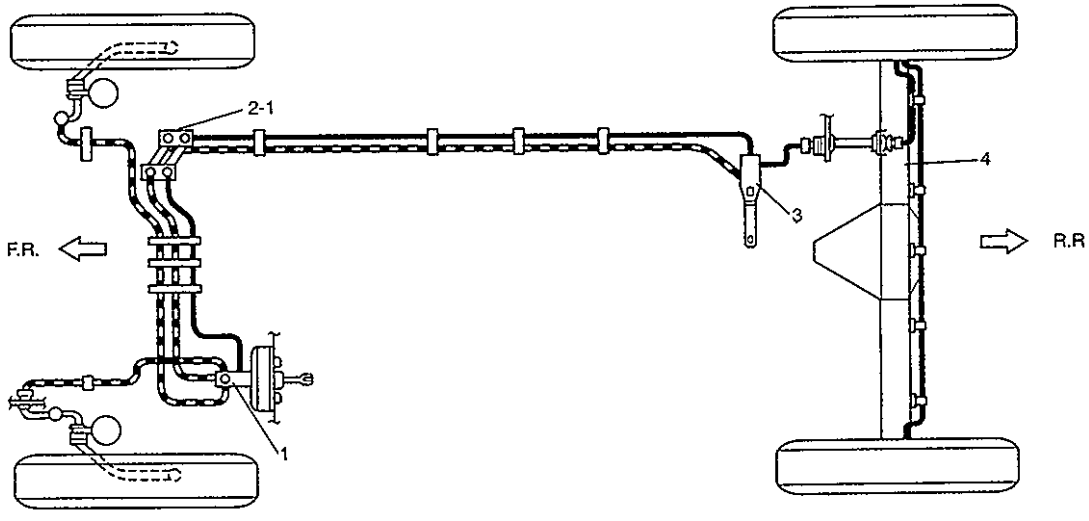
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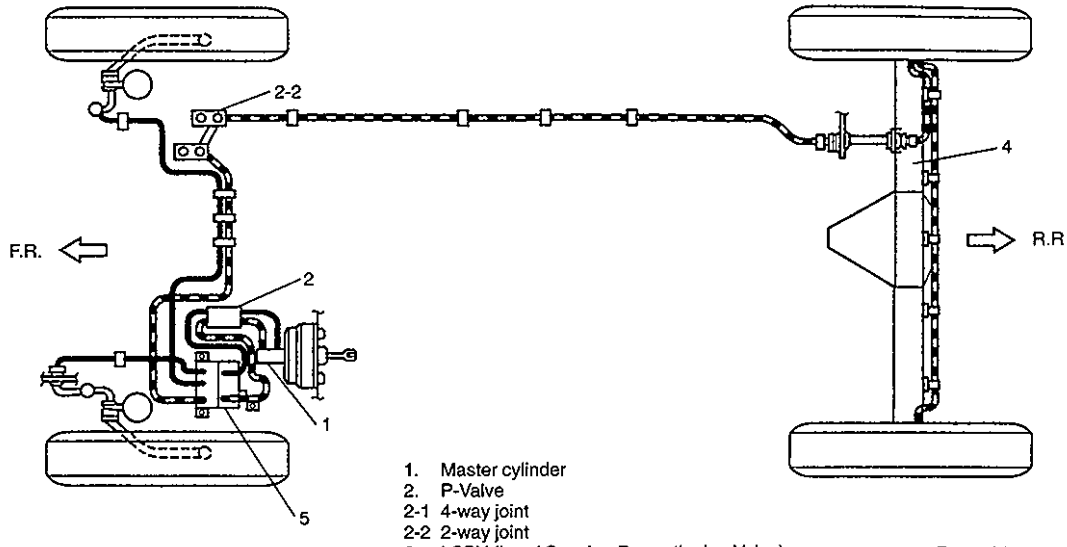
GENERAL DESCRIPTION

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and four in rear).
The master cylinder is a tandem master cylinder. Brake pipes are connected to the master cylinder and they make two independent circuits. One connects front brakes (right and left) and the other connects rear brakes (right and left).
The load sensing proportioning valve (LSPV) is included in these circuits between the master cylinder and the rear brake for the vehicle without ABS. And the proportioning valve is included in these circuit for the vehicle equipped with ABS.
In this brake system, the disc brake type is used for the front wheel brake and a drum brake type (leading/trailing shoes) for the rear brake.
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 are used for both parking and foot brakes.

[FOR VEHICLE WITHOUT ABS]



[FOR VEHICLE WITH ABS]



1. Master cylinder
2. P-Valve
2-1 4-way joint
2-2 2-way joint
3. LSPV (Load Sensing Proportioning Valve)
4. Rear axle housing
5. ABS actuator (H.U.)

F.R.:Front side
R.R.:Rear side

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.
If fluid level is lower than the minimum level of reservoir, refilling is necessary. Fill reservoir with specified brake fluid.

Brake fluid: Refer to reservoir tank cap.

CAUTION:
Since brake system of this vehicle is factory-filled with brake fluid indicated on reservoir tank cap, do not use or mix different type of fluid when refilling; otherwise serious damage will occur.
Do not use old or used brake fluid, or any fluid from a unsealed container.

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 linings.

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.

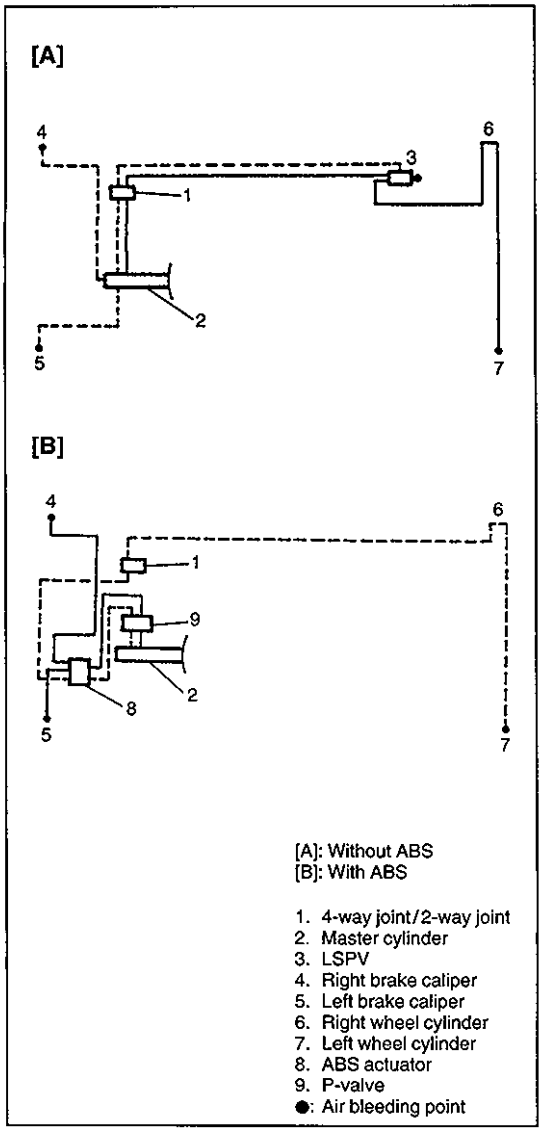
The system must be flushed if there is any doubt as to the grade of fluid in the system or if fluid has been used which contained parts that have been subjected to contaminated fluid.

DIAGNOSIS TABLE

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.	Repair for proper contact.
	• Brake shoes linings stained with oil or wet with water.	Replace.
	• Badly worn brake shoe linings.	Replace.
	• Defective wheel cylinders.	Repair or replace.
	• Malfunctioning caliper assembly.	Repair or replace.
	• Air in system.	Bleed system.
	• Maladjusted sensor spring length of LSPV.	Check or adjust.
	• Broken sensor spring of LSPV.	Replace.
	• Defective collar of LSPV.	Replace.
	• Malfunctioning ABS (Antilock brake system), if equipped.	Check system and replace as necessary.
Brake pull (Brakes not working in unison)	• Pad 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. (Malfunctioning auto adjusting mechanism).	Check for inoperative auto adjusting mechanism.
	• Drum is out of round in some brakes.	Replace.
	• Wheel tires are inflated unequally.	Inflate equally.
	• Malfunctioning 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 tubes 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.
	• Loose suspension parts.	Caliper should slide. Check all suspension mountings.
	• Loose calipers.	Check and torque bolts to specifications.
Noise (high pitched squeak without brake applied)	• Front lining worn out.	Replace linings.
Rear brake locked prematurely	• Maladjusted sensor spring length of LSPV.	Check or adjust.
	• Malfunction LSPV assembly.	Replace assembly.
Brake locked (For vehicles equipped with ABS)	• Malfunctioning ABS, if equipped.	Check system and replace as necessary.

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).	Repair auto adjusting mechanism. Adjust rear brakes.
	• Bent brake shoes.	Replace brake shoes.
	• Worn rear brake shoes.	Replace brake shoes.
Dragging brakes (A very light drag is present in all disc brakes immediately after pedal is released)	• Master cylinder pistons not returning correctly.	Replace master cylinder.
	• Restricted brake tubes or hoses.	Check for soft hoses or damaged tubes and replace with new hoes and/or new brake tubes.
	• Incorrect parking brake adjustment on rear brakes.	Check and adjust to correct specifications.
	• Weakened or broken return springs in the brake.	Replace.
	• Sluggish parking-brake cables or linkage.	Repair or replace.
	• Wheel cylinder or caliper piston sticking.	Repair as necessary.
	• Malfunctioning ABS, if equipped with ABS.	Check system and replace as necessary.
Pedal pulsation (Pedal pulsates when depressed for braking)	• Damaged or loose wheel bearings.	Replace wheel bearings.
	• Distorted steering knuckle or rear axle shafts.	Replace knuckle or rear axle shaft.
	• 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 with specifications, replace or machine the disc.
	• Rear drums out of round.	Check runout. Repair or replace drum as necessary.
Braking noise	• Glazed shoe linings, or foreign matters stuck to linings.	Repair or replace shoe lining.
	• Worn or distorted shoe linings.	Replace shoe lining (or pad).
	• Loose front wheel bearings.	Replace wheel bearing.
	• Distorted backing plates or loose mounting bolts.	Replace or retighten securing bolts.

Condition	Possible Cause	Correction
Brake warning light turns on after engine start	• Parking brake applied. • Insufficient amount of brake fluid. • Brake fluid leaking from brake line. • Brake warning light circuit faulty.	Release parking brake and check that brake warning light turns off. Add brake fluid. Investigate leaky point, correct it and add brake fluid. Repair circuit.
Brake warning light turns on when brake is applied	• Brake fluid leaking from brake line. • Insufficient amount of brake fluid.	Investigate leaky point, correct it and add brake fluid. Add brake fluid.
Brake warning light fails to turn on even when parking brake is applied	• Bulb burnt out. • Brake warning light circuit open.	Replace bulb. Repair circuit.
ABS warning light does not turn on for 2 sec. after ignition switch has turned ON.	• Bulb burnt out. • ABS warning light circuit open, if equipped with ABS. (including check relay)	Replace bulb. Check system referring to "DIAGNOSIS" of ABS section.
ABS warning light remains on after ignition switch has turned on for 2 sec.	• Malfunctioning ABS, if equipped with ABS.	Check system referring to "DIAGNOSIS" of ABS section.



[A]: Without ABS
[B]: With ABS

1. 4-way joint/2-way joint
2. Master cylinder
3. LSPV
4. Right brake caliper
5. Left brake caliper
6. Right wheel cylinder
7. Left wheel cylinder
8. ABS actuator
9. P-valve
●: Air bleeding point

CHECK AND ADJUSTMENT

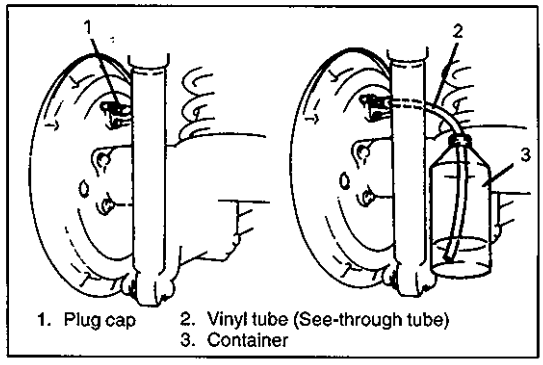
BLEEDING BRAKES

CAUTION:
Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

NOTE:
For vehicle equipped with ABS, make sure that ignition switch turns off.

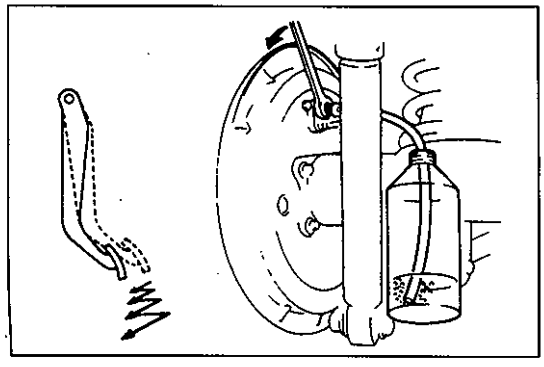
Be sure to bleed air of brake system according to following procedure when its oil hydraulic circuit has been disconnected.

Hydraulic lines of brake system consists of two separate lines, one for front wheel brakes and the other for rear wheel brakes.
Air bleeding is necessary at right and left front wheel brakes, left rear wheel brake and LSPV (if equipped without ABS), i.e. 4 places (3 places for vehicle with ABS) in all.

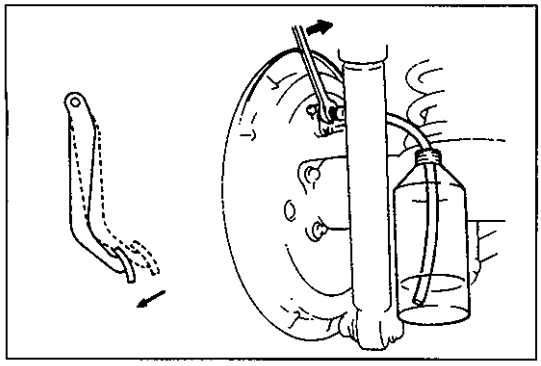


1. Plug cap
2. Vinyl tube (See-through tube)
3. Container

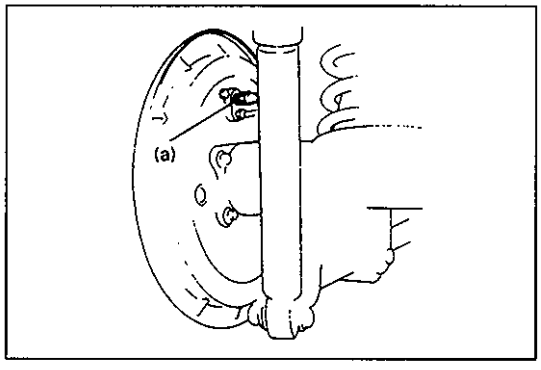
1) Fill master cylinder reservoir with brake fluid and keep at least one-half full of fluid during bleeding operation.
2) Remove bleeder plug cap.
   Attach a vinyl tube to bleeder plug of wheel cylinder, and insert the other end into container.



3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one half turn.



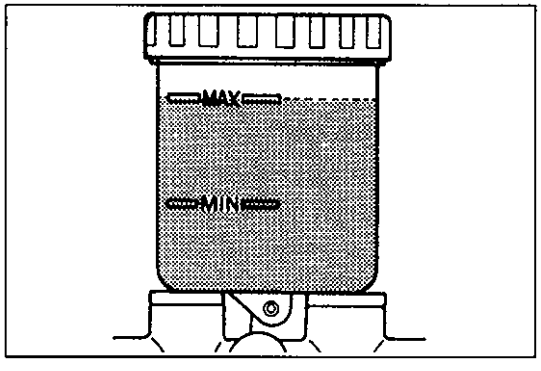
4) When fluid pressure in the cylinder is almost depleted, retighten bleeder plug.



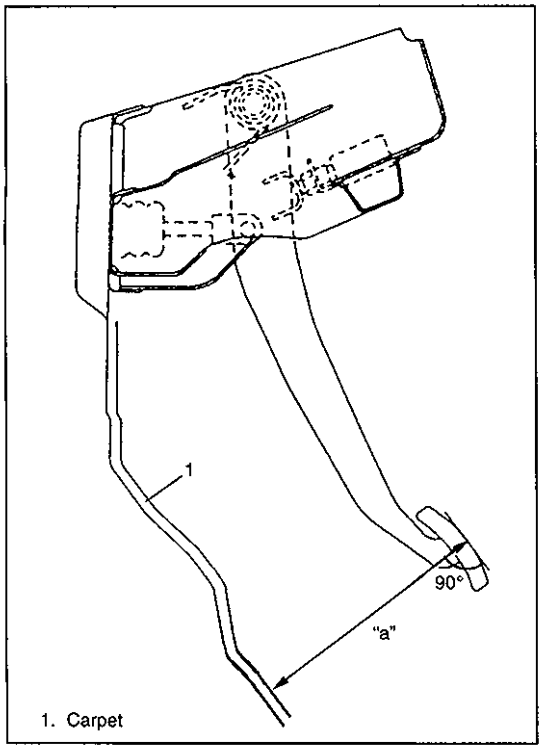
5) Repeat this operation until there are no more air bubbles in hydraulic line.
6) When bubbles stop, depress and hold brake pedal and tighten bleeder plug.

For tightening torque specification of air bleeder plug, refer to "TIGHTENING TORQUE SPECIFICATION" in this section.

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.



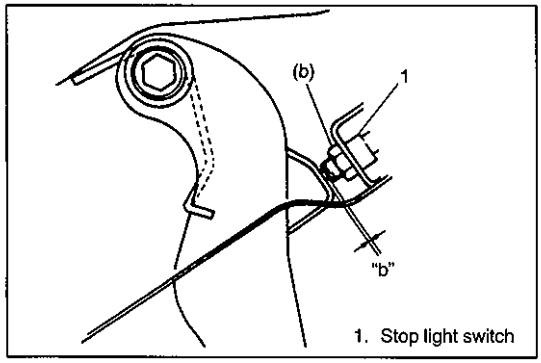
1. Carpet

BRAKE PEDAL FREE HEIGHT ADJUSTMENT

Check brake pedal free height.
If it is not within specification, check and adjust following item 1) and 2).

Brake pedal free height "a"
from carpet : 193 – 203 mm (7.60 – 7.99 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 (refer to BRAKE BOOSTER INSPECTION AND ADJUSTMENT).
2) Check stop light switch position. Adjust it if it is out of specification.

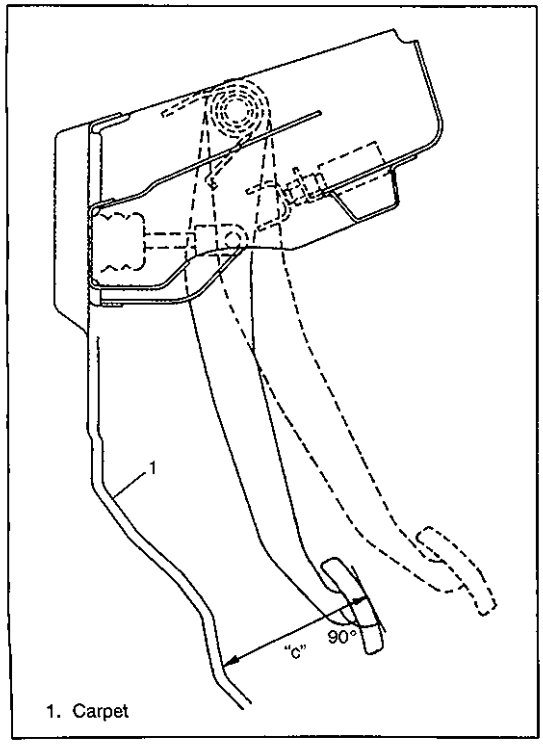


1. Stop light switch

BRAKE 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 return cushion (shown as "b" in figure).
Then tighten lock nut to specified torque.
Clearance "b": 1.5 – 2.0 mm (0.06 – 0.08 in.)

Tightening Torque
(b): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)



1. Carpet

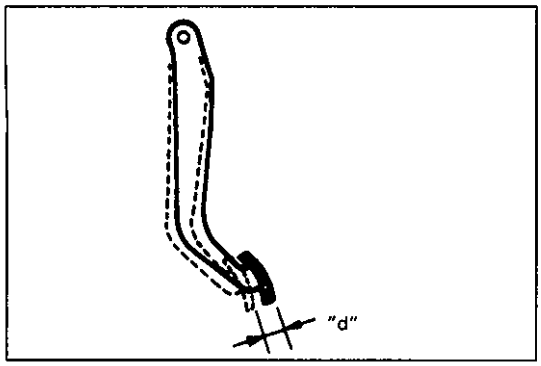
EXCESSIVE PEDAL TRAVEL CHECK

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

CAUTION:
Make sure that carpet is attached to vehicle body tightly when taking measurement.

Clearance "c": over 100 mm (3.94 in.)

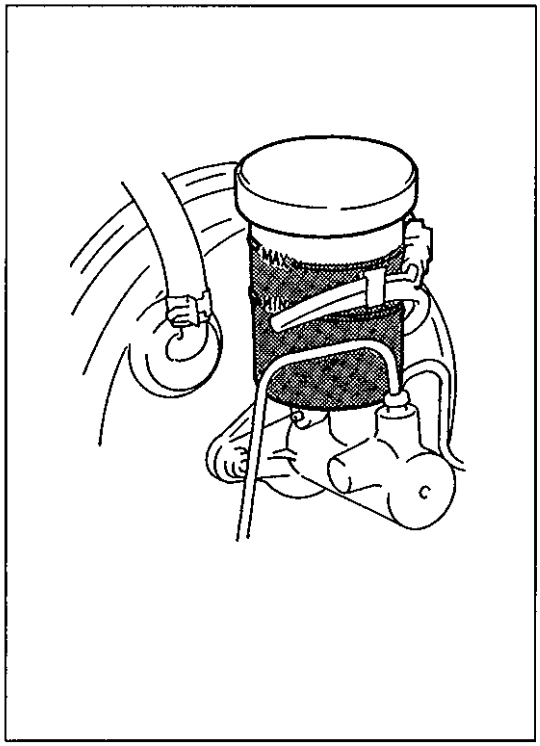
4) If clearance "c" is less than 100 mm (3.94 in.), the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines.
Should clearance "c" remain less than 100 mm (3.94 in.) even after replacement of brake shoes and bleeding of system, other possible but infrequent cause is malfunction of rear brake shoe adjusters or booster push rod length out of adjustment for the vehicle with brake booster.



BRAKE PEDAL PLAY CHECK

Pedal play should be within specification. If out of specification, check brake 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.

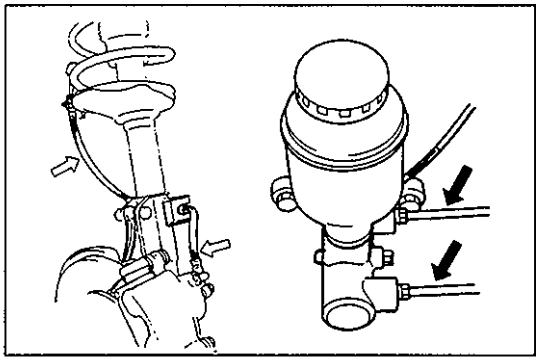
Pedal play "d": 1 – 8 mm (0.04 – 0.32 in.)



BRAKE FLUID LEVEL CHECK

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.

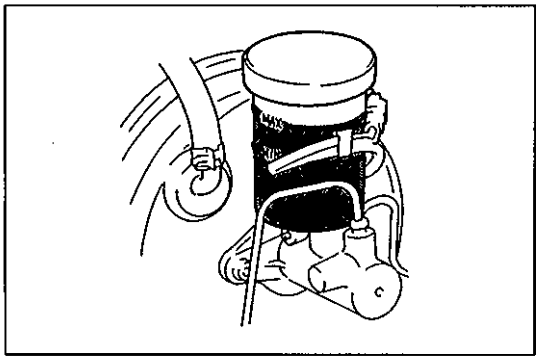
CAUTION:
Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic brake system and water mixed into brake fluid will lower fluid boiling point. Keep all fluid containers capped to prevent contamination.



BRAKE HOSE AND PIPE CHECK

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.

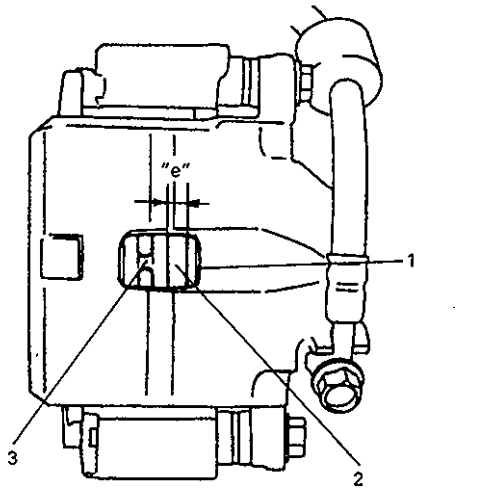


MASTER CYLINDER CHECK

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.

BRAKE DISC CHECK

Refer to item DISC BRAKE INSPECTION of Section 5B for inspection point and procedure.



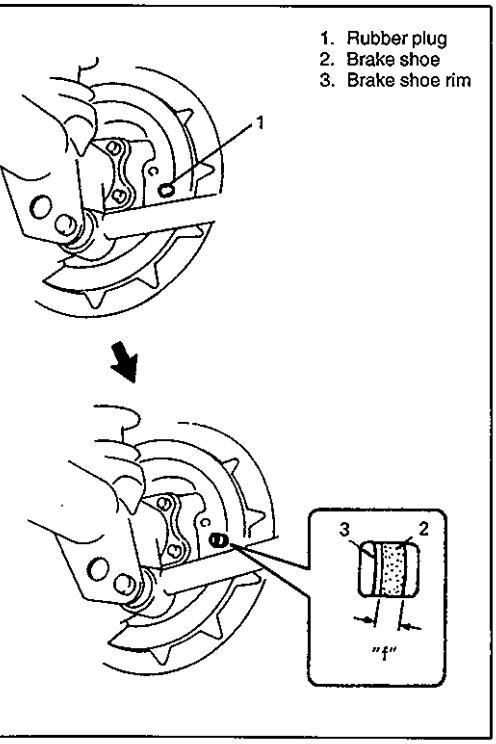
1. Pad rim
2. Lining
3. Disc

BRAKE PAD CHECK

Inspect pad linings periodically according to maintenance schedule whenever wheels are removed (for tire rotation or other reason). Take a look through hole of caliper and check lining thickness of inside pad.

Thickness "e"
Standard: 10.0 mm (0.39 in.)
Service Limit: 2.0 mm (0.08 in.)

If one of brake pad is worn to service limit, all linings must be replaced at the same time.



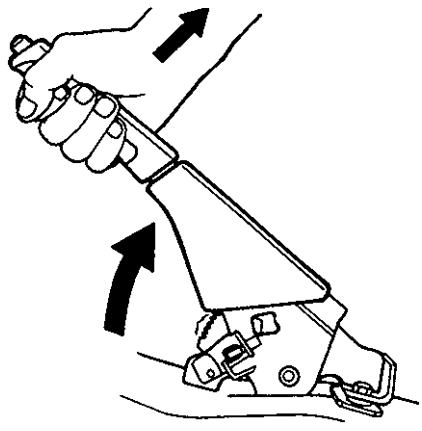
1. Rubber plug
2. Brake shoe
3. Brake shoe rim

BRAKE SHOE CHECK

Inspection should be carried out on following points after brake pedal travel "c" (pedal to carpet clearance) check as described on previous page of this section, even when it is more than 100 mm (3.94 in.).
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 "f" is found less than below specified wear limit, replace with new brake shoes.

Thickness "f"
Service Limit: 1.0 mm (0.04 in.)



PARKING BRAKE INSPECTION AND ADJUSTMENT

Inspection

Hold center of parking brake lever grip and pull it up with 20 kg (40 lbs) force.
With parking brake lever pulled up as shown, count ratchet notches. There should be 5 to 7 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) 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.

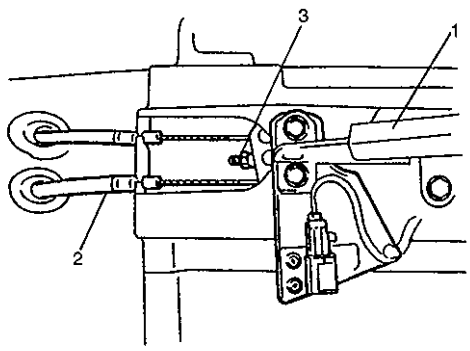
Adjustment

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 a few times with about 20 kg (44 lbs) force.**
- **Rear brake shoes are not worn beyond limit, and self adjusting mechanism operates properly.**
- **To slacken parking brake cable, loosen selflocking nut as far as end of bolt. Then depress brake pedal a few times with about 30 kg (66 lbs) load.**

After confirming that above 6 conditions are all satisfied, adjust parking brake lever stroke by loosening or tightening locking nut.

NOTE:
Check brake drum for dragging after adjustment.

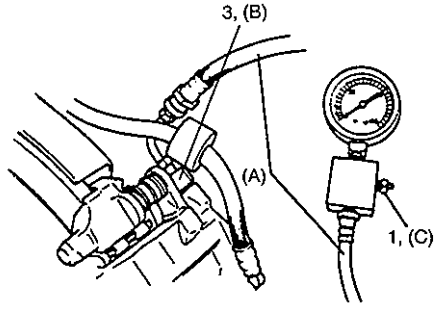
Parking brake stroke: 5 to 7 notches
(When lever is pulled up at 20 kg (44 lbs))

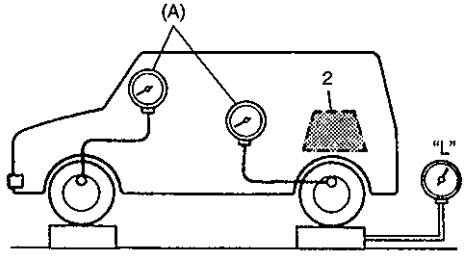


1. Parking brake lever
2. Brake cable
3. Self locking nut

FLUSHING BRAKE HYDRAULIC SYSTEM

It is recommended that entire hydraulic system be throughly flushed with clean brake fluid whenever new parts are installed in hydraulic system.
Periodical change of brake fluid is also recommended.





1. Air bleeder plug
2. Weight
3. Attachment

FLUID PRESSURE TEST(if equipped with LSPV)

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) Stop vehicle on level floor and place approximately about 200 kg (441 lbs) weight on rear housing so that rear axle weighs 800 kg (1764 lb).

   Rear axle weight "L": 800 kg (1764 lb)

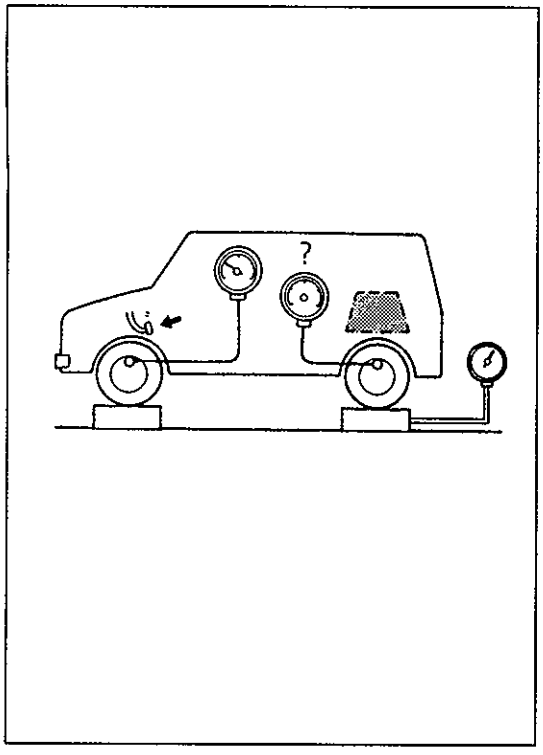
2) Install special tool to front and rear brake.

   NOTE:
   Special tool should be connected to breather of front (driver's side brake) and rear brakes.

   Special Tool
   Front brake
   (A): 09956-02310
   (B): 09952-46510 (with 16 in. brake disc)
   (C): 55473-82030 (Air bleeder plug as a spare part)

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

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

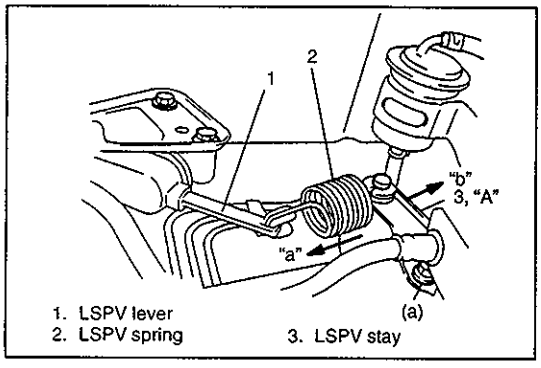


3) Depress brake pedal gradually till fluid pressure of front brake becomes as specified below and check corresponding pressure of rear brake then. It should be within specification given below. Refer to page 5A-3 for identification of LSPV.

Front brake	Rear brake	
8,000 kPa 80 kg/cm^2 1,138 psi	RHYTHM marked	6,000 – 7,300 kPa 60 – 73 kg/cm^2 853 – 1,038 psi
	JKC marked	4,500 – 7,300 kPa 45 – 73 kg/cm^2 640 – 1,038 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	RHYTHM marked	6,500 – 8,000 kPa 65 – 80 kg/cm^2 924 – 1,138 psi
	JKC marked	5,000 – 8,000 kPa 50 – 80 kg/cm^2 711 – 1,138 psi

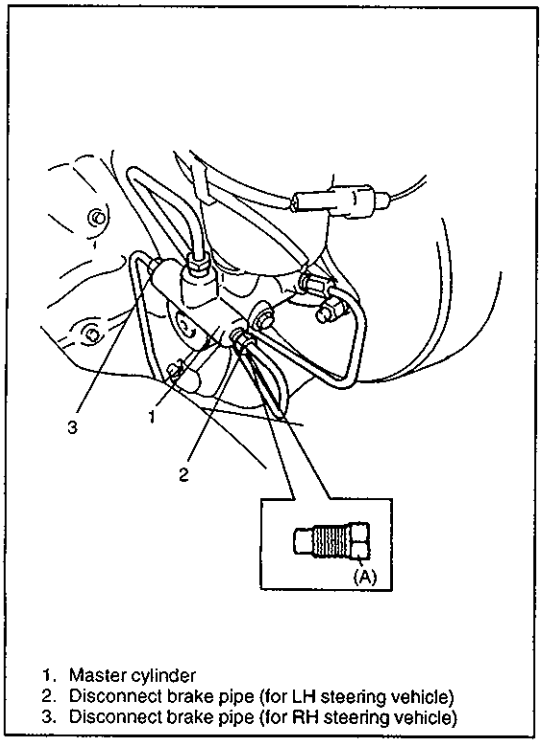


1. LSPV lever
2. LSPV spring
3. LSPV stay

4) If rear brake pressure is not within specification, adjust it by changing stay "A" 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 stay "A" to direction "a" and if it is lower, to direction "b".
- Repeat steps 3) and 4) until rear brake pressure is within specification.
- After adjustment, be sure to torque nut to specification.



1. Master cylinder
2. Disconnect brake pipe (for LH steering vehicle)
3. Disconnect brake pipe (for RH steering vehicle)

5) Disconnect brake pipe (connecting between master cylinder secondary side and 4-way joint) from master cylinder.
Tighten plug (special tool) to master cylinder.
Depress brake pedal. If rear brake pressure is 95 – 100 kg/cm^2 when front brake pressure is 100 kg/cm^2, it means that front fail-safe system functions properly.

Front brake	Rear brake
10000 kPa 100 kg/cm^2 1422 psi	9500 – 10000 kPa 95 – 100 kg/cm^2 1350 – 1422 psi

Special Tool
(A): 09956-02210

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

BOOSTER OPERATION CHECK

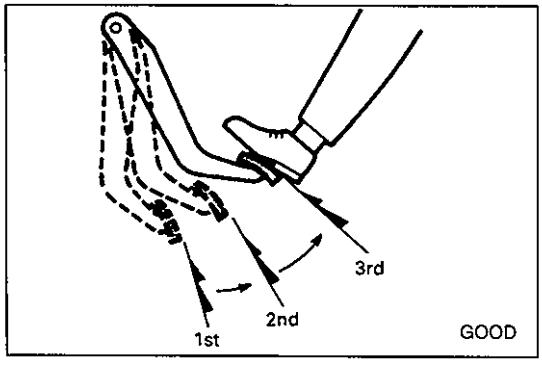
There are two ways to perform this inspection, with and without a tester. Ordinarily, it is possible to roughly determine its condition without using a tester.

NOTE:
For this check, make sure that no air is in hydraulic line.

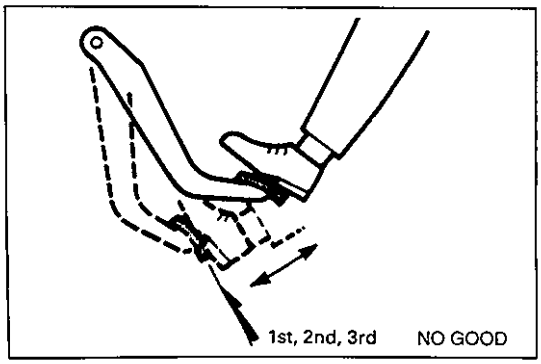
INSPECTION WITHOUT TESTER

Check Air Tightness

1) Start engine.
2) Stop engine after running for 1 to 2 minutes.

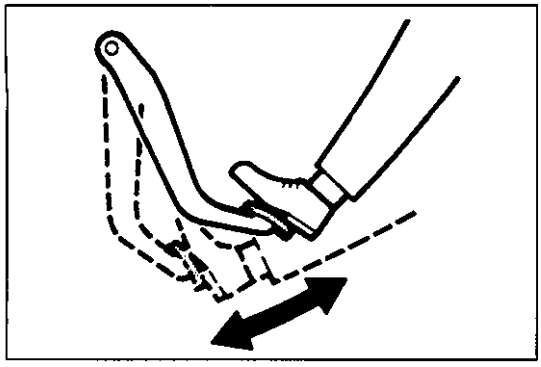


3) Depress brake pedal several times with the same load as in ordinary braking and observe pedal travel. If pedal goes down deep the first time but its travel decreases as it is depressed the second and more times, air tightness is obtained.



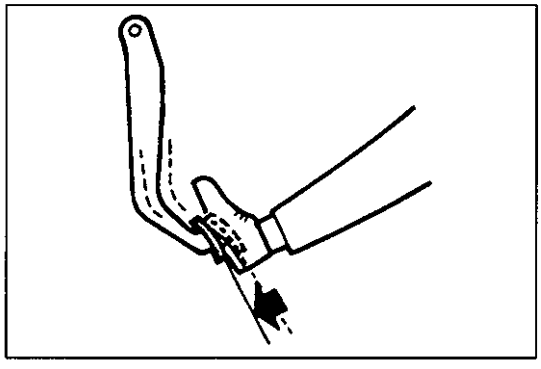
4) If pedal travel doesn't change, air tightness isn't obtained.

NOTE:
If defective, inspect vacuum lines and sealing parts, and replace any faulty part.
When this has been done, repeat the entire test.

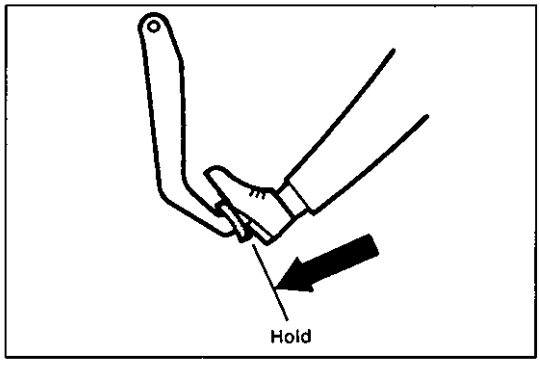


Check Operation

1) With engine stopped, depress brake pedal several times with the same load and make sure that pedal travel doesn't change.

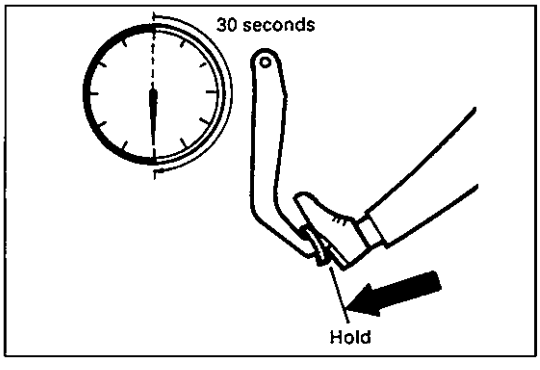


2) Start engine while depressing brake pedal. If pedal travel increases a little, operation is satisfactory. But no change in pedal travel indicates malfunction.



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.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
Brake pipe 2-way (or 4-way) joint bolt		23	2.3	17.0
Brake pipe flare nut		16	1.6	11.5
Brake bleeder plug	Front caliper	8.5	0.85	6.5
		8.0	0.8	6.0
	Wheel cylinder	7.5	0.75	5.5
	LSPV	7.5	0.75	5.5
LSPV mounting bolt		23	2.3	17.0
LSPV stay bolt				
LSPV spring nut				
Wheel nut		95	9.5	69.0
Stop light switch lock nut		7.5	0.75	5.5

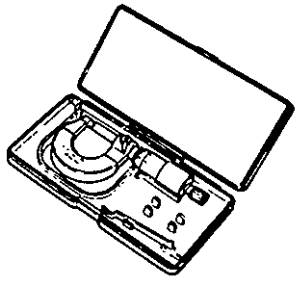
REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir 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 and wheel cylinder when they are disassembled.

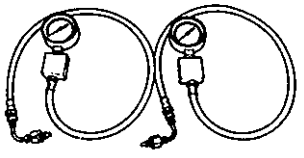
SPECIAL TOOLS



09950-78220
Flare nut wrench (10 mm)



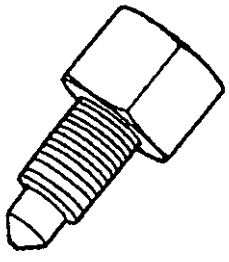
09900-20205
Micrometer (0 – 25 mm)



09956-02310
Fluid pressure gauge



09956-02210
Brake circuit plug



09952-36310/46510
Pressure gauge attachment

SECTION 5A

BRAKES PIPE/HOSE/MASTER CYLINDER

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:
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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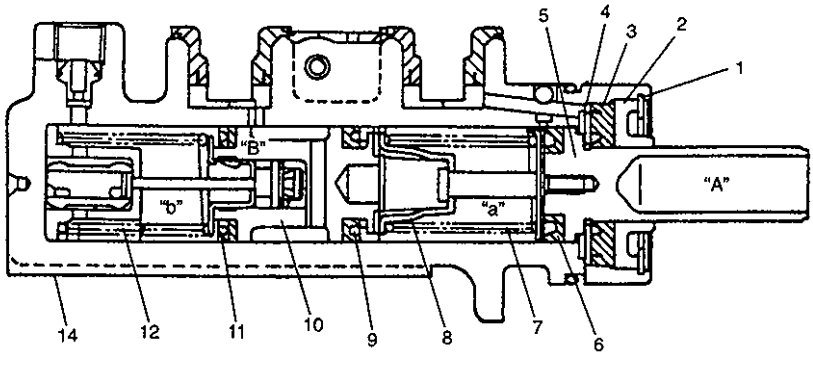
GENERAL DESCRIPTION

MASTER CYLINDER ASSEMBLY

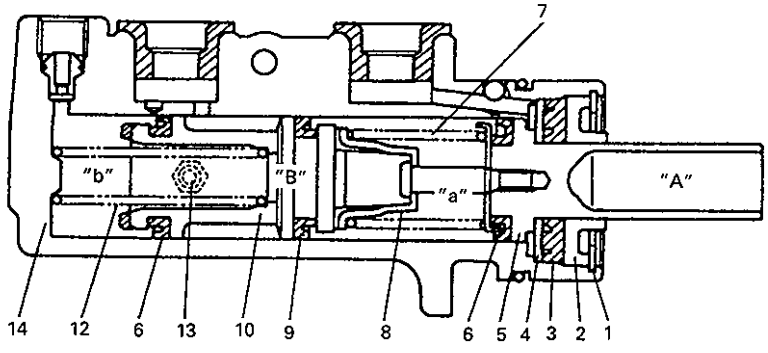
The master cylinder has two pistons and three piston cups. Its hydraulic pressure is produced in the primary ("a" in the figure below) and secondary ("b") chambers. The hydraulic pressure produced in the primary chamber ("a") acts on the front (for vehicle without ABS, rear) wheel brakes.
Also, the hydraulic pressure produced in the secondary chamber ("b") acts on the rear (for vehicle without ABS, front) wheel brakes.

NOTE:
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.

[A]



[B]



[A]: with ABS
[B]: without ABS

1. Piston stopper circlip
2. Piston stopper
3. Cylinder cup
4. Plate
5. Primary piston
6. Piston cup
7. Primary piston return spring
8. Primary spring retainer
9. Secondary piston pressure cup
10. Secondary piston
11. Return spring secondary seat
12. Secondary piston return spring
13. Secondary piston stopper bolt
14. Master cylinder body

"A": Primary piston
"B": Secondary piston

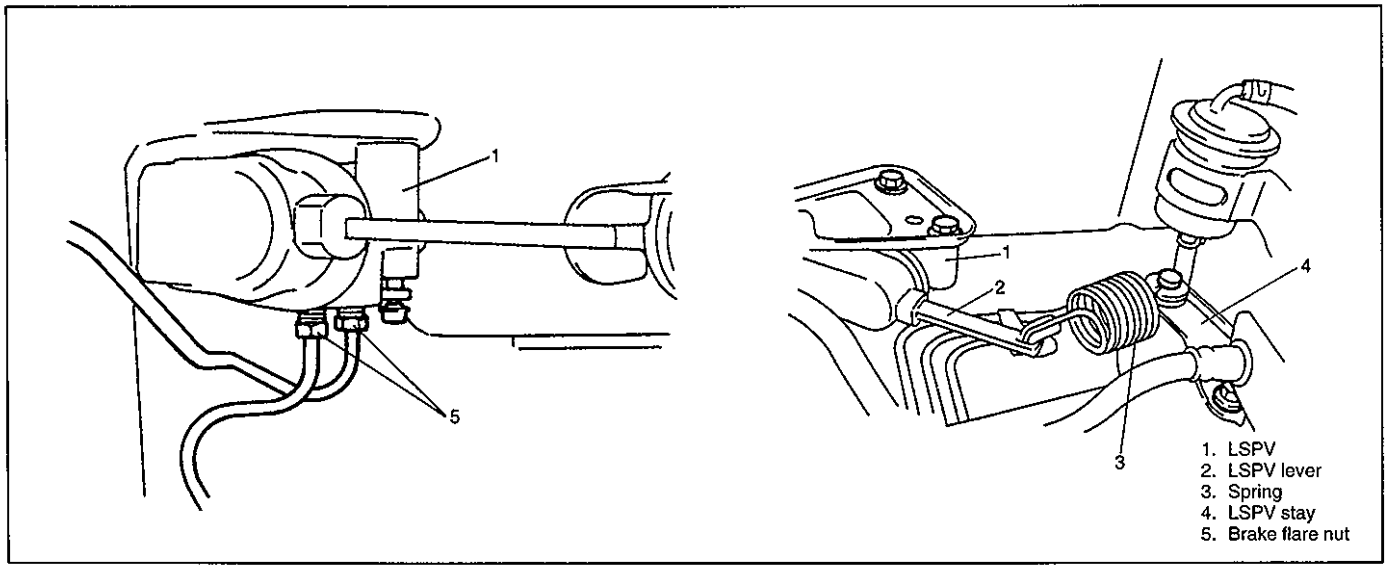
BOOSTER ASSEMBLY

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.
The booster has two diaphragms of ø7.5 in. (191 mm) effective diameter.

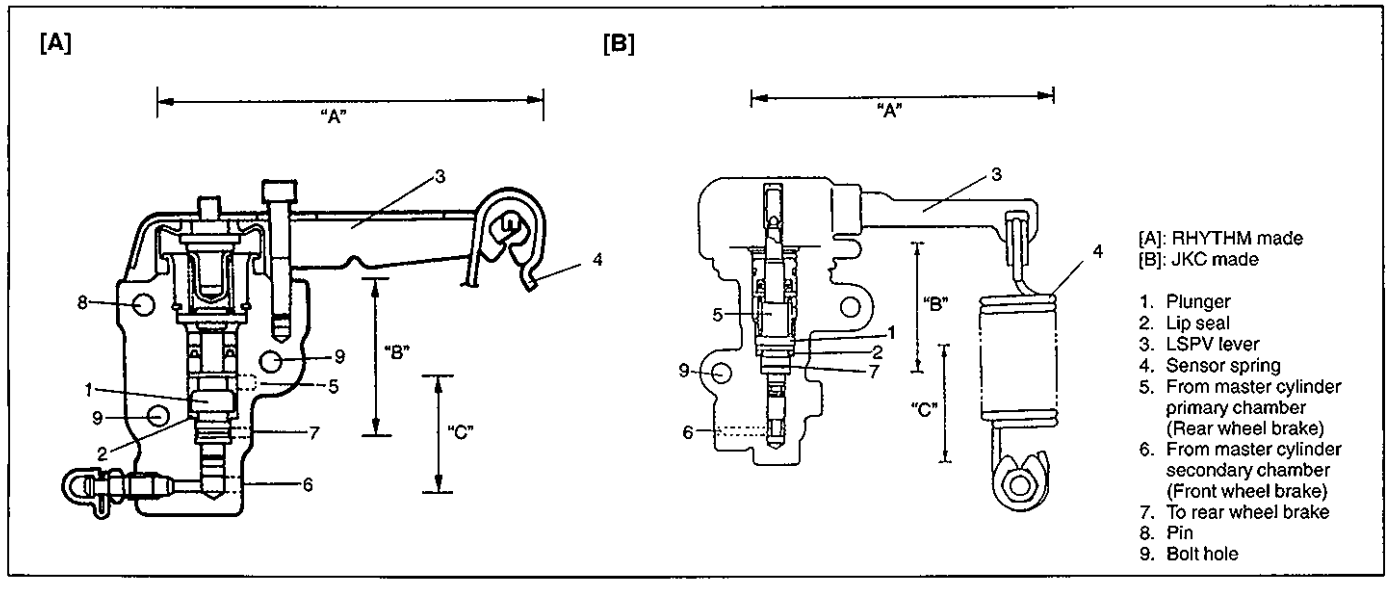
CAUTION:
- **Never disassemble brake booster assembly. If it is found faulty, replace it with new assembly.**
- **The torque values specified are for dry, unlubricated fasteners. If any hydraulic component is removed or brake line disconnected, bleed the brake system.**

LSPV (Load Sensing Proportioning Valve) ASSEMBLY (if equipped)

As shown in figure 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, it releases the above described control over the hydraulic pressure applied to the rear wheel brake, should any failure occur in the hydraulic circuit of the front wheel brake so that the hydraulic pressure produced in the master cylinder is applied to the rear wheel brake directly to operate it.



CONSTITUTION



The LSPV components are grouped into three sections as follows.

"A": Sensor section

The main parts in this section are a lever and a spring which senses variation in the vehicle height as affected by the loaded condition and converts it into the load.

"B": Hydraulic pressure control section

Included in this section are a stepped plunger and valve mechanism to execute proportional control.

"C": Fail-safe section

The main parts in this section are a chamber which draws in the hydraulic pressure from the front wheel brake system and a fail-safe piston which releases the valve mechanism in the control section connected to the rear wheel brake, should any failure occur in the front wheel brake system.

DIAGNOSIS

Refer to Section 5 (BRAKES)

CHECK AND ADJUSTMENT

Refer to Section 5 (BRAKES)

ON-VEHICLE SERVICE

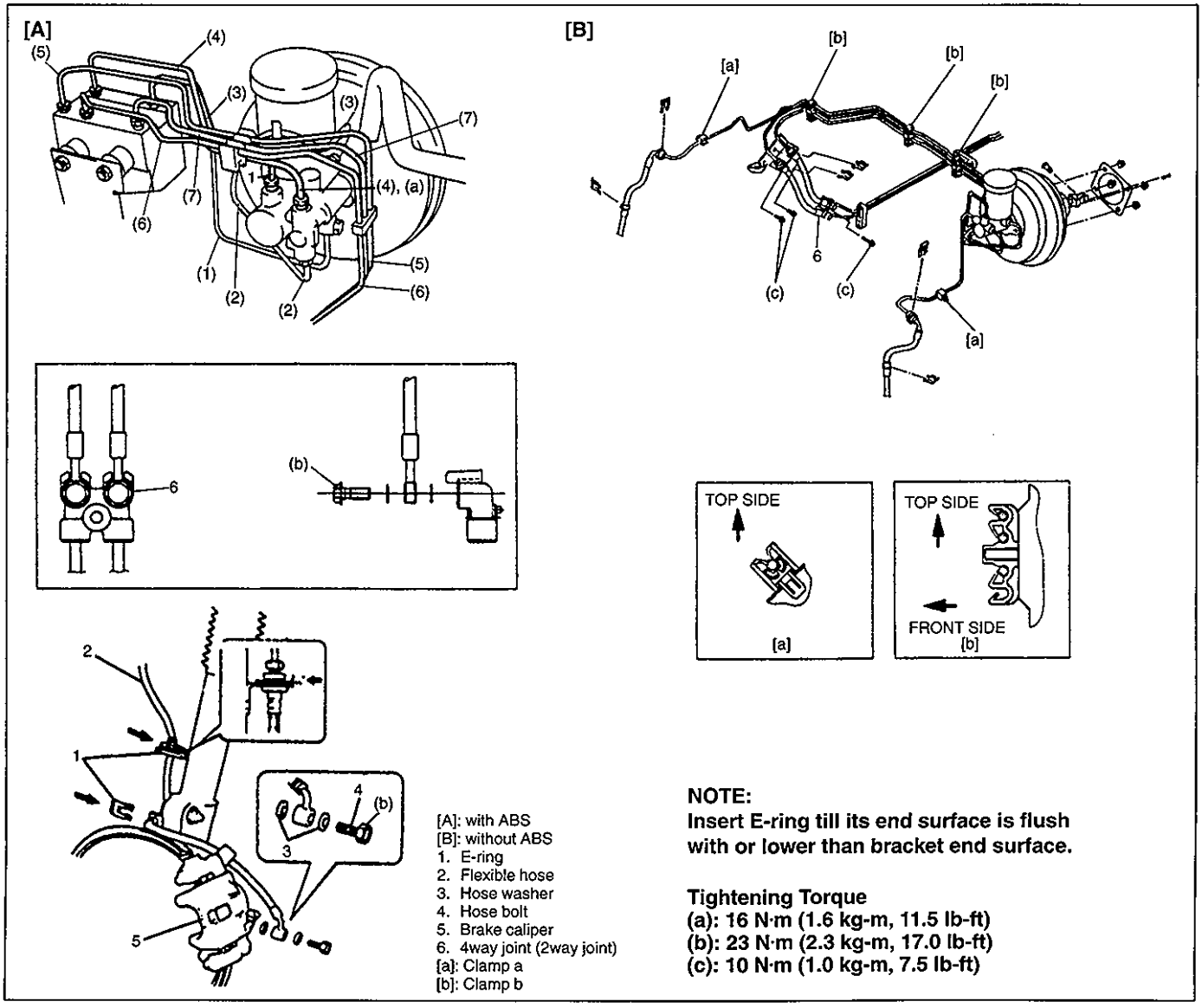
FRONT BRAKE HOSE/PIPE

REMOVAL

1) Raise and suitably support vehicle. Remove tire and wheel.
   This operation is not necessary when removing pipes connecting master cylinder and flexible hose.
2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

INSTALLATION

1) Reverse removal procedure for brake hose and pipe installation procedure.
   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.
2) Perform brake test and check installed part for fluid leakage.



[A]: with ABS
[B]: without ABS
1. E-ring
2. Flexible hose
3. Hose washer
4. Hose bolt
5. Brake caliper
6. 4way joint (2way joint)
[a]: Clamp a
[b]: Clamp b

NOTE:
Insert E-ring till its end surface is flush with or lower than bracket end surface.

Tightening Torque
(a): 16 N·m (1.6 kg-m, 11.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)
(c): 10 N·m (1.0 kg-m, 7.5 lb-ft)

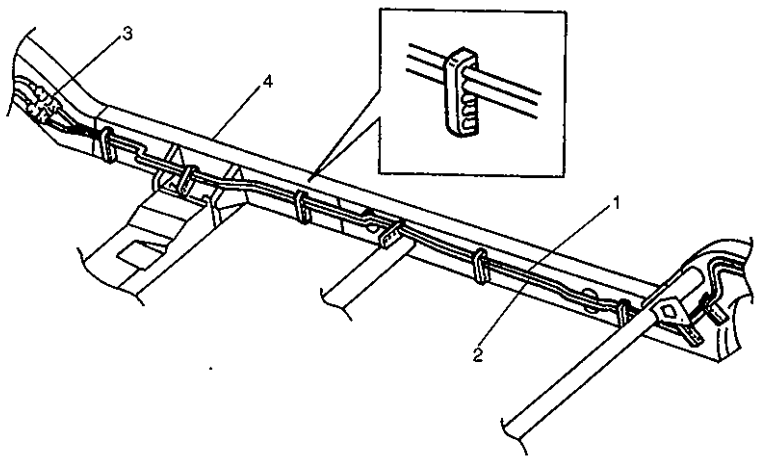
REAR BRAKE HOSE/PIPE

REMOVAL

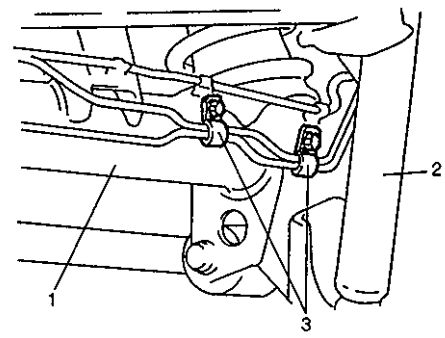
1) Raise and suitably support vehicle. Remove tire and wheel.
2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

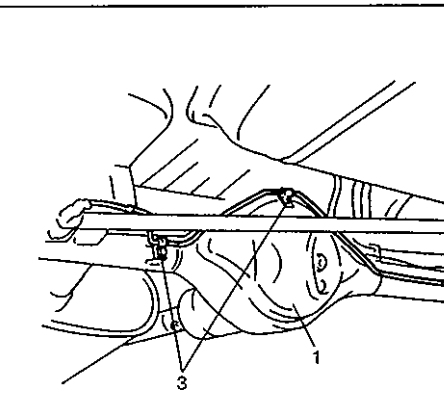
INSTALLATION

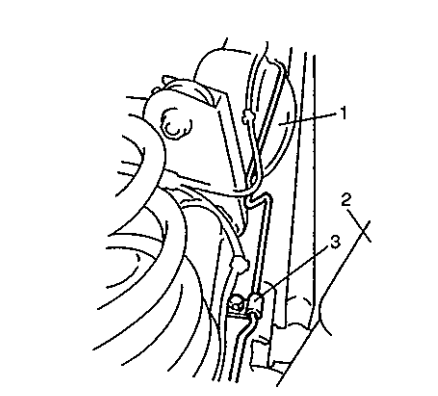
1) Reverse removal procedure for brake hose or pipe installation procedure.
   - Be sure to obtain more than 3 mm (0.118 in.) clearance between axle housing and brake pipe.
   - Install clamps properly referring to figure below and tighten bolts.
   - When installing hose, make sure that it has no twist or kink.
2) Fill and maintain brake fluid level in reservoir. Bleed brake system.
3) Perform brake test and check each installed part for fluid leakage.



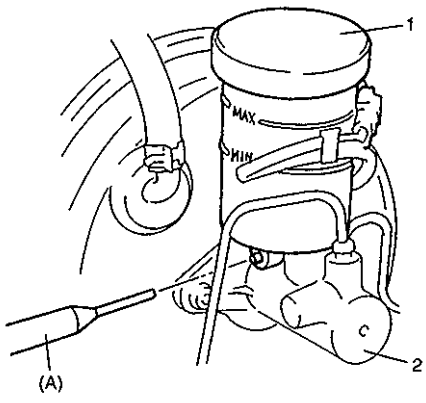
1. Brake pipe (to rear)
2. Brake pipe (to LSPV, for vehicle without ABS)
3. 4-way (2-way) joint
4. Chasis frame







1. Rear axle
2. Shock absorber
3. Clamp



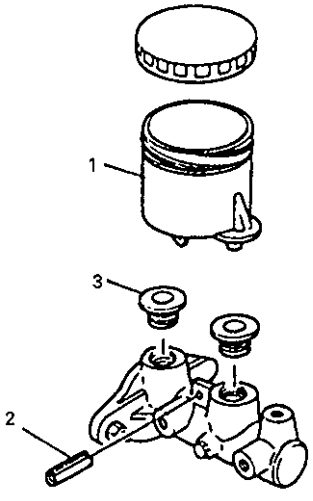
1. Reservoir
2. Master cylinder

MASTER CYLINDER RESERVOIR

REMOVAL

1) Disconnect reservoir lead wire at coupler.
2) Clean outside of reservoir.
3) Take out fluid with syringe or such.
4) Remove reservoir connector pin by using special tool.

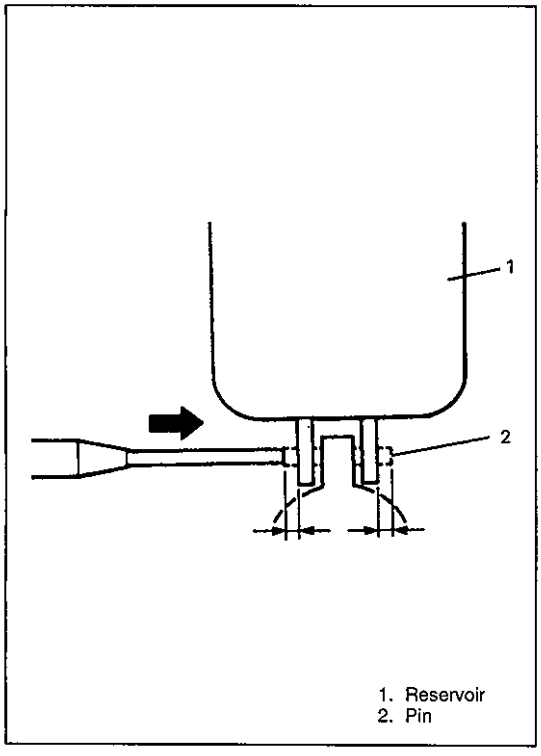
Special Tool
(A): 09922-85811



1. Reservoir
2. Connector pin
3. Grommets

5) Remove reservoir.

NOTE:
Do not allow brake fluid to get on painted surfaces.



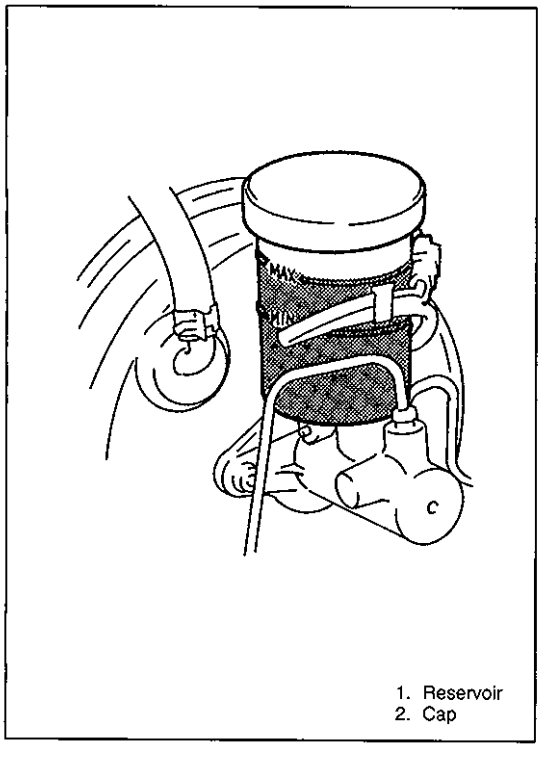
1. Reservoir
2. Pin

INSTALLATION

NOTE:
See NOTE at the beginning of this section.

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.
2) Install reservoir and drive in reservoir pin.

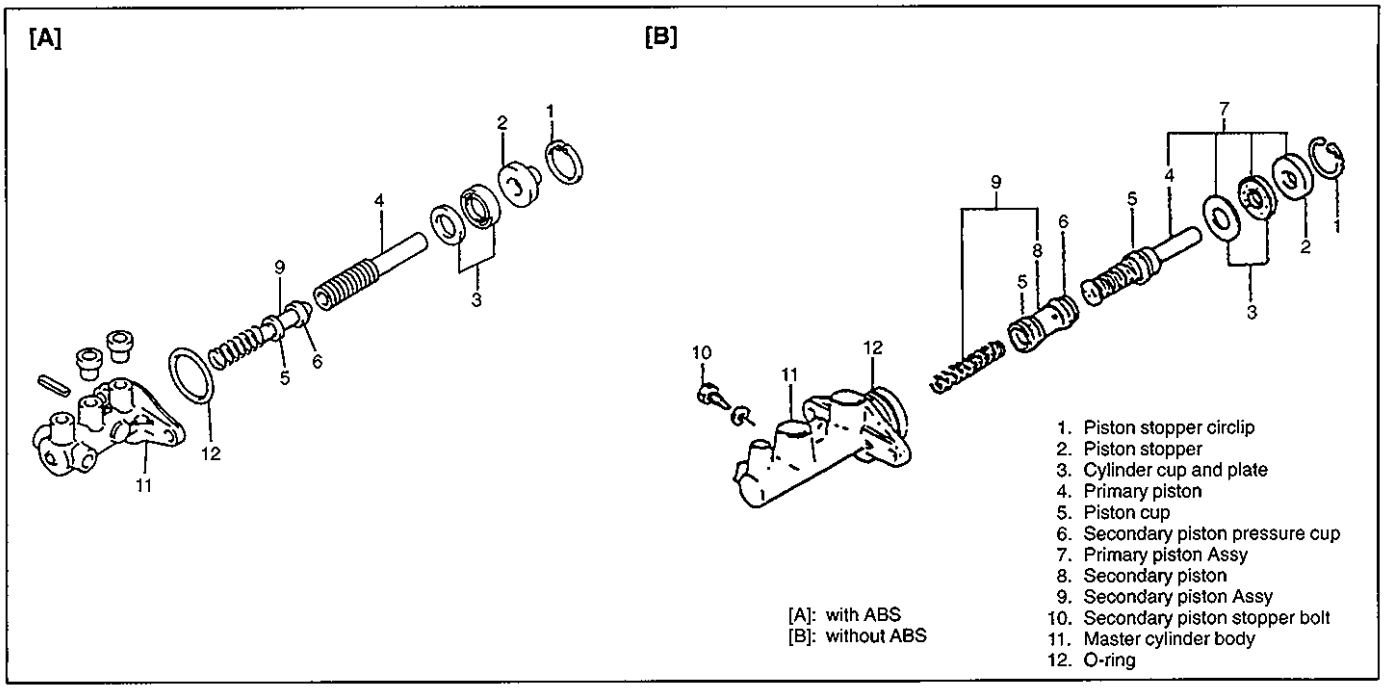
NOTE:
Drive in reservoir pin till both of its ends at the right and left or reservoir becomes the same length.

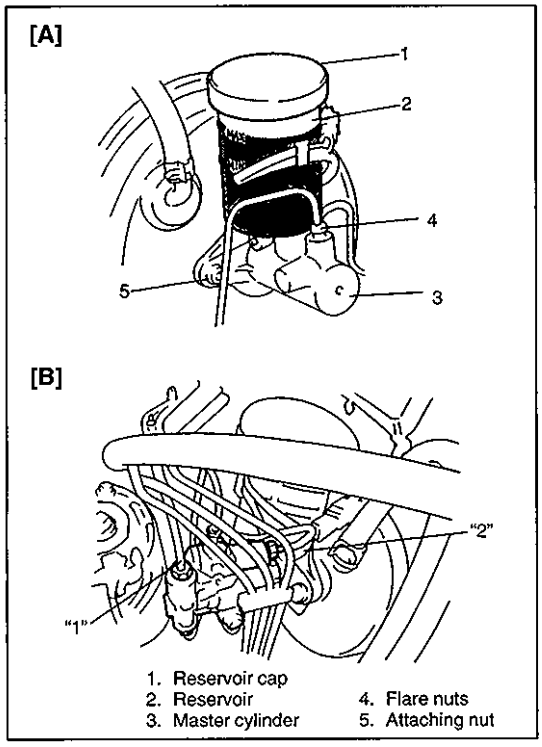


1. Reservoir
2. Cap

3) Connect reservoir lead wire.
4) Fill reservoir with specified fluid.
5) Upon completion of installation, check for fluid leakage.

MASTER CYLINDER ASSEMBLY

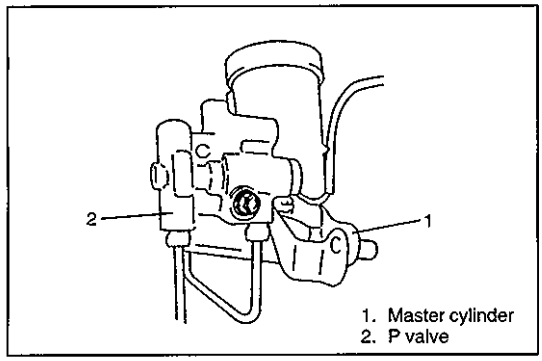




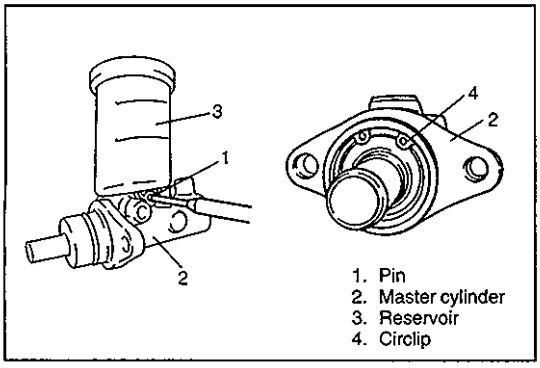
REMOVAL

NOTE:
Do not allow brake fluid to get on painted surfaces.

1) Remove strut tower bar (if equuipped).
2) Disconnect reservoir lead wire at coupler.
3) Clean around reservoir cap and take out fluid with syringe or such.
4) Disconnect brake pipes from master cylinder.
   For RH steering vehicle equipped with ABS, disconnect pipes "1" and "2" from P valve.
5) Remove attaching nuts.



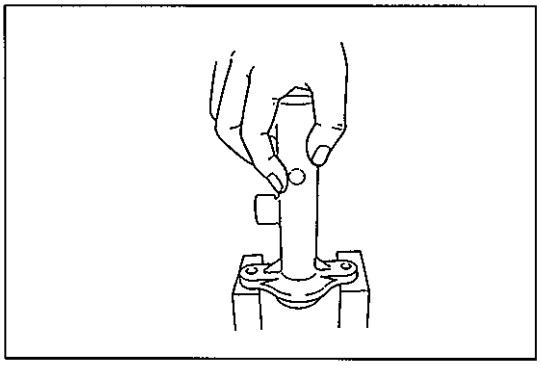
6) Remove master cylinder from brake booster.
   For RH steering vehicle with ABS, separate P valve from master cylinder.



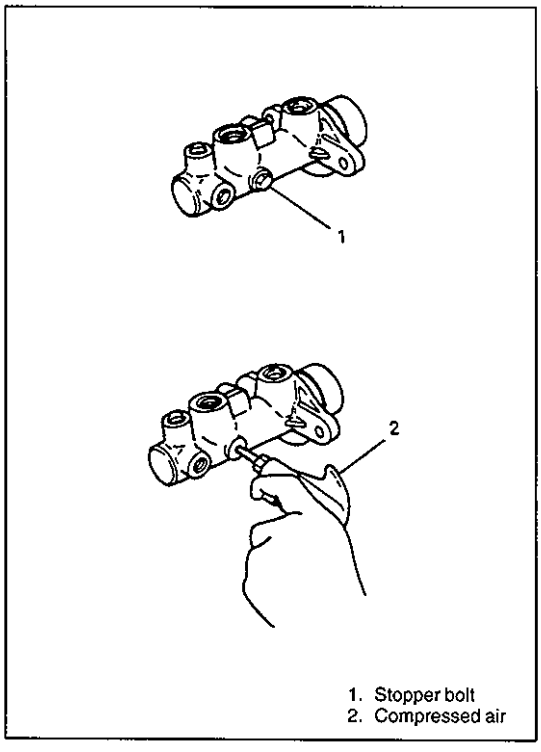
1. Pin
2. Master cylinder
3. Reservoir
4. Circlip

DISASSEMBLY

1) Remove reservoir pin and reservoir.
2) Remove circlip.



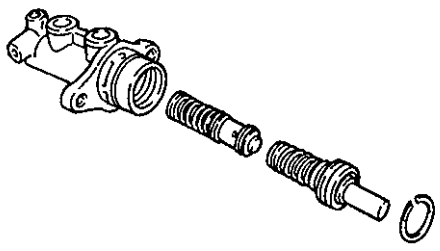
3) For vehicle with ABS
   Pull out primary piston assembly straight so as not to cause any damage to inside of cylinder wall.
   Pull out secondary piston assembly straight so as not to cause any damage to inside of cylinder wall and by tapping flange with a piece of wood or something soft.



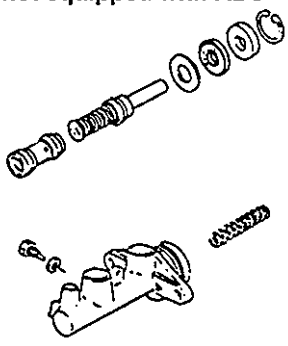
1. Stopper bolt
2. Compressed air

3') For vehicle without ABS
   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.

Vehicle equipped with ABS



Vehicle not equipped with ABS



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 master cylinder bore for scoring or corrosion. It is best to replace corroded cylinder.
Corrosion can be identified as pits or excessive roughness.

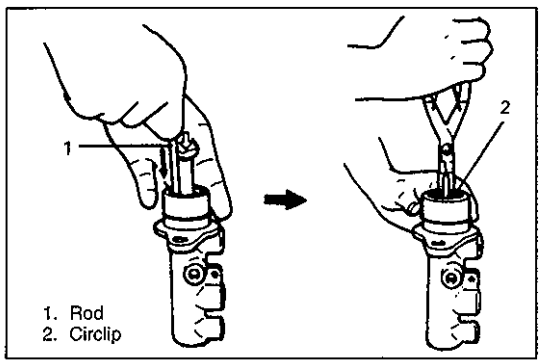
NOTE:
Polishing bore or master cylinder with cast aluminum body with anything abrasive is prohibited, as damage to cylinder bore may occur.

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.

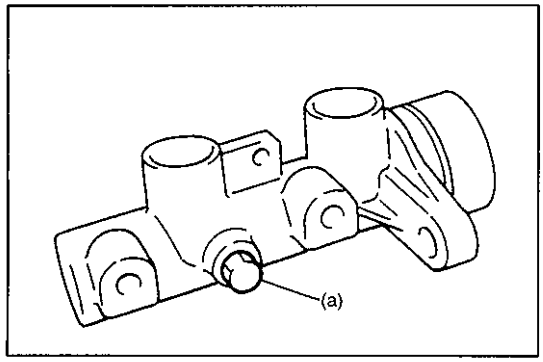
ASSEMBLY

NOTE:
- **See NOTE at the beginning of this section.**
- **Before assembling, wash each part in fluid recommended to use for that vehicle.**

1) Install secondary piston assembly into cylinder.
2) Install primary piston assembly in cylinder.

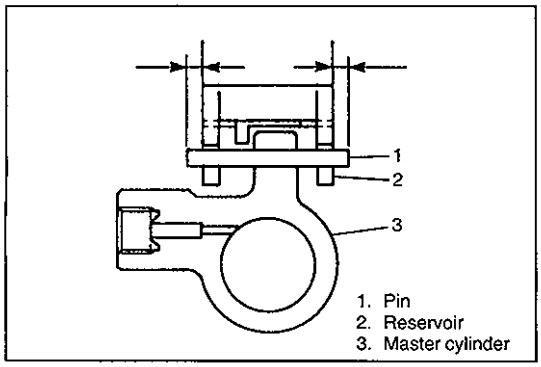


3) Depress, and install circlip.



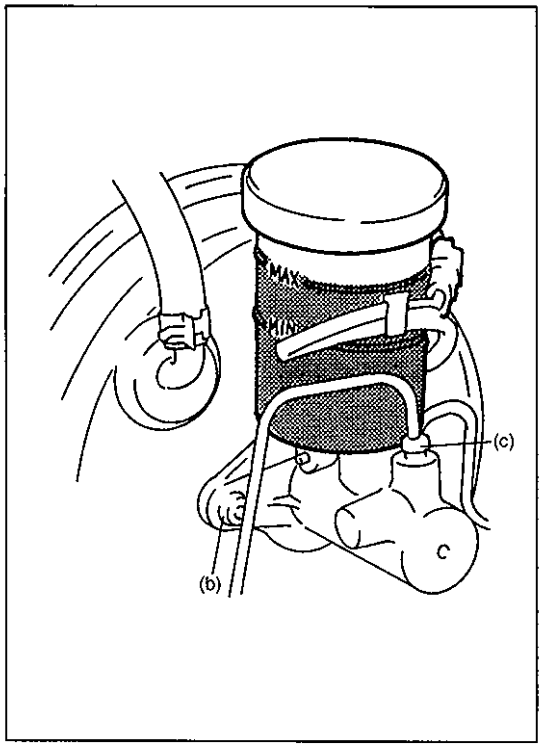
4) Install piston stopper bolt with pistons pushed in all the way and tighten it to specified torque (For vehicle without ABS).

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



1. Pin
2. Reservoir
3. Master cylinder

5) Apply thin coat of brake fluid to all around new grommets (2pcs.) and install them to cylinder body, then install reservoir.
6) Set a new pin in reservoir hole and drive it in. At this time, make end of pin and end face margin of reservoir equal.



INSTALLATION

NOTE:

- **See NOTE at the beginning of this section.**
- **Adjust clearance between booster piston rod and primary piston with special tool (See page 5A-13).**

1) Install master cylinder to brake booster.
2) Torque master cylinder attaching nuts to specification.

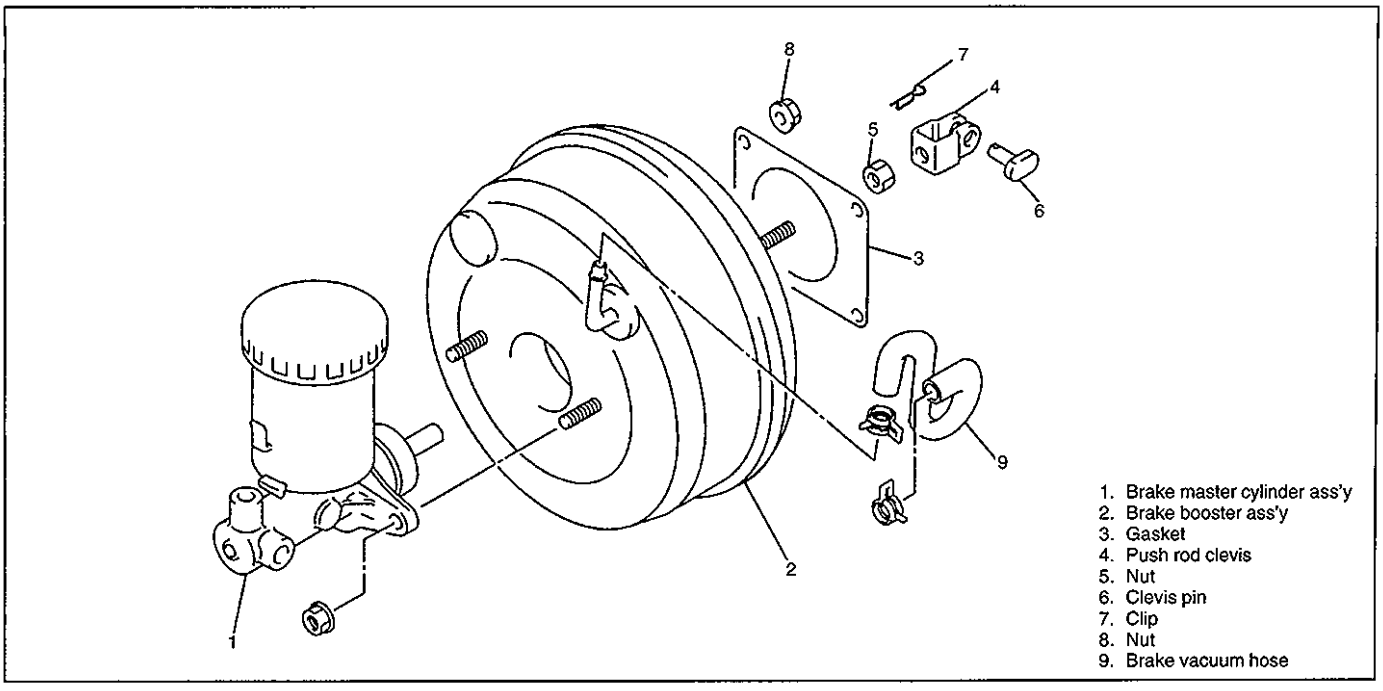
   Tightening Torque
   (b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

3) Connect hydraulic lines and torque flare nuts to specification.

   Tightening Torque
   (c): 16 N·m (1.6 kg-m, 12.0 lb-ft)

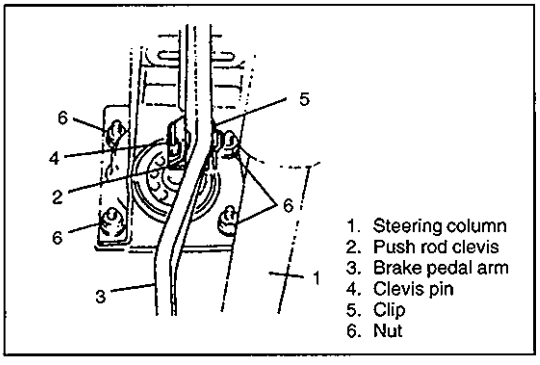
4) Connect reservoir lead wire.
5) Fill reservoir with specified brake fluid.
6) After installing, check brake pedal play and bleed air from system (See page 5-7).
7) Perform brake test and check each installed part for fluid leakage.

BRAKE BOOSTER



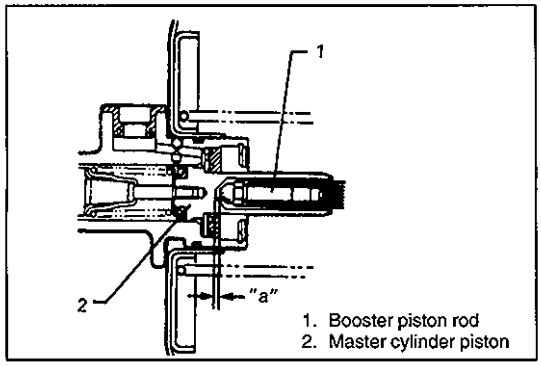
REMOVAL

1) Remove master cylinder assembly, referring to steps 1) to 5) of its REMOVAL on page 5A-8.
   For vehicle equipped with ABS, remove ABS actuator from vehicle body referring to section 5E1 and then remove master cylinder assembly.
2) Disconnect brake vacuum hose from brake booster.



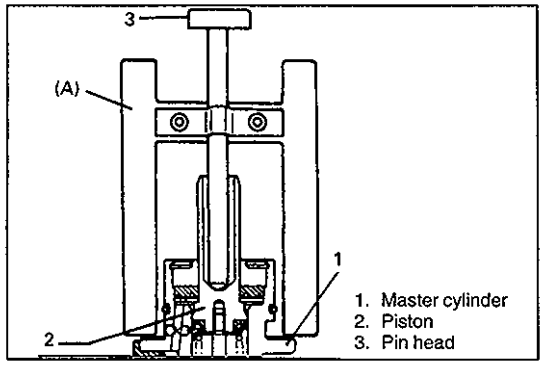
3) Disconnect push rod clevis from brake pedal arm.
4) Remove attaching nuts and then booster as shown.

CAUTION:
Never disassemble brake booster. Disassembly will spoil its original function. If is found faulty, replace it with new one.



CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON ADJUSTMENT

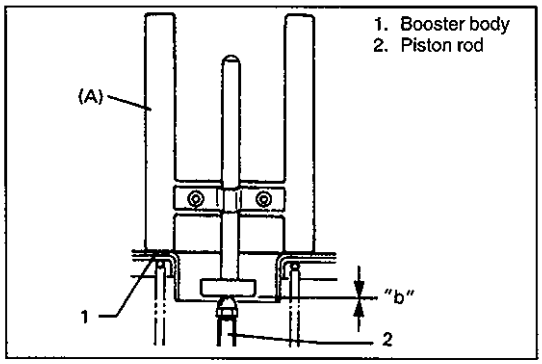
The length of booster piston rod is adjusted to provide specified clearance "a" between piston rod end and master cylinder piston.



- 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.

1) Set special tool (A) on master cylinder and push pin until contacts piston.

Special Tool
(A): 09950-96010

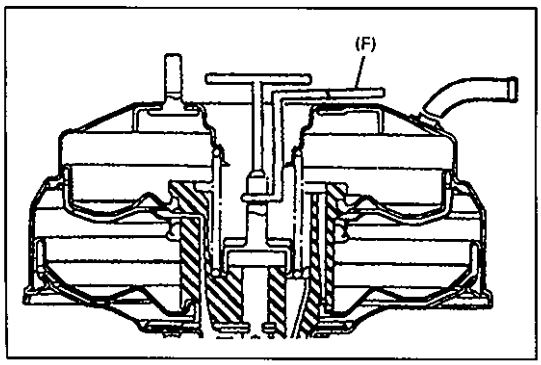


2) Turn special tool upside down and place it on booster. Adjust booster piston rod length until rod end contacts pin head.

Special Tool
(A): 09950-96010

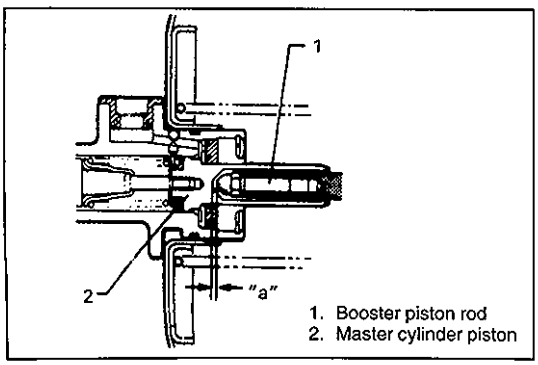
Clearance "b": 0 mm (0 in.)

NOTE:
Take measurement with booster set vertically and rod at the center.



3) Adjust clearance by turning adjusting screw of piston rod.

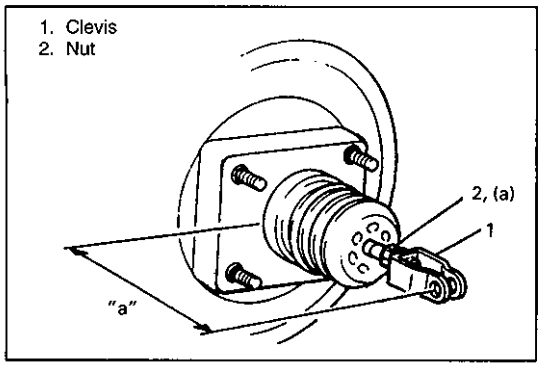
Special Tool
(F): 09952-16010



Reference

When adjusted as above, its negative pressure is applied to booster with engine at idle, piston to piston rod clearance "a" should become below.

Clearance "a": 0.25 – 0.5 mm (0.010 – 0.020 in.)

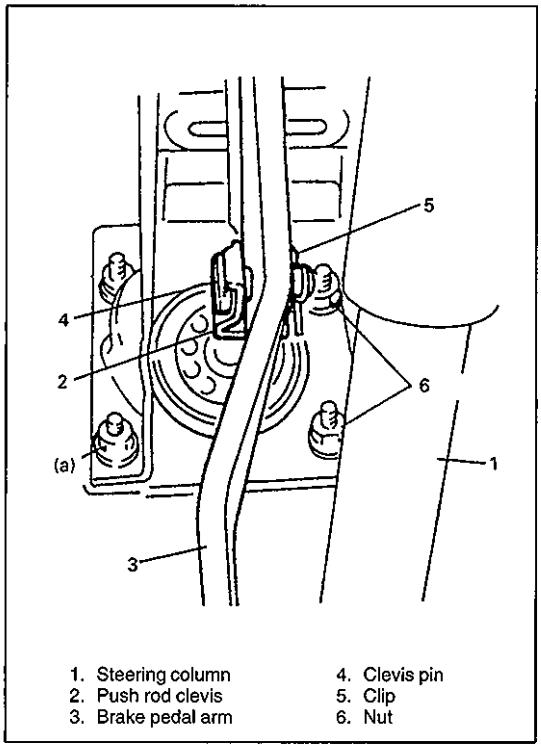


BOOSTER PUSH ROD CLEVIS ADJUSTMENT

Install push rod clevis so that measurement "a" is obtained and torque nut to specification.

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

Length
"a": 109.5 – 110.5 mm (4.31 – 4.35 in.)



1. Steering column
2. Push rod clevis
3. Brake pedal arm
4. Clevis pin
5. Clip
6. Nut

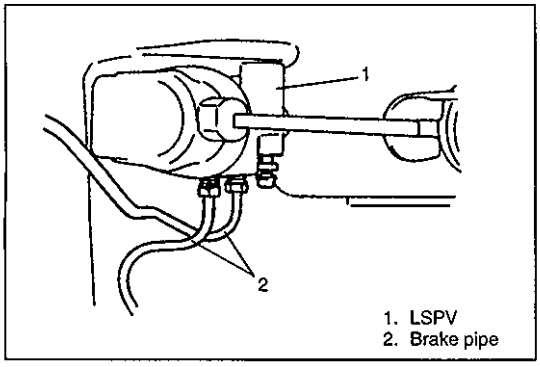
INSTALLATION

NOTE:
- **See NOTE at the beginning of this section.**
- **Check length of push rod clevis. (Refer to item BOOSTER PUSH ROD CLEVIS ADJUSTMENT)**
- **Before installing master cylinder, adjust booster piston rod. (Refer to item CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON ADJUSTMENT of this section).**
- **Apply silicone grease to master cylinder piston.**

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 master cylinder, referring to steps 1) to 7) of its INSTALLATION of this section.
   For vehicle equipped with ABS, install ABS actuator referring to section 5E1.
5) After installing, check. (See page 5-10.)

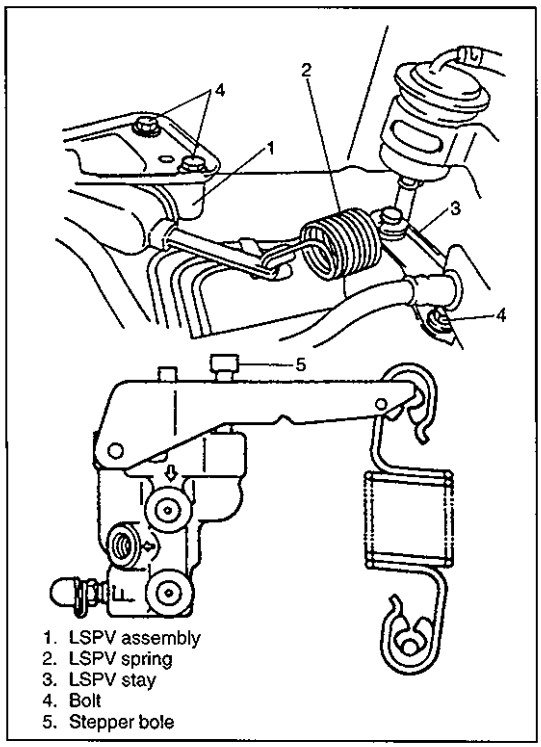


1. LSPV
2. Brake pipe

LSPV (Load Sensing Proportioning Valve) ASSEMBLY (if equipped)

REMOVAL

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Hoist vehicle.
3) Disconnect brake pipes from LSPV.



1. LSPV assembly
2. LSPV spring
3. LSPV stay
4. Bolt
5. Stepper bole

4) Remove LSPV assembly from vehicle body.

NOTE:
As shown in figure left, LSPV assembly should be removed together with its spring and stay installed or rear axle housing.

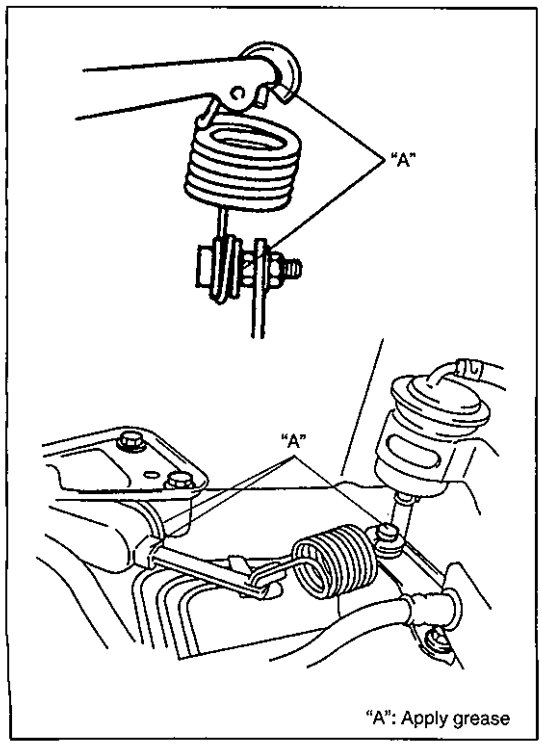
5) Remove spring and stay from lever.

CAUTION:
- **LSPV assembly must not be disassembled. Replace with new one if defective.**
- **Stopper bolt should not be loosened or tightened.**

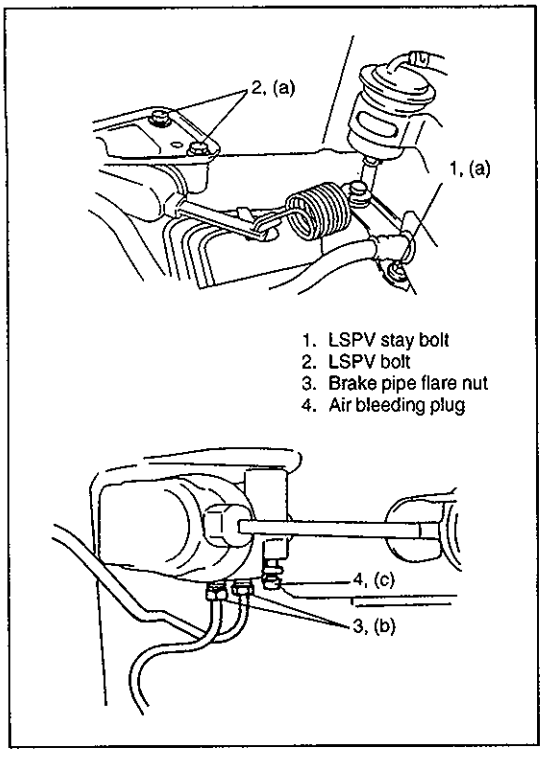
INSTALLATION

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.



"A": Apply grease



1. LSPV stay bolt
2. LSPV bolt
3. Brake pipe flare nut
4. Air bleeding plug

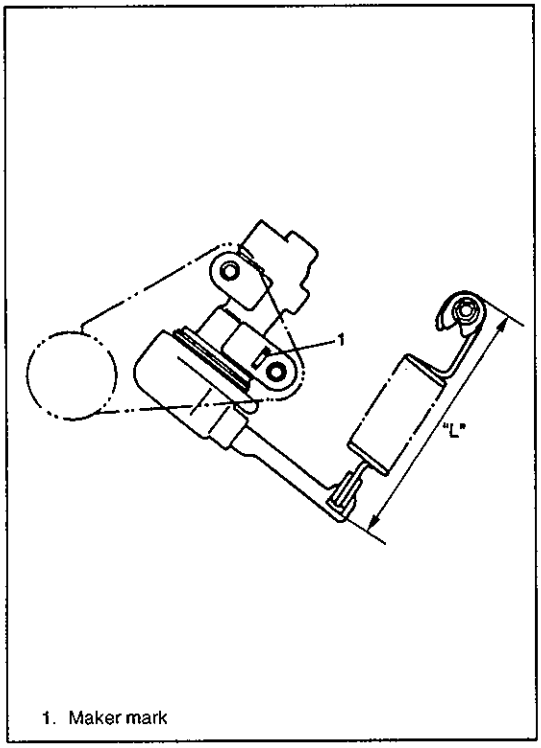
2) Torque each bolt and nut to specification as indicated respectively in figure left.

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) (brake flare nut)
(c): 7.5 N·m (0.75 kg-m, 9.0 lb-ft) (bleeder plug)

3) Upon completion of installation, fill reservoir tank with specified fluid and bleed air from brake system.

NOTE:
Make sure to bleed air from LSPV bleeder without failure.

4) After bleeding air, check that LSPV is installed properly, referring to following INSPECTION & ADJUSTMENT.



1. Maker mark

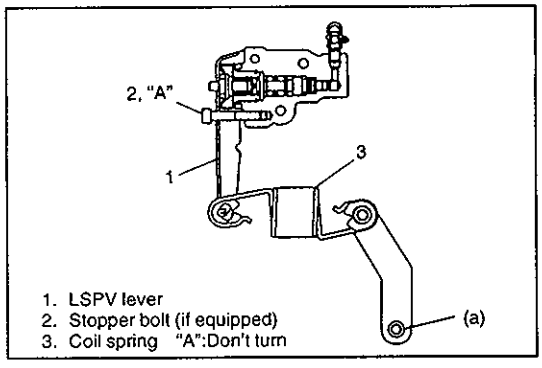
INSPECTION & ADJUSTMENT

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 (JKC mark) or push down (RHYTHM mark) LSPV lever with finger till it stops and measure length of coil spring ("L" in below figure) as it is pulled.
3) Spring length "L" should be the value specified below.

Spring length (between spring end and spring bolt)
"L": 103 mm (4.06 in.) ..... (JKC mark)
157 mm (6.18 in.) ..... (RHYTHM mark)

NOTE:
For identification of the type of LSPV, see maker mark stamped on the place shown in left figure.

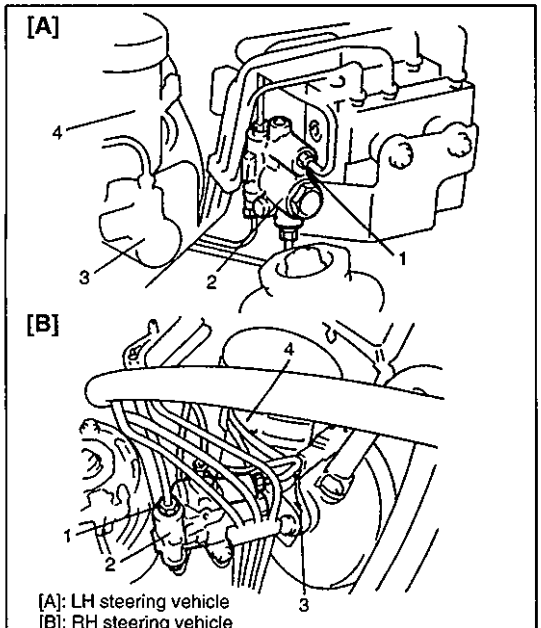


1. LSPV lever
2. Stopper bolt (if equipped)
3. Coil spring "A":Don't turn

4) If it isn't, adjust it to specification by changing stay positions as shown in left figure. After adjustment, tighten nut to specified torque.
For details, refer to left figure.

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.



[A]: LH steering vehicle
[B]: RH steering vehicle

1. Flare nuts
2. P valve
3. Master cylinder
4. Reservoir

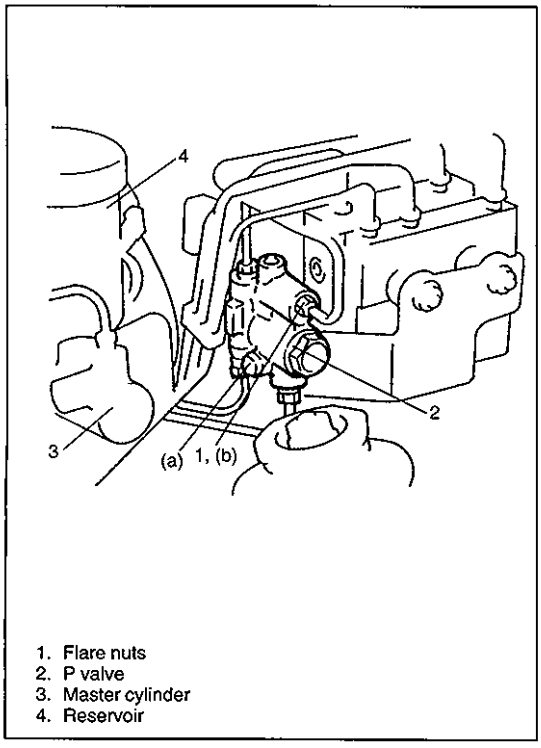
P (Proportioning) VALVE (if equipped)

REMOVAL

CAUTION:
Do not allow brake fluid to get on painted surfaces.

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Disconnect brake pipes from P valve.
3) Remove P valve.

WARNING:
Never disassemble P valve assembly.
if it is found faulty, replace it with new assembly.



1. Flare nuts
2. P valve
3. Master cylinder
4. Reservoir

INSTALLATION

1) Install P valve.

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

2) Tighten flare nuts to specified torque.

Tightening Torque
(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

3) Fill reservoir with specified brake fluid.
4) After installing, check brake pedal play and bleed air from system. Refer to "BLEEDING BRAKES" in Section 5.
5) Perform brake test and check each installed part for fluid leakage.

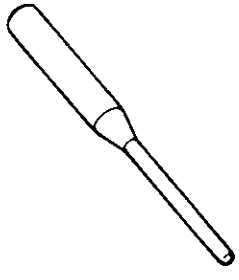
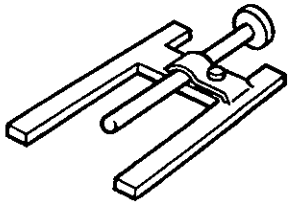
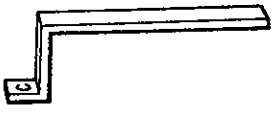
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
Brake flexible hose bolt (Brake caliper/2 (4) way joiut)		23	2.3	17.0
Master cylinder attaching nut		13	1.3	9.5
Booster nut		13	1.3	9.5
Crevis nut		25	2.5	18
2-way (or 4-way) joint mounting bolt		10	1.0	7.5
Brake pipe flare nut		16	1.6	11.5
Brake bleeder plug	Front caliper (15 in. brake disc)	8.5	0.85	6.5
	(16 in. brake disc)	8.0	0.8	6.0
	Wheel cylinder	7.5	0.75	5.5
	LSPV	8.0	0.8	6.0
LSPV mounting bolt		23	2.3	17.0
LSPV stay bolt				
LSPV spring nut				
Wheel nut		95	9.5	69.0
P valve bolt		10	1.0	7.5

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir 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 and wheel cylinder when they are disassembled.

SPECIAL TOOLS

		
09922-85811 Connector pin remover	09950-96010 Booster piston rod gauge	09952-16010 Booster piston rod adjuster

SECTION 5B

FRONT BRAKE

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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Front Disc Brake Caliper 5B- 6
Front Brake Disc 5B-10
TIGHTENING TORQUE SPECIFICATIONS 5B-11
REQUIRED SERVICE MATERIAL 5B-11

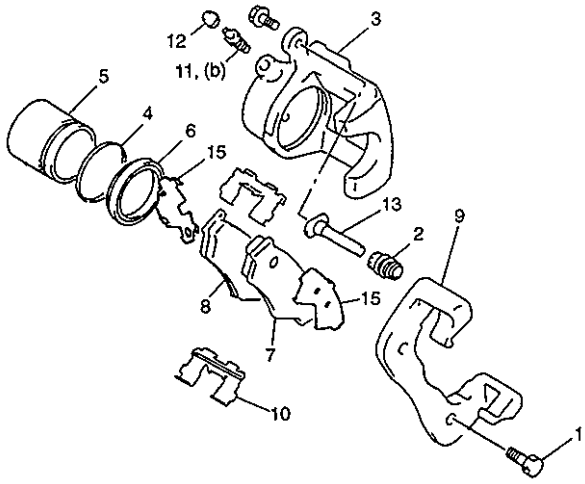
GENERAL DESCRIPTION

DISC BRAKE CALIPER ASSEMBLY

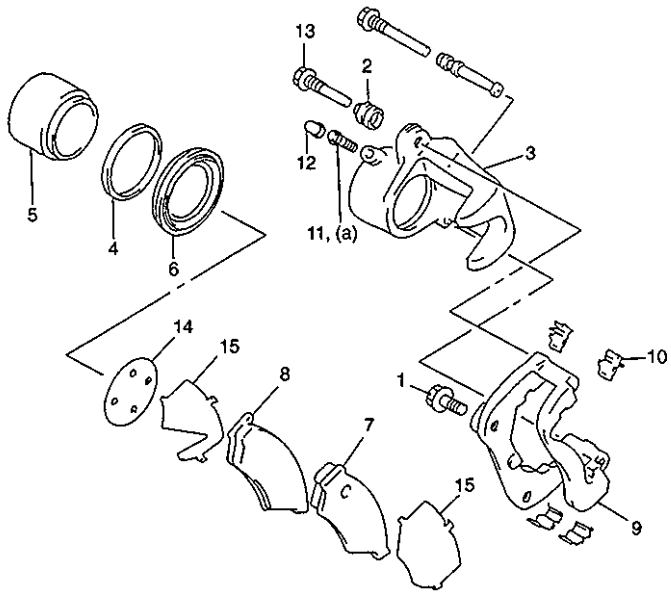
This caliper is mounted to the brake caliper carrier with two caliper pin bolts. Hydraulic force, created by applying force to the brake pedal, is converted by the caliper to friction. The hydraulic force acts equally against the piston and the bottom of the caliper bore to move the piston outward and 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.

[A]



[B]



[A]: 15 in. brake disc type
[B]: 16 in. brake disc type

1. Caliper pin bolt
2. Boot
3. Disc brake caliper (disc brake cylinder)
4. Piston seal
5. Disc brake piston
6. Cylinder boot
7. Disc brake inner pad
8. Disc brake outer pad
9. Brake caliper carrier
10. Pad spring
11. Bleeder plug
12. Bleeder plug cap
13. Caliper pin
14. Anti noise shim
15. Inner shim

Tightening torque
(a): 8.0 N·m (0.80 kg-m, 6.0 lb-ft)
(b): 8.5 N·m (0.85 kg-m, 6.5 lb-ft)

DIAGNOSIS

Refer to Section 5 (BRAKES).

CHECK AND ADJUSTMENT

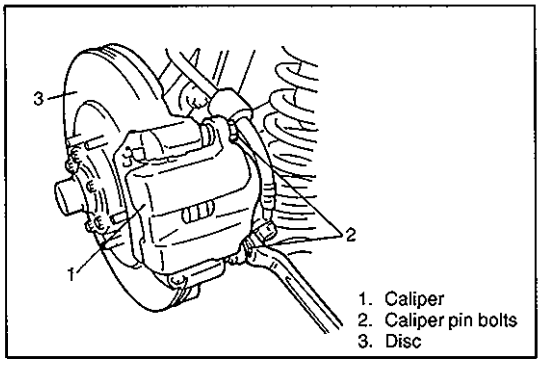
Refer to Section 5 (BRAKES).

ON-VEHICLE SERVICE

FRONT DISC BRAKE PAD

REMOVAL

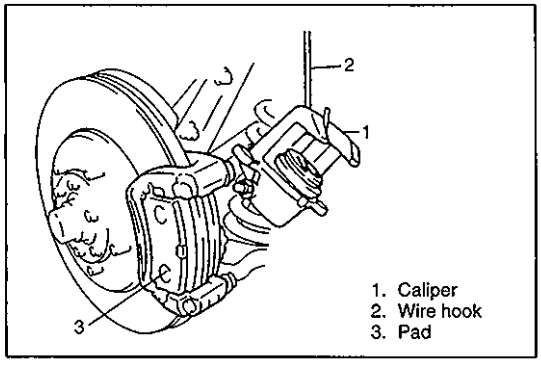
1) Hoist vehicle and remove wheel.
2) Remove caliper pin bolts.



1. Caliper
2. Caliper pin bolts
3. Disc

3) Remove E-ring from strut and then 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.



1. Caliper
2. Wire hook
3. Pad

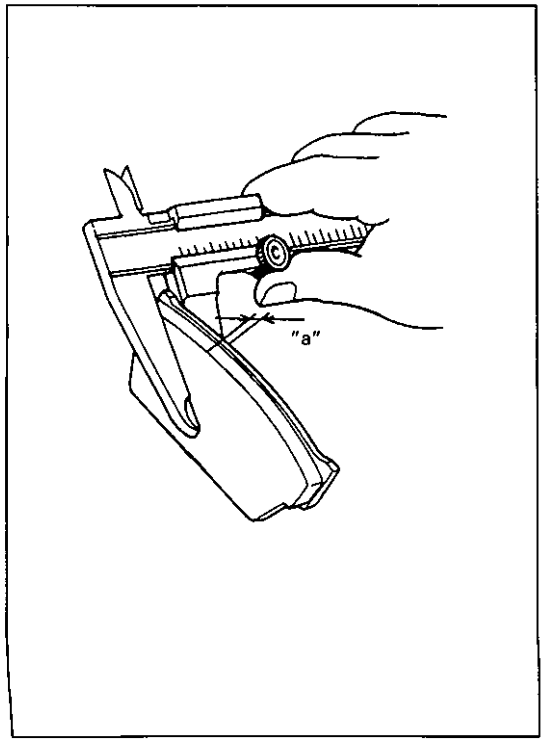
4) Remove pads.

INSPECTION

Brake Pad

Check pad lining for wear. When wear exceeds limit, replace with new one.

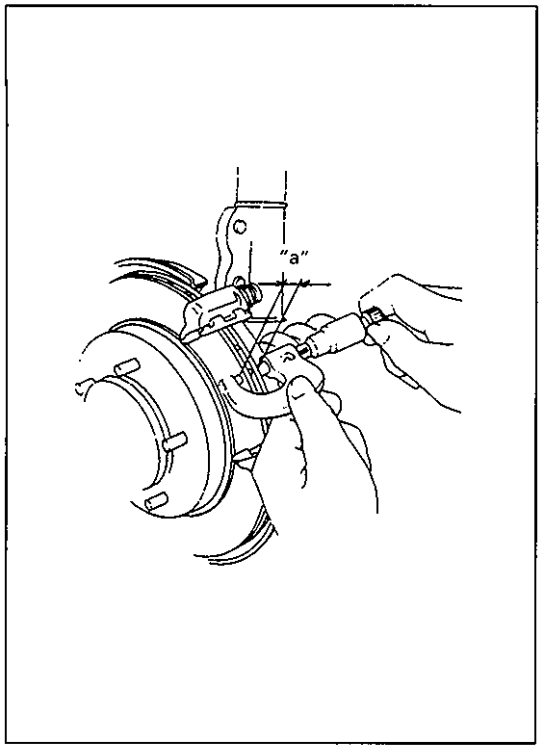
CAUTION:
Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.



Pad thickness (lining + rim) "a"
Standard: 15.0 mm (0.590 in.) .... 16 in. brake disc
15.5 mm (0.610 in.) .... 15 in. brake disc

Service limit: 7.0 mm (0.275 in.) ... 16 in. brake disc
7.5 mm (0.295 in.) ... 15 in. brake disc

NOTE:
When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.



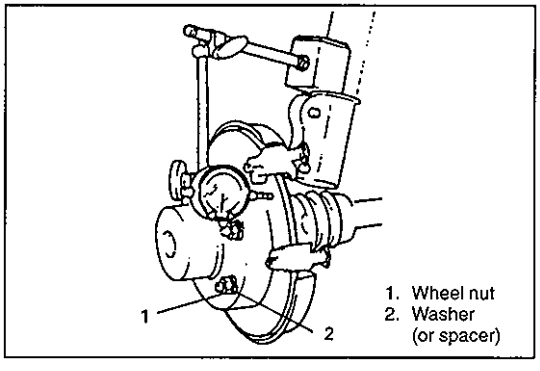
Brake disc

Before this inspection, brake pads must be removed.
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 "a"

Standard: 22 mm (0.866 in.) ..... 16 in. brake disc
17 mm (0.670 in.) ..... 15 in. brake disc

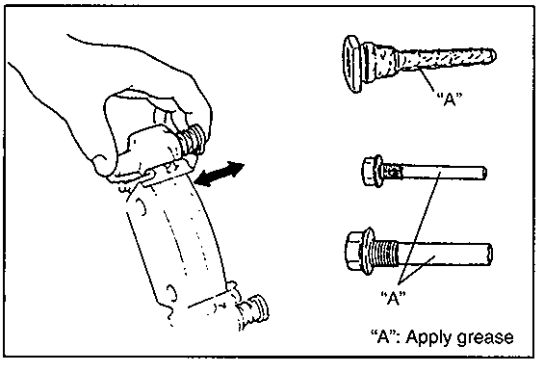
Service limit: 20 mm (0.787 in.) ... 16 in. brake disc
15 mm (0.590 in.) ... 15 in. brake disc



Use wheel nuts and suitable plain washers to hold the disc securely against the hub, then mount a dial indicator as shown and measure the runout at 25 mm (0.98 in.) from the outer edge of the disc.

Limit on disc deflection: 0.15 mm (0.006 in.)

NOTE:
Check front wheel bearing for looseness before measurement.

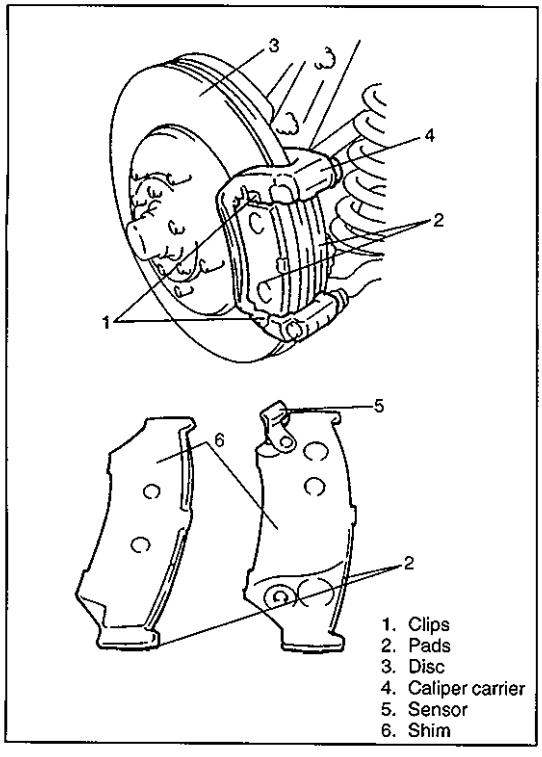


Cylinder Slide Guide Pin/Pin Bolt

Check guide pin for smooth movement as shown.
If it is found faulty, correct or replace. Apply rubber grease to guide pin outer surface. Rubber grease should be the on whose viscosity is less affected by such low temperature a –40°C (–40°F).

Dust Boot

Check boot for breakage, crack and damage. If defective, replace.



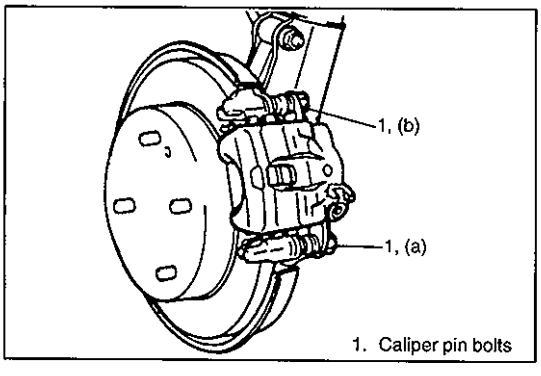
1. Clips
2. Pads
3. Disc
4. Caliper carrier
5. Sensor
6. Shim

INSTALLATION

NOTE:
See NOTE at the beginning of this section.

1) Install pad clips and pads.

NOTE:
Install pad with sensor to body center side of caliper.

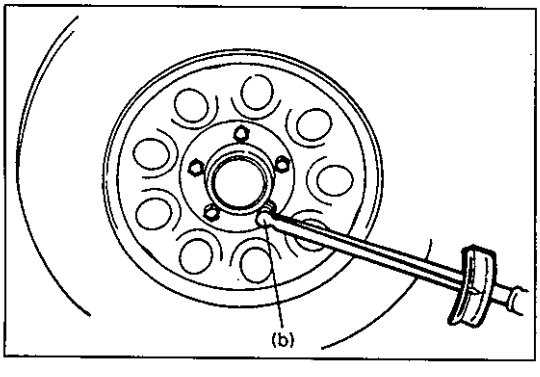


1. Caliper pin bolts

2) Install caliper and torque caliper pin bolts to specification.

Tightening Torque
(a), (b): 27 N·m (2.7 kg-m, 20.0 lb-ft) ... 15 in. brake disc
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft) ..... 16 in. brake disc
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

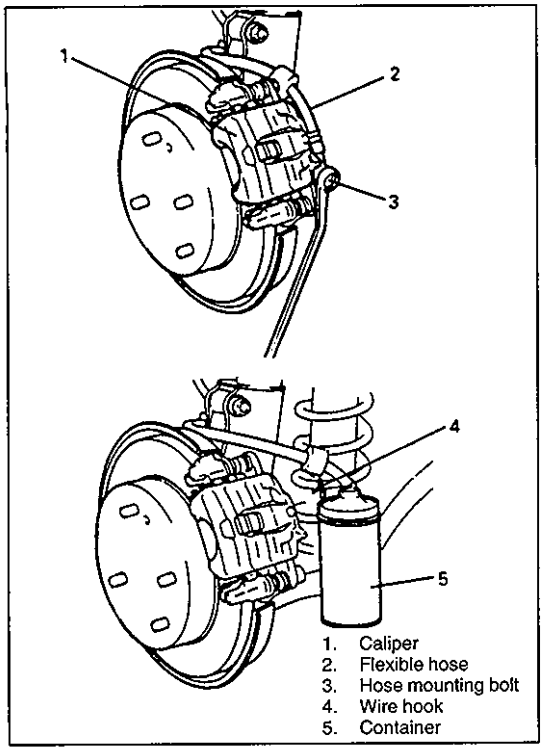
NOTE:
Make sure that boots are fit into groove securely.



3) Torque front wheel nuts to specification.

Tightening Torque
(b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

4) Upon completion of installation, perform brake test.

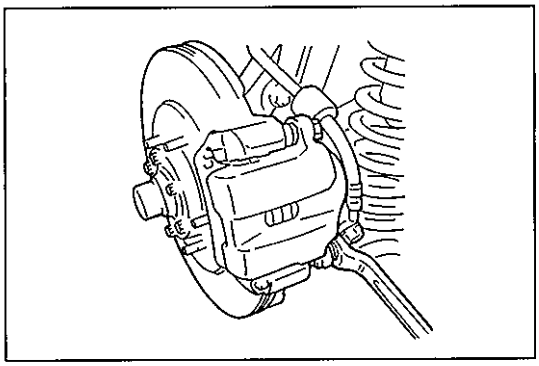


1. Caliper
2. Flexible hose
3. Hose mounting bolt
4. Wire hook
5. Container

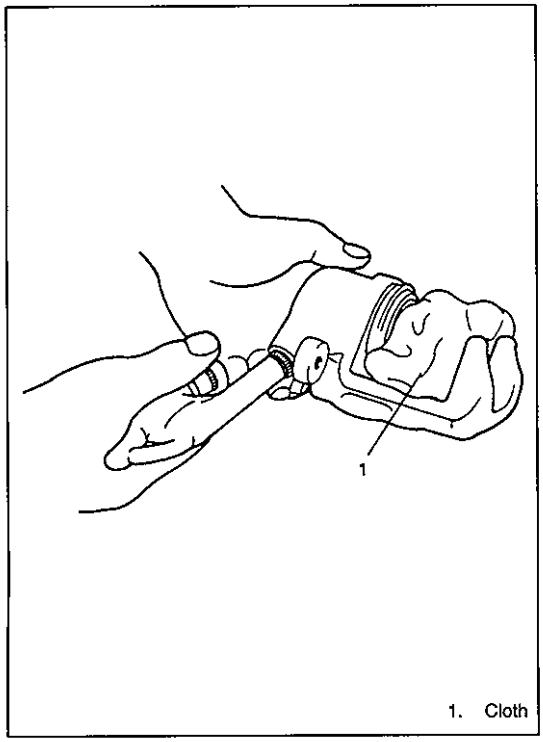
FRONT DISC BRAKE CALIPER

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.



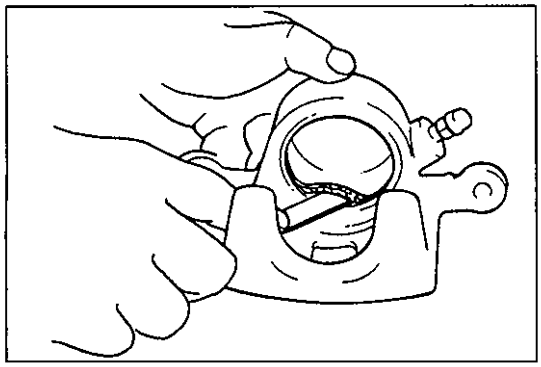
1. Cloth

DISASSEMBLY

Before disassembly, clean all around caliper with brake fluid.

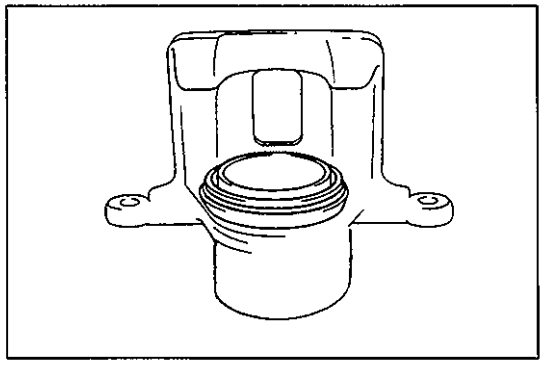
1) Remove anti noise shim (if equipped) and blow compressed air into cylinder through bolt hole where flexible hose was fitted. With this air pressure, piston can be pushed out of cylinder.

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.



2) Remove piston seal using a thin blade like a thickness gauge, etc.

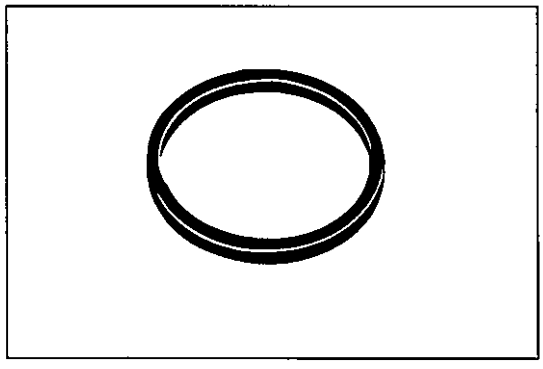
CAUTION:
Be careful not to damage inside (bore side) of cylinder.



INSPECTION

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.

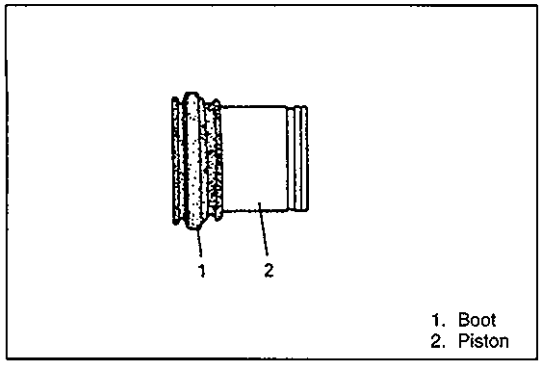
ASSEMBLY

Reassemble front brake in reverse order of disassembly, noting the following points.

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.**

Piston Seal

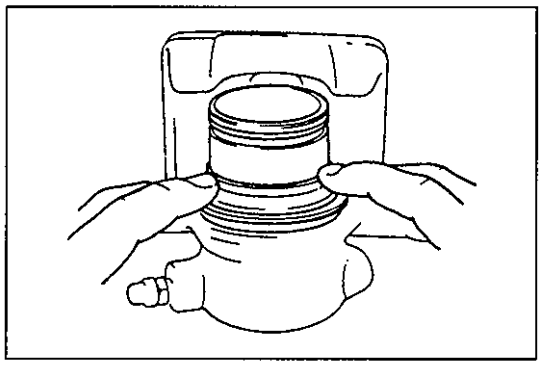
Piston seal is used to seal piston and cylinder and to adjust clearance between pad and disc. Replace with a new one at every overhaul. Fit piston seal into groove in cylinder taking care not to twist it.



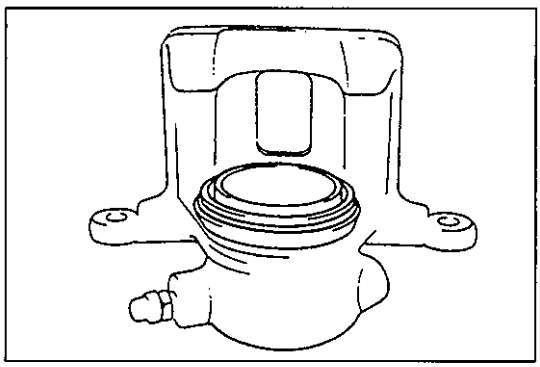
1. Boot
2. Piston

Piston and Boot

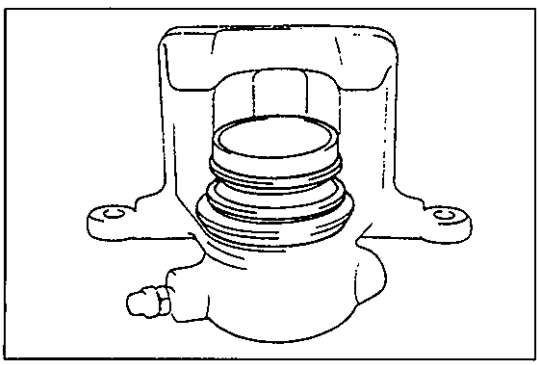
1) Before inserting piston into cylinder, install boot onto piston as shown.



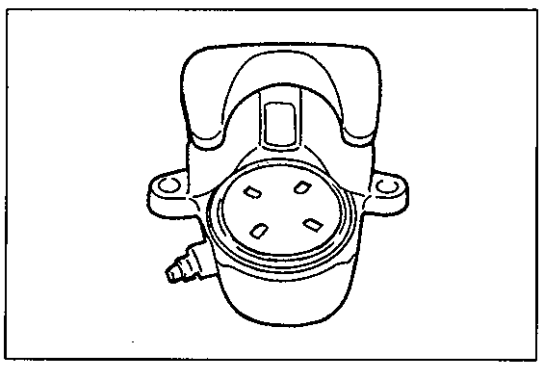
2) Fit boot as it is in above figure into boot groove in cylinder with fingers.
   Check to make sure that boot is fitted into boot groove in cylinder completely in its circumference.



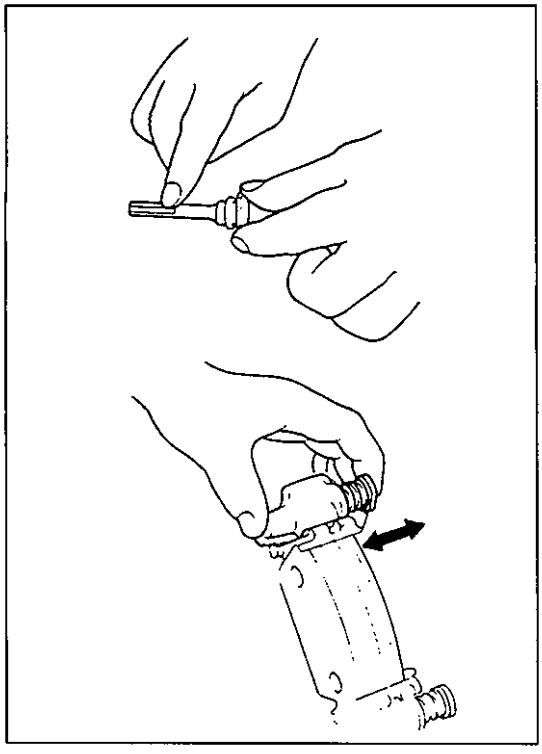
3) Insert piston into cylinder by hand and fit boot in boot groove in piston.



4) 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.



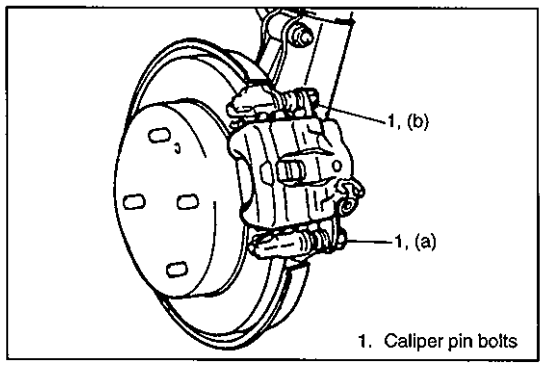
5) Insert piston into cylinder by hand.
6) Install anti noise shim, if equipped.



Caliper

Before installing caliper (cylinder body) to carrier, check to ensure that guide pin (pin bolt) inserted in each caliper carrier hole can be moved smoothly in thrust direction.

NOTE:
Where temperature gets as low as –30°C in cold weather, use rubber grease whose viscosity varies very little even at –40°C (–40°F).



1. Caliper pin bolts

INSTALLATION

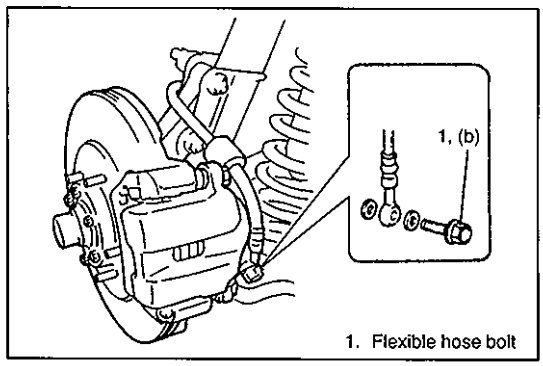
1) Install caliper to caliper carrier.
2) Torque caliper pin bolts to specifications.

Tightening Torque
(a), (b): 27 N·m (2.7 kg-m, 20.0 lb-ft) ..... 15 in. brake disc
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)
(b): 85 N·m (8.5 kg-m, 61.5 lb-ft) ..... 16 in. brake disc

NOTE:
Make sure that boots are fit into groove securely.

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)

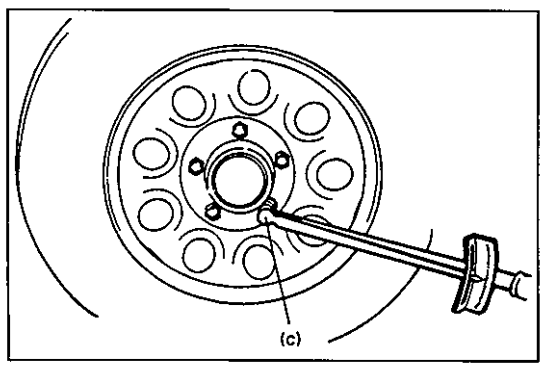


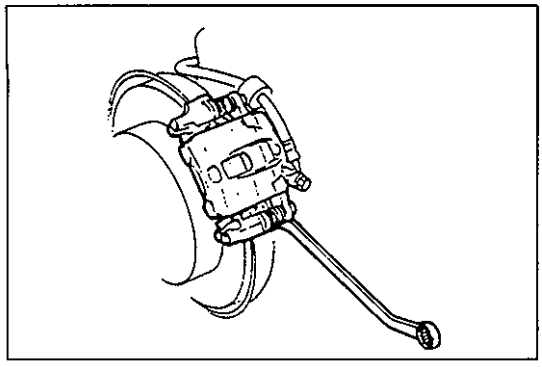
1. Flexible hose bolt

4) Torque wheel nuts to specification.

Tightening Torque
(c): 95 N·m (9.5 kg-m, 69.0 lb-ft)

5) After completing installation, fill reservoir with brake fluid and bleed brake system. Perform brake test and check each installed part for oil leakage.



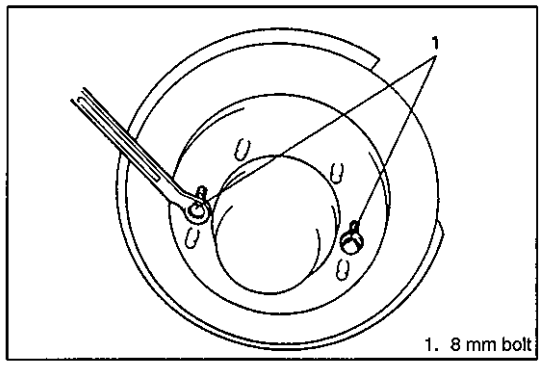


FRONT BRAKE DISC

REMOVAL

1) Hoist vehicle and remove wheel.
2) Remove caliper assembly by loosening carrier bolts (2 pcs).

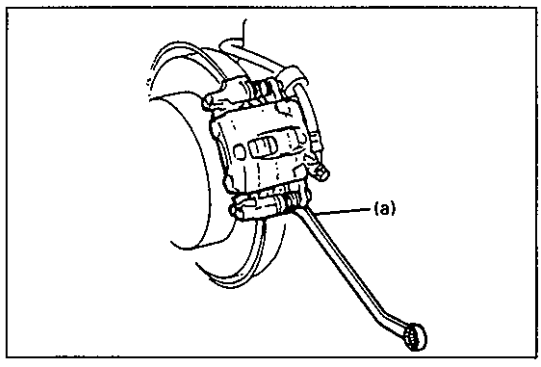
CAUTION:
During removal, be careful not to damage brake flexible hose and not to depress brake pedal.



3) Remove disc by using 8 mm bolts (2 pcs).

INSPECTION

Refer to FRONT DISC BRAKE PAD INSPECTION.

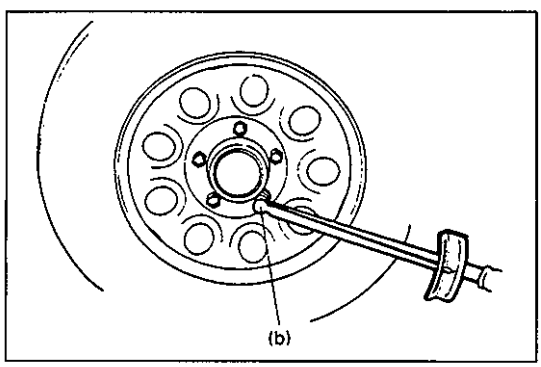


INSTALLATION

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): 85 N·m (8.5 kg-m, 61.5 lb-ft)



4) Torque front wheel nuts to specifications.

Tightening Torque
(b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

5) Upon completion of installation, perform brake test.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Brake caliper bleeder plug (16 in. brake disc)	8.0	0.80	6.0
Brake caliper bleeder plug (15 in brake disc)	8.5	0.85	6.5
Caliper pin bolt (15 in. brake disc)	27	2.7	20.0
Caliper pin bolt (M10) (16 in. brake disc)	50	5.0	36.5
(M12) (16 in. brake disc)	85	8.5	61.5
Flexible hose bolt	23	2.3	17.0
Brake carrier bolt	85	8.5	61.5
Wheel nut	95	9.5	69.0

REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir 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 and wheel cylinder when they are disassembled.

SECTION 5C

PARKING AND REAR BRAKE

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:
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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Parking Brake Cable 5C- 5
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TIGHTENING TORQUE SPECIFICATIONS 5C-16
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SPECIAL TOOLS 5C-16

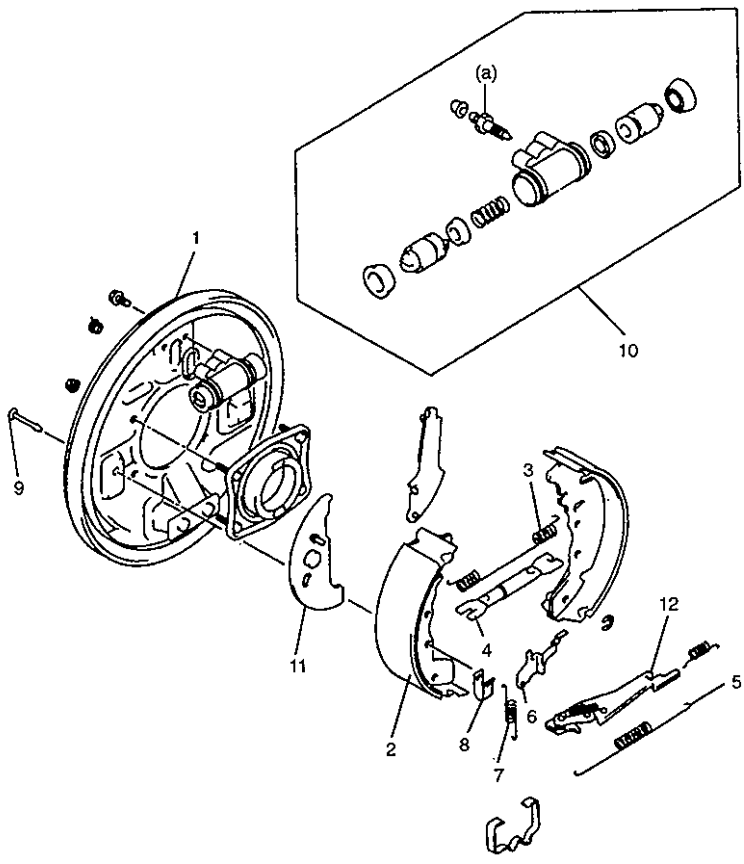
GENERAL DESCRIPTION

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. Rear brake is a drum type. It uses leading trailing operation when brake pedal is depressed and when parking brake is applied on level road.
It also uses duo servo operation when parking brake is applied on gradient road and load is applied in longitudinal direction of vehicle.

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. Shoe return upper spring
4. Adjuster
5. Shoe return lower spring
6. Adjuster lever
7. Adjuster spring
8. Shoe hold down spring
9. Shoe hold down pin
10. Wheel cylinder
11. Link
12. Brake strut

Tightening torque
(a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

DIAGNOSIS

Refer to SECTION 5 (BRAKES).

CHECK AND ADJUSTMENT

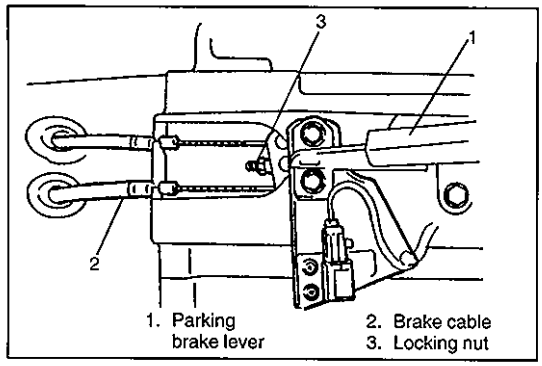
Refer to SECTION 5 (BRAKES).

ON-VEHICLE SERVICE

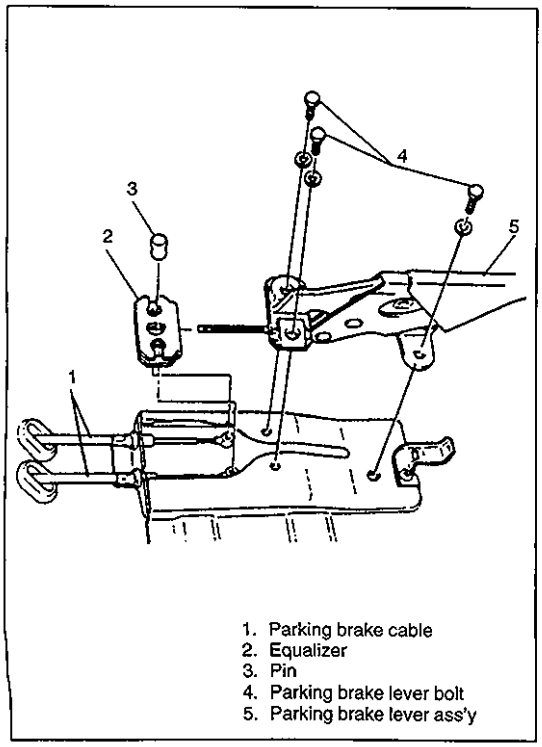
PARKING BRAKE LEVER

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Block vehicle wheels and release parking brake lever.
3) Remove parking brake lever cover.
4) Disconnect lead wire of parking brake switch at coupler.

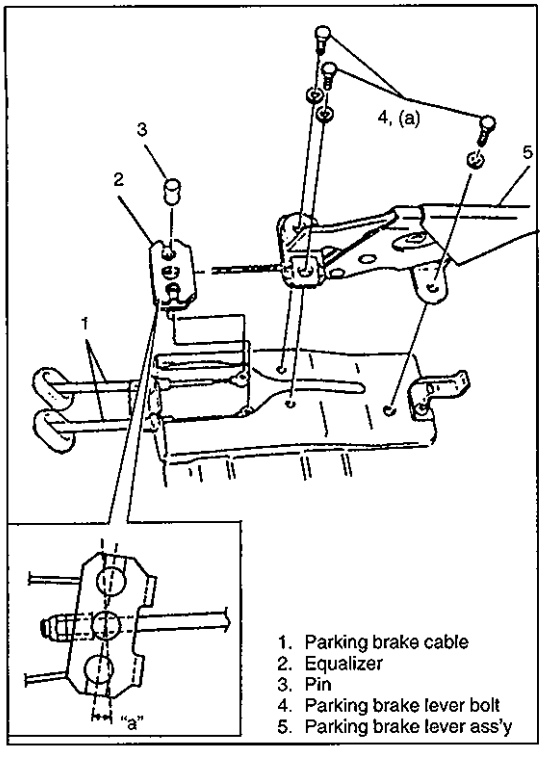


5) Remove parking brake cable locking nut.



6) Remove parking brake lever bolts and then remove parking brake lever assembly from equalizer.
7) Remove equalizer from parking brake cable.

NOTE:
Don't disassemble parking brake lever switch. It must be removed and installed as a complete switch assembly.



1. Parking brake cable
2. Equalizer
3. Pin
4. Parking brake lever bolt
5. Parking brake lever ass'y

INSTALLATION

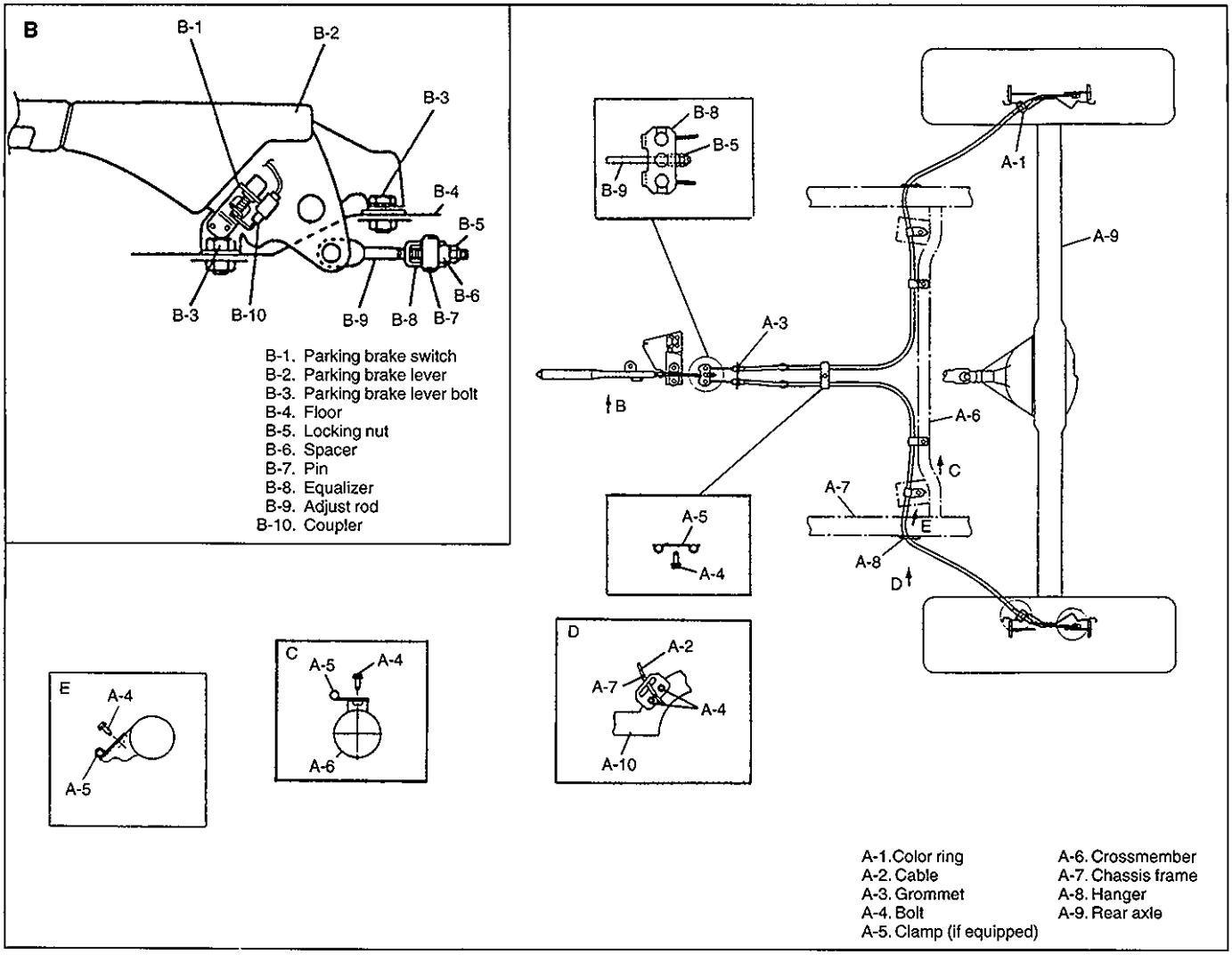
1) Install in reverse order of REMOVAL procedure.
   Check equalizer inclined angle.

   Angle "a": within 15 degrees

   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 section 5.
3) Check brake drum for dragging and brake system for proper performance.

PARKING BRAKE CABLE



REMOVAL

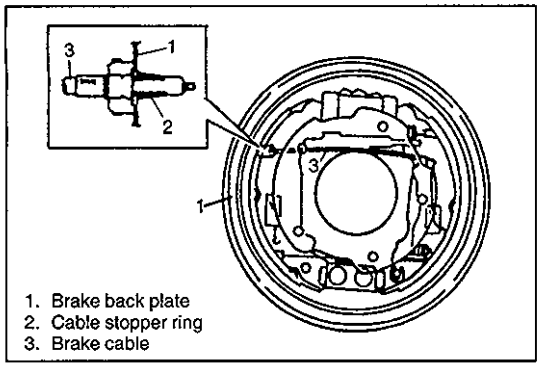
1) Remove brake drum. (Refer to steps 1) to 5) of BRAKE DRUM REMOVAL of this section, page 5C-7.)
2) Check the color of ring for reinstallation.

   NOTE:
   Color ring on brake cable is for the purpose of identification.

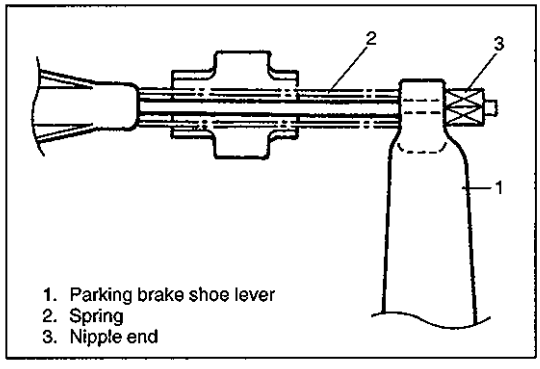
3) Disconnect parking brake cable from brake shoe lever. (Refer to steps 2) to 5) of BRAKE SHOE REMOVAL of this section, page 5C-9.)
4) Disconnect brake cable from brake back plate. (Refer to step 4) of BRAKE BACK PLATE REMOVAL section, page 5C-13.)

   NOTE:
   When it is necessary to remove both right and left parking brake cables, repeat above steps 1) to 3) on right and left wheels.

5) Remove cable from parking brake lever. (Refer to steps 1) to 5) of PARKING BRAKE LEVER REMOVAL of this section, page 5C-3.)



1. Brake back plate
2. Cable stopper ring
3. Brake cable



1. Parking brake shoe lever
2. Spring
3. Nipple end

INSTALLATION

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

1) Install brake cable stopper ring to brake back plate securely as shown in figure.

   NOTE:
   Color ring on brake cable is for the purpose of identification. Use cable with the same colored ring as before removal.

2) Install brake cable spring and nipple end to parking brake shoe lever securely as shown in figure.

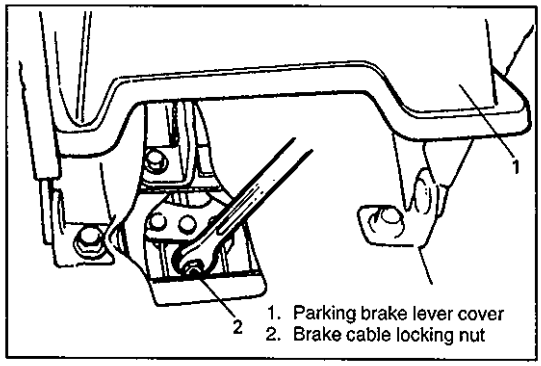
3) For brake shoe installation, refer to steps 1) and 4) of BRAKE SHOE INSTALLATION of this section, page 5C-11.
4) For brake drum installation, refer to steps 1) and 3) of BRAKE DRUM INSTALLATION of this section, page 5C-8.
5) For proper routing and secure clamping of parking brake cable.
6) For installation of cable to parking brake lever, refer to PARKING BRAKE LEVER INSTALLATION of this section, page 5C-4.

7) Upon completion of installation, adjust cable. (Refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in section 5.) Then check brake drum for dragging and brake system for proper performance. After removing vehicle from hoist, brake test should be performed.

REAR BRAKE DRUM

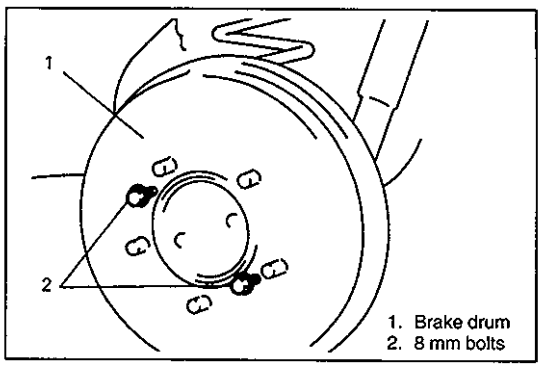
REMOVAL

1) Hoist vehicle and pull up parking brake lever.
2) Remove wheel.



1. Parking brake lever cover
2. Brake cable locking nut

3) Release parking brake lever.
4) Remove parking brake lever cover screws and with rear part of brake lever cover lifted a little, loosen parking brake cable locking nut.



1. Brake drum
2. 8 mm bolts

5) Remove brake drum by using 8 mm bolts (2 pcs).

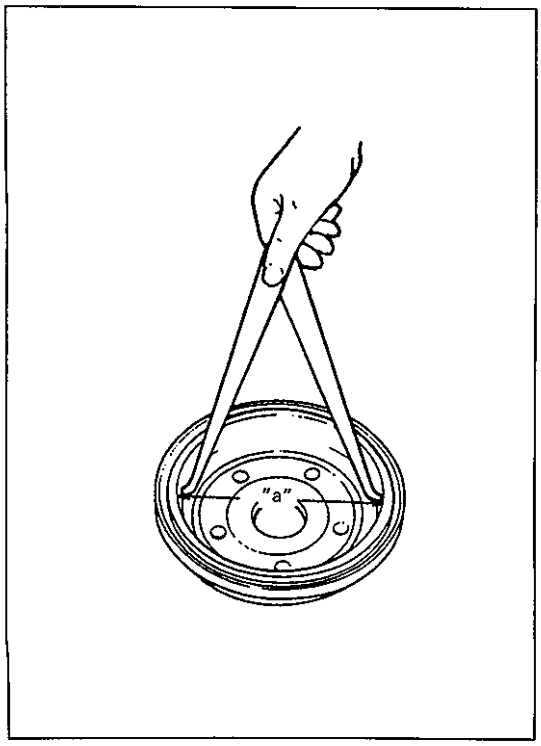
INSPECTION

Brake Drum

Inspect drum for cleanliness. Check wear of its braking surface by measuring its inside diameter.

Inside diameter "a"
Standard: 220 mm (8.66 in.)
Service Limit: 222 mm (8.74 in.)

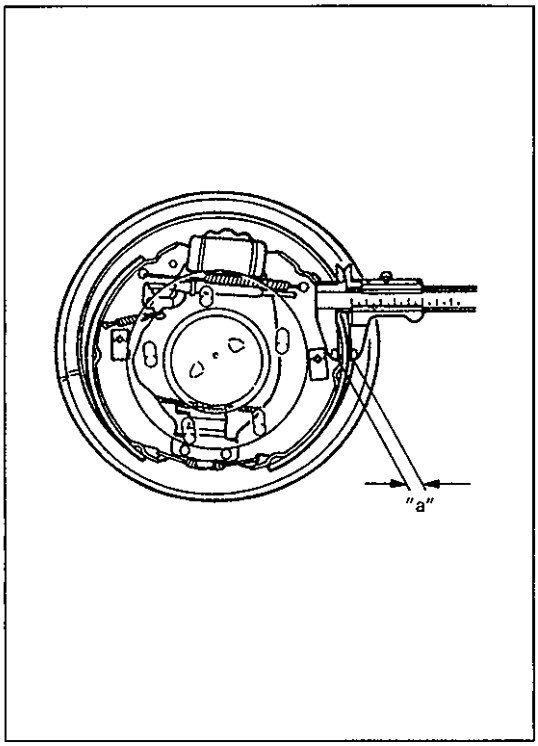
Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.



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 no be turned.

NOTE:
When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.



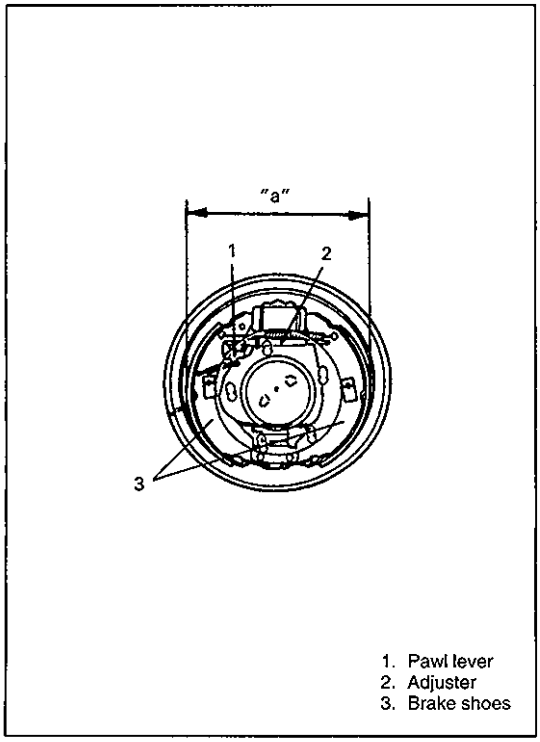
Brake shoe

Where lining is worn out beyond service limit, replace shoe.

Thickness "a"
Standard: 6.5 mm (0.24 in.)
Service limit: 3.0 mm (0.12 in.)

If one of brake linings is to service limit, all linings must be replaced at the same time.

CAUTION:
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.



1. Pawl lever
2. Adjuster
3. Brake shoes

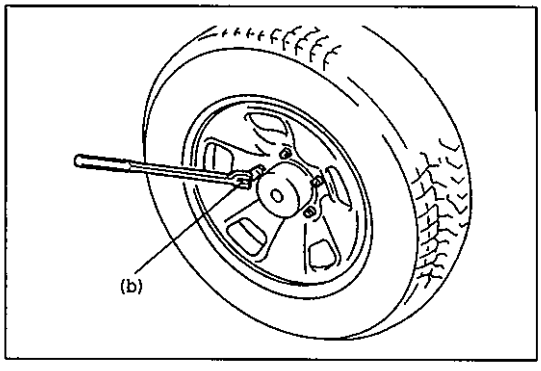
INSTALLATION

NOTE:
See NOTE at the beginning of the section.

1) Before installing brake drum, check outer diameter of brake shoes. If it is not within value as specified below, adjust it to specification by turning adjuster.

   Outer diameter of brake shoes
   "a": 219.4 – 219.7 mm (8.638 – 8.650 in.)

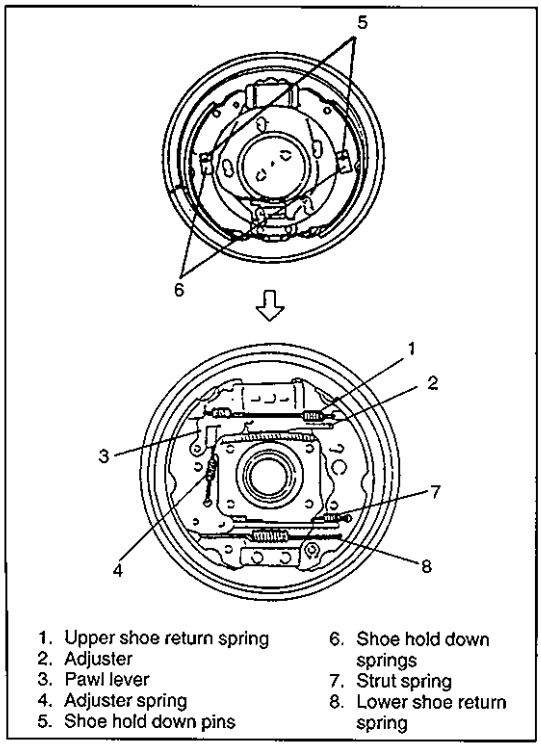
2) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
3) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to ten times so as to obtain proper drum-to-shoe clearance.
   Adjust parking brake cable. (For adjustment, see page 5-12)
4) Tighten parking brake lever cover screws.



5) Install wheel and tighten wheel nuts to specified torque.

   Tightening Torque
   (b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

6) 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).



1. Upper shoe return spring
2. Adjuster
3. Pawl lever
4. Adjuster spring
5. Shoe hold down pins
6. Shoe hold down springs
7. Strut spring
8. Lower shoe return spring

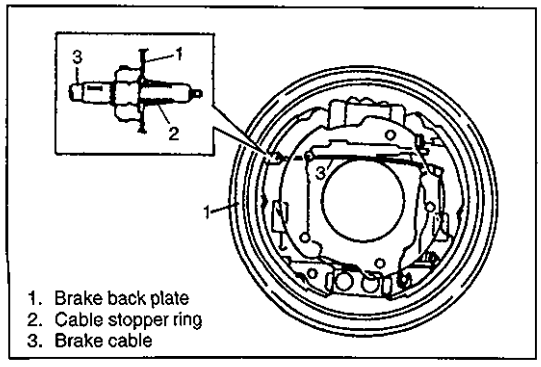
BRAKE SHOE

REMOVAL

1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL. (See page 5C-7).

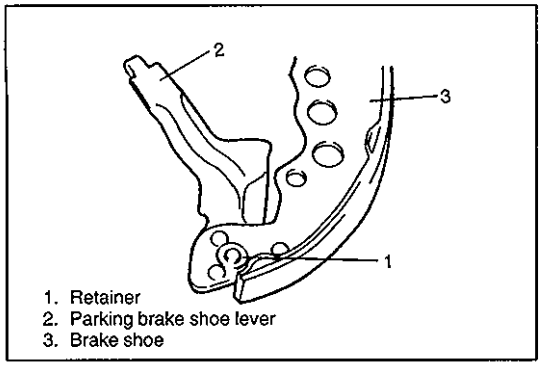
WARNING:
Use special care when installing brake shoe return spring. Failure in its proper installation may allow it to springback and cause personal injury.

2) Remove shoe hold down springs by turning shoe hold down pins.
3) Remove upper return spring, struts, adjuster, adjuster lever and springs.
4) Remove brake shoes and lower shoe return spring.



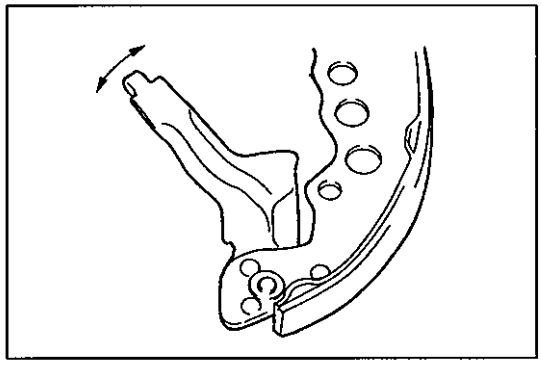
1. Brake back plate
2. Cable stopper ring
3. Brake cable

5) Remove brake shoes and disconnect parking brake cable from parking brake shoe lever.



1. Retainer
2. Parking brake shoe lever
3. Brake shoe

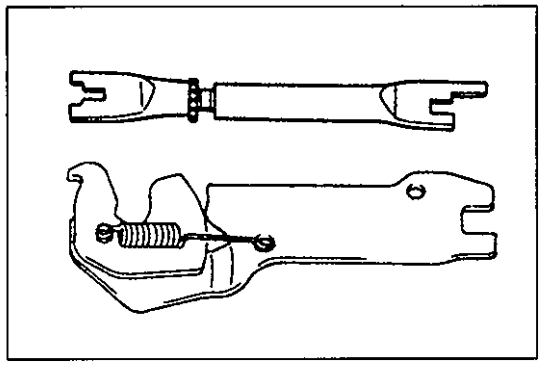
6) Remove parking brake shoe lever from brake shoe.



INSPECTION

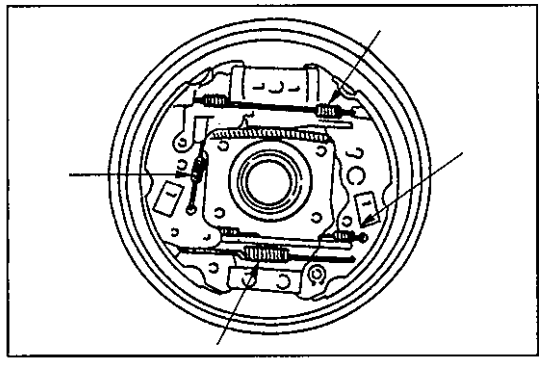
Parking Shoe Lever

Inspect brake shoe lever for free movement against brake shoe web. If defective, correct or replace.



Strut, Adjuster

Check thread or ratchet of strut and adjuster for wear, sticking and corrosion.

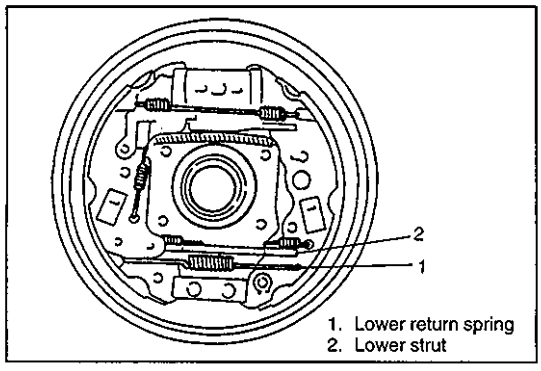


Springs

Inspect for damage or weakening.
Inspect each part with arrow for rust. If found defective, replace.

Brake Shoe

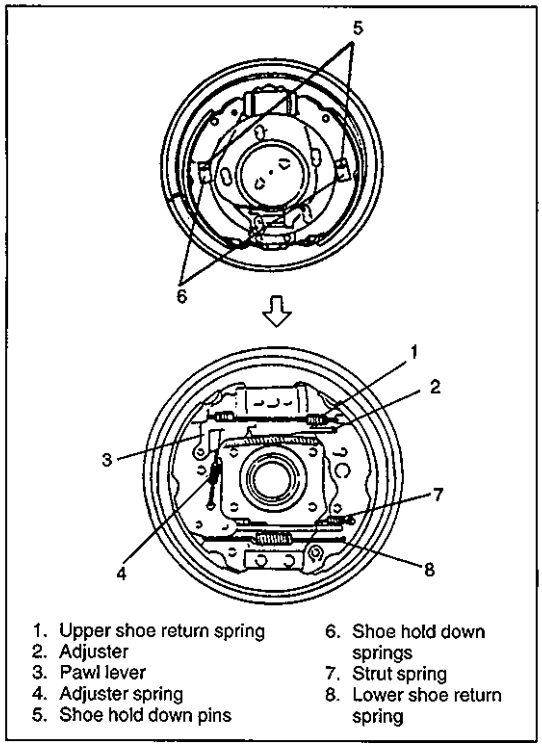
Refer to BRAKE DRUM INSPECTION.



1. Lower return spring
2. Lower strut

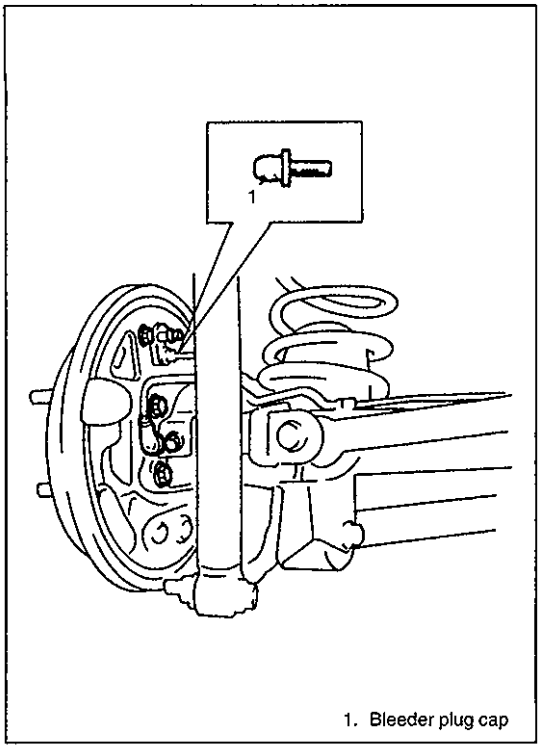
INSTALLATION

1) Assemble parts as shown in reverse order of removal.



1. Upper shoe return spring
2. Adjuster
3. Pawl lever
4. Adjuster spring
5. Shoe hold down pins
6. Shoe hold down springs
7. Strut spring
8. Lower shoe return spring

2) Install shoe hold down springs by pushing them down in place and turning hold down pins.
3) Install adjuster and upper shoe return spring.
4) Install adjuster lever, adjuster spring and strut spring.
5) For procedure hereafter, refer to steps 1) to 6) of BRAKE DRUM INSTALLATION on page 5C-8.

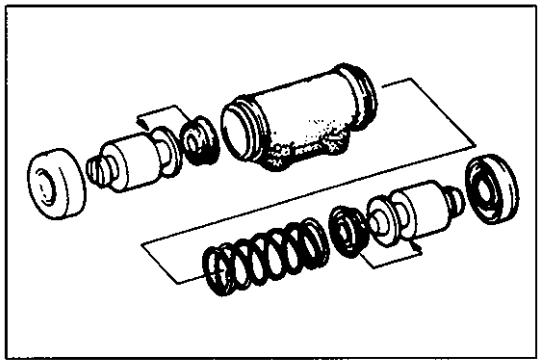


1. Bleeder plug cap

WHEEL CYLINDER

REMOVAL

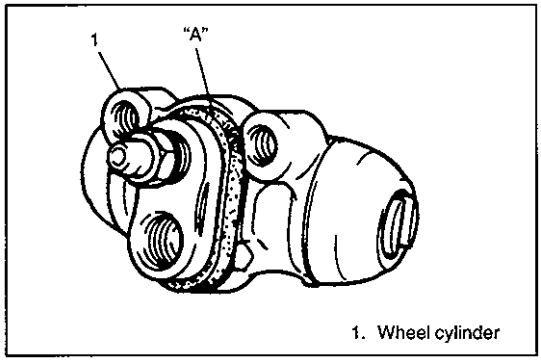
1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL. (See page 5C-7).
2) Perform steps 2) and 4) of BRAKE SHOE REMOVAL. (See page 5C-10).
3) Loosen brake pipe flare nut (or nuts) but only within the extent that fluid does not leak.
4) Remove wheel cylinder mounting bolts. Disconnect brake pipe (or pipes) from wheel cylinder and put wheel cylinder bleeder plug cap onto pipe to prevent fluid from spilling.



INSPECTION

Inspect wheel cylinder disassembled parts for wear, cracks, corrosion or damage.

NOTE:
Clean wheel cylinder components with brake fluid.

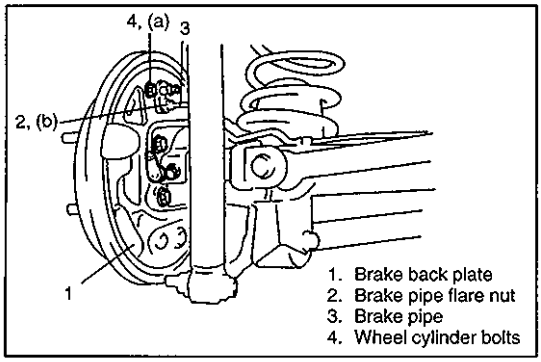


1. Wheel cylinder

INSTALLATION

1) Apply water tight sealant to joint seam of wheel cylinder and brake back plate. Then take off bleeder plug cap from brake pipe and connect pipe (for pipes) to wheel cylinder just enough to prevent fluid from leaking.

"A": Sealant 99000-31090



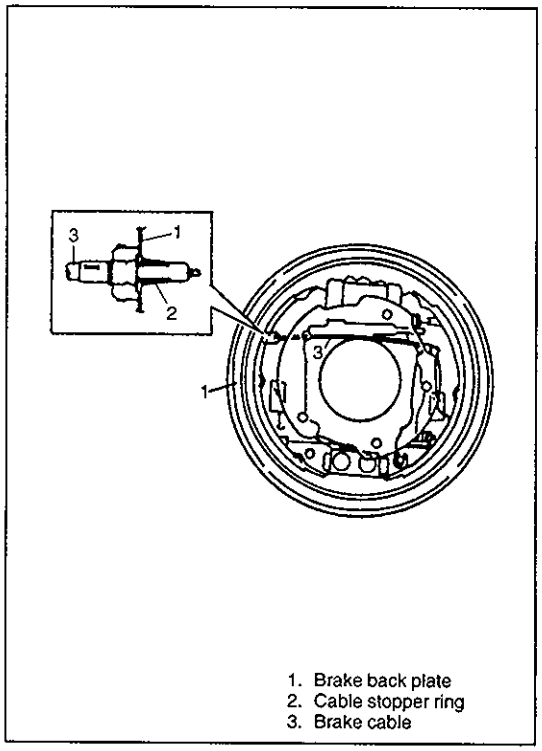
1. Brake back plate
2. Brake pipe flare nut
3. Brake pipe
4. Wheel cylinder bolts

2) Tighten wheel cylinder to brake back plate to specified torque.
3) Torque flare nut (or nuts) of brake pipe which was connected in step 1) to specification.

Tightening Torque
(a): 8.5 N·m (0.85 kg-m, 6.5 lb-ft)
(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

4) Install bleeder plug cap taken off from pipe back to bleeder plug.
5) For procedure hereafter, refer to steps 1) to 5) of BRAKE SHOE INSTALLATION.

NOTE:
Be sure to bleed brake system. (for bleeding operation, see page 5-7)

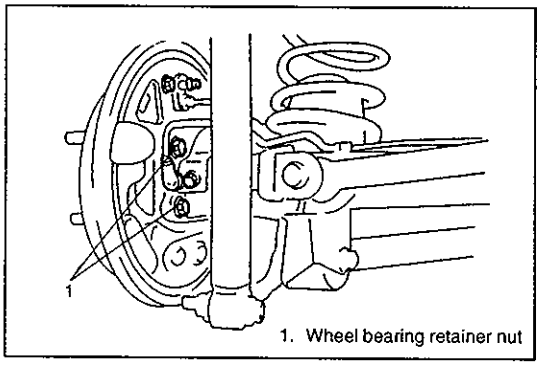


1. Brake back plate
2. Cable stopper ring
3. Brake cable

BRAKE BACK PLATE

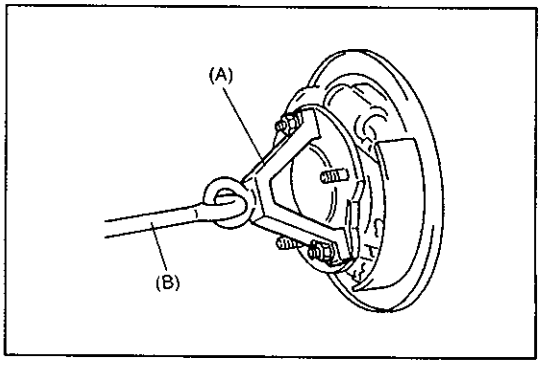
REMOVAL

1) Perform steps 1) to 5) of BRAKE DRUM REMOVAL on page 5C-7.
2) Perform steps 2) to 4) of BRAKE SHOE REMOVAL on page 5C-9.
3) Perform steps 3) and 4) of WHEEL CYLINDER REMOVAL on page 5C-12.
4) Remove cable from brake back plate by squeezing parking brake cable stopper ring.



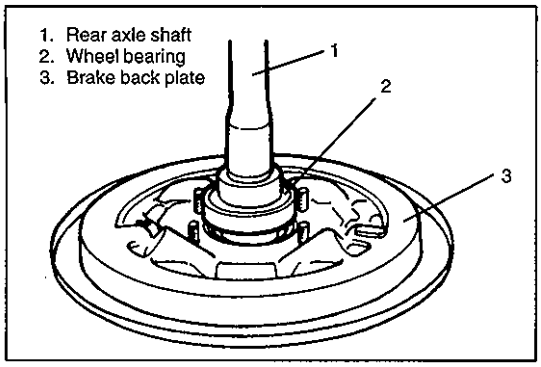
1. Wheel bearing retainer nut

5) Drain rear differential gear oil.
6) Remove wheel bearing retainer nuts from rear axle housing.

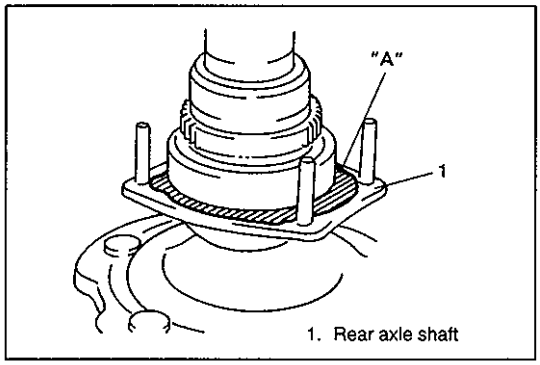


7) Using special tools, draw out rear axle shaft with brake back plate.

Special Tool
(A): 09943-35511
(B): 09942-15510



8) Remove brake back plate from rear axle shaft.

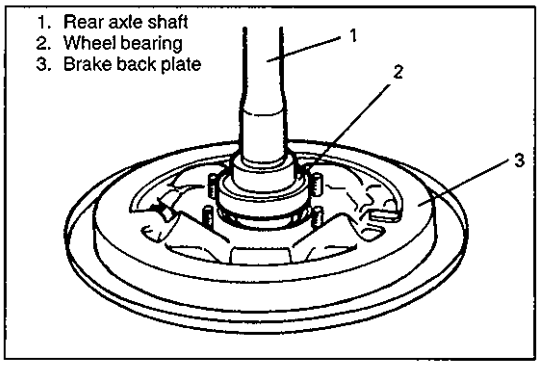


INSTALLATION

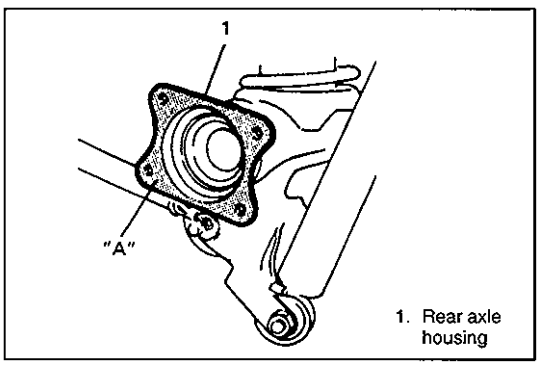
1) Apply sealant to mating surface of bearing retainer with brake back plate.

"A": Sealant 99000-31110

NOTE:
Make sure to remove old sealant before applying it anew.



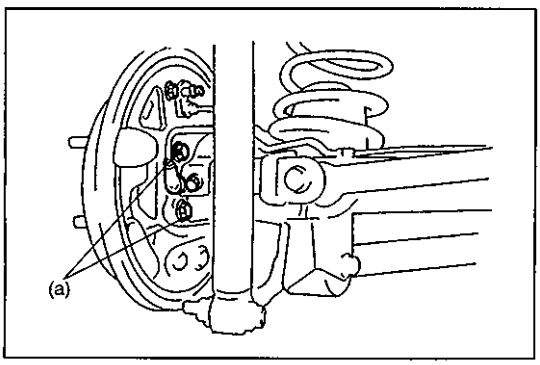
2) Install brake back plate to rear axle shaft.



3) Apply sealant to joint seam of rear axle housing and brake back plate.

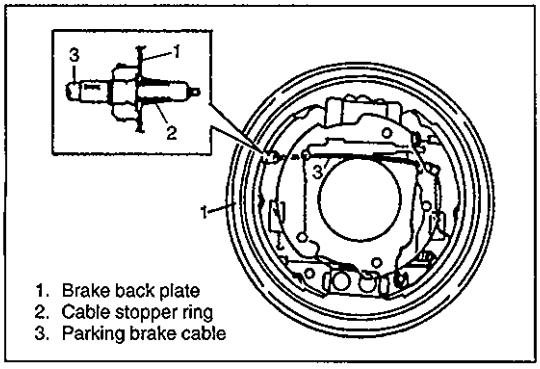
"A": Sealant 99000-31110

NOTE:
Make sure to remove old sealant before applying it anew.



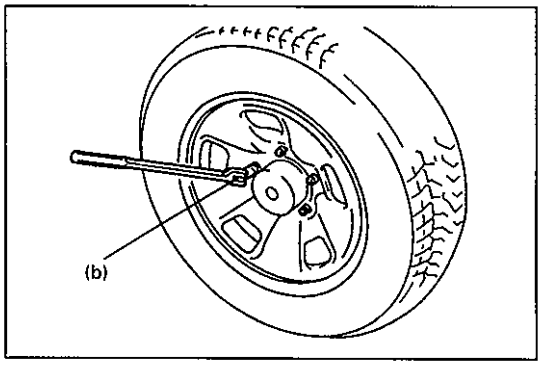
4) Install rear axle shaft to rear axle housing.
5) Tighten brake back plate nuts to specified torque.

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



6) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut (or nuts) to specified torque. (Refer to steps 1) to 4) of WHEEL CYLINDER INSTALLATION on page 5C-12 of this section.)
7) Install parking brake cable to brake back plate.

8) Install brake shoes, referring to steps 1) and 4) of its INSTALLATION on page 5C-11.
9) Install brake drum. Refer to steps 1) to 2) of its INSTALLATION on page 5C-8 in this section.
10) Refill differential housing with new specified gear oil. Refer to "ON-VEHICLE SERVICE" in SECTION 7F for refill.
11) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, see page 5-7)



12) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque
(b): 95 N·m (9.5 kg-m, 69.0 lb-ft)

13) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to ten times so as to obtain proper drum-to shoe clearance.
Adjust parking brake cable. (For adjustment, see page 5-12)
14) Tighten parking brake lever cover screws.
15) 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).
16) Check each installed part for oil leakage.

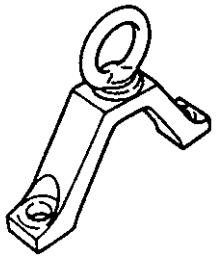
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Wheel cylinder bleeder plug	7.5	0.75	5.5
Parking brake lever bolt	23	2.3	17.0
Wheel cylinder bolt	8.5	0.85	0.5
Brake pipe flare nut	16	1.6	12.0
Brake back plate nut	23	2.3	17.0

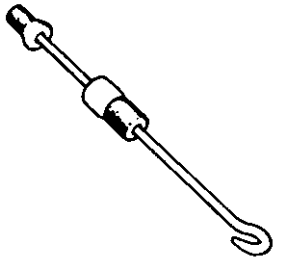
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir 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 and wheel cylinder when they are disassembled.
Water tight sealant	SEALING COMPOUND 366E 99000-31090	• To apply to mating surfaces of brake back plate and rear wheel cylinder.
Sealant	SUZUKI BOND NO. 1215 99000-31110	• To apply to mating surfaces of brake back plate and rear axle housing. • To apply mating surfaces of brake back plate and rear wheel bearing retainer.

SPECIAL TOOLS



09943-35511
Brake drum remover
(Front wheel hub remover)



09942-15510
Sliding hammer

SECTION 5E1

ANTILOCK BRAKE SYSTEM (ABS) (OPTIONAL)

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:
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.

5E1

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GENERAL DESCRIPTION

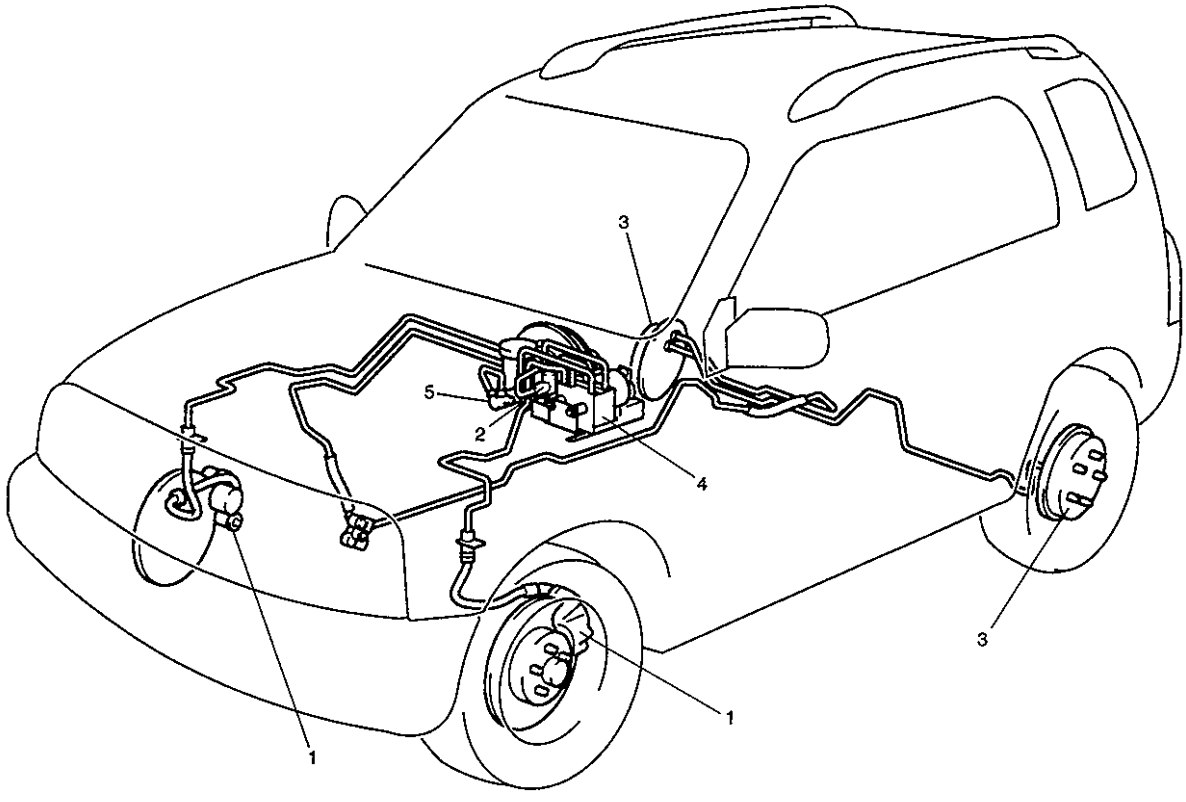
The ABS (Antilock Brake System) controls the fluid pressure applied to the wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied. This ABS is a 4-wheel type which controls the fluid pressure applied to the wheel cylinder of each of the four brakes to prevent each wheel from getting locked.

The component parts of this ABS includes following parts in addition to those of the conventional brake system.

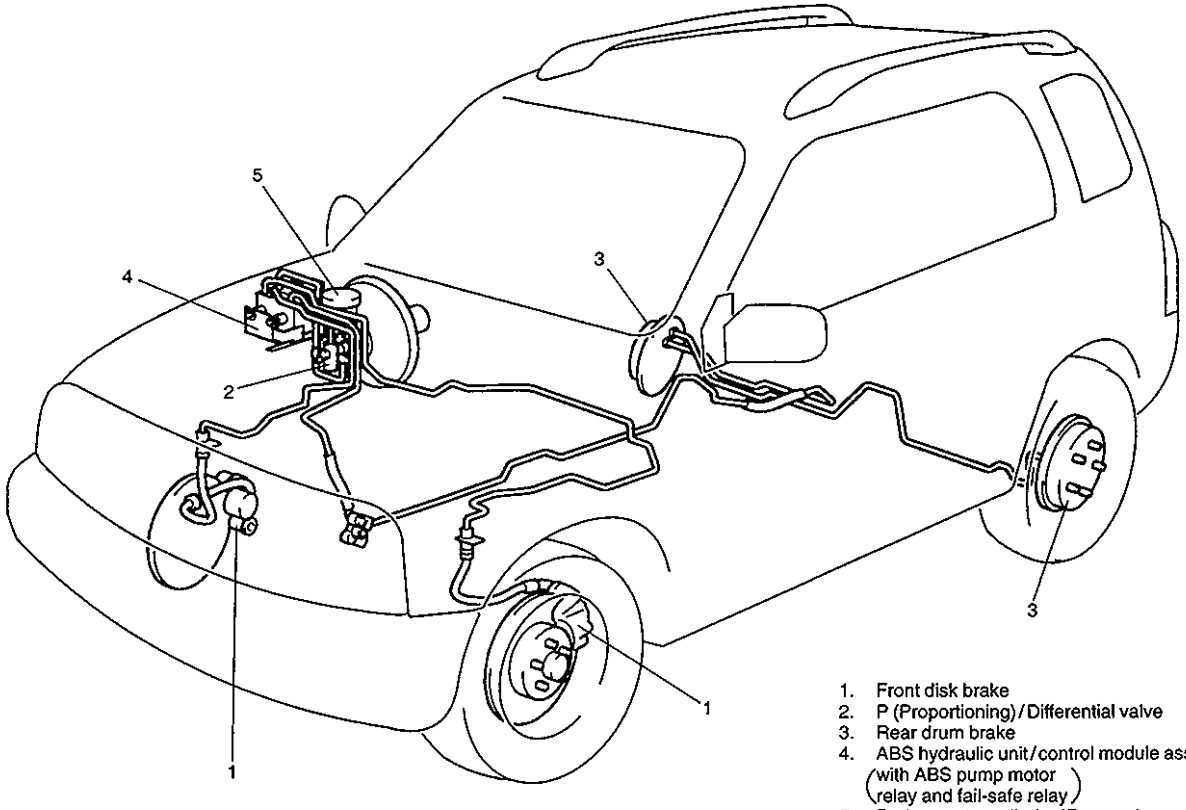
- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- In this ABS, ABS hydraulic unit (actuator assembly), ABS control module, pump motor relay and fail-safe relay are combined as one component.
- ABS control module which sends operation signal to ABS hydraulic unit 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.

BRAKE HOSE/PIPE LOUTING

For LH Steering Vehicle

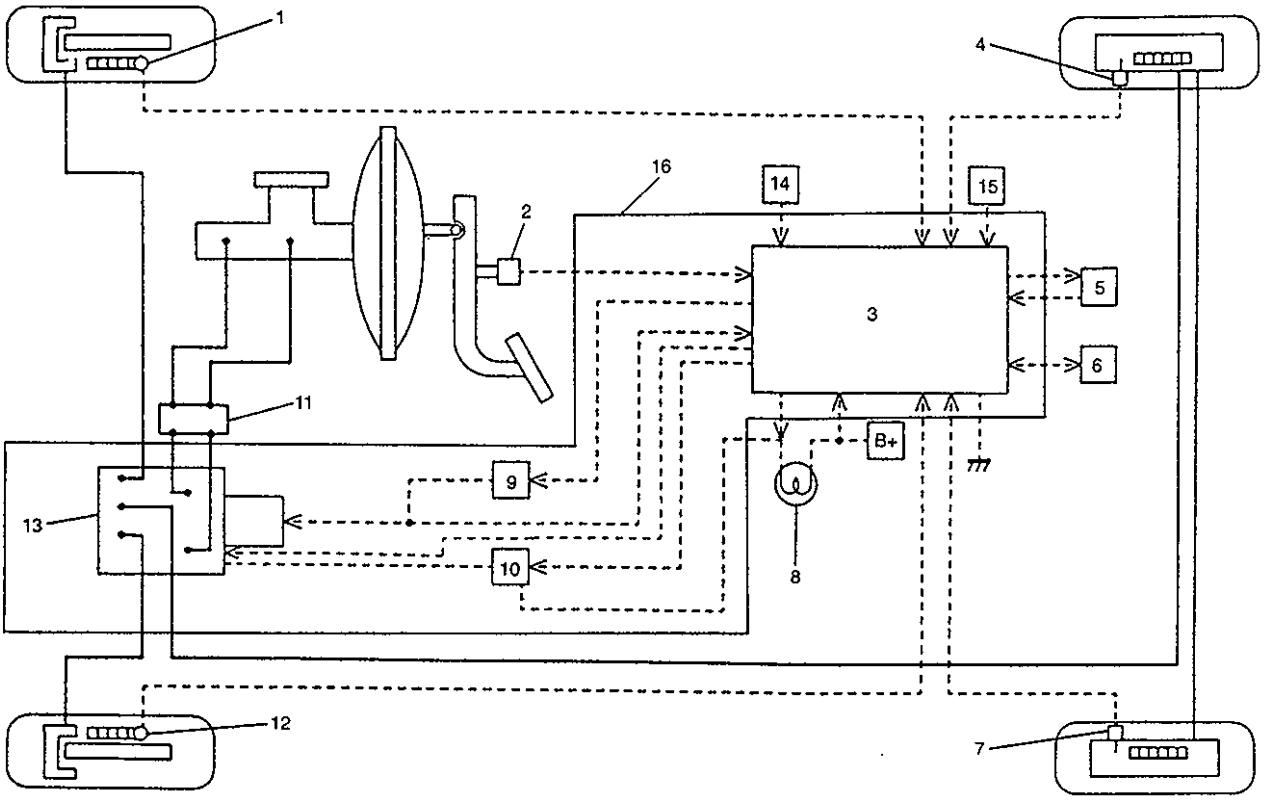


For RH Steering Vehicle

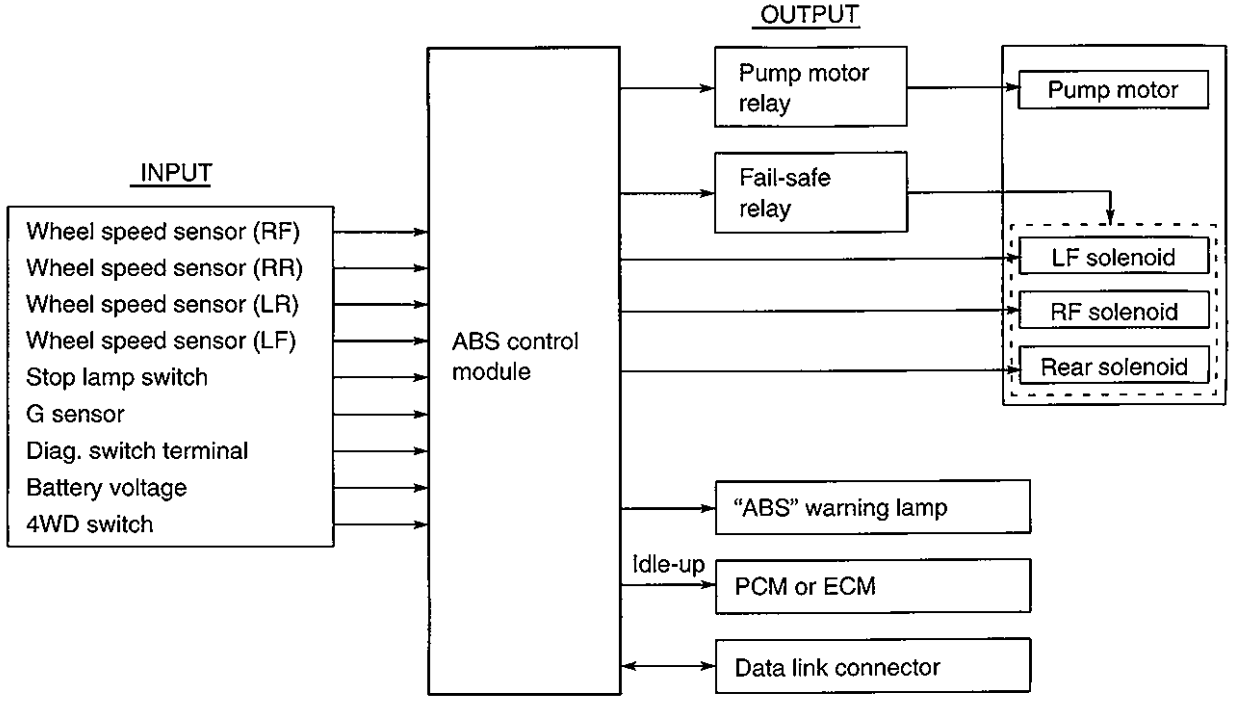


1. Front disk brake
2. P (Proportioning) / Differential valve
3. Rear drum brake
4. ABS hydraulic unit/control module assembly (with ABS pump motor relay and fail-safe relay)
5. Brake master cylinder/Reservoir

SYSTEM SCHEMATIC

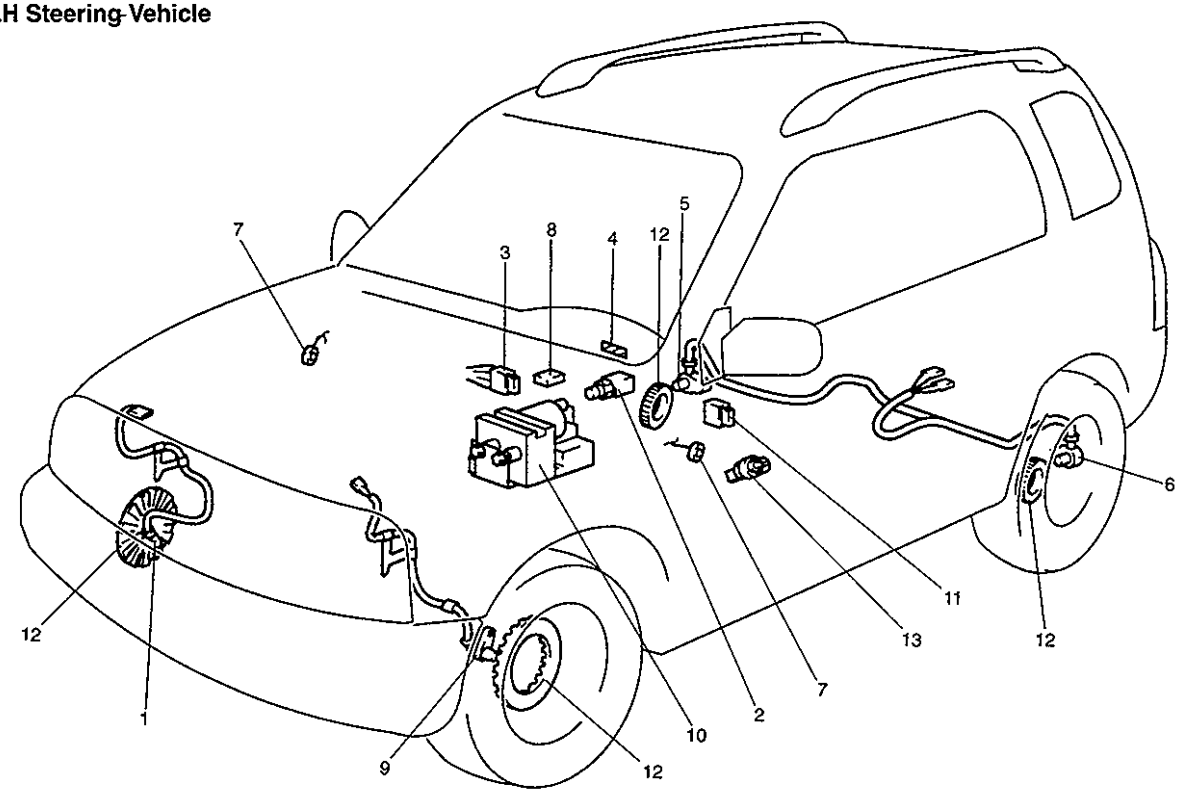


1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. ABS control module
4. Wheel speed sensor (Right-rear)
5. Diagnosis connector
6. Data link connector
7. Wheel speed sensor (Left-rear)
8. "ABS" warning lamp
9. ABS pump motor relay
10. ABS fail-safe relay (Solenoid valve relay)
11. Proportioning valve
12. Wheel speed sensor (Left-front)
13. ABS hydraulic unit
14. G sensor
15. 4WD switch
16. ABS hydraulic unit/control module assembly (with ABS pump motor & fail-safe relays)

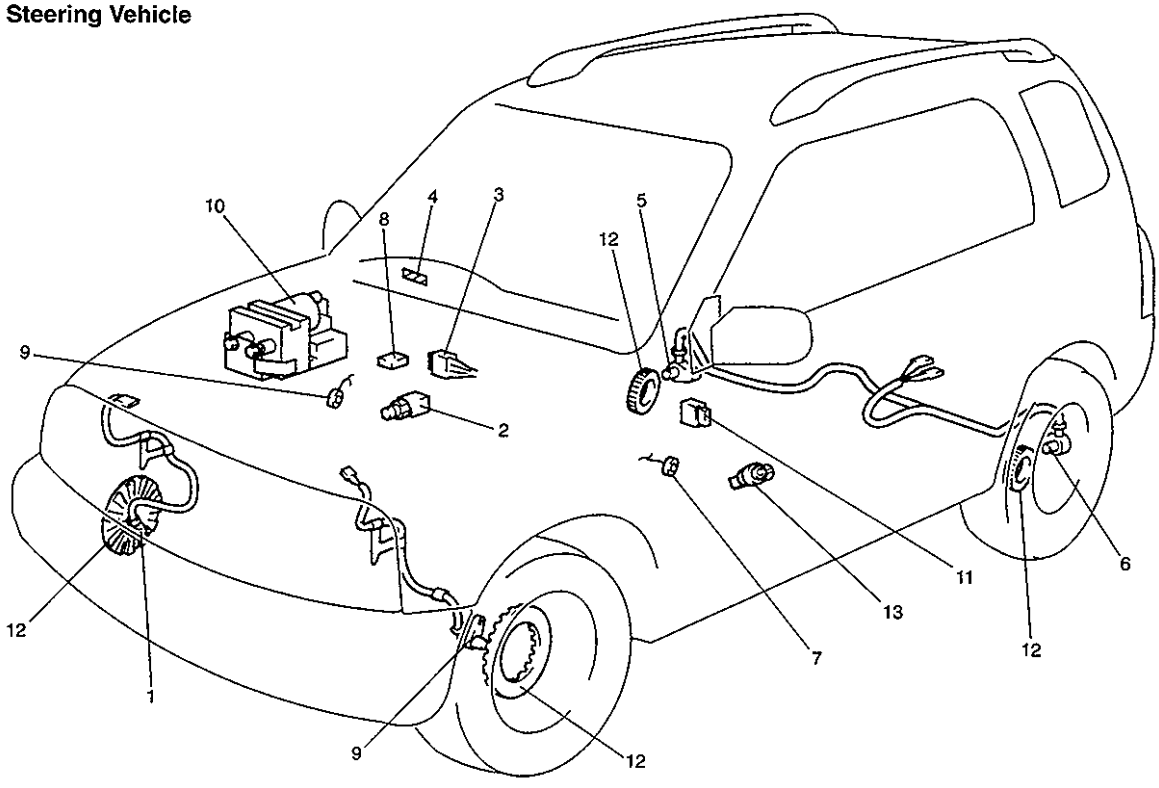


ABS COMPONENT PARTS LOCATION

For LH Steering Vehicle



For RH Steering Vehicle



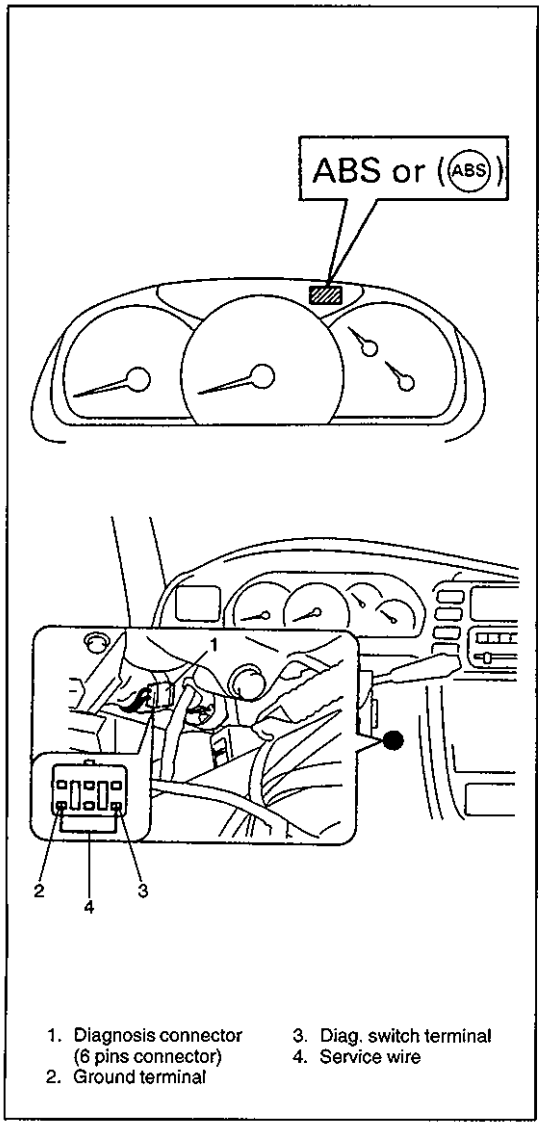
1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. Data link connector
4. "ABS" warning lamp
5. Wheel speed sensor (Right-rear)
6. Wheel speed sensor (Left-rear)
7. Ground
8. Diagnosis connector (Black connector)
9. Wheel speed sensor (Left-front)
10. ABS hydraulic unit/control module assembly (with ABS pump motor relay and fail-safe relay)
11. G sensor
12. Wheel speed sensor rotor (ring)
13. 4WD switch

ABS CONTROL MODULE

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 as described below.

1) When ignition switch is turned ON, "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 ON (more than one wheel speed sensor signals are inputted), solenoid valves and motor 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.
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 Diag. switch terminal of diagnosis connector (monitor connector) is grounded, the abnormal area is output as DTC. It is indicated by flashing of "ABS" warning lamp. (Refer to the table below.)



1. Diagnosis connector (6 pins connector)
2. Ground terminal
3. Diag. switch terminal
4. Service wire

SYSTEM CONDITION		ABS WARNING LAMP	
		Diag. switch terminal is not grounded	Diag. switch terminal is grounded
In good condition at present	No trouble in the past	OFF	DTC 12
	Trouble occurred in the past	OFF	History DTC
Abnormality exists at present	No trouble in the past	ON	Current DTC
	Trouble occurred in the past	ON	Current and history DTCs

For procedure to clear all DTC's, refer to the item "Diagnostic Trouble Code Clearance" in this section.

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 "GENERAL INFORMATION" section 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 diag. 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 cleaned diagnostic trouble code. Is trouble recur?	Go to step 7.	END.
5	Inspect and repair referring to DIAGNOSIS in "BRAKE" section. Then perform final confirmation test after cleaned diagnostic trouble code. Is trouble recur?	Go tp 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 3. Then perform final confirmation test after cleaned 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.

1-1. 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 questionnaire 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 ( )

1-2. PROBLEM SYMPTOM CONFIRMATION

Check if what the customer claimed in CUSTOMER QUESTIONNAIRE 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".

1-3. DIAGNOSTIC TROUBLE CODE (DTC) CHECK, RECORD AND CLEARANCE

Perform "Diagnostic Trouble Code Check" as shown below, 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, attempt to diagnose the trouble based on the DTC recorded in this step may mislead the diagnosis or make diagnosing difficult. Proceed to Step 2 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, proceed to Step 3.

2. DRIVING TEST

Test drive the vehicle at 40 km/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 ON, driving test as described in above is not necessary. Proceed to Step 3.

3. DIAGNOSTIC TROUBLE CODE CHECK

Recheck diagnostic trouble code referring to item "DTC CHECK" as shown below.

4. DIAGNOSTIC TROUBLE CODE FLOW CHART

According to Diagnostic flow table for the diagnostic trouble code confirmed in Step 3, 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.

5. "DIAGNOSIS" IN "BRAKE" SECTION

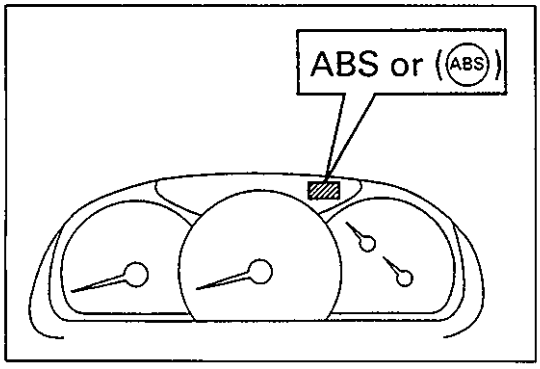
Check the parts or system suspected as a possible cause referring to "Diagnosis" in "BRAKE" section and based on symptoms appearing on the vehicle (symptoms obtained through Steps 1-1, 1-2 and 2 and repair or replace faulty parts, if any.

6. 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 "GENERAL INFORMATION" section and related circuit of trouble code recorded in Step 1-3.

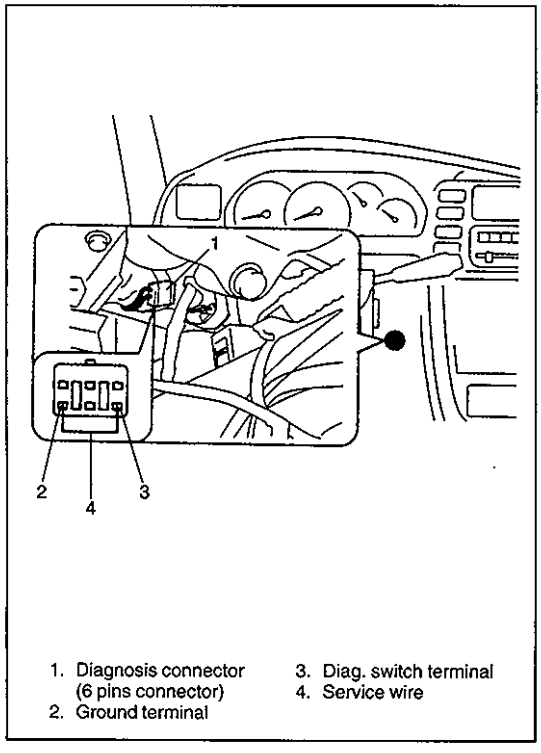
7. FINAL CONFIRMATION TEST

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 ON the ignition switch and check that "ABS" warning lamp lights for about 2 seconds and then goes OFF.
If anything faulty is found, advance to Diagnostic table – A, B or C.

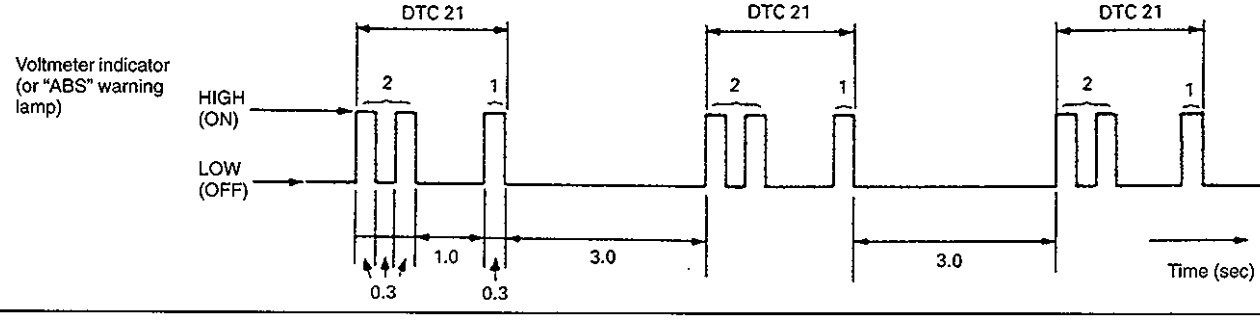


1. Diagnosis connector (6 pins connector)
2. Ground terminal
3. Diag. switch terminal
4. Service wire

DIAGNOSTIC TROUBLE CODE (DTC) CHECK (USING "ABS" WARNING LAMP)

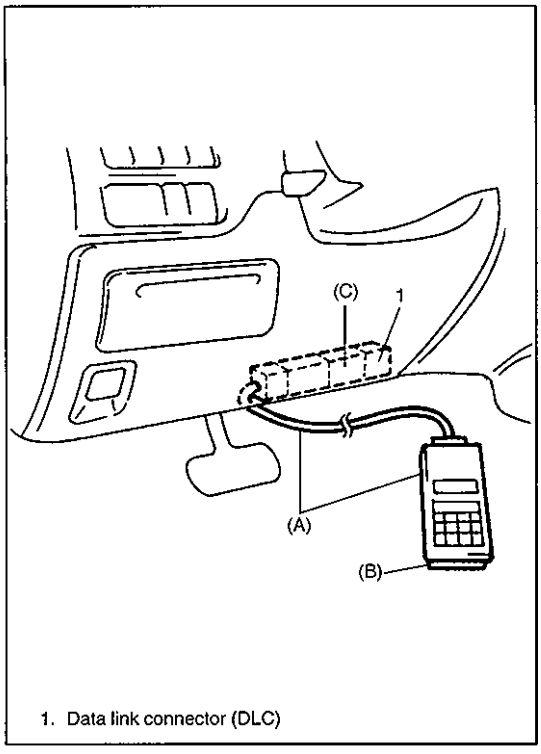
1) Using service wire, connect diag. switch terminal of diagnosis connector to ground.
2) Turn ignition switch ON.
3) Read flashing of "ABS" warning lamp which represents DTC as shown in example below and write it down. When more than 2 DTC's are stored in memory, deflection and flashing for each DTC 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 following DTC's, 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 off and disconnect service wire from DIAG. connector.



1. Data link connector (DLC)

DTC CHECK (USING SCAN TOOL, TECH-1)

1) After setting cartridge for ABS to Tech-1, connect Tech-1 to data link connector.

   Special Tool
   (A): 09931-76011 (Tech-1, scan tool)
   (B): Cartridge for ABS
   (C): 09931-96020
   (16/12 pin DLC adapter)

2) Turn ignition switch ON.
3) Read DTC according to instructions displayed on Tech-1 and print it or write it down. Refer to Tech-1 operator's manual for further details.
4) After completing the check, turn ignition switch off and disconnect Tech-1 from DLC.



1. Diagnosis connector (6 pins connector)
2. Ground terminal
3. Diag. switch terminal
4. Service wire

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

WARNING:
When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.

After repair or replace malfunction part(s), clear all DTC's by performing the following procedure.

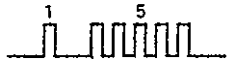
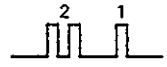
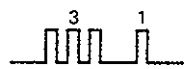
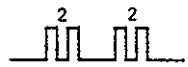
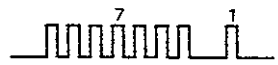
1) Turn ignition switch OFF.
2) Using service wire, connect diag. switch terminal of diag. connector to diag. ground terminal.
3) With connection described in above step 2) maintained, turn ignition switch ON.
4) Repeat on/off operation of service wire at diag. ground terminal at least 5 times within 10 seconds.

   NOTE:
   Service wire ON time must be for 0.1 second and more.

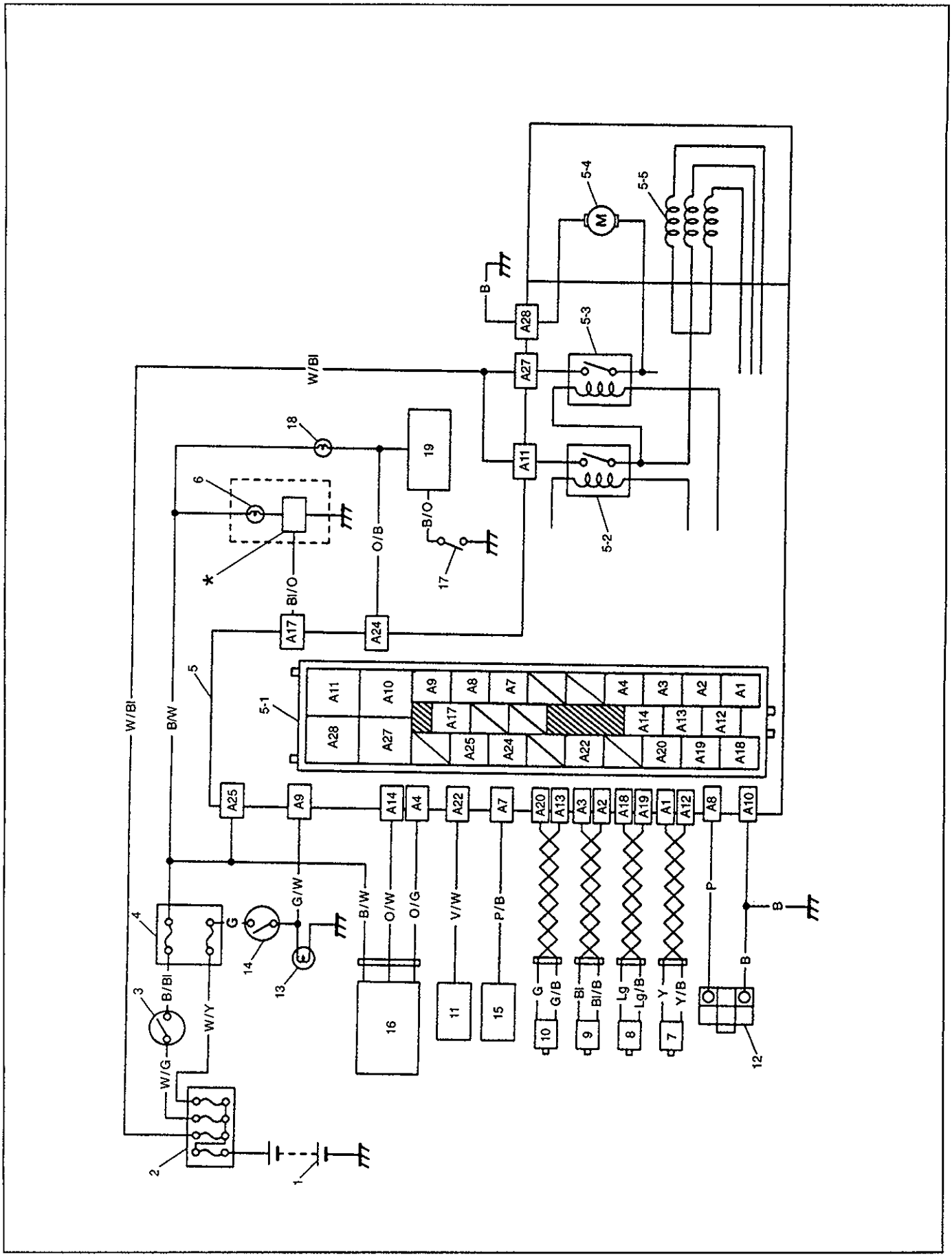
5) Turn ignition switch OFF and disconnect service wire from diag. connector.
6) Perform DRIVING TEST and DTC CHECK and confirm that normal DTC (DTC 12) is displayed; not malfunction DTC.

NOTE:
It is also possible to clear DTC by using Tech-1. Refer to Cartridge Manual for procedure to clear DTC.

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC	VOLTMETER INDICATION (or "ABS" warning lamp flashing pattern)	DIAGNOSTIC AREA	
15		G sensor (if equipped) or ABS control module	
18		Wheel speed sensor and/or rotor or hydraulic unit	
21		Right-front	Wheel speed sensor circuit and rotor
25		Left-front	
31		Right-rear	
35		Left-rear	
22		Right-front	
26		Left-front	
32		Right-rear	
36		Left-rear	
41		Right-front	Solenoid (in hydraulic unit) circuit
45		Left-front	
56		Rear	
57		Solenoid and pump motor power source circuit	
61		ABS pump motor (in hydraulic unit) circuit	
63		ABS fail-safe relay circuit	
71		ABS control module	
12		Normal	

SYSTEM CIRCUIT



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. PCM (ECM+TCM) or ECM
16. G sensor
17. 4WD switch
18. 4WD indicator lamp
19. 4WD controller

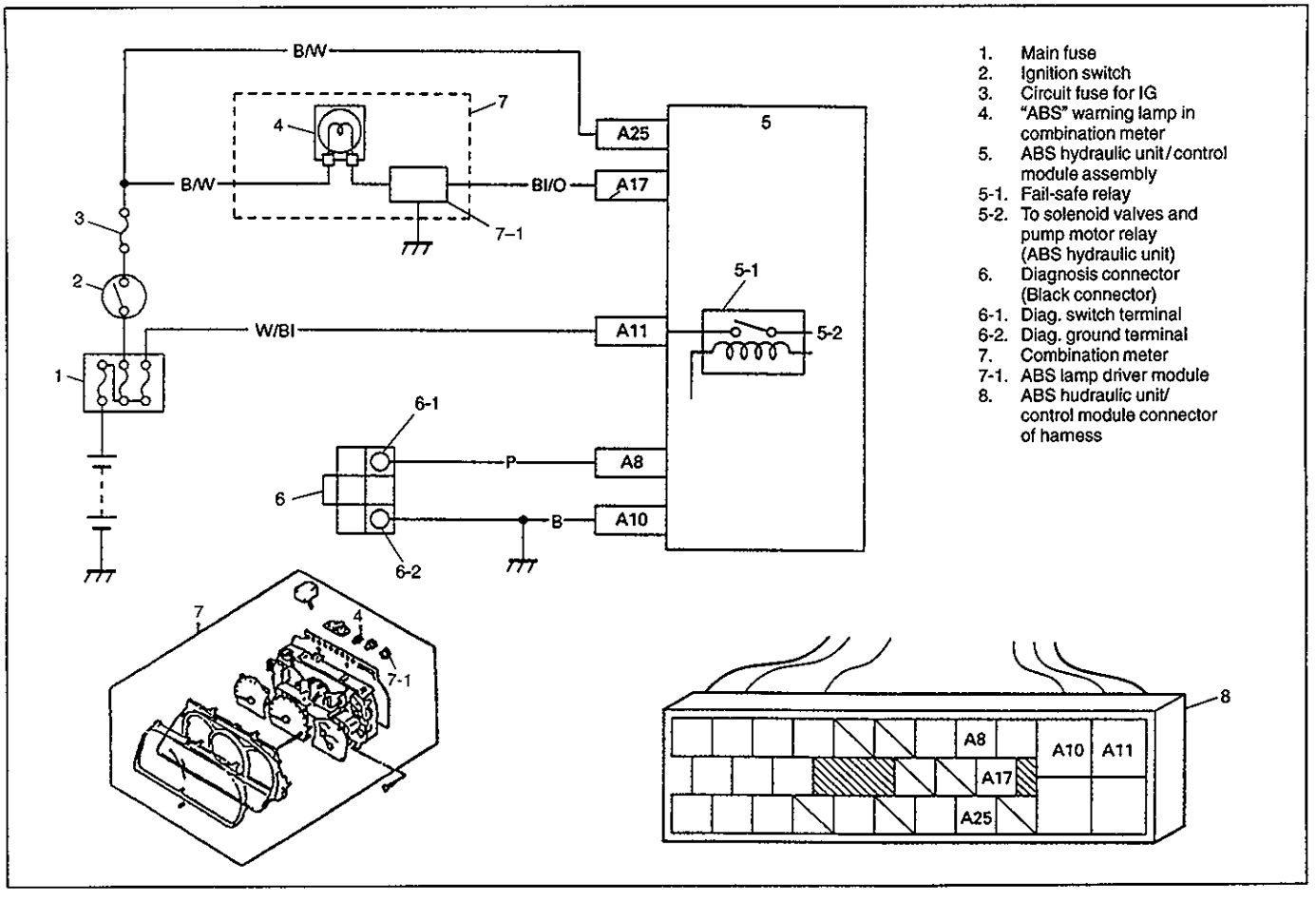
*: ABS lamp driver module
It is a module to turn on ABS warning lamp under the following conditions;
- each terminals "A25", "A17" and "A10" of ABS hydraulic unit/control module connector isn't connected,
- fuse has blown,
- each wire ("B/W", "Bl/O" and "B") is open.

Wire color

B : Black
B/Bl : Black/Blue
B/O : Black/Orange
B/W : Black/White
Bl : Blue
Bl/B : Blue/Black
Bl/O : Blue/Orange
G : Green
G/B : Green/Black
G/W : Green/White
Lg : Lightgreen
Lg/B : Lightgreen/Black
O/B : Orange/Black
O/G : Orange/Green
O/W : Orange/White
P : Pink
P/B : Pink/Black
V/W : Violet/White
W/Bl : White/Blue
W/G : White/Green
W/Y : White/Yellow
Y : Yellow
Y/B : Yellow/Black

TERMINAL	CIRCUIT
A1	Right-rear wheel speed sensor (+)
A2	Right-front wheel speed sensor (–)
A3	Right-front wheel speed sensor (+)
A4	G sensor ground
A5	———
A6	———
A7	Idle up signal
A8	Diagnosis switch terminal
A9	Stop lamp switch
A10	Ground (For ABS control module)
A11	ABS fail-safe relay
A12	Right-rear wheel speed sensor (–)
A13	Left-front wheel speed sensor (–)
A14	G sensor signal
A15	———
A16	———
A17	"ABS" warning lamp
A18	Left-rear wheel speed sensor (+)
A19	Left-rear wheel speed sensor (–)
A20	Left-front wheel speed sensor (+)
A21	———
A22	Data link connector
A23	———
A24	4WD switch
A25	Ignition switch
A26	———
A27	ABS pump motor relay
A28	Ground (For ABS pump motor)

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 in combination meter
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 (Black connector)
6-1. Diag. switch terminal
6-2. Diag. ground terminal
7. Combination meter
7-1. ABS lamp driver module
8. ABS hudraulic unit/ control module connector of hamess

CIRCUIT DESCRIPTION

Operation (ON/OFF) of the "ABS" warning lamp is controlled by the ABS control module.

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 lamp driver module 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 4.
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) Remove combination meter. Is bulb of ABS warning lamp in good condition?	"BI/O" circuit shorted to ground. If OK, replace ABS lamp driver module.	Replace bulb.
4	Is IG fuse in good condition?	Open in "B/W" wire to combination meter or poor connection.	Repair and replace.

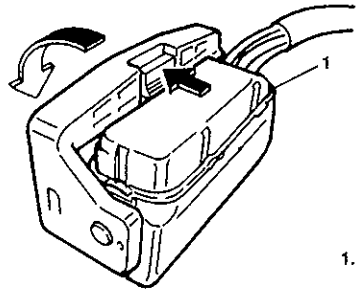
TABLE – B "ABS" WARNING LAMP CIRCUIT CHECK – LAMP COMES "ON" STEADY

Refer to TABLE – A for System Circuit Diagram and Circuit Description.

INSPECTION

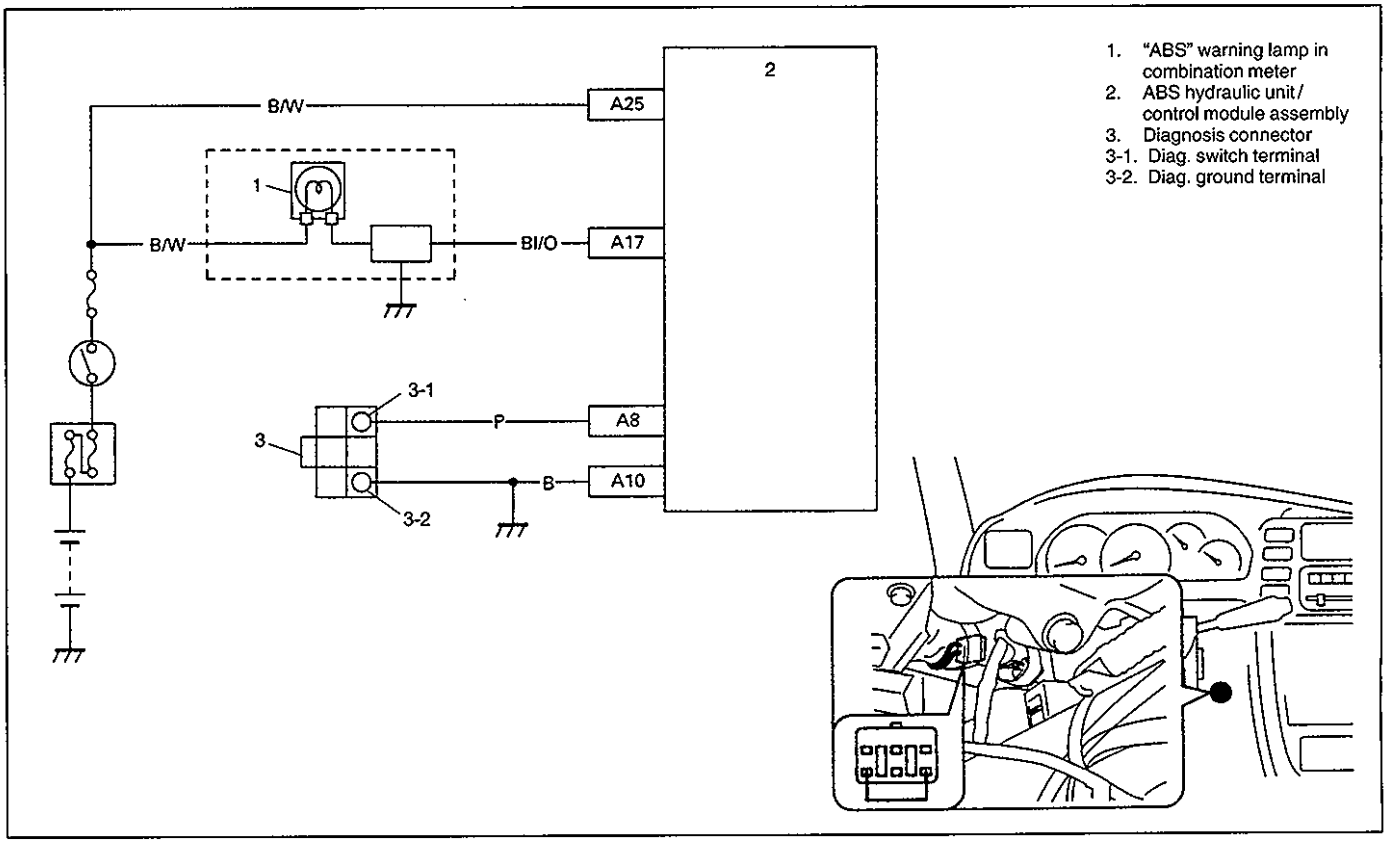
STEP	ACTION	YES	NO
1	Perform diagnostic trouble code check. Is there any DTC (including code No.12, NO CODES on tech-1) exists?	Go to step 2.	Go to step 4.
2	Is malfunction DTC (other than code No.12) exists at step 1?	Go to step 7 of ABS diagnostic flow table in this section.	Go to step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. (See Fig. 1) 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals "A17," "A25" and "A10". 3) If OK, turn ignition switch "ON" and measure voltage at terminal A25 of connector. Is it 10 – 14 V?	Go to step 4.	"B/W" circuit open.
4	1) With ABS control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal "A17" of disconnected connector to ground using service wire. Does "ABS warning lamp" turn off?	Go to step 5.	"BI/O" circuit open. If wire and connection are OK, replace ABS lamp driver module.
5	1) Measure resistance from connector terminal "A10" to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit control module assembly and recheck.	"B" circuit open.

Fig. 1



1. ABS hydraulic unit/control module connector

TABLE – C "ABS" WARNING LAMP CIRCUIT CHECK – THE LAMP FLASHES CONTINUOUSLY WHILE IGNITION SWITCH IS ON



CIRCUIT DESCRIPTION

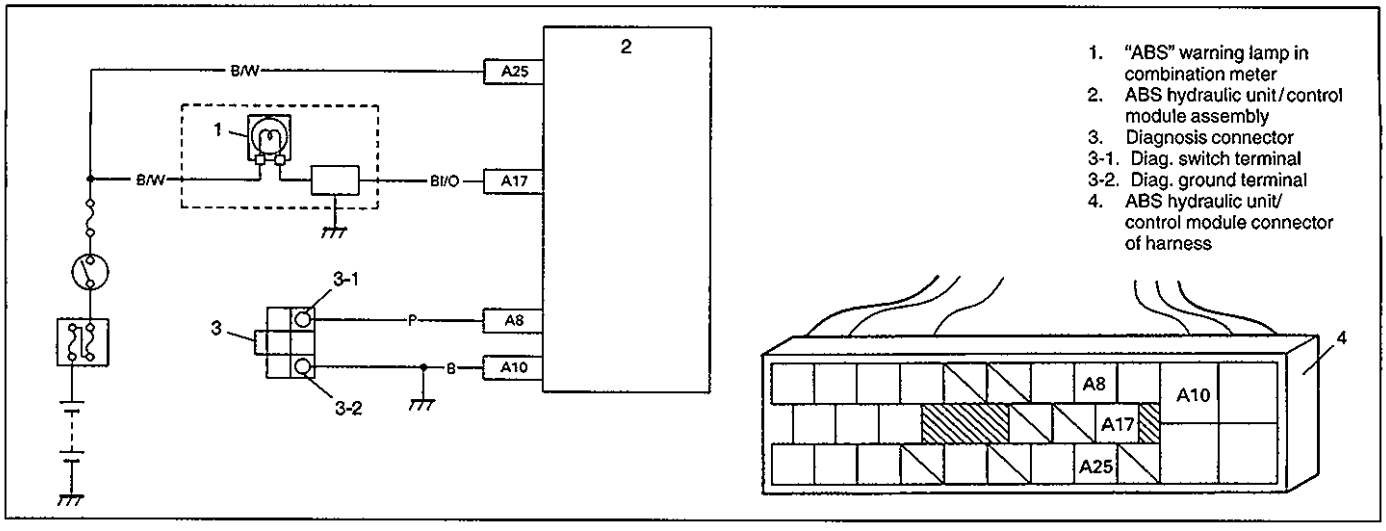
When the diag. switch terminal is shorted or connected to the ground with the ignition switch ON, the diag. trouble code (DTC) is indicated by flashing of the "ABS" warning lamp only in following cases.

- 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 connected to ground via service wire?	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.	"P" 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.

TABLE – D CODE (DTC) IS NOT OUTPUTTED EVEN WITH DIAG. SWITCH TERMINAL CONNECTED TO GROUND.



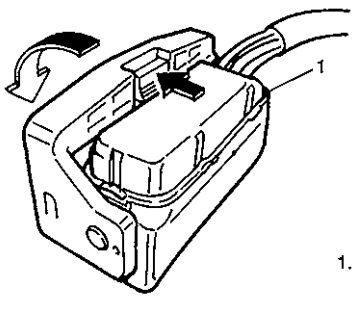
CIRCUIT DESCRIPTION

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

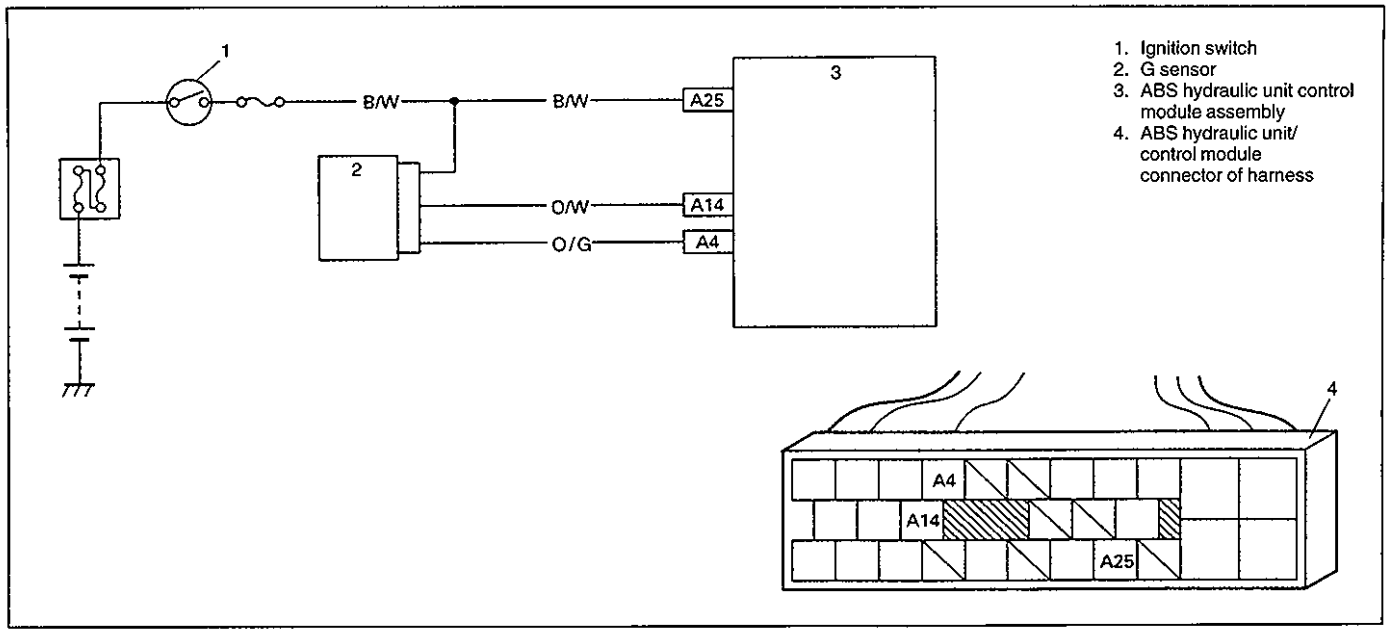
STEP	ACTION	YES	NO
1	Is it shorted diag. switch terminal and ground terminal by service wire properly?	Go to step 2.	Connect service wire securely.
2	1) Disconnect service wire. 2) Disconnect ABS hydraulic unit/control module connector. (See Fig. 1) 3) Measure resistance between diag. switch terminal and connector terminal "A8". Is it infinite (∞)?	"P" circuit open.	Go to step 3.
3	1) Measure resistance between ground terminal of monitor connector and body ground. Is continuity indicated?	Go to step 4.	"B" circuit open or poor connection.
4	1) Check for proper connection to ABS hydraulic unit/control module at terminal "A8" and "A10". 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 with/control module assembly and recheck.	Repair "ABS" warning lamp circuit.

Fig. 1



1. ABS hydraulic unit/control module connector

DTC 15 – G SENSOR CIRCUIT



DESCRIPTION

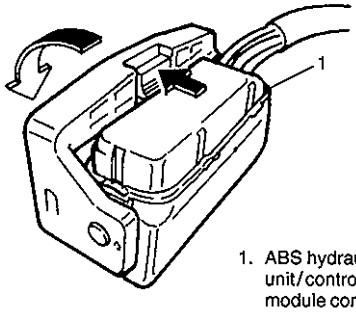
While a vehicle is at stop or running, if the potential difference between the sensor signal terminal "A14" and the sensor ground terminal "A4" is not within the specified voltage value, or if the signal voltage while at a stop does not vary from that while running, this DTC is set.

Therefore, this DTC may be set when a vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.

INSPECTION

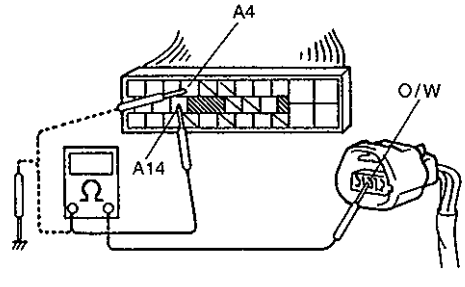
STEP	ACTION	YES	NO
1	Is G sensor installed floor securely?	Go to step 2.	Tighten sensor or bracket screw securely. If not, using new screw.
2	1) Ignition switch OFF. 2) Remove G sensor with bracket. 3) Check for proper connection to G sensor. 4) If OK then check G sensor referring to item INSPECTION of G sensor. 5) Is it in good condition?	Go to step 3.	Replace G sensor.
3	1) Disconnect connectors from ABS hydraulic unit/control module assembly (See Fig. 1) and G sensor. 2) Check for proper connection to ABS control module at terminals A14 and A4. 3) If OK, then turn ignition switch ON and measure voltage between B/W terminal of sensor connector and body ground. Is it 10 – 14 V?	Go to step 4.	"B/W" circuit open.
4	Measure voltage between "O/W" terminal of sensor connector and body ground. Is it 0 V?	Go to step 5.	"O/W" circuit shorted to power circuit.
5	1) Ignition switch OFF. 2) Check that "O/W" circuit is free from open or short to ground and "O/G" circuit. Is it in good condition? (See Fig. 2)	"O/G" circuit open. If circuit is OK, substitute a known-good ABS hydraulic unit/control module assembly.	"O/W" circuit open or shorted to ground or "O/G" circuit.

Fig. 1

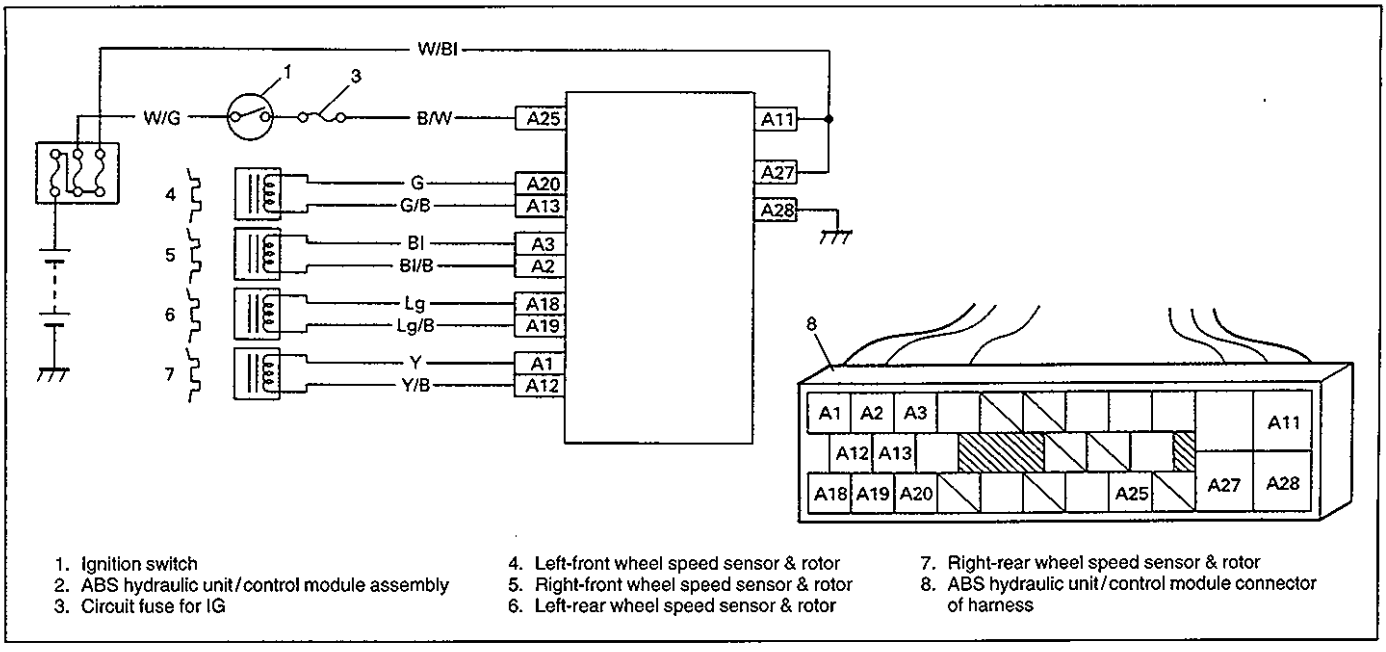


1. ABS hydraulic unit/control module connector

Fig. 2



DTC 18 – WHEEL SPEED SENSOR/ROTOR OR ABS HYDRAULIC UNIT



1. Ignition switch
2. ABS hydraulic unit/control module assembly
3. Circuit fuse for IG
4. Left-front wheel speed sensor & rotor
5. Right-front wheel speed sensor & rotor
6. Left-rear wheel speed sensor & rotor
7. Right-rear wheel speed sensor & rotor
8. ABS hydraulic unit/control module connector of harness

DESCRIPTION

When no other malfunction DTC is detected and ABS control is performed for longer than approx. 1 minute continuously, this DTC will be set.

INSPECTION

STEP	ACTION	YES	NO
1	1) Remove all speed sensors. 2) Check each sensor for damage or foreign material being attached to it. Are they in good condition? See Fig. 1	Go to step 2.	Clean or replace.
2	Check visually all wheel speed sensor installation hole for the following. ● Rotor serration (teeth) neither missing nor damaged. ● No foreign material attached. ● Rotor not being eccentric. ● Wheel bearing free from excessive play. Are they in good condition? See Fig. 2	Go to step 3.	Clean repair or replace.
3	1) Install each speed sensor to each knuckle and/or axle housing. 2) Tighten each sensor bolt to specified torque. Is there any clearance between sensor and knuckle or axle housing? (See Fig. 3)	Replace sensor.	Go to step 4.
4	Referring to item OUTPUT VOLTAGE INSPECTION of FRONT WHEEL SPEED SENSOR, check output voltage or waveform of each sensor. Is proper output voltage or waveform available?	Go to step 5.	Replace sensor and recheck.
5	Referring to item ABS HYDRAULIC UNIT OPERATION CHECK in this section, check ABS hydraulic unit. Is it in good condition?	Substitute a known-good ABS hydraulic unit/ control module assembly and recheck.	Replace ABS, hydraulic unit/ control module assembly.

Fig. 1

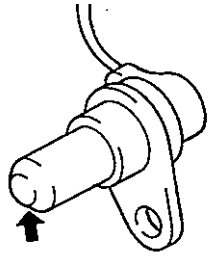


Fig. 2

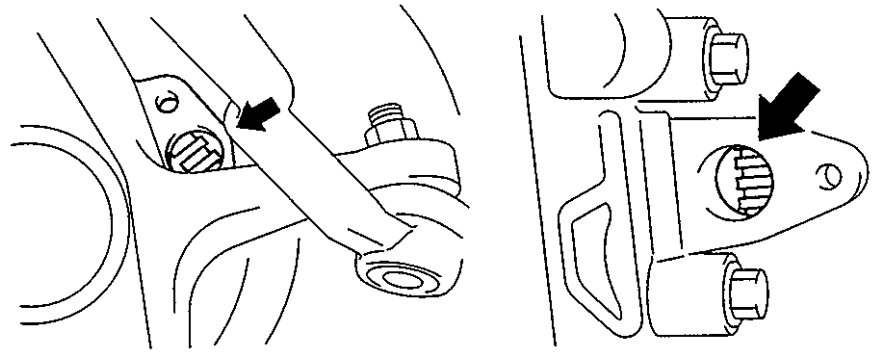
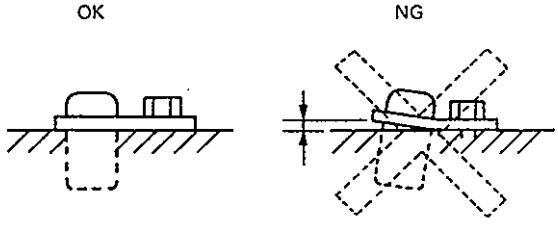
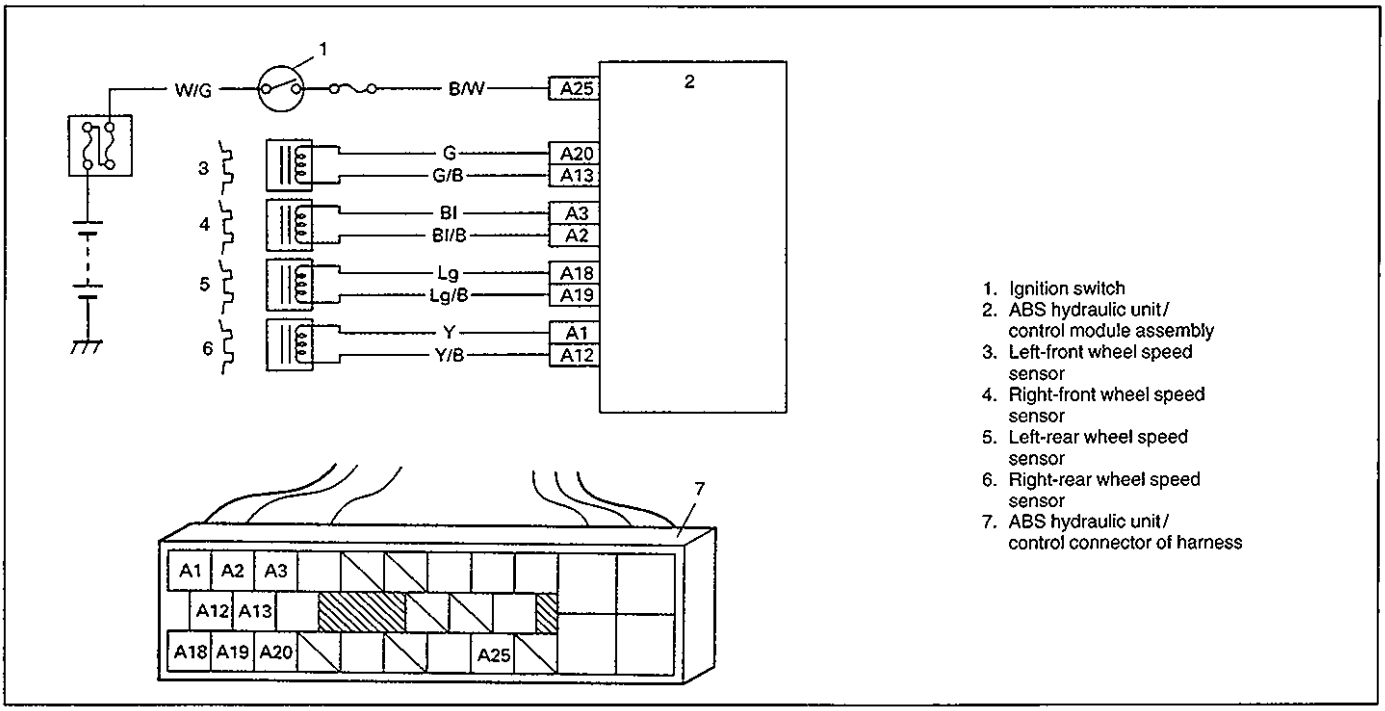


Fig. 3



DTC 21, 22 – RIGHT-FRONT WHEEL SPEED SENSOR CIRCUIT
25, 26 – LEFT-FRONT WHEEL SPEED SENSOR CIRCUIT
31, 32 – RIGHT-REAR WHEEL SPEED SENSOR CIRCUIT
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. 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 DIAG. 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 kΩ (at 20°C, 68°F) 3) Measure resistance between each terminal and body ground. Insulation resistance: 1MΩ 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 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 0V?	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 serration (teeth) 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

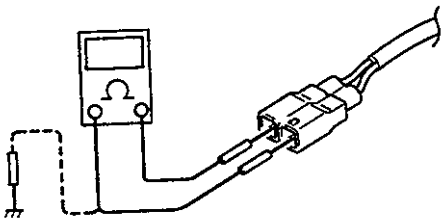
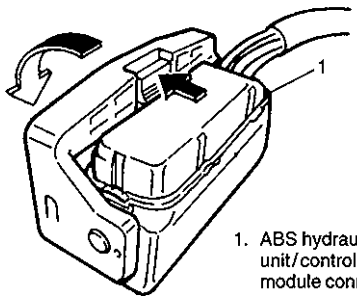


Fig. 2



1. ABS hydraulic unit/control module connector

Fig. 3

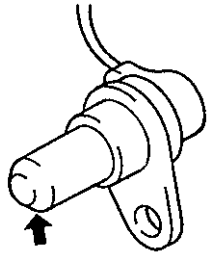


Fig. 4

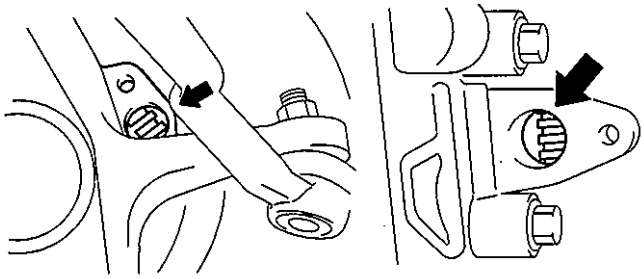
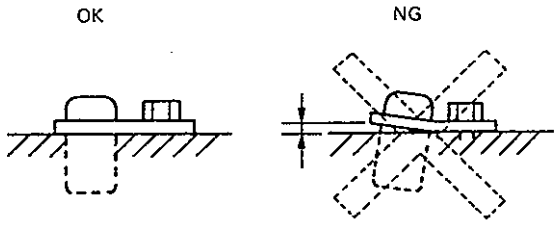
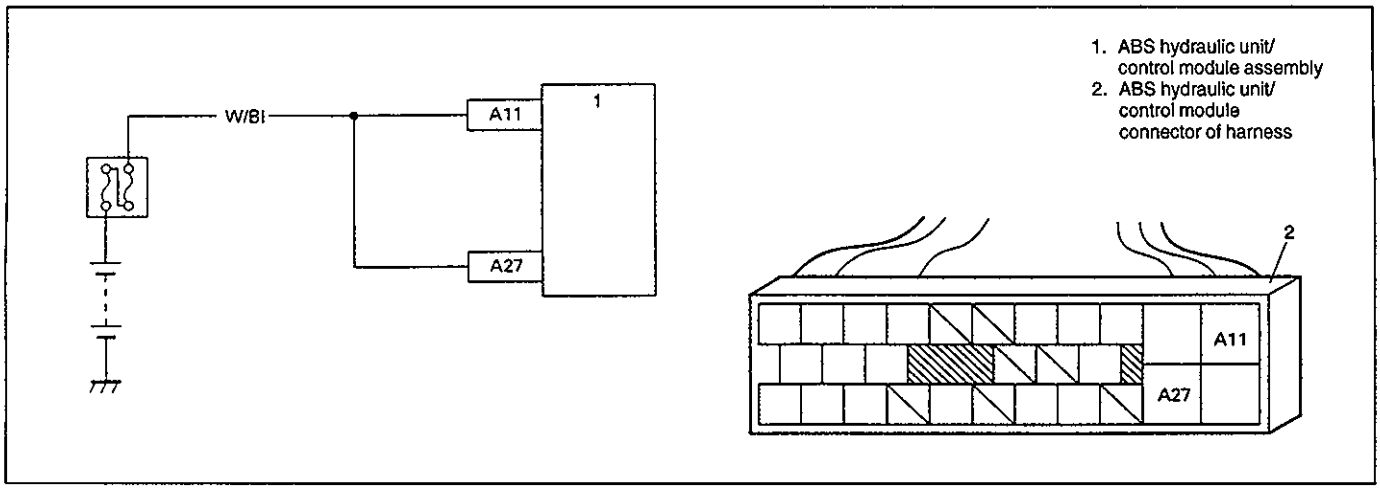


Fig. 5



DTC 41 – RIGHT-FRONT SOLENOID CIRCUIT
45 – LEFT-FRONT SOLENOID CIRCUIT
56 – REAR SOLENOID CIRCUIT



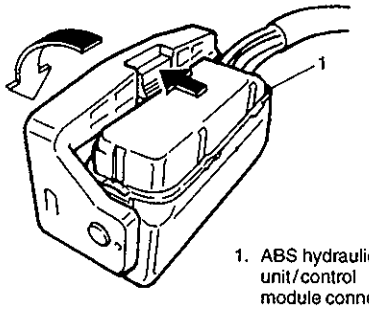
DESCRIPTION

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

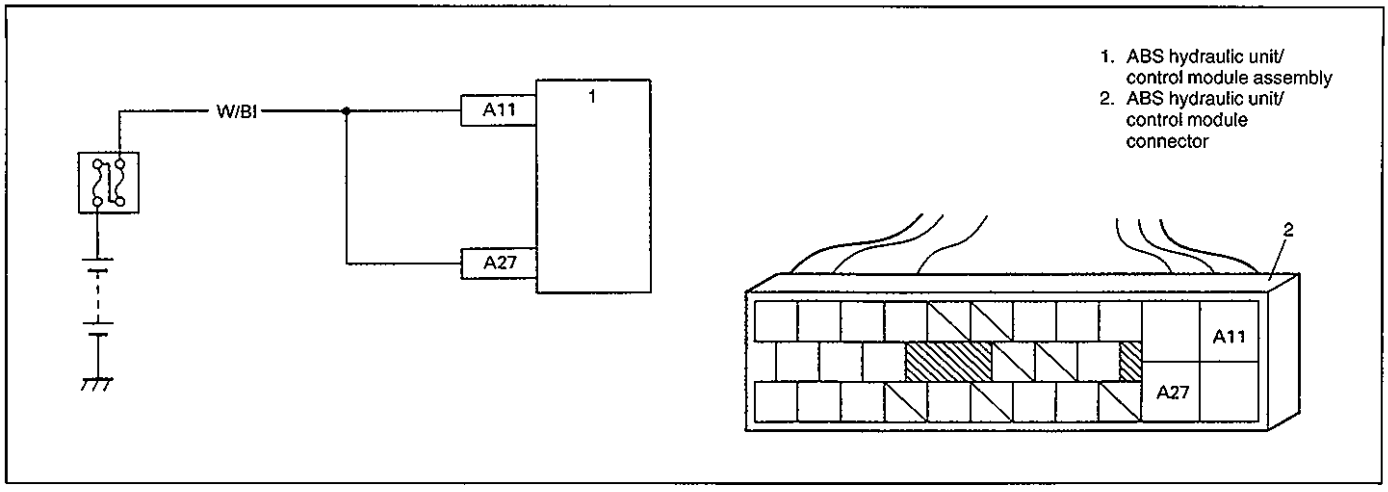
STEP	ACTION	YES	NO
1	1) Check solenoid referring to item "ABS HYDRAULIC UNIT OPERATION CHECK" in this section. Is it in good condition?	Check terminals "A11" and "A27" connection. If connections OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to step 2.
2	1) Ignition switch "OFF". 2) Disconnect ABS hydraulic unit/control module connector. (See Fig. 1) 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "A11". 4) If OK, then measure voltage between terminal "A11" of module connector and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"W/Bl" circuit open.

Fig. 1



1. ABS hydraulic unit/control module connector

DTC 57 – SOLENOID AND PUMP MOTOR POWER SOURCE CIRCUIT



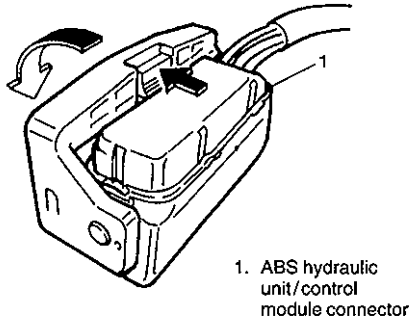
DESCRIPTION

The ABS control module monitors the voltage at terminal ("A11" and "A27") 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 "A27" 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

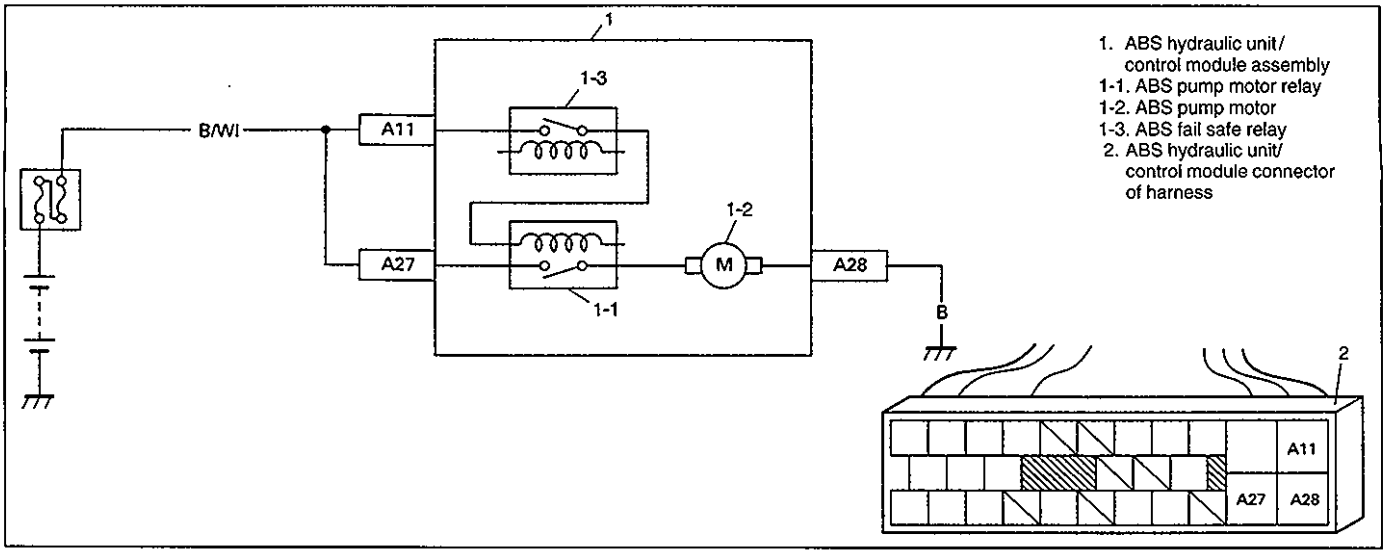
STEP	ACTION	YES	NO
1	Check battery voltage. Is it about 11 V or higher?	Go to step 2.	Check charging system referring to "CHARGING SYSTEM" section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to step 3.	Repair and/or replace fuse.
3	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. (See Fig. 1) 3) Check proper connection to ABS hydraulic unit/ control module connector at terminal A27. 4) If OK, then measure voltage between connector terminal A27 and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"W/Bl" circuit open.

Fig. 1



1. ABS hydraulic unit/control module connector

DTC 61 – ABS PUMP MOTOR CIRCUIT



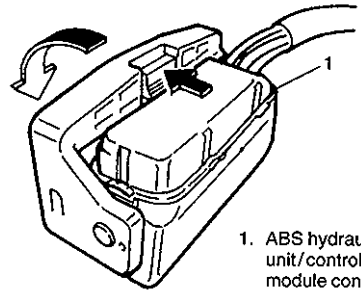
DESCRIPTION

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).

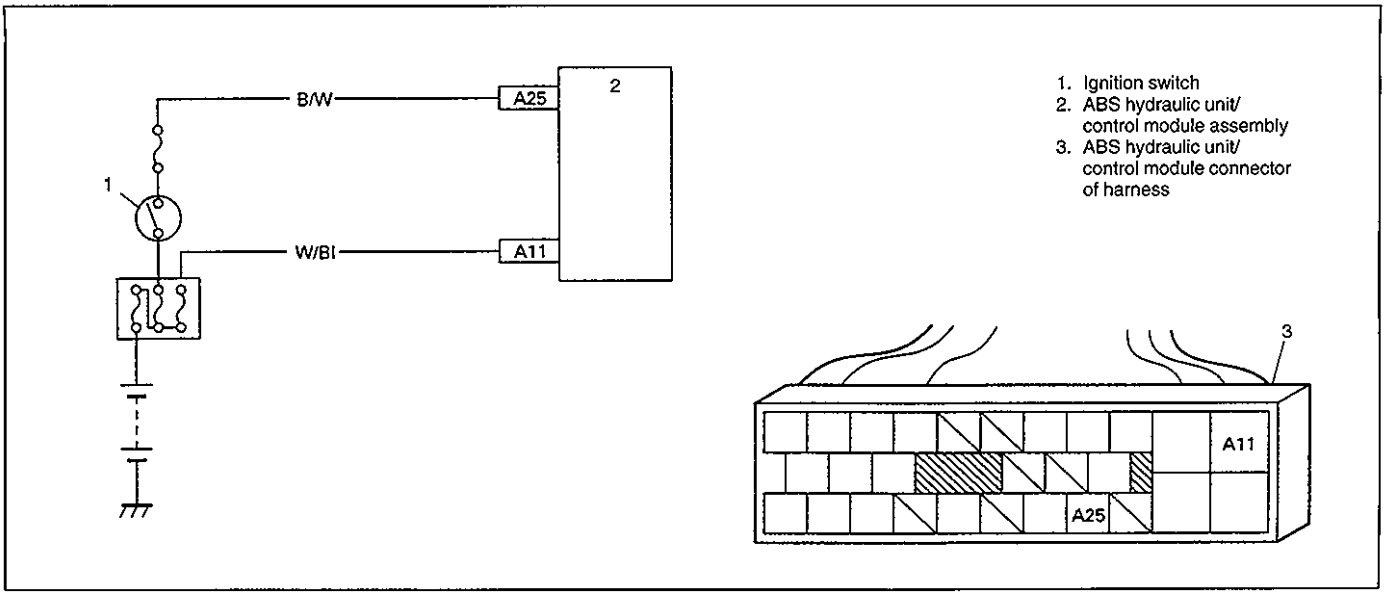
INSPECTION

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 "A11" and "A27" 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. (See Fig. 1) 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal "A27". 4) If OK, then measure voltage between terminal "A27" of module connector and body ground. Is it 10 – 14V?	Go to step 3.	"W/Bl" circuit open.
3	Measure resistance between connector terminal "A28" of ABS hydraulic unit/control module assembly. Is it infinite (∞)?	"B" circuit open.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

Fig. 1



DTC 63 – ABS FAIL-SAFE RELAY CIRCUIT



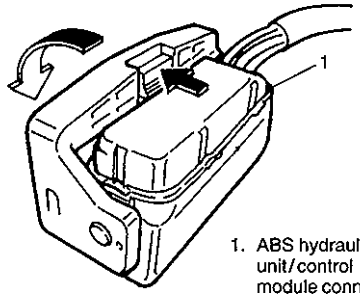
DESCRIPTION

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 3 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. (See Fig. 1) 3) Check proper connection to ABS hydraulic unit/ control module at terminal "A11". 4) If OK, then measure voltage between connector terminal A11, and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/ control module assembly and recheck.	"W/Bl" circuit open or short to ground.

Fig. 1



1. ABS hydraulic unit/control module connector

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.

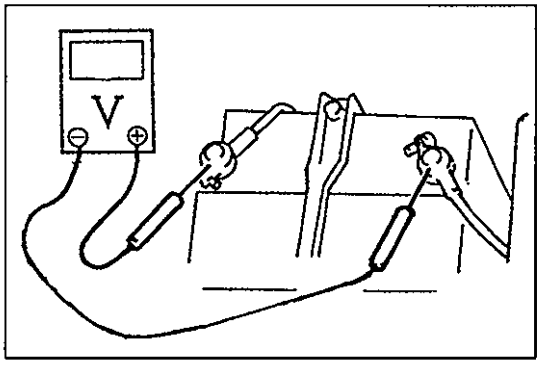
ON-VEHICLE SERVICE

PRECAUTION

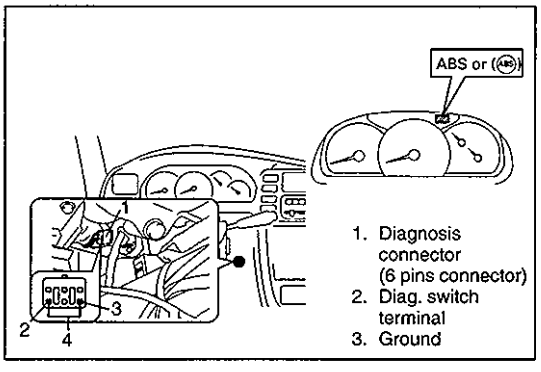
When connector are connected to ABS hydraulic unit/control module assembly, do not disconnect connectors of sensors and turn ignition switch ON. Then DTC will be set in ABS control module.

ABS HYDRAULIC UNIT OPERATION CHECK

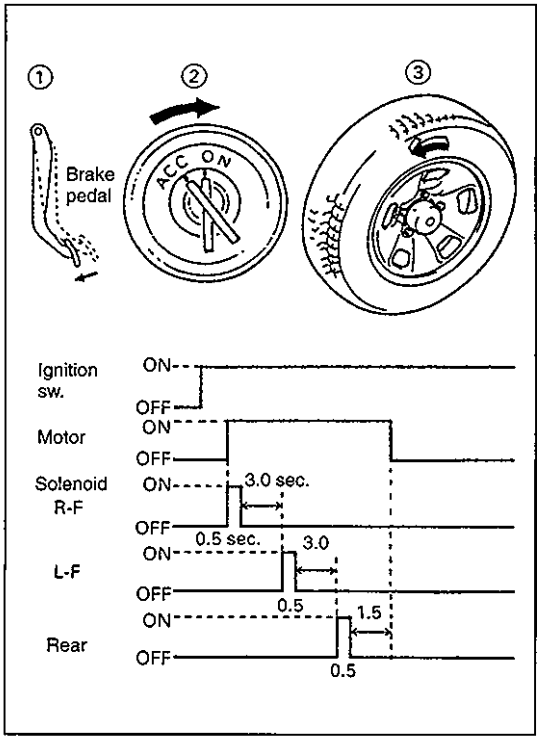
1) Check that basic brake system other than ABS is in good condition.



2) Check that battery voltage is 11V or higher.
3) With "ABS" warning lamp, check that no abnormality is detected in ABS. Refer to "DIAGNOSTIC TROUBLE CODE (DTC) 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.

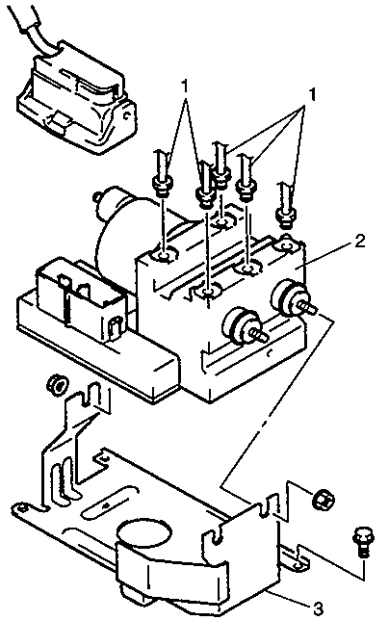


7) With diag. switch terminal of diagnosis connector connected to ground by using service wire, turn ignition switch ON and check if "ABS" warning lamp indicates DTC 12.
8) Turn ignition switch "OFF".



9) Perform following checks with help of another person.
   Brake pedal should be depressed and then ignition switch turned ON 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 Steps 8) and 9) till all 4 wheels are checked.
    If a faulty condition is found in Steps 9) and 10), replace hydraulic unit/control module assembly.
11) Turn ignition switch "OFF" and remove service wire from diagnosis connector.

ABS HYDRAULIC UNIT/CONTROL MODULE ASSEMBLY

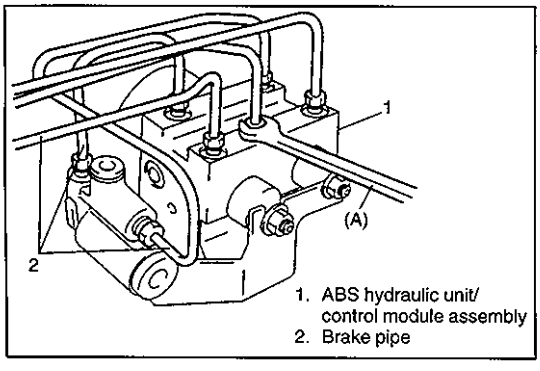


CAUTION:
Never disassemble ABS hydraulic unit/control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS hydraulic unit/control module assembly.

1. Brake pipe
2. ABS hydraulic unit/ control module assembly
3. Bracket

HYDRAULIC UNIT INSPECTION

- Check hydraulic unit for fluid leakage.
  If any, repair or replace.



1. ABS hydraulic unit/ control module assembly
2. Brake pipe

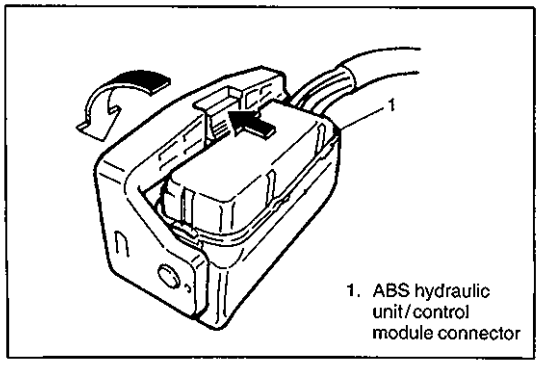
REMOVAL

1) Disconnect negative cable from battery.
2) Using special tool, disconnect brake pipes from ABS hydraulic unit/control module assembly and loosen flare nuts as shown figure.

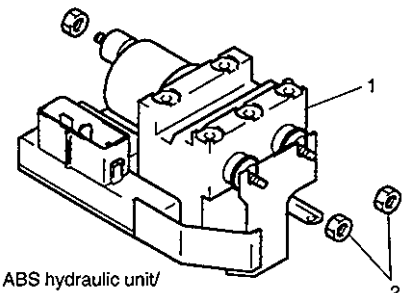
Special Tool
(A): 09950-78210

NOTE:
Put bleeder plug cap onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.

3) Disconnect ABS hydraulic unit/control module assembly connector.



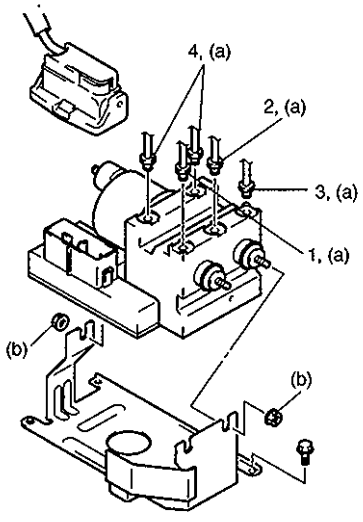
1. ABS hydraulic unit/control module connector



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 left-front
2. To right-front
3. To rear
4. From proportioning valve

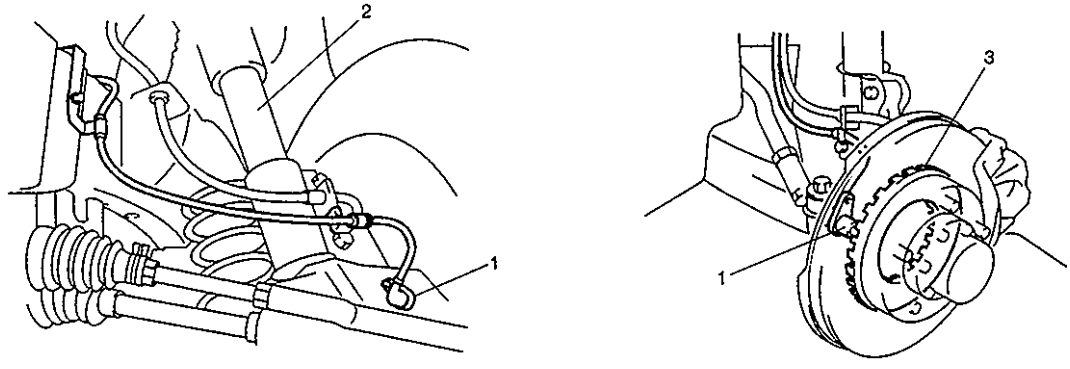
INSTALLATION

1) Install hydraulic unit by reversing removal procedure.

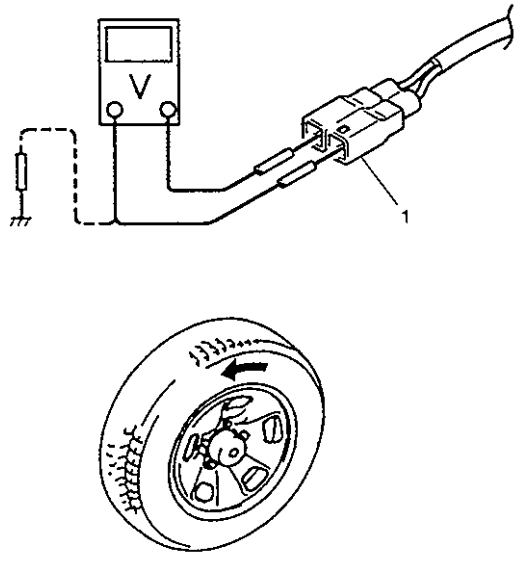
Tightening Torque
(a): 16 N·m (1.6 kg-m, 12.0 lb-ft)
(b): 21 N·m (2.1 kg-m, 15.5 lb-ft)

2) Bleed air from brake system referring to "BRAKE" section of service manual mentioned in FOREWORD of this manual.
3) Check each installed part for fluid leakage and perform hydraulic unit operation check.

FRONT WHEEL SPEED SENSOR



1. Left front wheel speed sensor
2. Left front strut
3. Sensor rotor



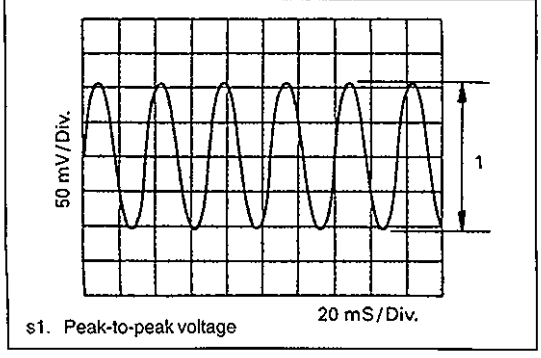
1. Wheel speed sensor connector

OUTPUT VOLTAGE INSPECTION

1) Turn ignition switch "OFF".
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 (35 – 53 Hz): 106 mV or more

If measured voltage is not as specified, check sensor, rotor and their installation conditions.

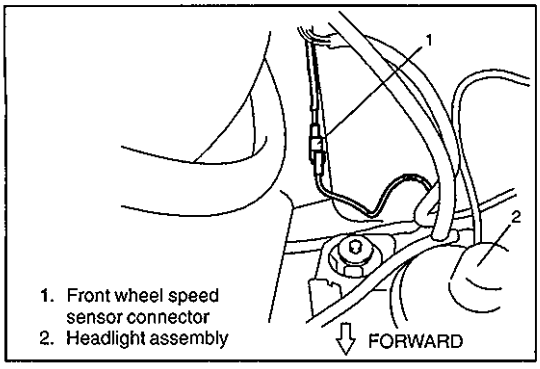


s1. Peak-to-peak voltage

Reference

When using oscilloscope for this check, check if peak-to-peak voltage meets specification and waveform is complete.

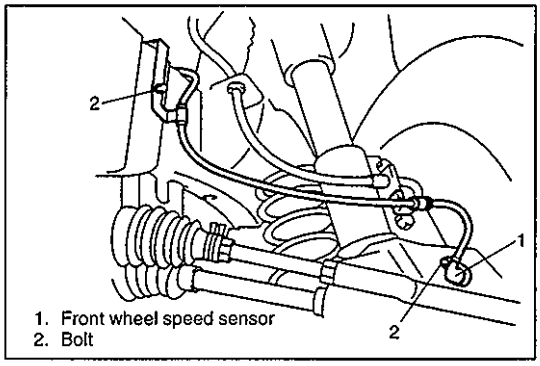
Peak-to-peak voltage at 2/3 to one rotation per second (35 – 53 Hz): 150 mV or more



1. Front wheel speed sensor connector
2. Headlight assembly

REMOVAL

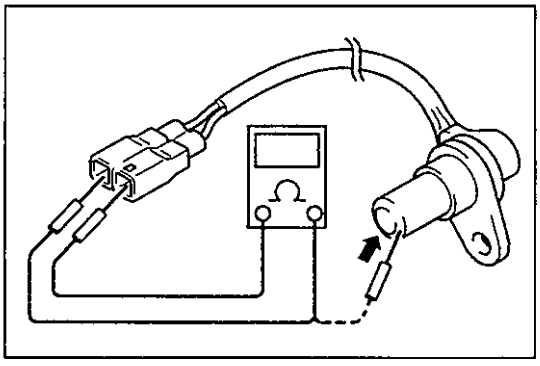
1) Disconnect negative cable from battery.
2) Hoist vehicle and remove wheel.
3) Disconnect front wheel speed sensor connector.



1. Front wheel speed sensor
2. Bolt

4) 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.**

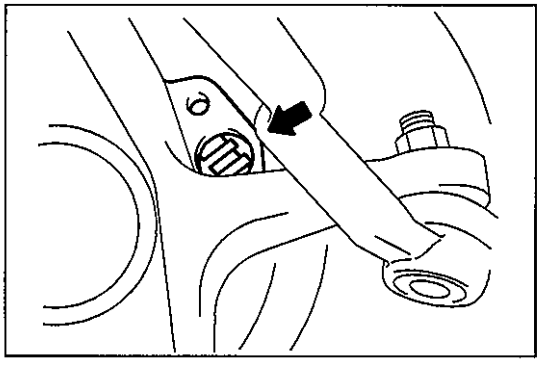


SENSOR INSPECTION

- Check sensor for damage.
- Check sensor for resistance.

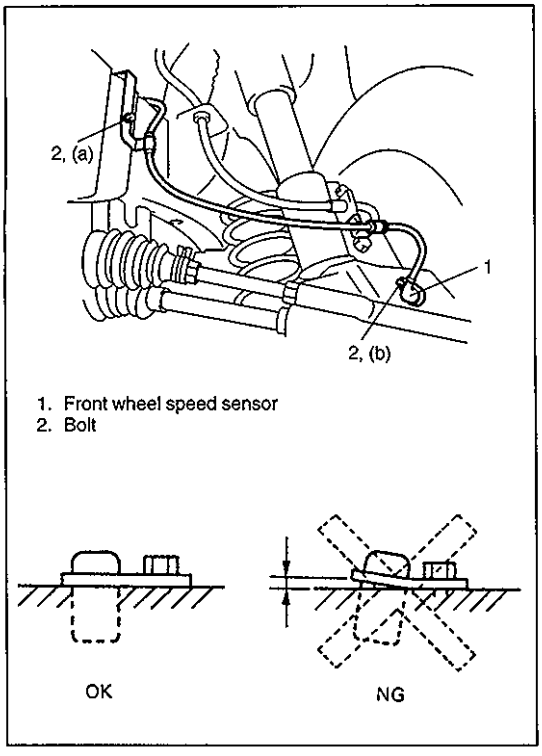
Resistance between terminals: 1.2 – 1.6 kΩ at 20°C (68°F)
Resistance between terminal and sensor body: 1 MΩ or more

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.



1. Front wheel speed sensor
2. Bolt

INSTALLATION

1) Check that no foreign material is attached to sensor and rotor.
2) Install it by reversing removal procedure.

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)

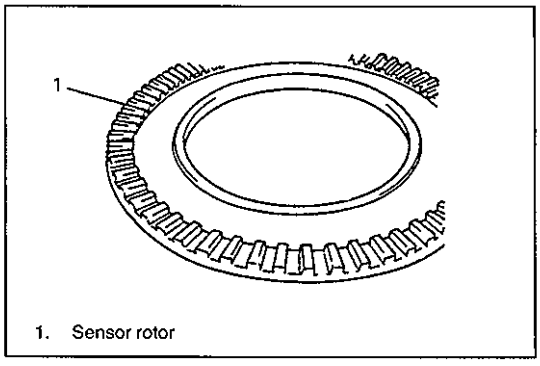
CAUTION:
- **Do not pull wire harness or twist more than necessary when installing front wheel speed sensor.**
- **Fit harness grommet to inner fender securely.**

3) Check that there is no clearance between sensor and knuckle.

FRONT SENSOR ROTOR

REMOVAL

Remove front sensor rotor referring to steps 1) to 10) of "WHEEL HUB/BEARING/OIL SEAL" removal procedure in "FRONT SUSPENSION" section.



1. Sensor rotor

INSPECTION

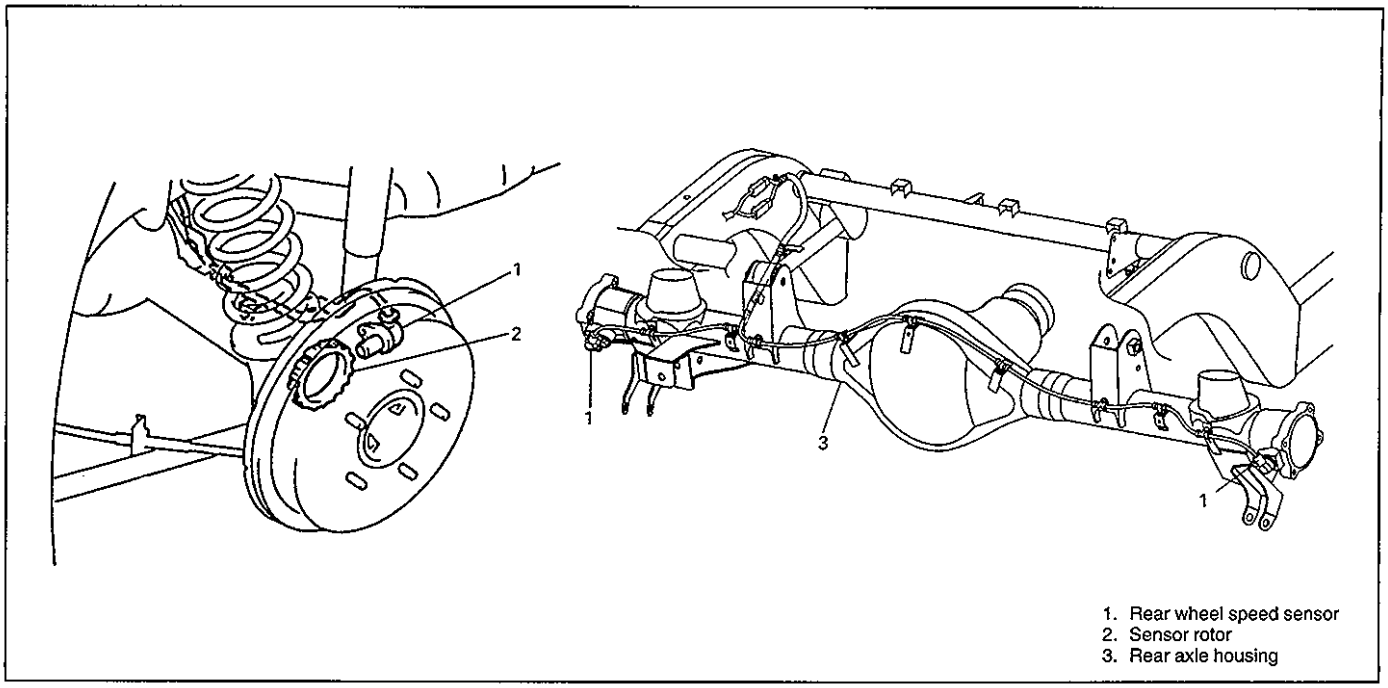
- Check rotor serration (teeth) for being missing, damaged or deformed.
- Check sensor rotor for being deformed (warped).
- Check that no foreign material is attached.

If any faulty is found, repair or replace.

INSTALLATION

Install front sensor rotor referring to steps 6) to 17) of "WHEEL HUB/BEARING/OIL SEAL" installation procedure in "FRONT SUSPENSION" section.

REAR WHEEL SPEED SENSOR

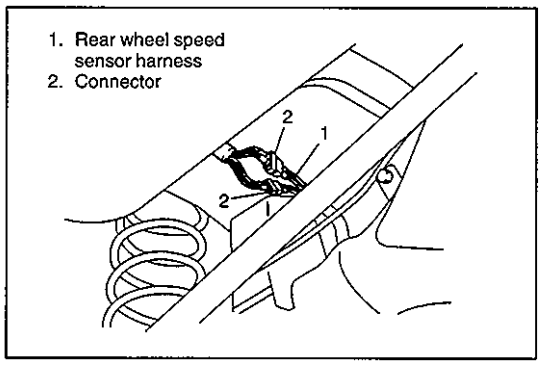


1. Rear wheel speed sensor
2. Sensor rotor
3. Rear axle housing

OUTPUT VOLTAGE INSPECTION

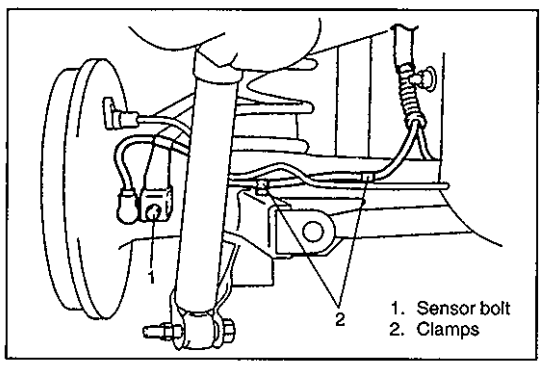
Check in the same procedure as that used of front wheel speed sensor check.

Output AC voltage at 2/3 to
one rotation per second (25 – 38 Hz): 106 mV or more
Reference
When using oscilloscope,
peak-to-peak voltage at 2/3 to
one rotation per second (25 – 38 Hz): 150 mV or more



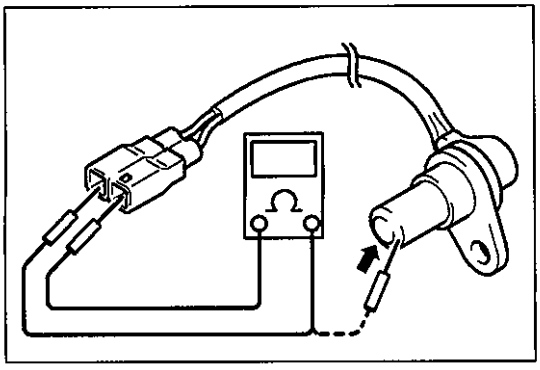
REMOVAL

1) Disconnect negative cable from battery.
2) Hoist vehicle.
3) Disconnect rear wheel speed sensor connector and detach wire harness from vehicle body and rear axle.



4) Remove harness clamps and remove rear wheel speed sensor from rear axle.

CAUTION:
- **Do not pull wire harness when removing rear wheel speed sensor.**
- **Do not cause damage to surface of rear wheel speed sensor and do not allow dust, etc. to enter its installation hole.**



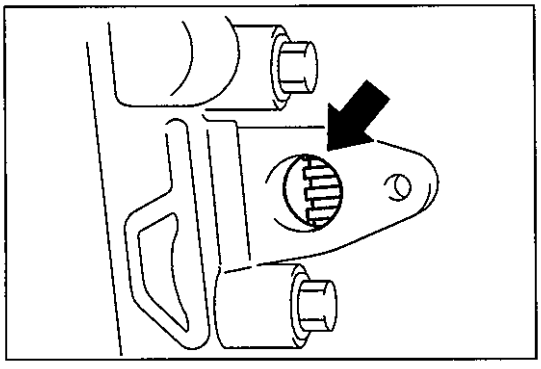
SENSOR INSPECTION

- 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: 1 MΩ or more

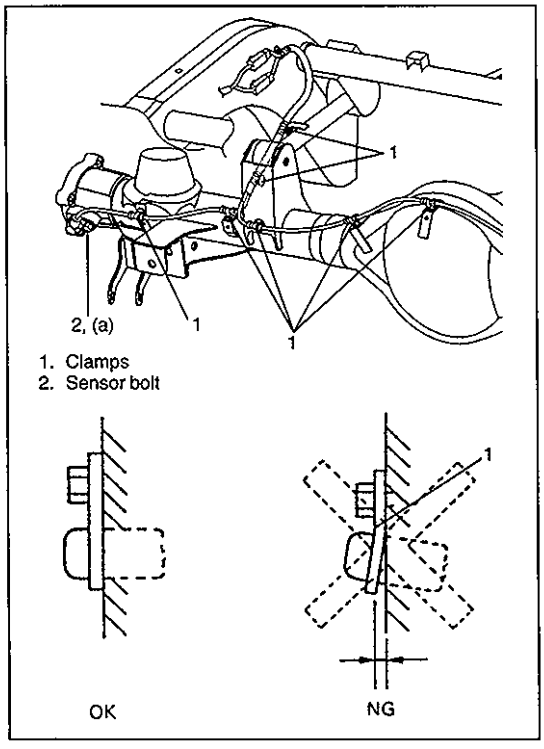
If any faulty is found, replace.



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): 21 N·m (2.1 kg-m, 15.0 lb-ft)

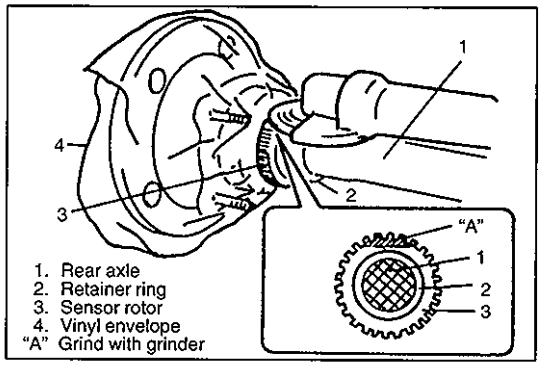
CAUTION:
Do not pull wire harness or twist more than necessary when installing rear wheel speed sensor.

3) Check that there is no clearance between sensor and knuckle.

REAR SENSOR ROTOR

REMOVAL

1) Remove rear axle shaft. Refer to "REAR SUSPENSION" section.

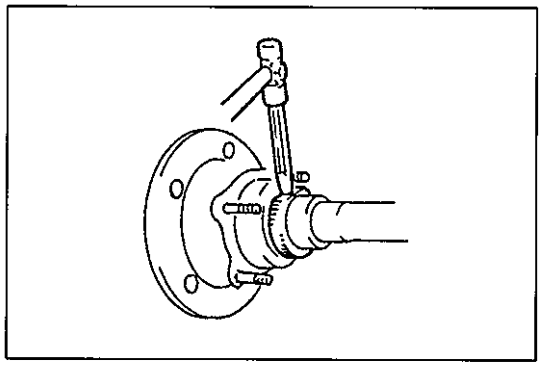


1. Rear axle
2. Retainer ring
3. Sensor rotor
4. Vinyl envelope

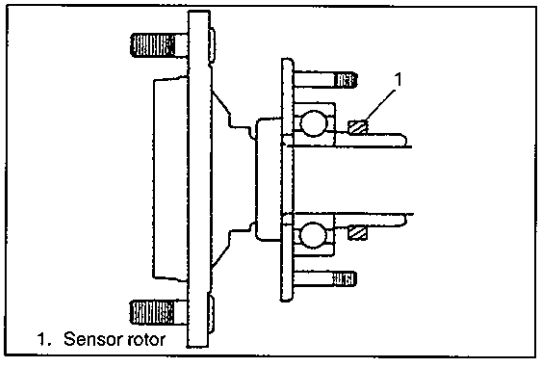
"A" Grind with grinder

2) In order to remove sensor rotor from retainer ring, grind with a grinder one part of the sensor rotor as illustrated till it becomes thin.

CAUTION:
- **Cover vinyl sheet or the like over wheel bearing so that fine grains from grinding will not enter there.**
- **Be careful not to go so far as to grind the retainer ring.**



3) Break with a chisel the thin ground sensor rotor, and it can be removed.



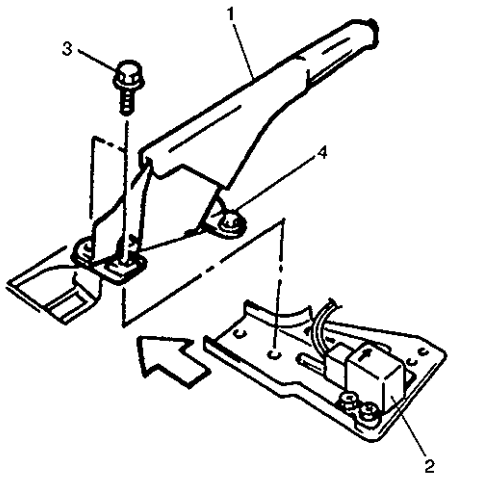
1. Sensor rotor

INSTALLATION

1) Press-fit sensor rotor as shown.

NOTE:
Use care not to cause any damage to outside of retainer ring.

2) Install rear axle shaft referring to "REAR SUSPENSION" section in this manual.
3) Install brake drum and wheel.
Refer to "BRAKES" section in this manual.



1. Parking brake lever ass'y
2. G sensor
3. Bolt "1"
4. Bolt "2"

G SENSOR

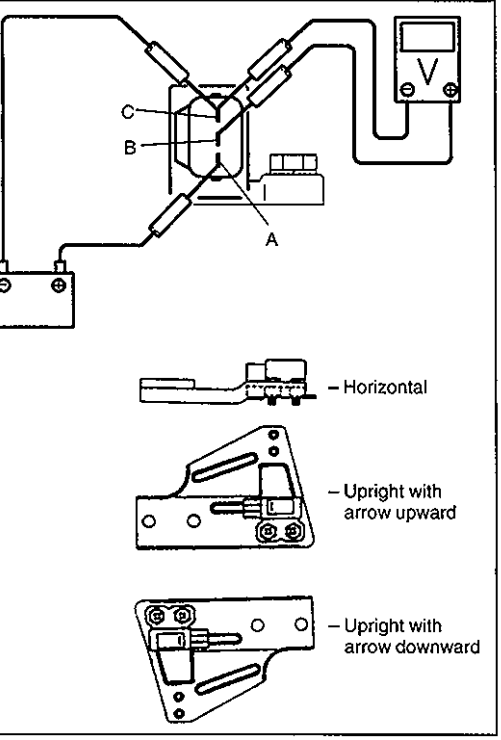
REMOVAL

1) Turn ignition switch "OFF" and disconnect battery negative cable.
2) Remove rear center console box.
3) Remove parking brake lever bolts "1" and G sensor with bracket from floor.

NOTE:
Loosen only bolt "2".

4) Remove sensor with bracket from floor.
5) Disconnect connector from sensor.

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.**

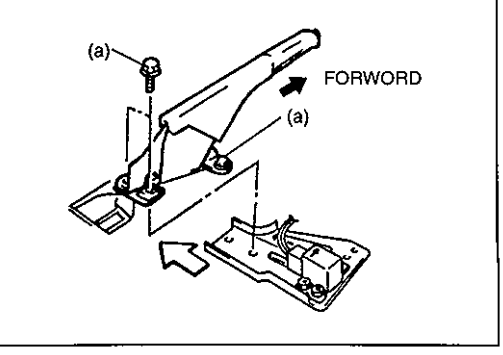


INSPECTION

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 – 3V
When placed upright with arrow upward: 3 – 4V
When placed upright with arrow downward: 1 – 2V

If measured voltage is not as specified, replace sensor with bracket.



INSTALLATION

1) Connect connector to sensor securely.
2) Install sensor with bracket and parking lever assy onto floor so that arrow mark directs vehicle forward.

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

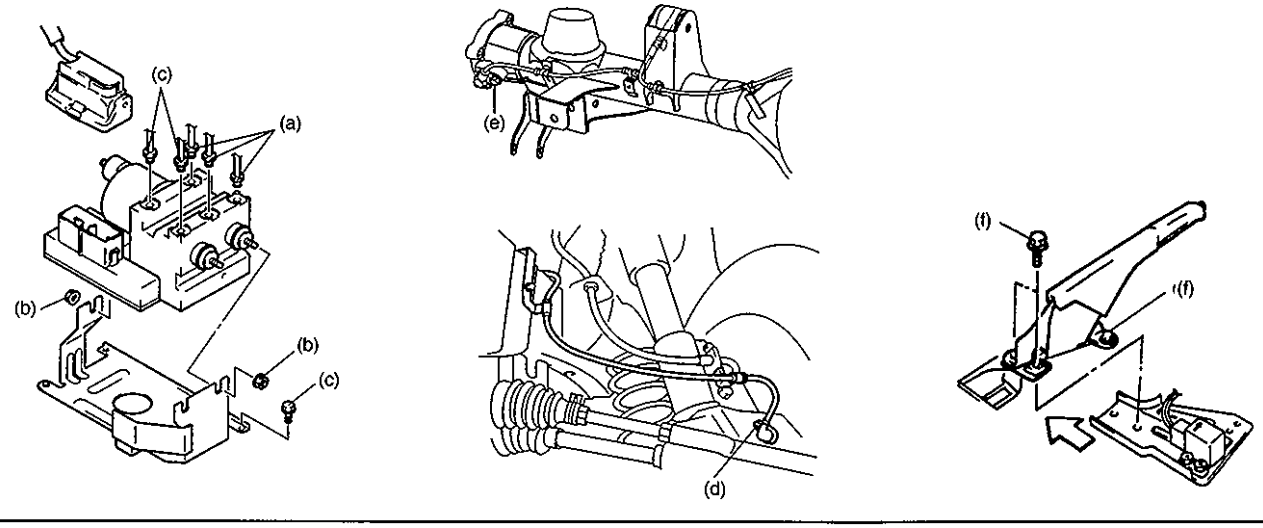
3) Install rear console box.

4WD SWITCH

For removal, inspection and installation of this switch, refer to "TRANSFER" section.

TIGHTENING TORQUE SPECIFICATIONS

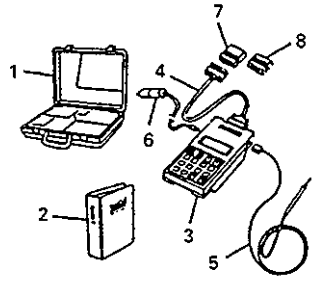
Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
Brake pipe flare nut: (a)		16	1.6	11.5
ABS hydraulic unit nut: (b)		21	2.1	15.5
ABS hydraulic unit bracket bolt: (c)		10	1.0	7.5
Wheel speed sensor bolt	(Front): (d)	23	2.3	17.0
	(Rear): (e)	21	2.1	15.5
Parking lever assy mounting bolt: (f)		23	2.3	17.0



SPECIAL TOOLS

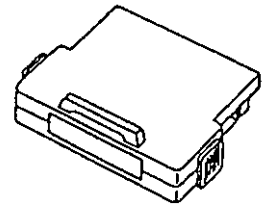


09950-78210
Flare nut wrench
(10 mm)

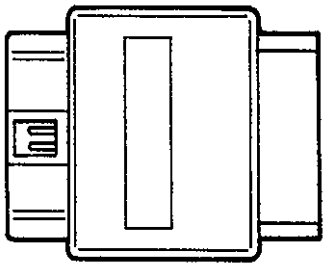


1. Storage case
2. Operator's manual
3. Tech-1 A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

09931-76011
Tech-1 (scan tool) kit



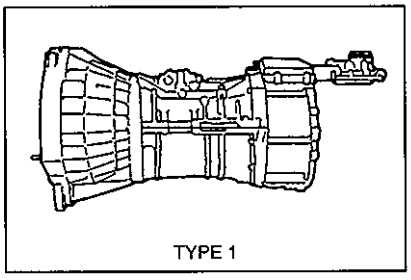
Tech-1 cartridge for ABS



09931-96020
16/12 pin DLC adapter

SECTION 7A

MANUAL TRANSMISSION (TYPE 1)


TYPE 1

CONTENTS

GENERAL DESCRIPTION 7A- 1
DIAGNOSIS 7A- 2
ON-VEHICLE SERVICE 7A- 3
Gear Oil 7A- 3
Shift Control Levers 7A- 4
Switches 7A- 6
Engine Rear Mounting 7A- 8
Dismounting of Trans. Unit 7A- 9
Remounting of Trans. Unit 7A-12
UNIT REPAIR 7A-13
TIGHTENING TORQUE SPECIFICATIONS 7A-13
REQUIRED SERVICE MATERIALS 7A-13

GENERAL DESCRIPTION

The manual transmission consists of the input shaft, main shaft, countershaft and reverse gear which are installed in the aluminum case. Its gears are of forward five speeds in synchro mesh and reverse one speed in constant mesh system.

The main shaft gears are held by the needle bearings and on them the synchronizer rings and synchronizer sleeve & hubs are assembled.

The gear shift lever case is located at the upper behind the transmission case and has a cam which prevents direct gear shift from the 5th speed gear to the reverse gear.

As the aluminum case is sealed with liquid type gasket, it is necessary to use genuine sealant or its equivalent on its mating surfaces when reassembling it. Also, the case fastening bolts must be tightened to specified torque by means of the torque wrench and tightening over or below the specified torque should be avoided.

The description under ON-VEHICLE SERVICE in this section covers a part of the TYPE 2 manual transmission and the transfer. The transfer is next to the transmission as well, but their gear boxes are independent and each of them has its own drain and level/filler plugs for the oil change or the level check.
For the repair procedure of the transfer unit, refer to Section 7D.

DIAGNOSIS

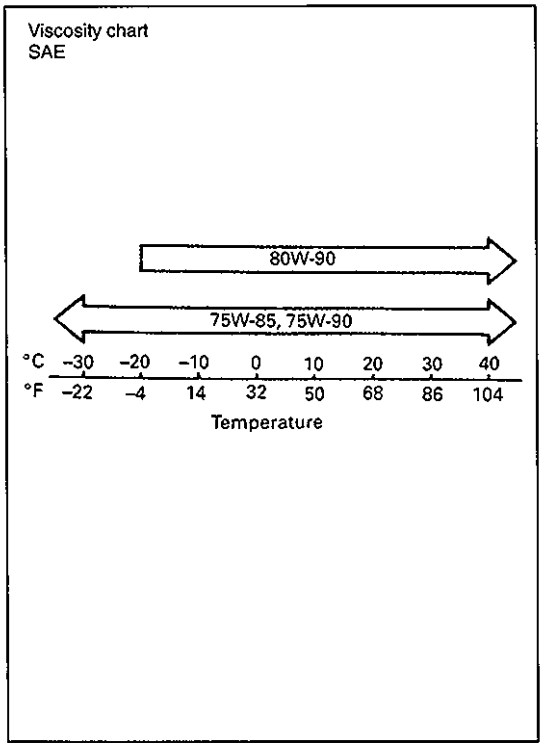
Condition	Possible Cause	Correction
Gear slipping out of mesh	● Worn shift fork shaft	Replace
	● Worn shift fork or synchronizer sleeve	Replace
	● Weak or damaged locating spring	Replace
	● Worn bearings on input shaft or mainshaft	Replace
	● Worn chamfered tooth on sleeve or gear	Replace sleeve and gear
	● Missing or disengagement of circlip(s)	Install
Gears refusing to disengage	● Weakened or broken synchronizer spring	Replace
	● Distorted shift shaft or shift fork	Replace
Hard shifting	● 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 and gear
	● 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 ring	Replace
	● Damaged or worn chamfered tooth on sleeve or gear	Replace

ON-VEHICLE SERVICE

GEAR OIL

INSPECTION AND 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 or repair it.

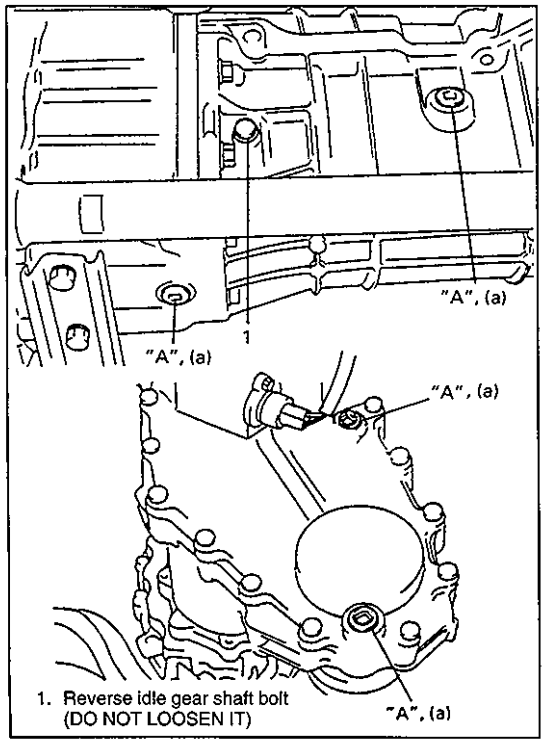


3) Drain old oil and fill new specified oil as shown below by specified amount (roughly up to level hole).

NOTE:
- **It is highly recommended to use 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 and status of breather hoses.**
- **If water or rust is mixed in drained oil, be sure to check breather hose and boot of transmission and transfer.**

Gear Oil Specification
Oil grade: API GL-4
Viscosity: SAE 75W-85, 75W-90 or 80W-90

Oil Capacity:
Transmission 1.5 liters (3.2/2.6 US/Imp. pt)
Transfer 1.7 liters (3.6/3.0 US/Imp. pt)

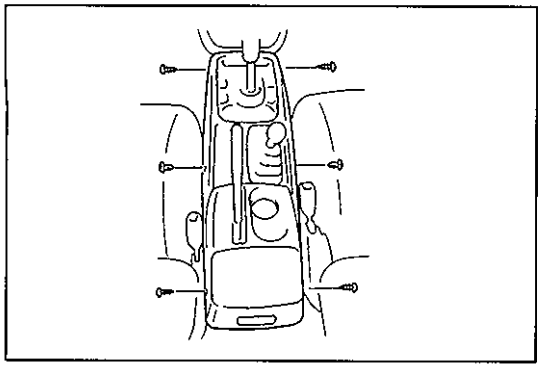


4) Torque drain plug and level/filler plug as specified below after applying sealant to its thread.

CAUTION:
- **Transmission oil must not be poured through gear shift control lever part.**
- **Do not loosen or remove reverse idle gear shaft bolt.**

"A": Sealant 99000-31110

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

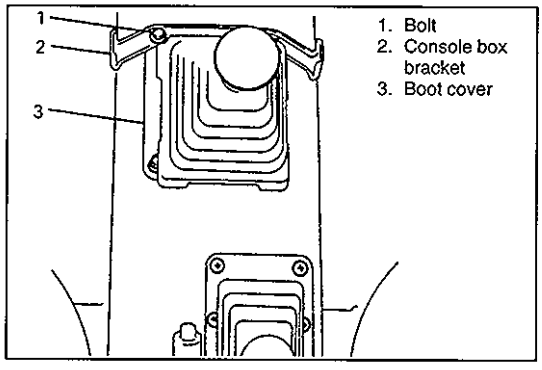


SHIFT CONTROL LEVERS

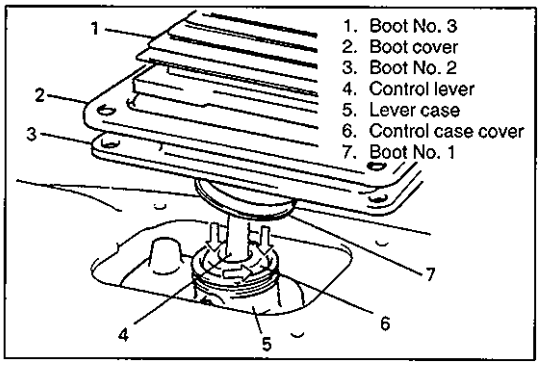
REMOVAL

1) Remove 4 screws at the front and rear and 2 clips at the center then take off front and rear center console boxes.

NOTE:
To remove clip, push in its center pin first.



2) Remove console box bracket by removing bolts and lift up boot cover and boot No. 2.
3) Remove boot clamp and then remove boot No. 1 from transmission shift lever case.



4) With gear shift control case cover pushed down with fingers, turn it to counter clockwise and take out shift control lever.
5) Take out transfer shift control lever in similar manner as described above.

INSPECTION AND INSTALLATION

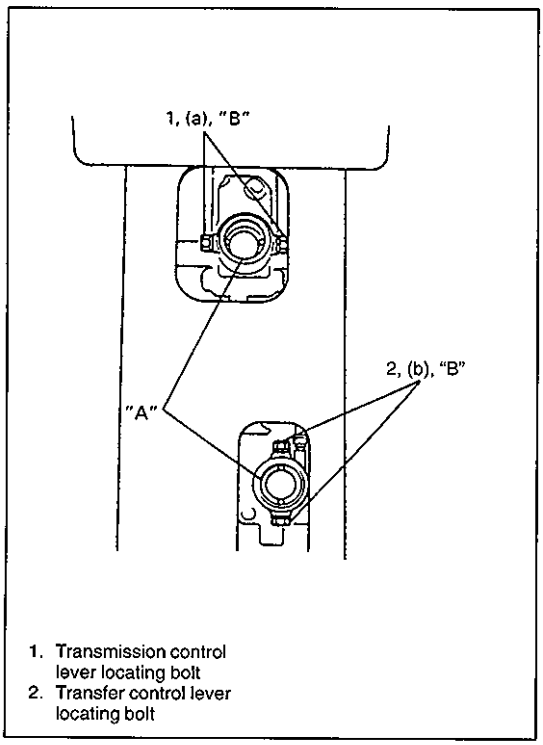
1) Check shift control lever lower portion and control lever locating sheet for excessive wear, and boot for damage. Correct or replace if necessary.
2) Apply grease to pivot portions and seat, then install shift control lever.

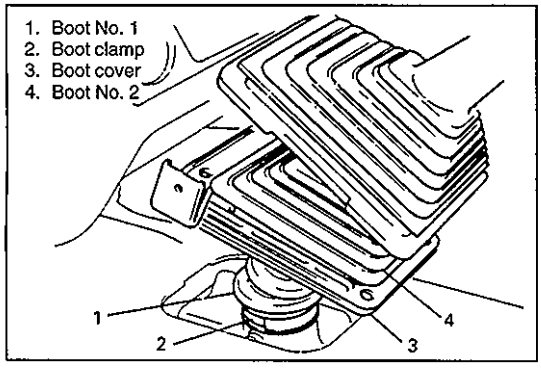
"A": Grease 99000-25010

3) Perform above steps also for transfer shift control lever.
4) If control lever locating bolts (a) are replaced or retightened, torque them as specified below.
Replacing of control lever locating bolts requires thread lock cement.

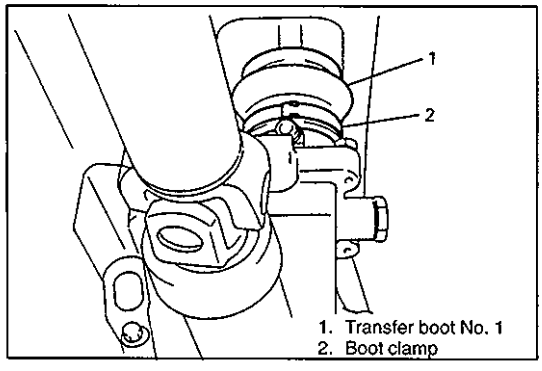
"B": Cement 99000-32020

Tightening Torque
(a): 17 N·m (1.7 kg-m, 12.5 lb-ft) (Type 1)
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft) (Type 2)
(b): 17 N·m (1.7 kg-m, 12.5 lb-ft)

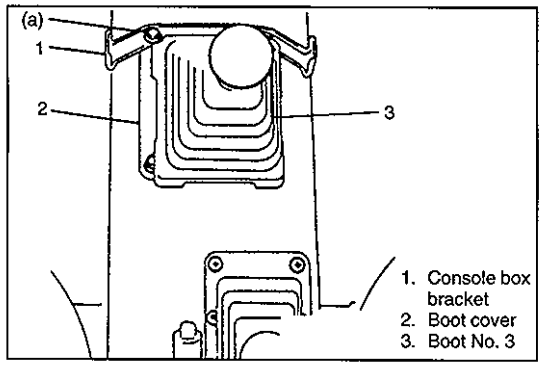




5) Install transmission boot No. 1 from inside of cabin and clamp it with a new clamp securely.



6) Install transfer boot No. 1 securely on lift and clamp it by using a new clamp.

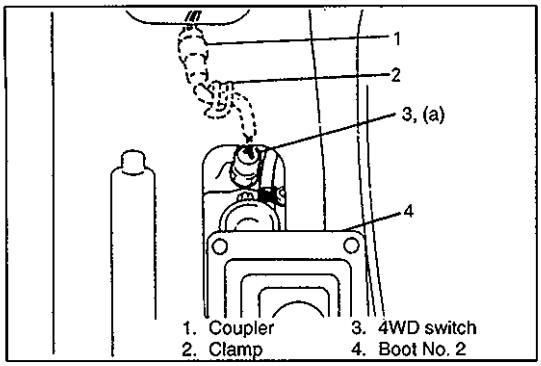


7) Tighten transmission boot No. 2 with boot cover and console box bracket.

Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.0 lb-ft)

8) Install console box.

NOTE:
Be sure that flare end of transmission boot No. 3 is engaged with console box.



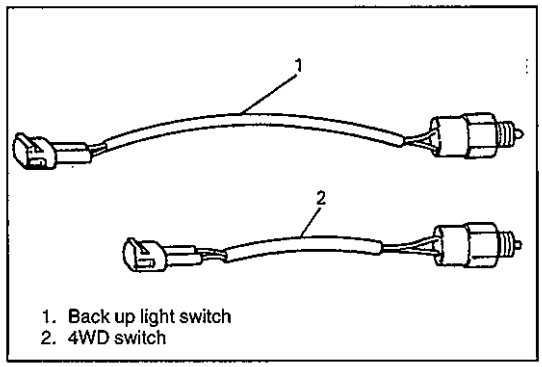
SWITCHES

TRANSFER 4WD SWITCH

1) Remove console box and lift transmission control lever boots No. 2 and No. 3. (Refer to page 7A-4.)
2) Remove transfer control lever boot No. 2, unclamp wiring on transfer case to free it and pull off coupler.
3) Replace switch and connect as it was.

Tightening Torque
(a): 20 N·m (2.0 kg-m, 14.5 lb-ft)

4) Turn ON ignition switch, shift transfer shift control lever to 4WD position and check that indicator lights. Turn OFF switch after checking.



NOTE:
- **When removing and reinstalling switch, use care not to let dust enter transfer box inside.**
- **Make sure to reset clamp for wiring which is located where invisible directly.**
- **It is recommended to work on transfer shift control lever boot No. 1 from underside of vehicle on lift.**
- **Identify this switch by its leg part which is different for that of back up light switch.**

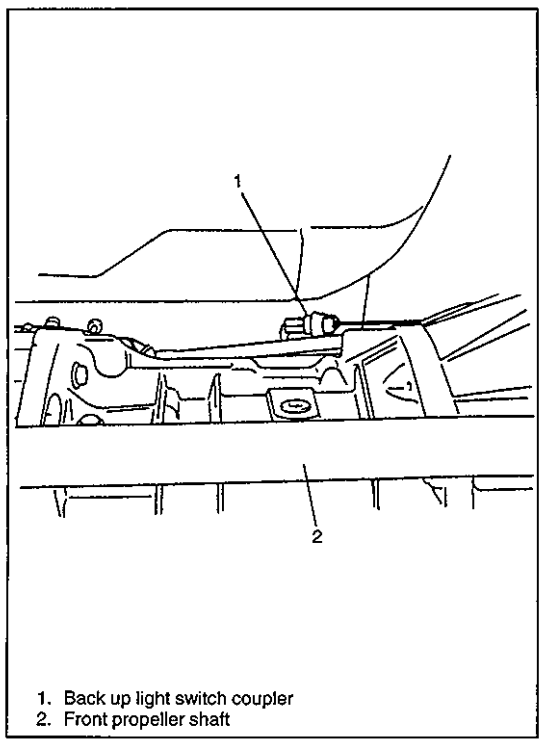
BACK UP LIGHT SWITCH

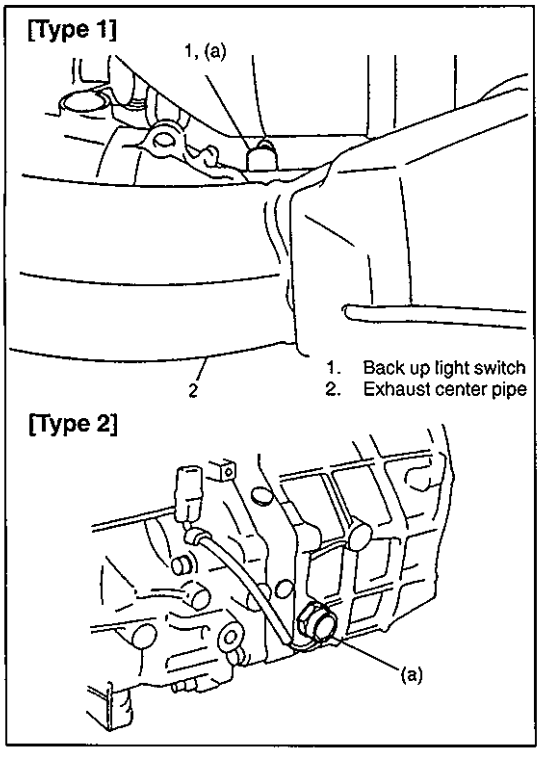
WARNING:
Refrain from work while exhaust center pipe is hot.

REMOVAL AND INSTALLATION

NOTE:
When replacing switch, use care not to let dust enter transmission through switch hole.

1) Lift up vehicle.
2) Remove coupler(s) for switch wiring.





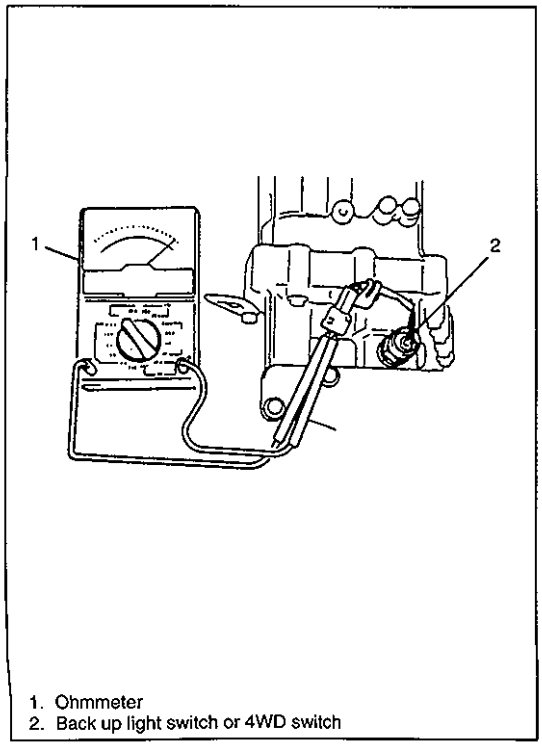
3) Replace switch, connect and clamp as they were.

Tightening Torque
(a): 20 N·m (2.0 kg-m, 14.5 lb-ft) (Type 1)
(a); 45 N·m (4.5 kg-m, 32.5 lb-ft) (Type 2)

4) When back up light switch has been replaced, check switch for proper function with ignition switch turned ON and gear shifted to reverse position. Turn OFF switch after checking its function.

INSPECTION OF 4WD SWITCH AND BACK UP LIGHT SWITCH

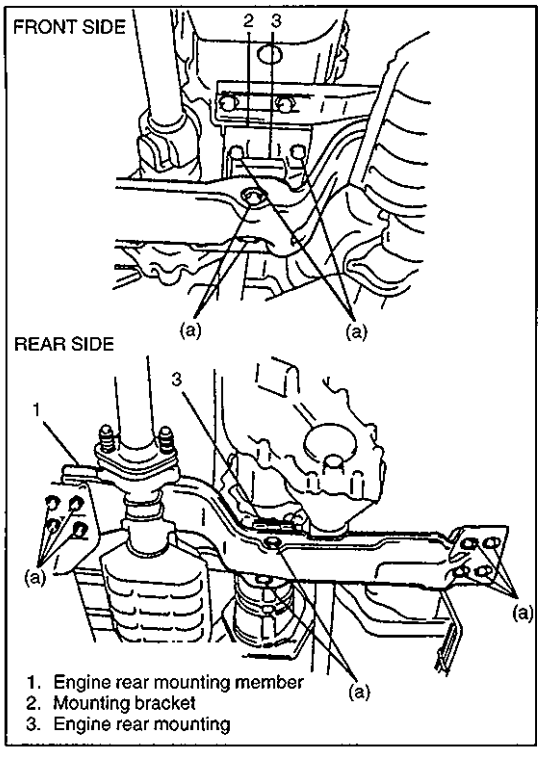
1) Undo clamp and disconnect coupler of back up light switch and/or 4WD switch.



2) Function of back up light switch can be checked as shown in figure.
   There should be conduction at these terminals only when shift lever is shifted to reverse position.
3) Function of transfer 4WD switch can be checked in the same manner as back up light switch.
   There should be conduction at these terminals when shift lever is shifted to 4H, and 4L positions.

Upon completion of check, connect coupler and clamp wiring harness as they were.

NOTE:
When replacing switch(es), use care not to let dust enter transmission through switch hole(s).

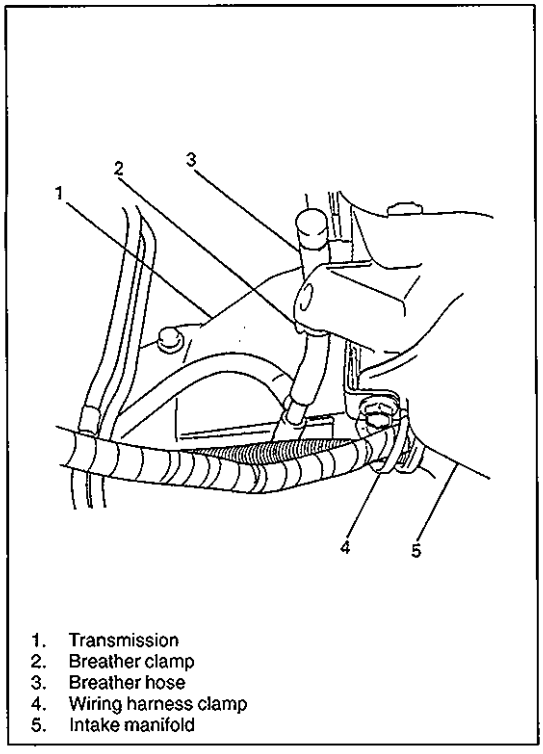


1. Engine rear mounting member
2. Mounting bracket
3. Engine rear mounting

ENGINE REAR MOUNTING

When replacement of mounting parts are necessary, torque bolts and nut as specified below.

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



1. Transmission
2. Breather clamp
3. Breather hose
4. Wiring harness clamp
5. Intake manifold

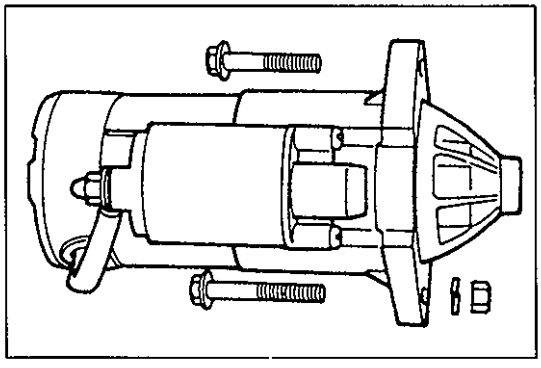
DISMOUNTING OF TRANS. UNIT

IN CABIN

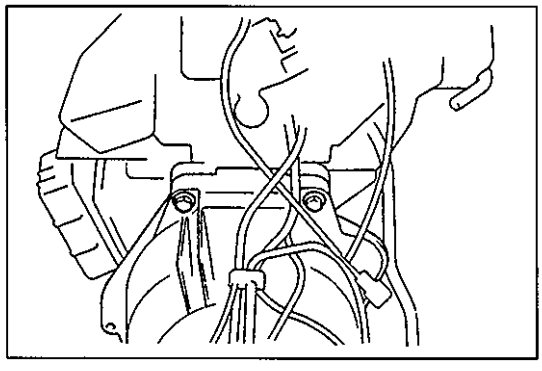
Remove transmission shift control lever (refer to page 7A-4) and transfer shift control lever knob.

IN ENGINE ROOM

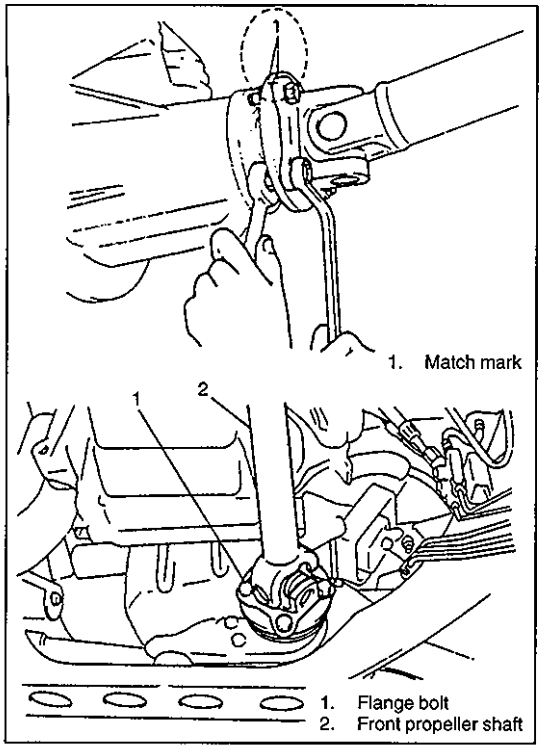
1) Disconnect negative (–) cable of battery.
2) Remove breather hose from clamp at the rear end of cylinder head.



3) Remove starting motor fixing bolts and nut and then remove starter.



4) Remove transmission fastening bolts.



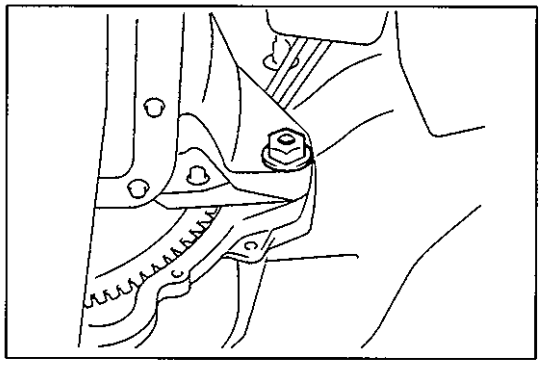
ON LIFT

1) Drain oil from transmission and transfer.
2) Give match marks on joint flange and propeller shaft as shown in figure. (front and rear)
3) Remove flange bolts of rear propeller shaft universal joint and pull out propeller shaft.
4) Remove flange bolts of front propeller shaft universal joint and pull out propeller shaft.
5) Remove clutch operating cylinder from transmission. It is not necessary to disconnect clutch hose from operating cylinder.

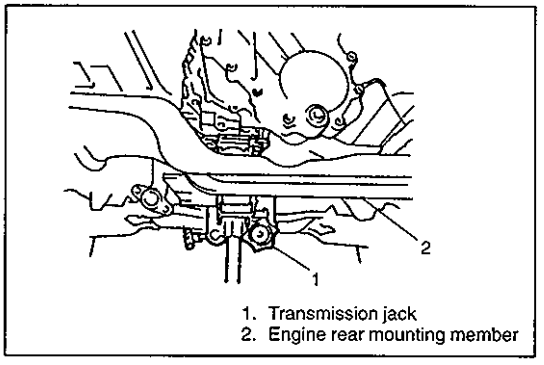
NOTE:

- **It is not necessary to drain transmission oil when dismounting transmission and transfer for clutch maintenance only.**
- **Work without draining transfer oil is possible if front propeller shaft is dismounted together with transmission and transfer.**

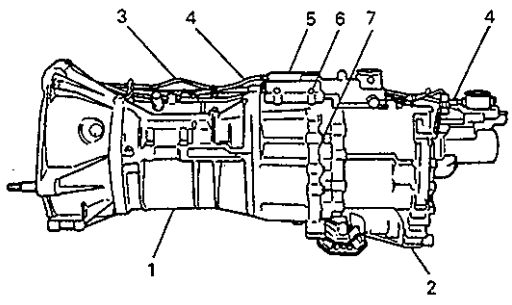
6) Remove clutch housing lower plate.



7) Disconnect couplers from 4WD switch, back up light switch and speed sensor assembly and release their harness from clamps. Remove nuts from joint with engine.

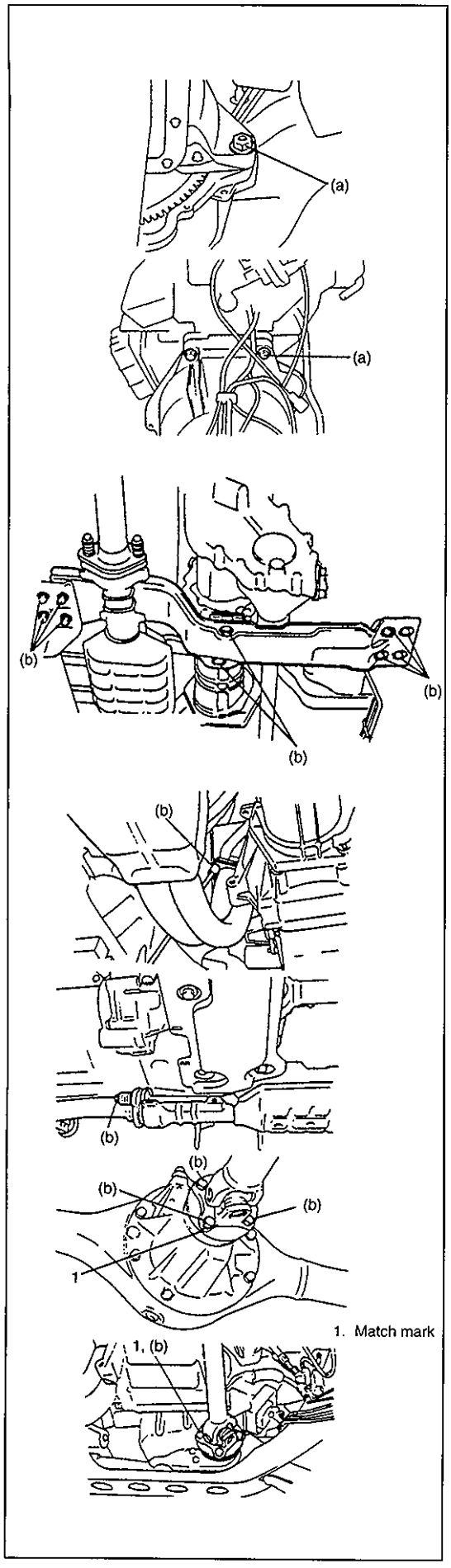


8) Apply transmission jack and remove engine rear mounting member taking off its bolts.
9) After removing mounting member, move rearward transmission and transfer assemblies placed on jack and then lower them.



1. Transmission assembly
2. Transfer assembly
3. Wiring harness
4. Breather hose
5. Gear shift lever case
6. Bolt
7. Bolt

10) Remove wiring harness and breather hose.
11) Separate gear shift lever case and transfer assembly from transmission.



1. Match mark

REMOUNTING

For remounting, reverse dismounting procedure.
Use specified torques as given below.

Tightening Torque
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)
(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

- For tightening torque of transmission stiffener bolt, refer to "ENGINE MECHANICAL" section.
- Set each clamp for wiring, hose and cable securely.
- Set clamp for shift control lever boots securely.
- After installing clutch operating cylinder, check clutch pedal free travel. Refer to SECTION 7C1 "CLUTCH".
- Fill gear oil to transmission and transfer as specified.
- Connect battery and check function of engine, clutch and trans.
- When installing propeller shaft, align the match marks.

UNIT REPAIR

Refer to the same section of UNIT REPAIR MANUAL mentioned in FOREWORD of this manual.

TIGHTENING TORQUE SPECIFICATIONS

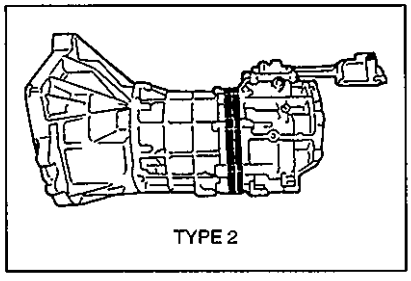
Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
Oil filler/level and drain plugs	23	2.3	17.0
Control lever boot cover bolts	6	0.6	4.0
4WD switch	20	2.0	14.5
Back up light switch (Type 1)	20	2.0	14.5
Back up light switch (Type 2)	45	4.5	32.5
Control lever locating bolts (Type 1)	17	1.7	12.5
Control lever locating bolts (Type 2)	23	2.3	12.5
Transmission to engine bolts and nuts	85	8.5	61.5
Engine rear mounting bolts and nut	50	5.0	36.5
Exhaust center pipe to manifold nuts	50	5.0	36.5
Muffler to exhaust center pipe bolts	50	5.0	36.5
Universal joint flange bolts	50	5.0	36.5

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Shift control lever.
Thread lock cement	THREAD LOCK CEMENT SUPER 1333B (99000-32020)	• Shift control lever locating bolts.
Sealant	SUZUKI BOND No. 1215 (99000-31110)	• Oil Drain and filler/level plugs.

SECTION 7A1

MANUAL TRANSMISSION (TYPE 2)



TYPE 2

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GENERAL DESCRIPTION

The manual transmission consists of the input shaft, main shaft, counter shaft and reverse gear which are installed in the aluminum and castings cases. Its gears are of forward five speeds in synchro mesh and reverse one speed in sliding idler gear arrangement system.

The main shaft gears are held by the needle bearings and on them the synchronizer rings and synchronizer sleeve & hubs are assembled.

As the aluminum and castings cases are sealed with liquid type gasket, it is necessary to use genuine sealant or its equivalent on its mating surfaces when reassembling them. Also, the case fastening bolts must be tightened to specified torque by means of the torque wrench and tightening over or below the specified torque should be avoided.

The description under ON-VEHICLE SERVICE in this section covers the transfer partially which is next to the transmission as well, but their gear boxes are independent and each of them has its own drain and level/filler plugs for the oil change or the level check. For the repair procedure of the transfer unit, refer to Section 7D.

DIAGNOSIS

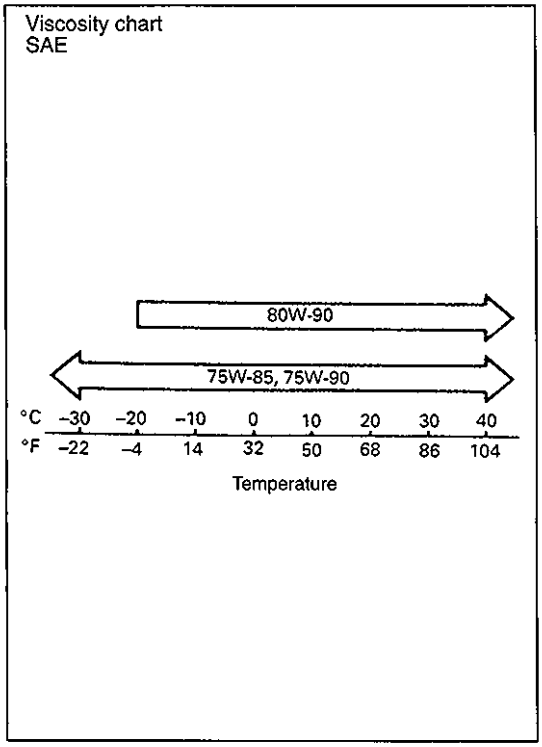
Condition	Possible Cause	Correction
Gear slipping out of mesh	● Worn shift fork shaft	Replace
	● Worn shift fork or synchronizer sleeve	Replace
	● Weak or damaged locating spring	Replace
	● Worn bearings on input shaft or main shaft	Replace
	● Worn chamfered tooth on sleeve or gear	Replace sleeve and gear
	● Missing or disengagement of circlip(s)	Install
Gears refusing to disengage	● Weakened or broken synchronizer spring	Replace
	● Distorted shift shaft or shift fork	Replace
Hard shifting	● 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 and gear
	● 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 ring	Replace
	● Damaged or worn chamfered tooth on sleeve or gear	Replace

ON-VEHICLE SERVICE

GEAR OIL

INSPECTION AND 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 or repair it.

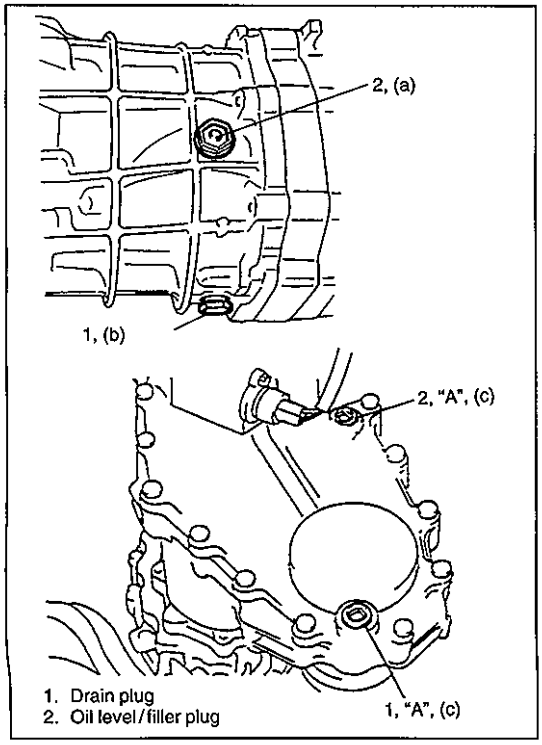


3) Drain old oil and fill new specified oil as shown below by specified amount (roughly up to level hole).

NOTE:
- **It is highly recommended to use 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 and status of breather hoses.**
- **If water or rust is mixed in drained oil, be sure to check breather hose and boot of transmission and transfer.**

Gear Oil Specification
Oil grade: API GL-4
Viscosity: SAE 75W-85, 75W-90 or 80W-90

Oil Capacity:
Transmission 2.7 liters (5.5/4.6 US/Imp. pt)
Transfer 1.7 liters (3.6/3.0 US/Imp. pt)



4) Torque drain plug and level/filler plug as specified below after applying sealant to its thread.

CAUTION:
Transmission oil must not be poured through gear shift control lever part.

"A": Sealant 99000-31110

Tightening Torque
(a): 38 N·m (3.8 kg-m, 27.5 lb-ft)
(b): 45 N·m (4.5 kg-m, 32.5 lb-ft)
(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

SHIFT CONTROL LEVERS

Refer to SECTION 7A in this manual.

DISMOUNTING/REMOUNTING OF TRANS. UNIT

Refer to the same item in SECTION 7A "MANUAL TRANSMISSION".
For tightening torque of filler and level/drain plug, refer to "Gear Oil Inspection and Change" of "ON-VEHICLE SERVICE" in this section.

UNIT REPAIR

Refer to the same section of UNIT REPAIR MANUAL mentioned in FOREWORD of this manual.

TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
Transfer oil filler/level and drain plugs	23	2.3	17.0
Transmission oil filler/level plug	38	3.8	27.5
Transmission oil drain plug	45	4.5	32.5
Control lever boot cover bolts	6	0.6	4.0
4WD switch	20	2.0	14.5
Back-up light switch	45	4.5	32.5
Control lever locating bolts	23	2.3	17.0
Transmission to engine bolts and nuts	85	8.5	61.5
Engine rear mounting bolts	50	5.0	36.5
Muffler to exhaust No. 2 pipe nuts	50	5.0	36.5
Universal joint flange bolts	50	5.0	36.5

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Shift control lever
Thread lock cement	THREAD LOCK CEMENT SUPER 1333B (99000-32020)	• Shift control lever locating bolts
Sealant	SUZUKI BOND No. 1215 (99000-31110)	• Oil drain and filler/level plugs

SECTION 7B1

AUTOMATIC TRANSMISSION (4 A/T)

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).**

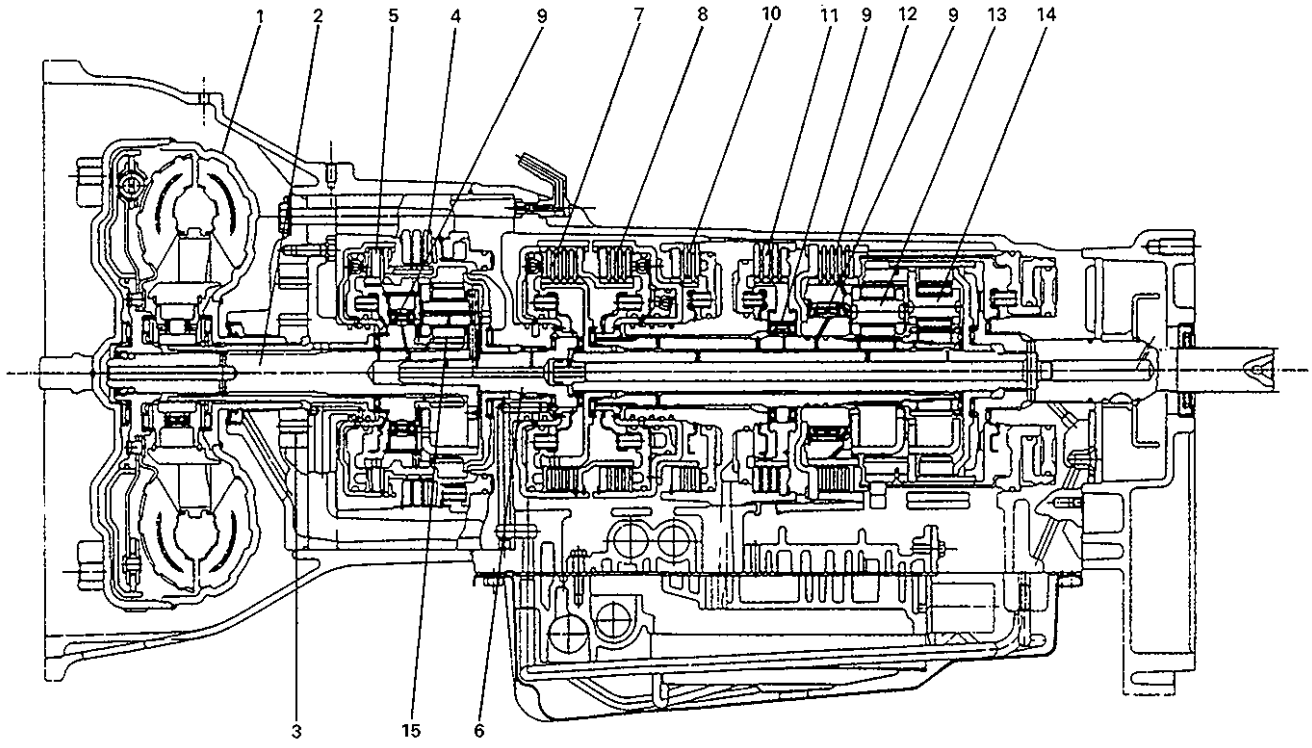
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GENERAL DESCRIPTION

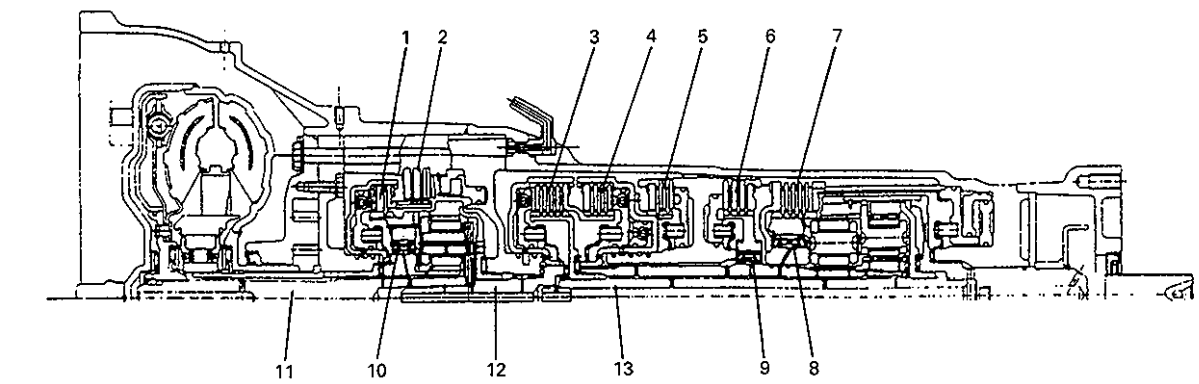
This automatic transmission is a full automatic type with 3-speed plus overdrive (O/D).
The toque converter is a 3-element, 1-step and 2-phase type and is equipped with an electronically controlled lock-up mechanism. The gear shift device consists of 3 sets of planetary gear units, 3 disc type clutches, 4 disc type brakes and 3 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 (except at 4L) and shift-down from the overdrive mode. Also, by using the P/N change switch located on the console box, it is possible to select the gear change timing of 2 modes, normal and power.

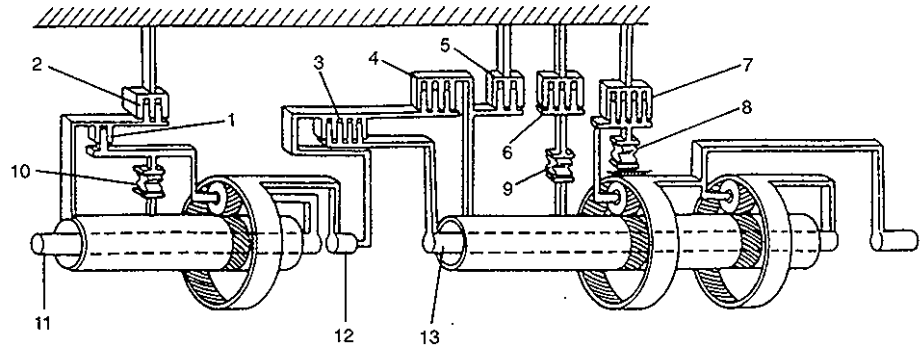


1. Torque converter
2. Overdrive input shaft
3. Oil pump
4. Overdrive brake
5. Overdrive clutch
6. Forward clutch input shaft
7. Forward clutch
8. Direct clutch
9. One-way clutch
10. Second coast brake
11. Second brake
12. Reverse brake
13. Front planetary gear
14. Rear planetary gear
15. Overdrive planetary gear

Item			Specifications		
Torque converter	Type		3-element, 1-step, 2-phase type (with TCC (lock-up) mechanism)		
	Stall torque ratio		2.4 (G16) 2.0 (J20) 1.9 (H25)		
Oil pump	Type		Trochoid type oil pump		
	Drive system		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) Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change "D" range (O/D OFF) Forward 1st ↔ 2nd ↔ 3rd automatic gear change "2" range (Normal mode) Forward 1st ↔ 2nd ↔ 3rd automatic gear change (Power mode) Forward 2nd ← 3rd automatic gear change and fixed at 2nd gear "L" range Forward 1st ← 2nd reduction, and fixed at 1st gear		
	Engine type		G16	J20	H25
	Gear ratio	1st (low gear)	2.826	2.826	2.452
		2nd (second gear)	1.493	1.493	1.452
		3rd (top gear)	1.000	1.000	1.000
		4th (overdrive gear)	0.730	0.689	0.689
		Reverse (reverse gear)	2.703	2.703	2.212
	Control elements		Wet type multi-disc clutch ..... 3 sets Wet type multi-disc brake ..... 4 sets One-way clutch ..... 3 sets		
	Transfer		Hi: 1.000 Lo: 1.816 (4WD model only)		
	Final gear reduction ratio (Differential)		5.125 (G16 and J20 engines) 4.875 (H25 engine)		
Lubrication	Lubrication system		Force feed system by oil pump		
Cooling	Cooling system		Radiator assisted cooling (water-cooled)		
Fluid used			An equivalent of DEXRON®II, DEXRON®IIE or DEXRON®III		

CLUTCH/BRAKE FUNCTIONS





1. Overdrive clutch
2. Overdrive brake
3. Forward clutch
4. Direct clutch
5. Second coast brake
6. Second brake
7. Reverse brake
8. One-way clutch No.2
9. One-way clutch No.1
10. Overdrive one-way clutch
11. Overdrive input shaft
12. Forward clutch input shaft
13. Intermediate shaft

Part Name	Function
Overdrive clutch	Meshes overdrive carrier and overdrive sun gear.
Overdrive brake	Fixes overdrive sun gear.
Overdrive one-way clutch	Meshes overdrive carrier and overdrive sun gear only when driven by engine.
Forward clutch	Meshes input shaft and intermediate shaft.
Direct clutch	Meshes input shaft with front sun gear and rear sun gear.
Second coast brake	Fixes front sun gear and rear sun gear.
Second brake	Fixes outer race of one-way clutch No.1, to prevent front sun gear and rear sun gear from turning counterclockwise (reverse direction of engine input rotation direction).
Reverse brake	Fixes front planetary carrier.
One-way clutch No.1	Prevents front sun gear and rear sun gear from turning counterclockwise only when second brake is at work.
One-way clutch No.2	Prevents front planetary carrier from turning counterclockwise.

TABLE OF COMPONENT OPERATION

Shift position \ Element		Solenoid valve No. 1–A	Solenoid valve No. 1–B	O/D clutch	Forward clutch	Direct clutch		O/D brake	Second coast brake	Second brake	Reverse brake		O/D one-way clutch	One-way clutch No. 1	One-way clutch No. 2
						Inner piston	Outer piston				Inner piston	Outer piston			
P		○	X	○	–	–	–	–	–	–	–	–	○	–	–
R		○	X	○	–	○	○	–	–	–	○	○	○	–	–
N		○	X	○	–	–	–	–	–	–	–	–	○	–	–
D	1st gear	○	X	○	○	–	–	–	–	–	–	–	○	–	○
	2nd gear	○	○	○	○	–	–	–	–	○	–	–	○	○	–
	3rd gear	X	○	○	○	–	○	–	–	○	–	–	○	–	–
	O/D	X	X	–	○	–	○	○	–	○	–	–	–	–	–
2	1st gear	○	X	○	○	–	–	–	–	–	–	–	○	–	○
	2nd gear	○	○	○	○	–	–	–	○	○	–	–	○	–	–
	3rd gear (Fail safe)	X	○	○	○	–	○	–	–	○	–	–	○	–	–
L	1st gear	○	X	○	○	–	–	–	–	–	○	○	○	–	–
	2nd gear (Fail safe)	○	○	○	○	–	–	–	○	○	–	–	○	–	–

○: ON, X: OFF

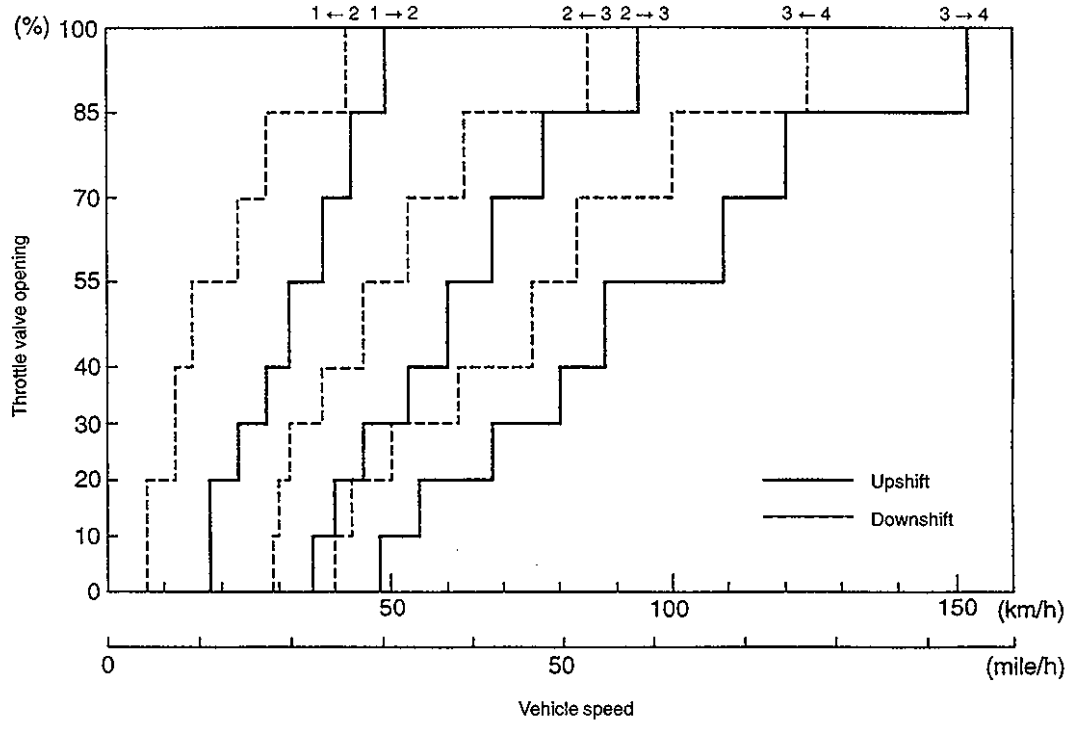
AUTOMATIC GEAR SHIFT DIAGRAM

Automatic shift schedule as a result of shift control is shown below.

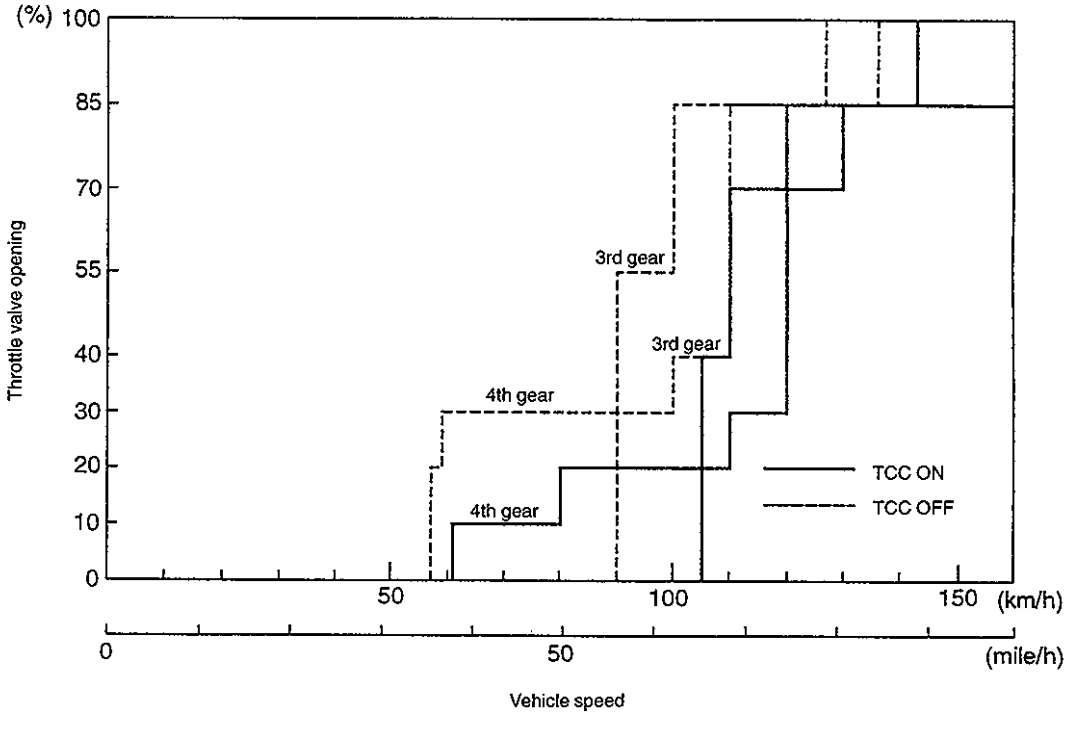
[G16 engine]

Power Mode

Gear Shift Diagram

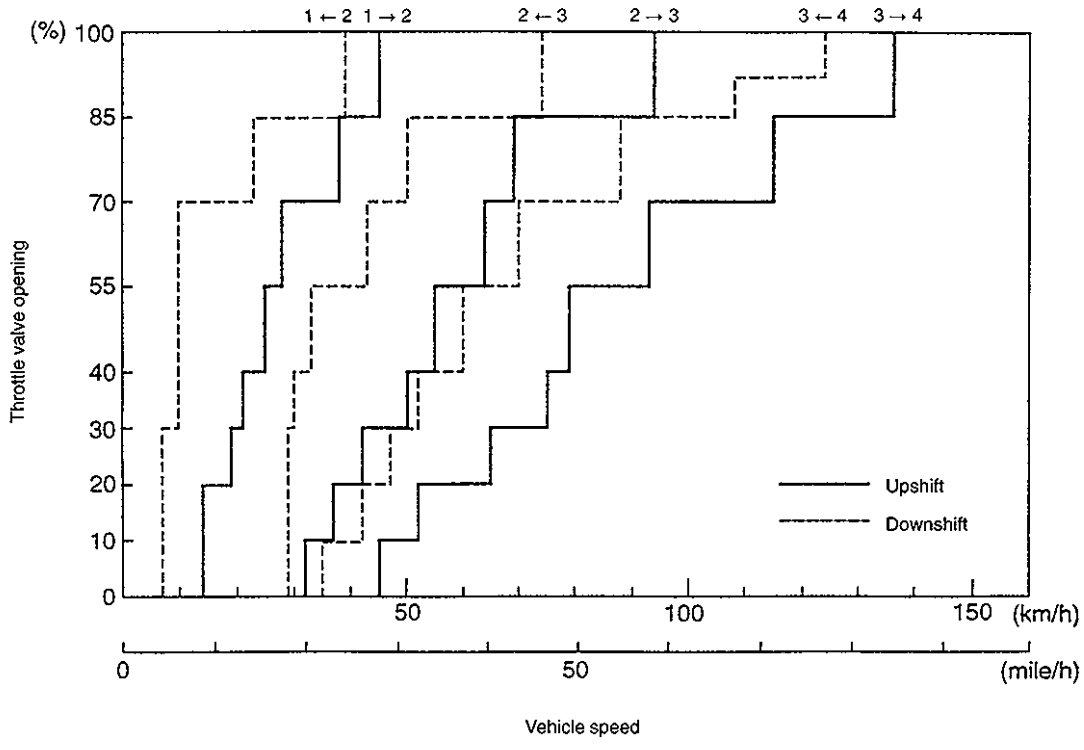


TCC Lock-up Diagram

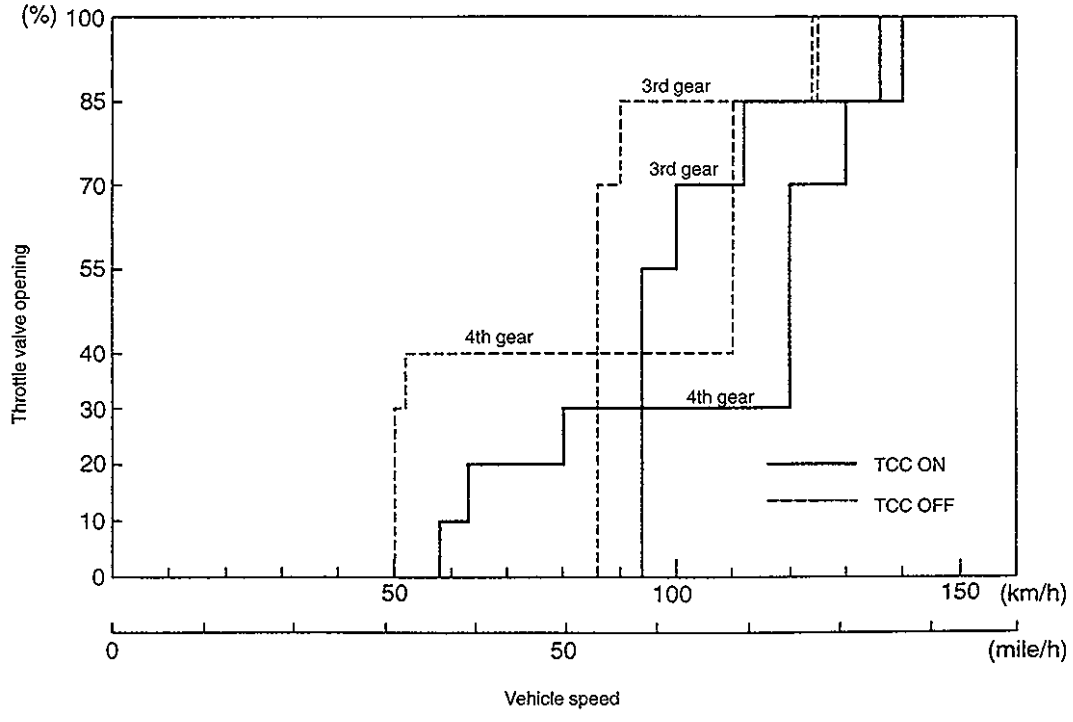


Normal Mode

Gear Shift Diagram

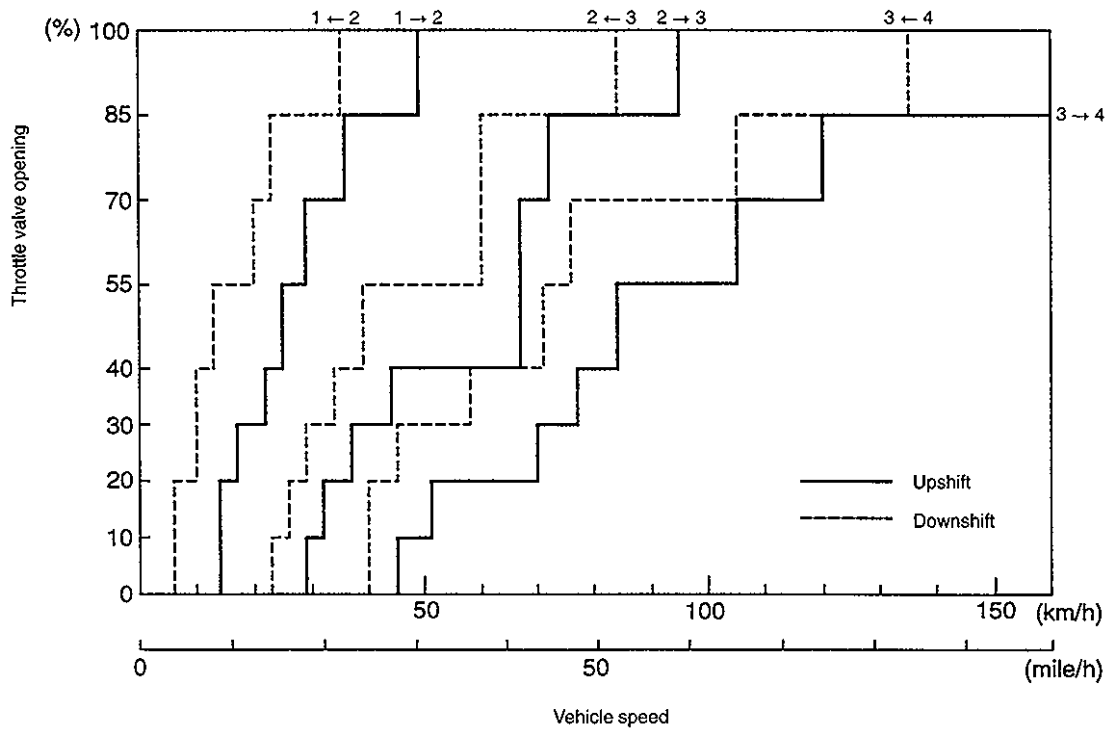


TCC Lock-up Diagram

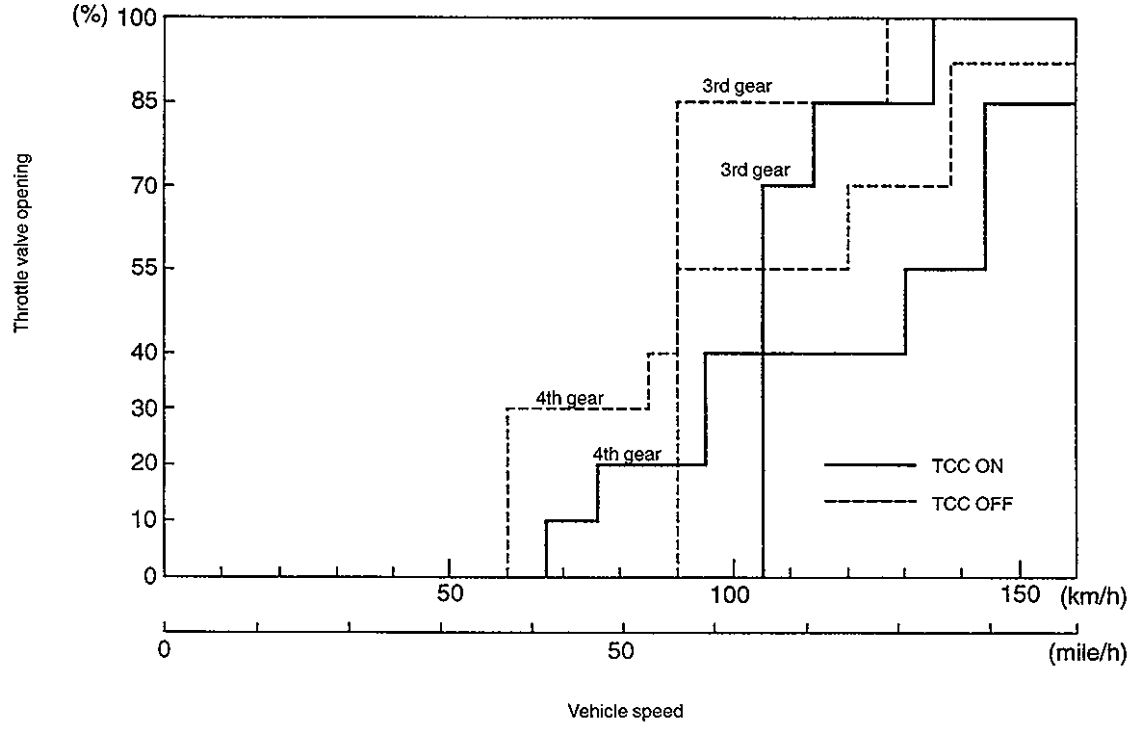


[J20 engine]
Power Mode

Gear Shift Diagram

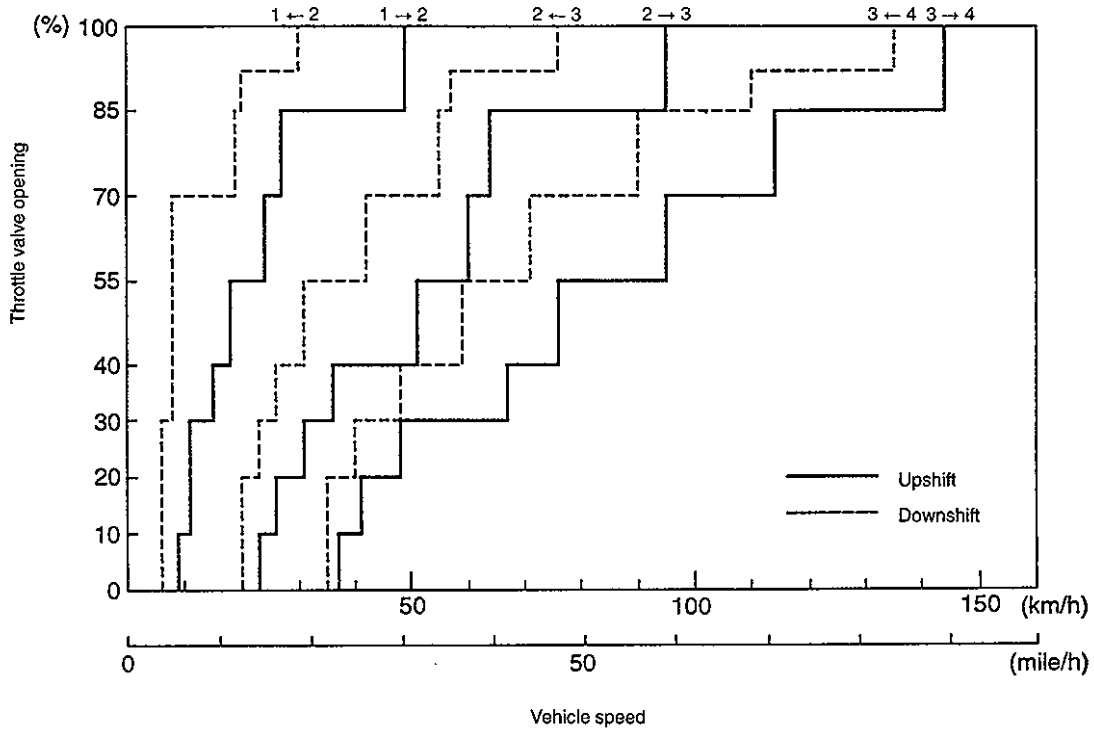


TCC Lock-up Diagram

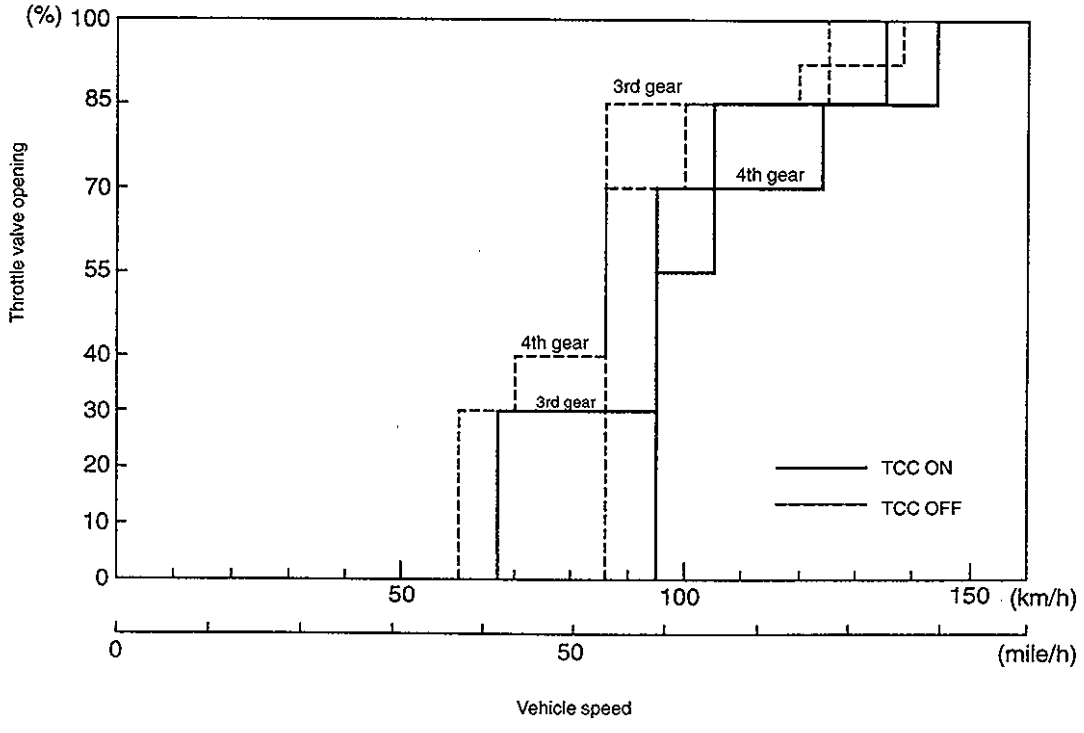


Normal Mode

Gear Shift Diagram

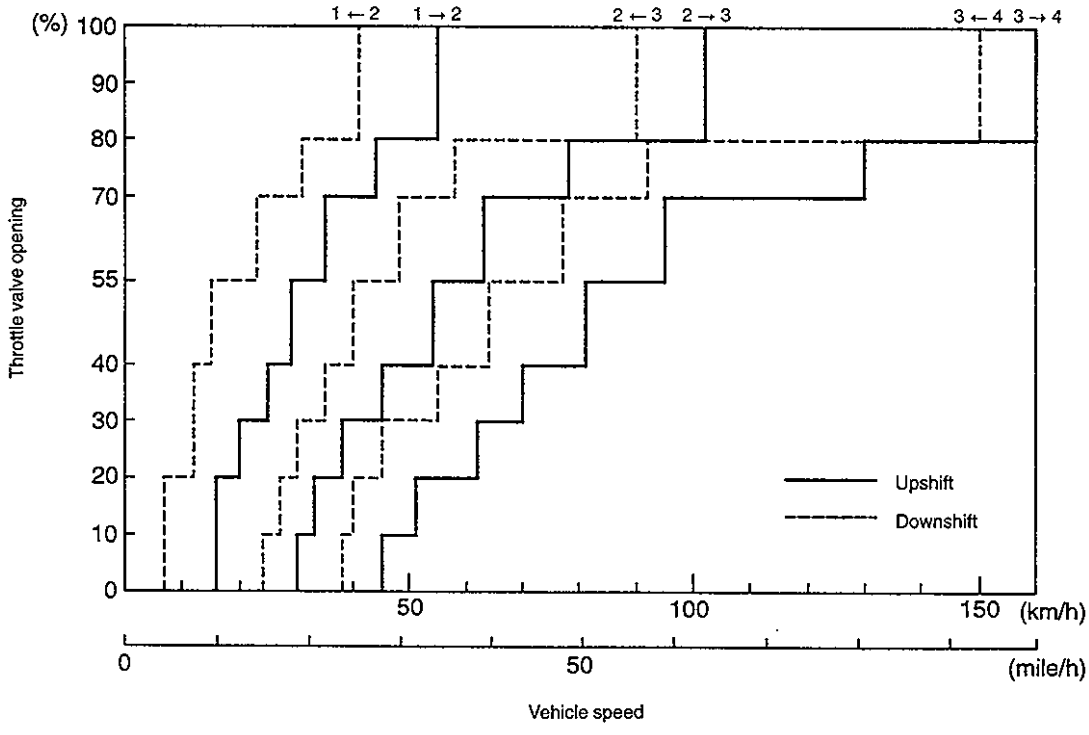


TCC Lock-up Diagram

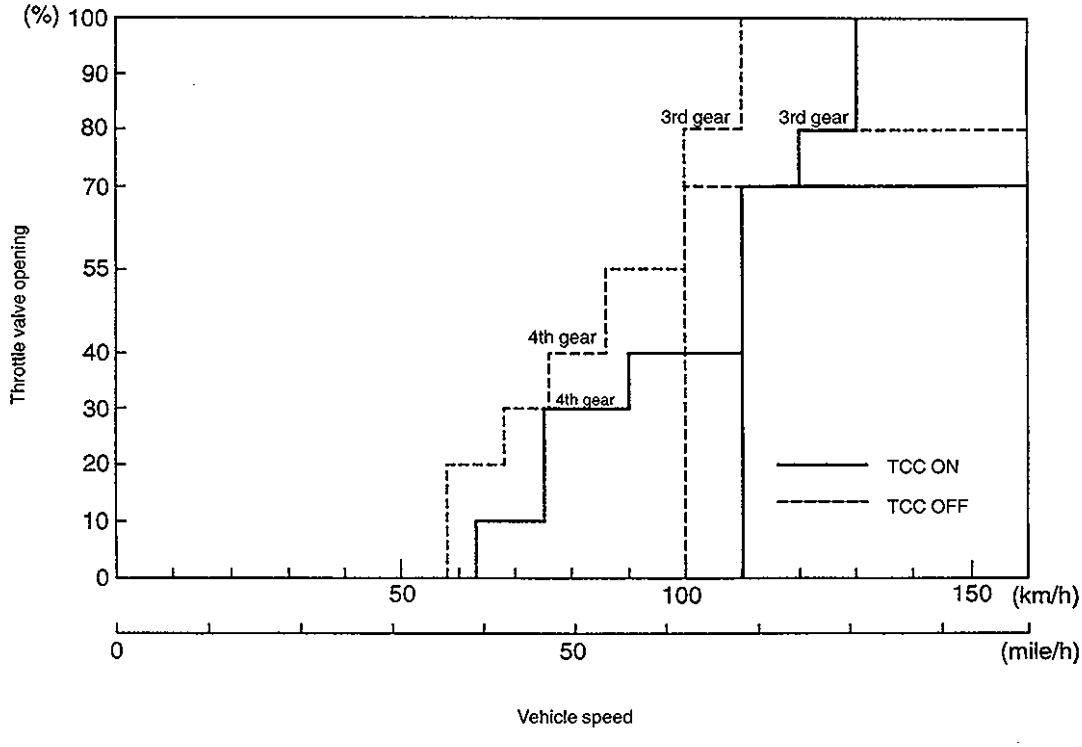


[H25 engine]
Power Mode

Gear Shift Diagram

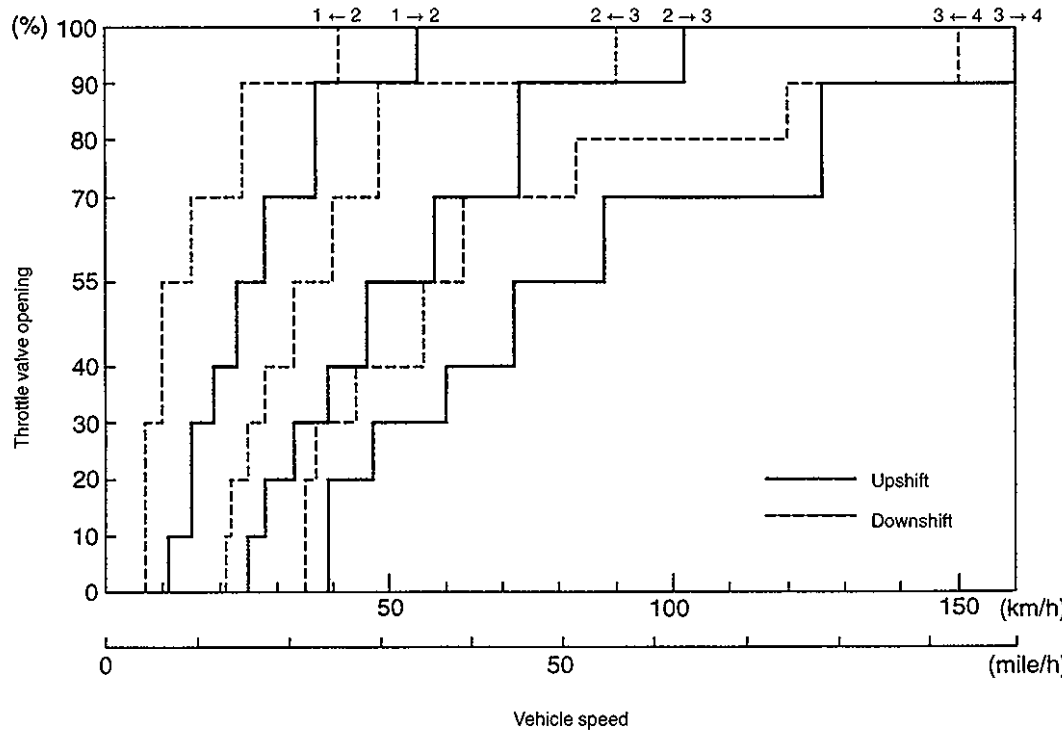


TCC Lock-up Diagram

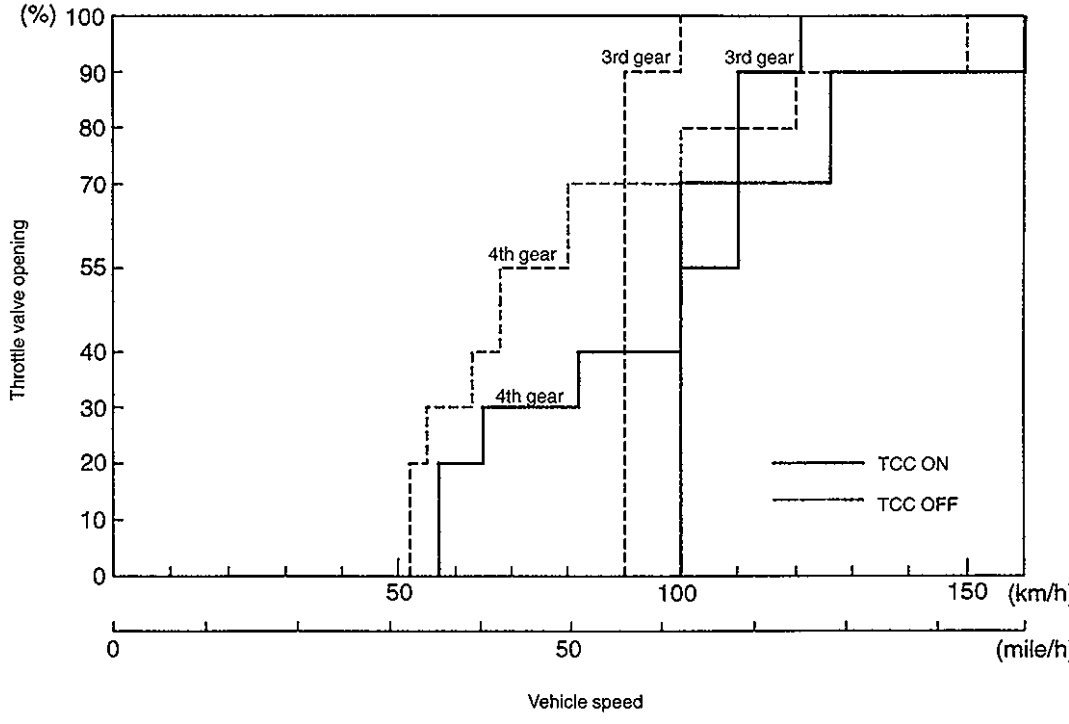


Normal Mode

Gear Shift Diagram



TCC Lock-up Diagram



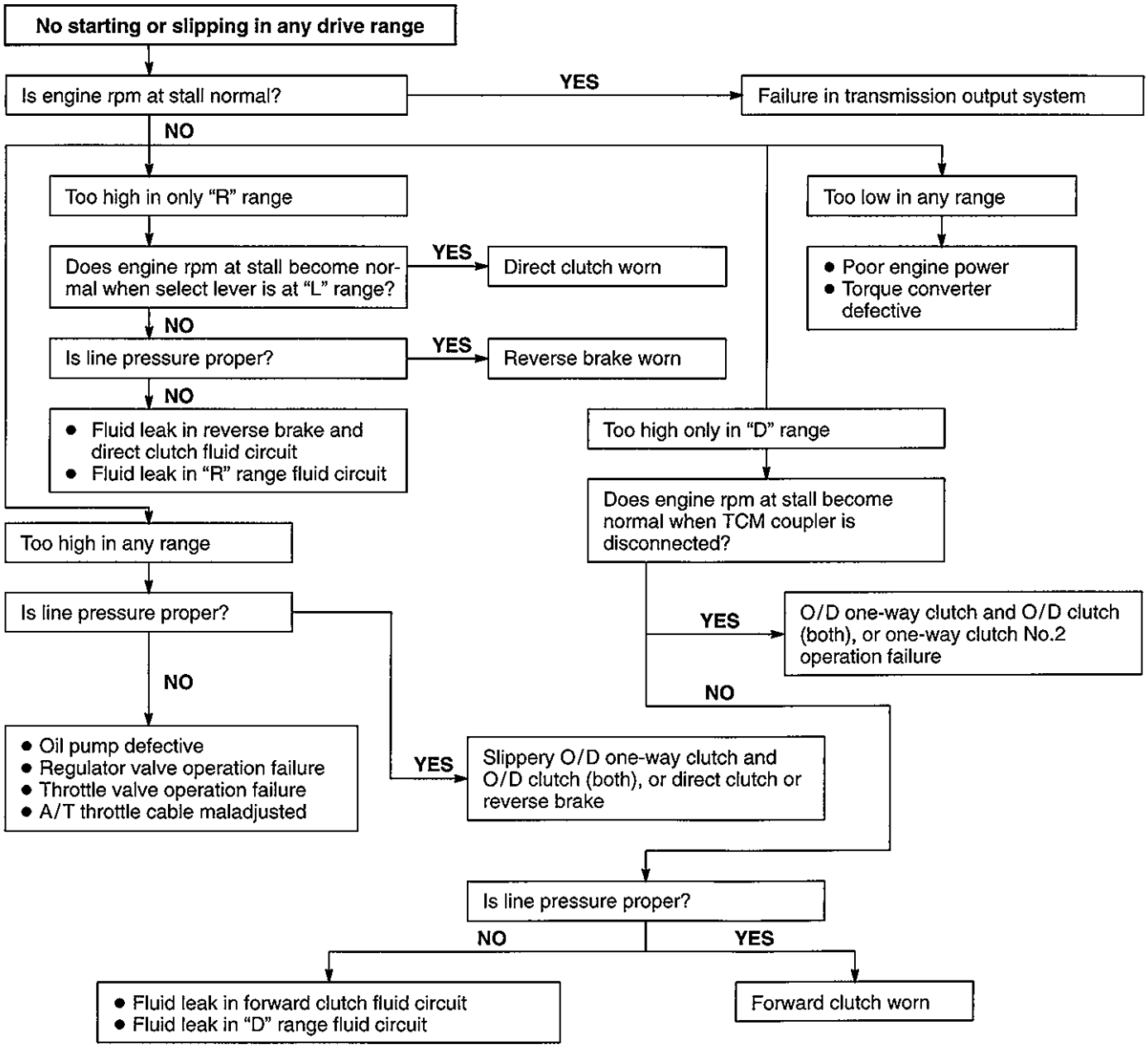
DIAGNOSIS

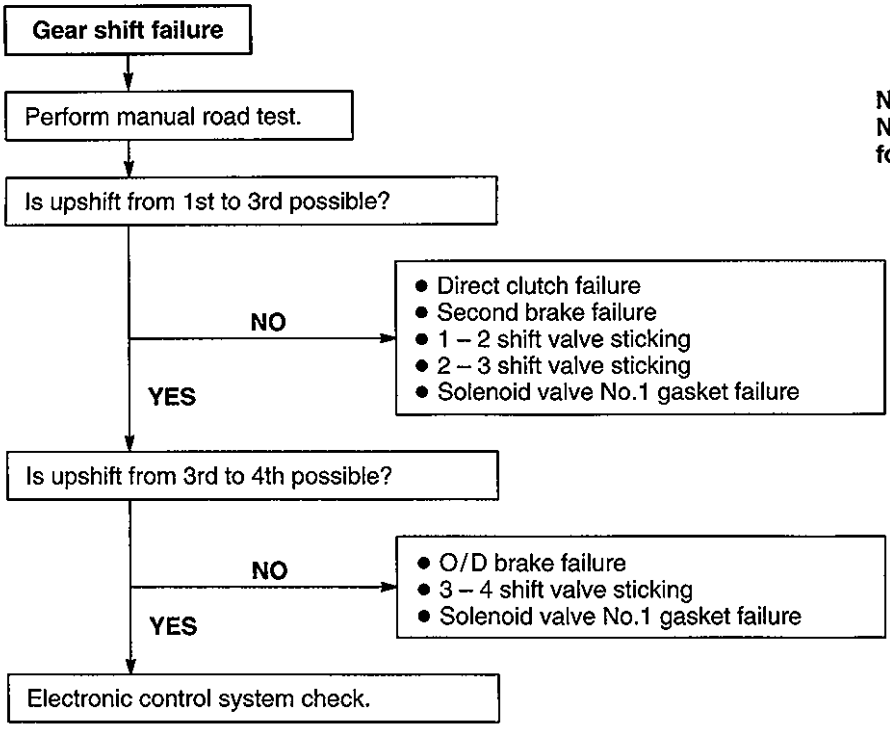
When a vehicle is brought is for service, its trouble should be identified with the below group by asking the user about the conditions of the trouble as precisely as possible and performing the recreation test based on them.
Possible troubles of the automatic transmission are grouped into following types.
(1) Improper inspection or maladjustment
(2) Poor engine performance
(3) Fault in fluid pressure control mechanism
(4) Fault in electronic control unit
(5) Mechanical fault in transmission

TRANSMISSION UNIT

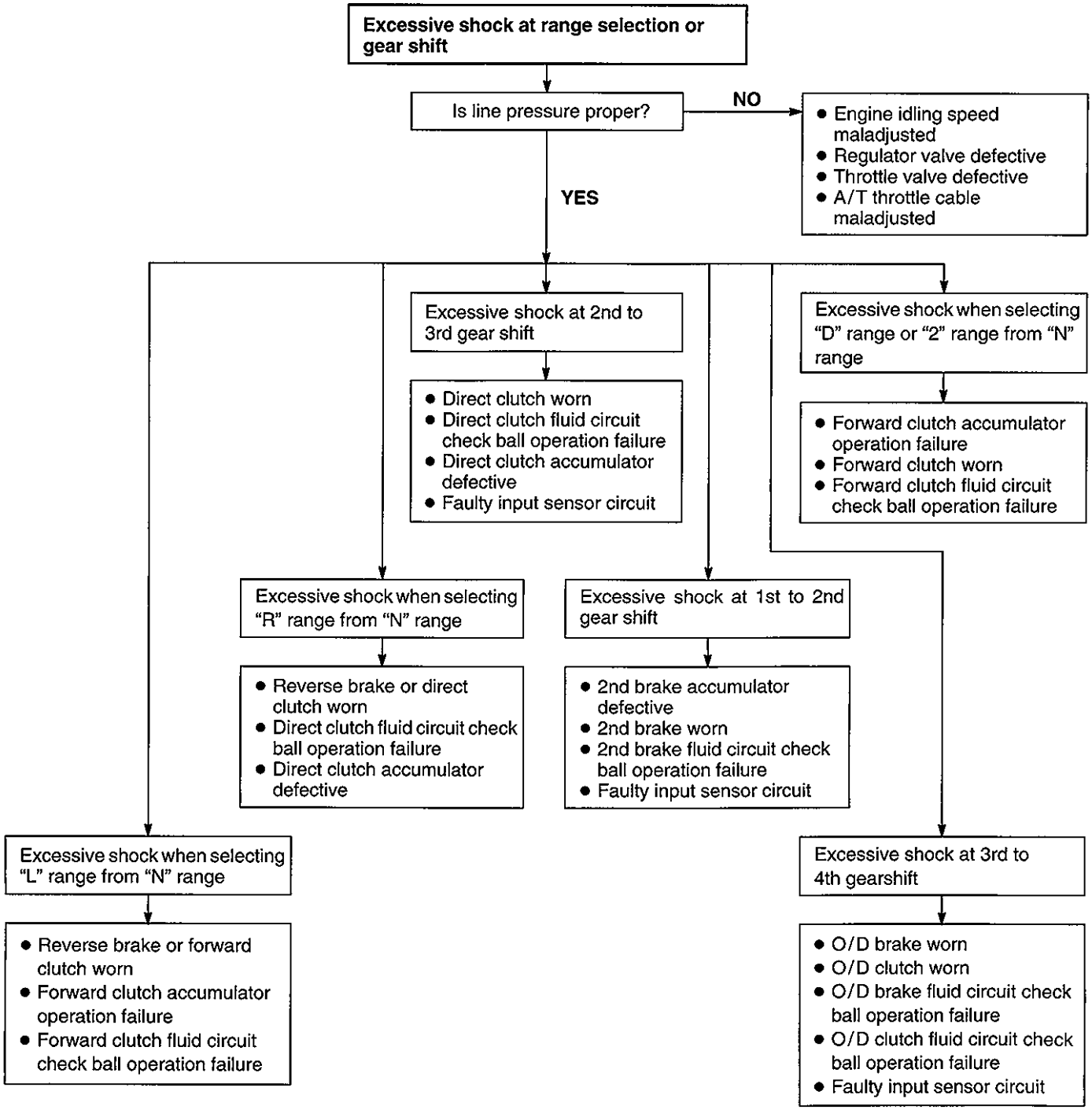
SYSTEMATIC TROUBLESHOOTING

Before performing troubleshooting for mechanical function described hereafter, make sure to check each of the following.
1) Engine coolant temperature is at normal operation temperature.
2) Engine idle speed is within specification.
3) Transmission fluid level is between FULL HOT and LOW HOT marks on dipstick at normal operating temperature of transmission fluid.
4) A/T throttle cable and select cable are adjusted properly.
5) Electronic circuit of gear shift control system is free from break, coupler disconnection and poor contact.


No starting or slipping in any drive range
Is engine rpm at stall normal?
YES
Failure in transmission output system
NO
Too high in only "R" range
Does engine rpm at stall become normal when select lever is at "L" range?
YES
Direct clutch worn
NO
Is line pressure proper?
YES
Reverse brake worn
NO
• Fluid leak in reverse brake and direct clutch fluid circuit
• Fluid leak in "R" range fluid circuit
Too low in any range
• Poor engine power
• Torque converter defective
Too high only in "D" range
Does engine rpm at stall become normal when TCM coupler is disconnected?
YES
O/D one-way clutch and O/D clutch (both), or one-way clutch No.2 operation failure
NO
Too high in any range
Is line pressure proper?
NO
• Oil pump defective
• Regulator valve operation failure
• Throttle valve operation failure
• A/T throttle cable maladjusted
YES
Slippery O/D one-way clutch and O/D clutch (both), or direct clutch or reverse brake
Is line pressure proper?
NO
YES
• Fluid leak in forward clutch fluid circuit
• Fluid leak in "D" range fluid circuit
Forward clutch worn



NOTE:
No gear shift occurs when O/D clutch or forward clutch is faulty.


Excessive shock at range selection or gear shift
Is line pressure proper?
NO
• Engine idling speed maladjusted
• Regulator valve defective
• Throttle valve defective
• A/T throttle cable maladjusted
YES
Excessive shock at 2nd to 3rd gear shift
• Direct clutch worn
• Direct clutch fluid circuit check ball operation failure
• Direct clutch accumulator defective
• Faulty input sensor circuit
Excessive shock when selecting "D" range or "2" range from "N" range
• Forward clutch accumulator operation failure
• Forward clutch worn
• Forward clutch fluid circuit check ball operation failure
Excessive shock when selecting "R" range from "N" range
• Reverse brake or direct clutch worn
• Direct clutch fluid circuit check ball operation failure
• Direct clutch accumulator defective
Excessive shock at 1st to 2nd gear shift
• 2nd brake accumulator defective
• 2nd brake worn
• 2nd brake fluid circuit check ball operation failure
• Faulty input sensor circuit
Excessive shock when selecting "L" range from "N" range
• Reverse brake or forward clutch worn
• Forward clutch accumulator operation failure
• Forward clutch fluid circuit check ball operation failure
Excessive shock at 3rd to 4th gearshift
• O/D brake worn
• O/D clutch worn
• O/D brake fluid circuit check ball operation failure
• O/D clutch fluid circuit check ball operation failure
• Faulty input sensor circuit

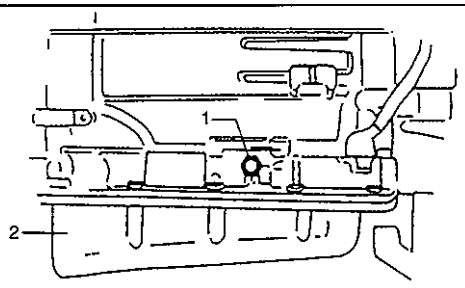
TROUBLE DIAGNOSIS TABLE

	Condition	Possible Cause	Correction
Transmission fluid	**Low fluid level**	• Fluid leakage from oil filler tube • External fluid leakage	Fill fluid to specified level. Repair.
	Fluid leakage from transmission case joint	• Excessively high fluid level • Crushed breather hose	Adjust to specified fluid level. Repair.
	Fluid leakage from transmission case	• Manual select shaft • Oil pan gasket • O-ring of oil filler tube • Oil pressure gauge plug • O-ring of electric connector	Replace. Replace gasket. Replace O-ring. Retighten plug. Replace.
	Low fluid pressure	• Low A/T fluid level. • Clogged oil pump strainer • Leakage from oil pressure circuit • Malfunction of pressure regulator valve	Fill fluid to specified level. Wash strainer. Overhaul. Overhaul valve body.
	High fluid pressure	• Pressure regulator valve	Overhaul valve body.
Running condition	**Unable to run in all ranges**	• Low A/T fluid level • Wear in oil pump • Seizure in oil pump • Regulator valve stick • Clogged oil strainer • Seized or broken planetary gear • Fluid pressure leakage to over drive clutch due to wear of oil pump bushing • Faulty in torque converter • Faulty manual valve	Refill fluid to specified level. Replace. Replace. Replace. Wash strainer. Repair or replace. Replace. Replace. Replace.

TROUBLE DIAGNOSIS TABLE

	Condition	Possible Cause	Correction
Transmission fluid	**Low fluid level**	• Fluid leakage from oil filler tube • External fluid leakage	Fill fluid to specified level. Repair.
	Fluid leakage from transmission case joint	• Excessively high fluid level • Crushed breather hose	Adjust to specified fluid level. Repair.
	Fluid leakage from transmission case	• Manual select shaft • Oil pan gasket • O-ring of oil filler tube • Oil pressure gauge plug • O-ring of electric connector	Replace. Replace gasket. Replace O-ring. Retighten plug. Replace.
	Low fluid pressure	• Low A/T fluid level. • Clogged oil pump strainer • Leakage from oil pressure circuit • Malfunction of pressure regulator valve	Fill fluid to specified level. Wash strainer. Overhaul. Overhaul valve body.
	High fluid pressure	• Pressure regulator valve	Overhaul valve body.
Running condition	**Unable to run in all ranges**	• Low A/T fluid level • Wear in oil pump • Seizure in oil pump • Regulator valve stick • Clogged oil strainer • Seized or broken planetary gear • Fluid pressure leakage to over drive clutch due to wear of oil pump bushing • Faulty in torque converter • Faulty manual valve	Refill fluid to specified level. Replace. Replace. Replace. Wash strainer. Repair or replace. Replace. Replace. Replace.

Condition		Possible Cause	Correction
Gear shift	**Poor 3 – 4 shift, excessive slippage**	● Faulty overdrive brake ● Faulty overdrive clutch ● 3 – 4 shift valve sticking ● Shift solenoid valve – B sticking	Replace. Replace. Replace. Replace.
	Poor start or juddering in "R" range	● Fluid pressure leakage of direct clutch due to wear or breakage of oil center support seal ring ● Worn direct clutch	Replace. Replace.
	Excessive shock on 1 – 2 shift	● Regulator valve sticking ● Faulty one-way clutch ● Faulty accumulator, second brake piston ● Faulty input sensor	Replace. Replace. Replace. Replace.
	Excessive shock on 2 – 3 shift	● Regulator valve sticking ● Faulty accumulator, direct clutch piston ● Faulty input sensor	Replace. Replace. Replace.
	Excessive shock on 3 – 4 shift	● Regulator valve sticking ● Faulty input sensor	Replace. Replace.
	Non operate lock-up system	● TCC (Lock-up) control valve sticking ● Solenoid valve No.2 (TCC solenoid valve) sticking ● Faulty torque converter	Replace. Replace. Replace.
Abnormal noise	**Noise (sucking) on starting**	● Low A/T fluid level	Fill fluid to specified level.
	Abnormal noise in "P" or "N" range	● Low A/T fluid level ● Worn oil pump	Fill fluid to specified level. Replace.

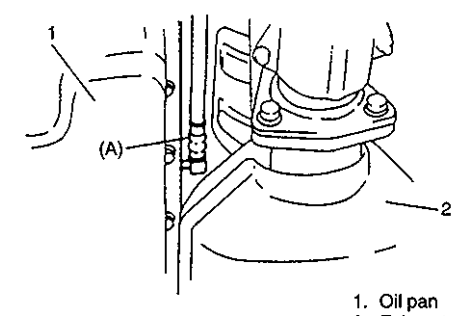


1. Fluid pressure check hole
2. Oil pan

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 following conditions.

- Automatic fluid is at normal operating temperature (70 to 80°C/158 – 176°F).
- Fluid is filled to proper level (between FULL HOT and LOW HOT on dipstick).



1. Oil pan
2. Exhaust pipe

1) Apply parking brake securely and place checks against wheels.
2) Attach oil pressure gauge to fluid pressure check hole in transmission case.

Special Tool
(A): 09925-37810

CAUTION:
After attaching oil pressure gauge, check that not fluid leakage exists.

3) 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.

[G16 and J20 engines]

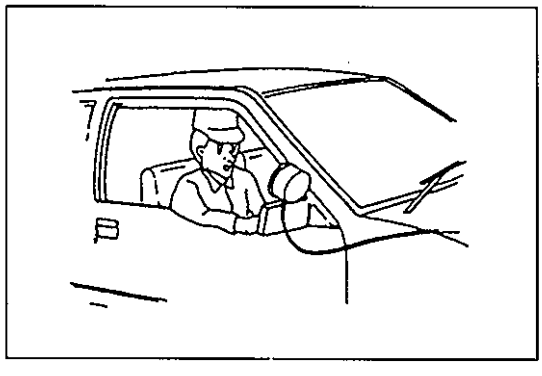
Engine running mode	Line pressure	
	"D" range	"R" range
At idle speed	3.7 – 4.1 kg/cm^2 53 – 58 psi	5.5 – 6.1 kg/cm^2 79 – 86 psi
At stall speed	10.3 – 11.8 kg/cm^2 146 – 168 psi	14.3 – 16.8 kg/cm^2 203 – 239 psi

[H25 engine]

Engine running mode	Line pressure	
	"D" range	"R" range
At idle speed	3.7 – 4.1 kg/cm^2 53 – 58 psi	5.1 – 5.7 kg/cm^2 73 – 81 psi
At stall speed	11.2 – 12.7 kg/cm^2 159 – 181 psi	14.5 – 17.0 kg/cm^2 206 – 242 psi

Check result	Possible cause
Line pressure higher than standard level in each range	• Malfunctioning regulator valve • Malfunctioning throttle valve • Maladjusted A/T throttle cable
Line pressure lower than standard level in each range	• Defective O/D clutch • Defective oil pump • Malfunctioning throttle valve • Malfunctioning regulator valve • Maladjusted A/T throttle cable
Line pressure lower than standard level only in "D" range	• Fluid leakage from forward clutch • Defective O/D clutch • Leakage from "D" range fluid pressure circuit
Line pressure lower than standard level only in "R" range	• Fluid leakage from direct clutch • Defective O/D clutch • Fluid leakage from reverse brake • Fluid leakage from "R" range fluid circuit

Tightening torque of transmission case plug:
17 N·m (1.7 kg-m, 12.0 lb-ft)



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 following specification.

Stall speed: 2,300 – 2,600 r/min..... G16 and H25 engines
2,000 – 2,300 r/min..... J20 engine

Check result	Possible cause
Lower than standard level	• Faulty engine output • Defective torque converter
Higher than standard level in "D" range	• Slippery O/D clutch • Slippery forward clutch • Malfunctioning O/D one-way clutch • Malfunctioning one-way clutch No.2 • Low line pressure
Higher than standard level in "R" range	• Slippery direct clutch • Slippery reverse brake • Low fluid pressure • Slippery O/D clutch • Defective O/D one-way clutch

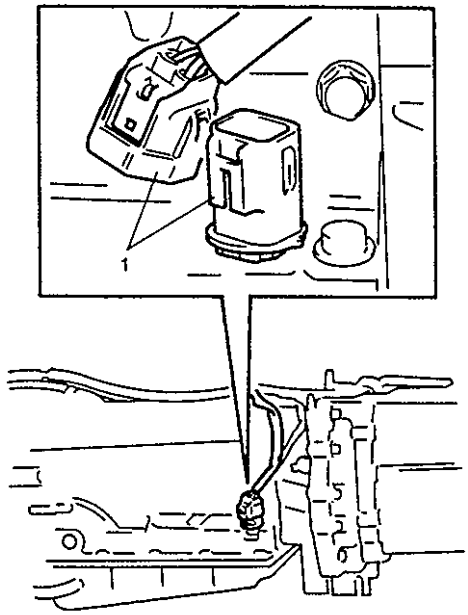
ROAD TEST

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 lever "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.
(Page 7B1-7 to 7B1-12.)

Test result	Possible cause
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. Shift solenoids connector

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:
[Using SUZUKI scan tool (Tech 1)]
Before this test, check DTC.
[Not using SUZUKI scan tool (Tech 1)]
Before this test, check DTC and make sure that Code No. 12 is indicated by flashing of malfunction indicator lamp ("CHECK ENGINE" light).

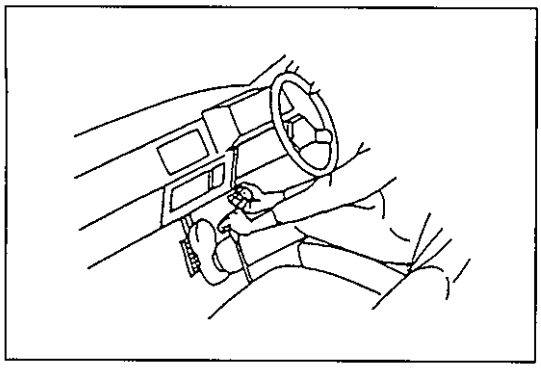
1) Disconnect coupler of shift solenoid valves on transmission.

> **WARNING:**
> **To avoid the danger of being burned, do not touch the hot exhaust system when disconnecting shift solenoid valves coupler.**

2) With selector lever in "P" range, start engine and warm it up.
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 with O/D cut switch "ON" 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 solenoid valves coupler.

> **WARNING:**
> **To avoid the danger of being burned, do not touch the hot exhaust system when connecting shift solenoid valves coupler.**

7) [Using SUZUKI scan tool (Tech 1)]
   Clear DTC referring to 7B1-30.
   [Not using SUZUKI scan tool (Tech 1)].
   Check DTC and make sure that Code No. 12 is indicated by flashing of malfunction indicator lamp ("CHECK ENGINE" light).



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 1.2 sec.
	"N" → "R"	Less than 1.5 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 causes
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 reverse brake

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) If engine brake fails to operate in above tests, possible causes for such failure are as follows. Check each part which is suspected to be the cause.

Condition	Possible cause
Fails to operate when shifted down to "2" range	Second coast brake defective
Fails to operate when shifted down to "L" range	Reverse brake defective

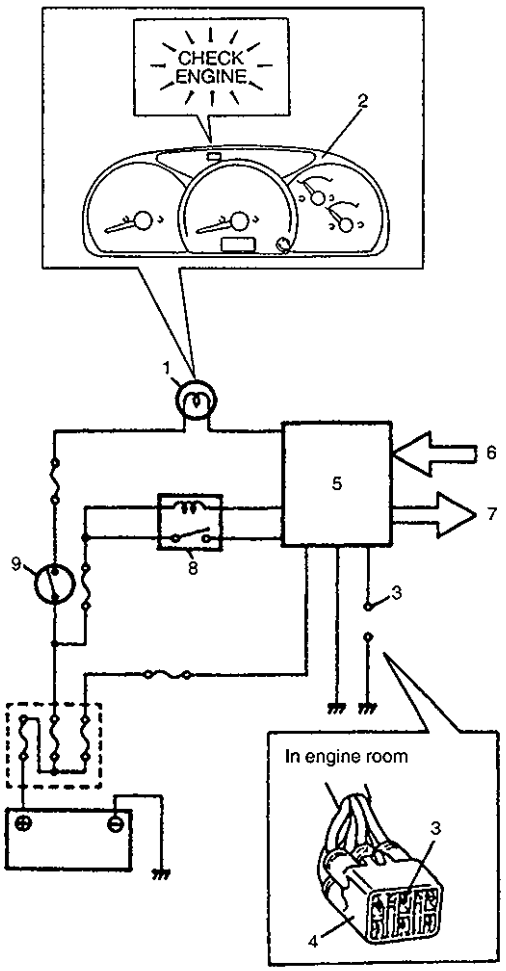
"P" RANGE TEST

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.

ELECTRONIC SHIFT CONTROL SYSTEM

The powertrain control module (PCM) with on-board diagnostic system (self-diagnosis function) operates as described below.
When diagnosing a trouble in the electronic shift control system, use "DIAGNOSTIC FLOW CHART" and "DIAGNOSTIC TROUBLE CODE TABLE" on the following page.



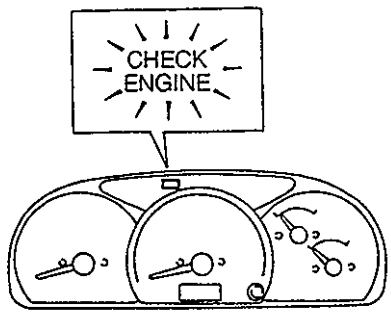
1. Malfunction indicator lamp ("CHECK ENGINE" light)
2. Combination meter
3. Diagnosis switch terminal
4. Monitor coupler
5. PCM
6. Sensed information
7. Output
8. Main relay
9. Ignition switch

ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION)

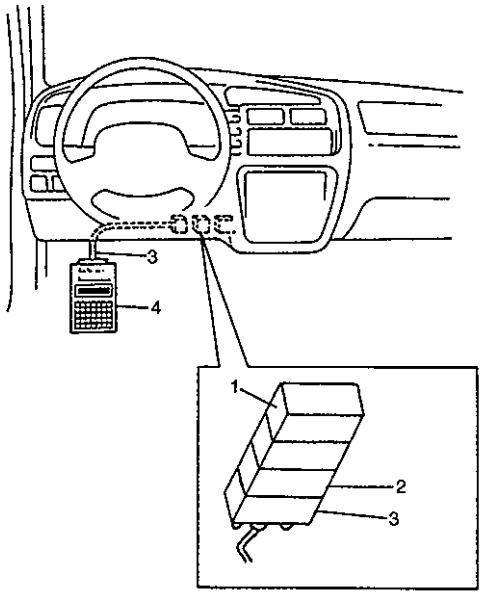
PCM and malfunction indicator lamp ("CHECK ENGINE" light) operate as follows.

- Malfunction indicator lamp ("CHECK ENGINE" light) lights when the ignition switch is turned ON (but the engine at stop) with the diagnosis switch terminal ungrounded regardless of the condition of electronic fuel injection system. This is only to check the malfunction indicator lamp ("CHECK ENGINE" light) bulb and its circuit.
- If electronic fuel injection system is free from any trouble after the engine start (while engine is running), malfunction indicator lamp ("CHECK ENGINE" light) turns OFF.
- When PCM detects a trouble in electronic fuel injection system, it makes malfunction indicator lamp ("CHECK ENGINE" lamp) to turn ON. While engine is running, PCM warns the driver that a trouble has occurred and, at the same time, stores trouble code of that trouble in back-up memory in itself. When it detects a trouble in electronic shift control system, however, it does not make malfunction indicator lamp ("CHECK ENGINE" lamp) to turn ON. It only stores its trouble code in back-up memory in itself. (The memory is kept as it is even if the trouble was only temporary and disappeared immediately. And it is not erased unless the power to PCM is shut off for 30 seconds or longer.)
  PCM also indicates trouble area in memory by means of flashing of malfunction indicator lamp ("CHECK ENGINE" light) at the time of inspection (i.e. when diagnosis switch terminal is grounded and ignition switch is turned ON).

[Not using SUZUKI scan tool (Tech 1)]



[Using SUZUKI scan tool (Tech 1)]

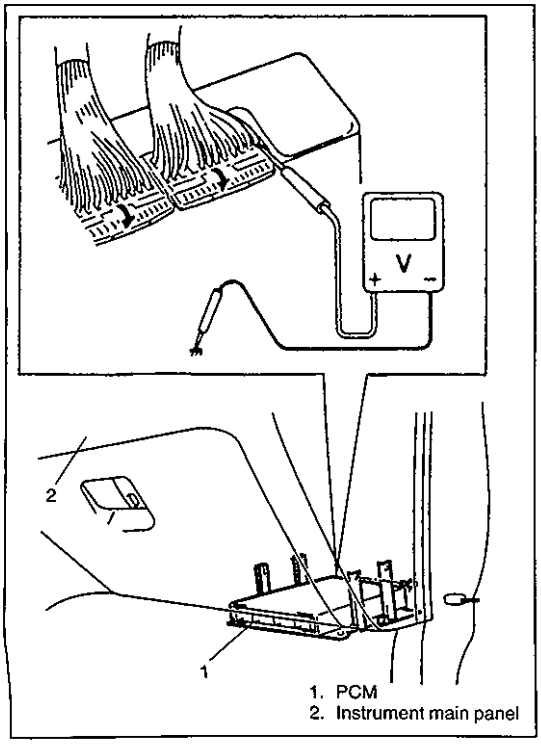


1. Data link connector
2. DLC cable adapter
3. DLC cable
4. SUZUKI scan tool (Tech 1)

PRECAUTIONS IN DIAGNOSING TROUBLES

[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

- Before identifying diagnostic trouble code, don't disconnect couplers from PCM, battery cable from battery, PCM ground wire harness from engine. Such disconnection will erase memorized trouble in PCM memory.
- If abnormality or malfunction lies in two or more areas, malfunction indicator lamp ("CHECK ENGINE" light) 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.
- Take a note of diagnostic trouble code indicated first.



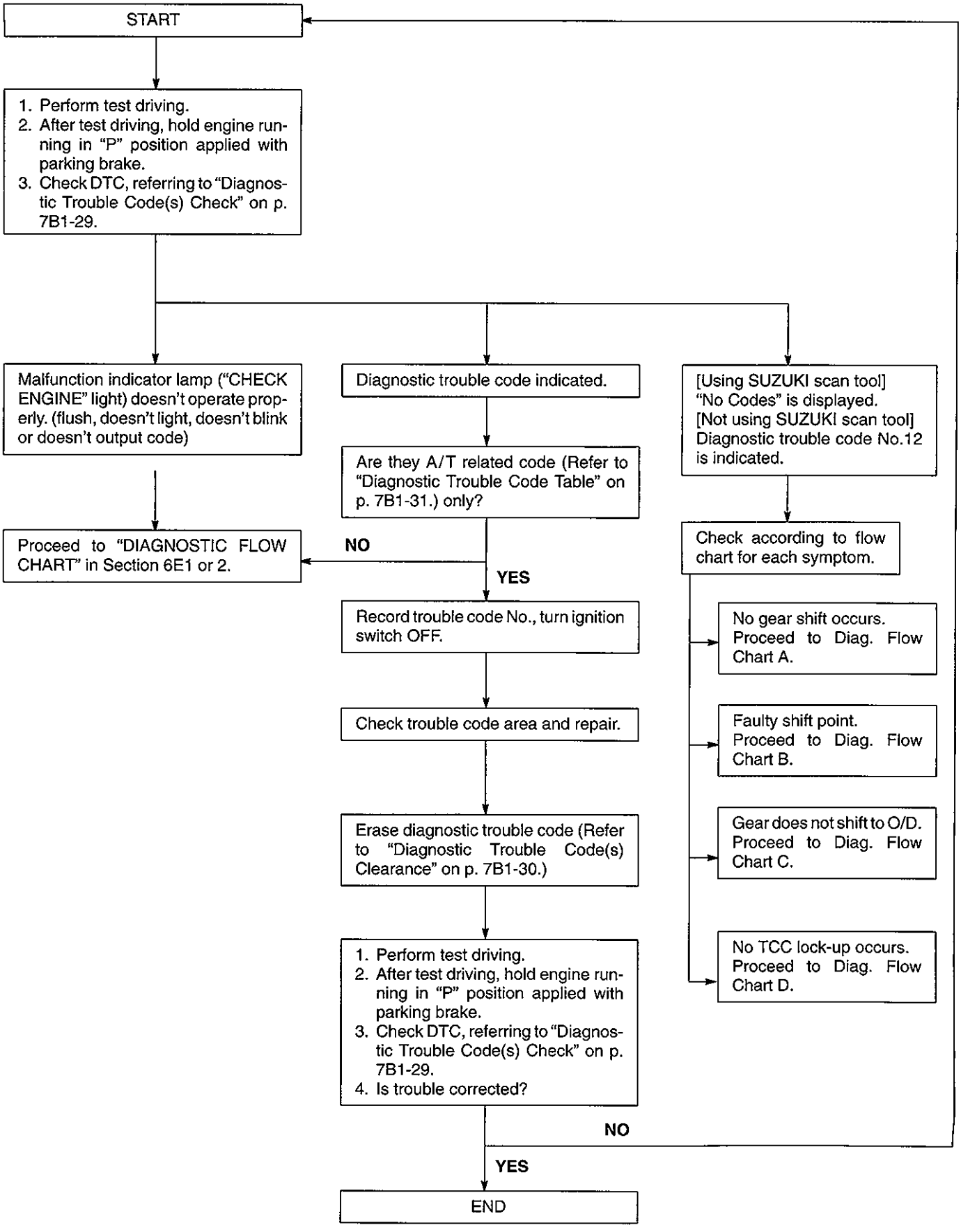
1. PCM
2. Instrument main panel

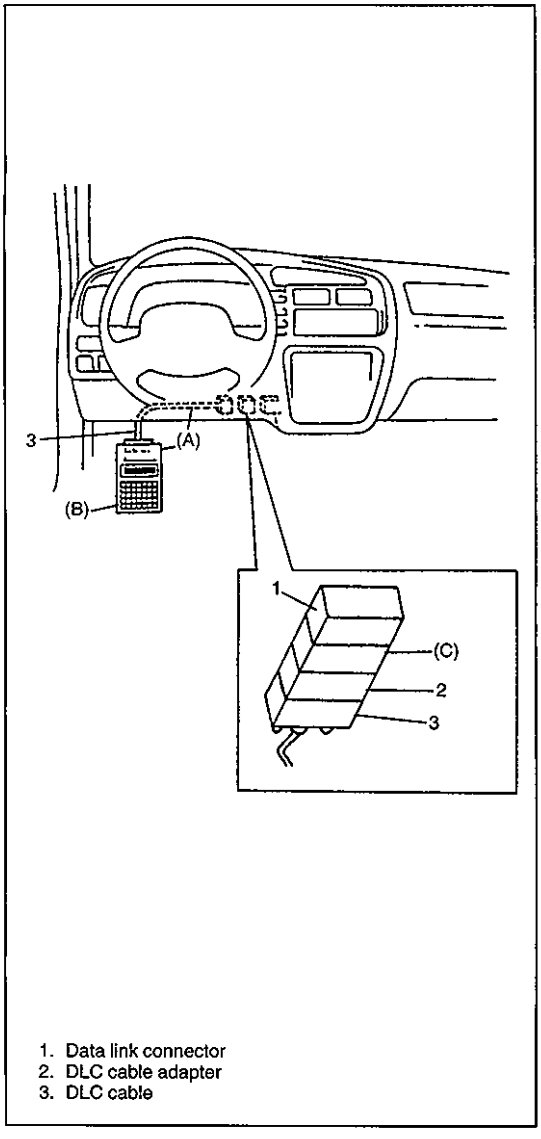
[INTERMITTENT TROUBLE] and [NOTES ON SYSTEM CIRCUIT INSPECTION]

Refer to SECTION 0A

- "Normal operating temperature" in the diagnostic flow chart means that the engine coolant temperature is 80°C (176°F) and A/T fluid temperature is 70 – 80°C (158 – 176°F).
- When checking voltage at each terminal of the coupler which is connected to PCM, be sure to connect negative probe to body ground. Any other way is prohibited even by accident.
  Applying it improperly may cause the sensor or PCM to be shorted and damaged.

DIAGNOSTIC FLOW CHART





1. Data link connector
2. DLC cable adapter
3. DLC cable

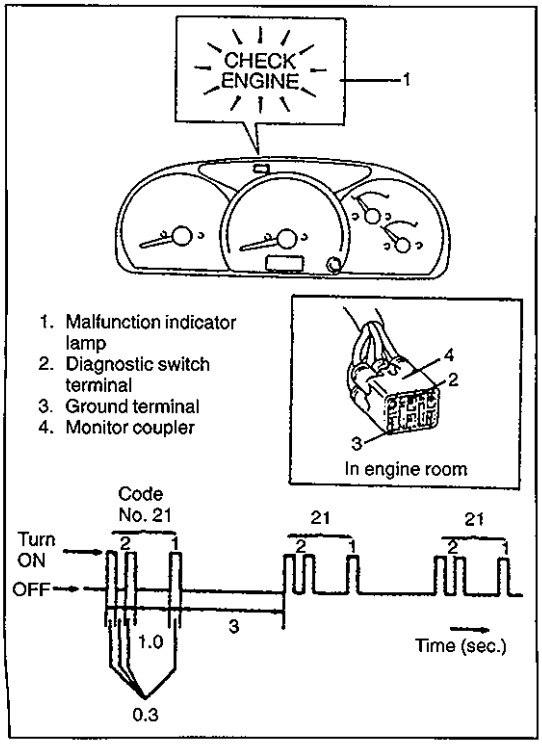
DIAGNOSTIC TROUBLE CODE(S) CHECK

[Using SUZUKI scan tool (Tech 1)]

1) Turn ignition switch OFF.
2) After setting cartridge to Tech 1, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special Tool
(A): 09931-76011 (scan tool, Tech 1)
(B): Mass storage cartridge
(C): 09931-96020 (16/12 pin DLC adapter)

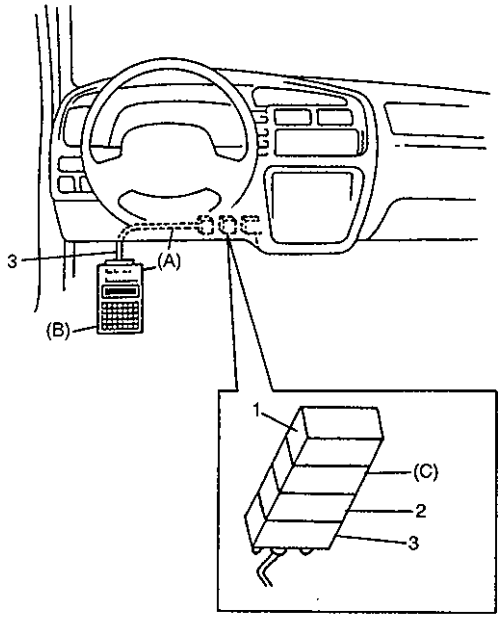
3) Turn ignition switch ON.
4) Read DTC according to instructions displayed on Tech 1 and print it or write it down. Refer to Tech 1 operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect Tech 1 from data link connector (DLC).



1. Malfunction indicator lamp
2. Diagnostic switch terminal
3. Ground terminal
4. Monitor coupler

[Not using SUZUKI scan tool (Tech 1)]

1) Check malfunction indicator lamp ("CHECK ENGINE" light), referring to "Malfunction Indicator Lamp Check" on Section 6E1 or 2.
2) Using service wire, ground diagnosis switch terminal in monitor coupler.
3) Read DTC from flashing pattern of malfunction indicator lamp ("CHECK ENGINE" light). (Refer to "Diagnostic Trouble Code Table" on p. 7B1-31.)
4) After completing the check, turn ignition switch OFF and disconnect service wire from monitor coupler.



1. Data link connector
2. DLC cable adapter
3. DLC cable

DIAGNOSTIC TROUBLE CODE(S) CLEARANCE

[Using SUZUKI scan tool (Tech 1)]

1) Turn ignition switch OFF.
2) After setting cartridge to Tech 1, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special Tool
(A): 09931-76011 (scan tool, Tech 1)
(B): Mass storage cartridge
(C): 09931-96020 (16/12 pin DLC adapter)

3) Turn ignition switch ON.
4) Erase DTC according to instructions displayed on Tech 1. Refer to Tech 1 operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect Tech 1 from data link connector (DLC).

[Not using SUZUKI scan tool (Tech 1)]

Turn ignition switch OFF for specified time below to erase diagnostic trouble code stored in PCM memory.

TIME REQUIRED TO ERASE A/T RELATED DTC

AMBIENT TEMPERATURE	TIME TO CUT POWER TO PCM
Over 0°C (32°F)	30 sec. or longer
Under 0°C (32°F)	Not specifiable. Select a place with higher than 0°C (32°F) temperature.

DIAGNOSTIC TROUBLE CODE TABLE (A/T RELATED CODE)

Code No.	Diagnostic Area	Diagnosis
12	–	Normal
61	Shift solenoid valve A	Shift solenoid valve A or its circuit open or shorted to power circuit.
62		Shift solenoid valve A or its circuit shorted to ground.
63	Shift solenoid valve B	Shift solenoid valve B or its circuit open or shorted to power circuit.
64		Shift solenoid valve B or its circuit shorted to ground.
65	TCC solenoid valve	TCC solenoid valve or its circuit open or shorted to power circuit.
66		TCC solenoid valve or its circuit shorted to ground.
72	Transmission range switch	Defective switch or its circuit (more than two shift switches of "R", "N", "D", "2" and "L" turned ON simultaneously or no shift switch turned ON while vehicle running).
75	A/T vehicle speed sensor	Defective sensor or its circuit. (open or short)
76	A/T input sensor	Defective sensor or its circuit. (open or short)

FAIL-SAFE TABLE

Code No.	Diagnostic Area	Fail-Safe Function
14	ECT sensor	After 15 min. from engine start, PCM release inhibitions of shift to O/D gear and TCC lock-up.
15		
21	TP sensor	Throttle opening is controlled as closed.
22		
61	Shift solenoid valve A	Shift solenoid valve B. 1st, 2nd and 3rd gears ON, 4th (O/D) gear OFF. For shift position, refer to FAIL-SAFE FUNCTION in ELECTRONIC SHIFT CONTROL SYSTEM.
62		
63	Shift solenoid valve B	Shift solenoid valve A. 1st gear ON, 2nd 3rd and 4th (O/D) gears OFF. For shift position, refer to FAIL-SAFE FUNCTION in ELECTRONIC SHIFT CONTROL SYSTEM.
64		
65	TCC solenoid valve	TCC solenoid valve OFF.
66		
72	Transmission range switch	Priority order is "L" → "2" → "N" → "D" → "R". (When two or more signals inputted same time) Transmission range switch is controlled as "D" range. (When no signal inputted)
75	A/T vehicle speed sensor	Signal from vehicle speed sensor (in speedometer) is used.

DIAGNOSTIC FLOW CHART A

NO GEAR SHIFT OCCURS

↓

Warm up engine and transmission to normal operating temperature.

↓

Check diag. trouble code.

Trouble code indicated. → Go back to DIAG. FLOW CHART in this "DIAGNOSIS" section.

No trouble code indicated.

↓

Perform manual road test referring to "ON-VEHICLE SERVICE" in this section. Is it OK?

NG → Transmission or manual select control system faulty.

OK

↓

1. With solenoid valves coupler connected, turn ignition switch ON.
2. Conduct a road test in "D" range and check voltage at each solenoid terminal.
   For relationship between vehicle speed and each gear position, refer to gear shift diagram in "GENERAL DESCRIPTION" in this section.

OK → Shift solenoid valve A, B or transmission faulty.

Vehicle speed	1st range	2nd range	3rd range	4th range
Shift solenoid A	Battery voltage	Battery voltage	0V	0V
Shift solenoid B	0V	Battery voltage	Battery voltage	0V

NG

↓

With PCM coupler connected and select lever shifted to "D" range, check voltage at "L" and "2" range signal terminals. Voltage at each terminal should be 0V.

NG → Shift switch or its circuit faulty.

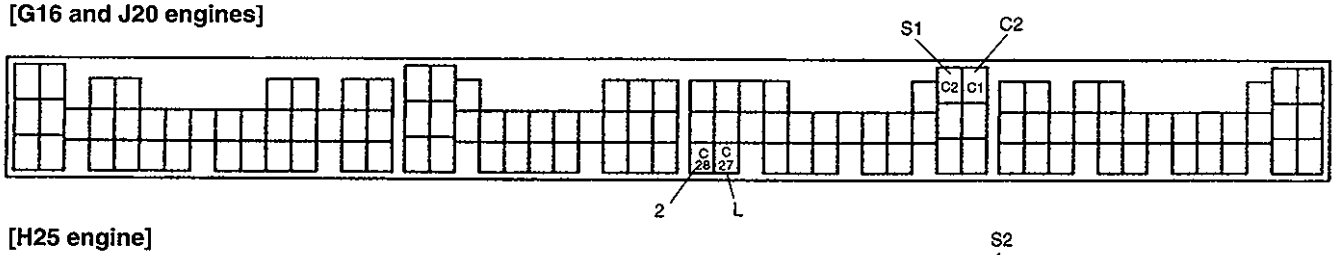
OK

↓

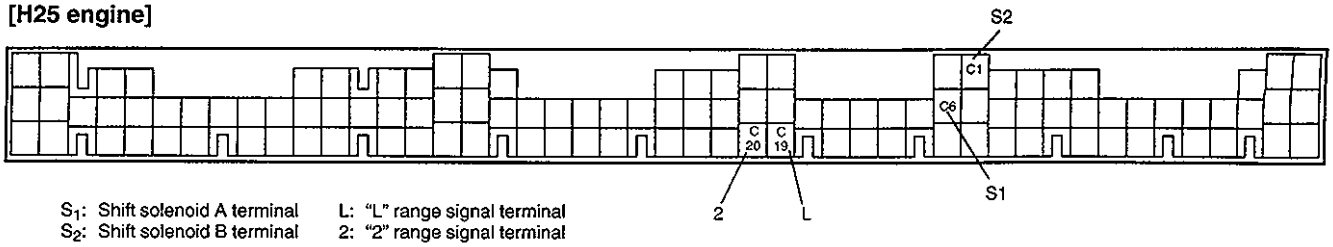
Replace PCM and recheck.

Terminal Arrangement of PCM Coupler (Viewed from harness side)

[G16 and J20 engines]



[H25 engine]



S_1: Shift solenoid A terminal
S_2: Shift solenoid B terminal
L: "L" range signal terminal
2: "2" range signal terminal

DIAGNOSTIC FLOW CHART B

FAULTY SHIFT POINT

↓

Warm up engine and transmission to normal operating temperature.

↓

Check diag. trouble code.

Trouble code indicated. → Go back to DIAG. FLOW CHART in this "DIAGNOSIS" section.

No trouble code indicated.

↓

Check throttle position (TP) sensor referring to Section 6E1 or 2.

NG → TP sensor maladjusted or faulty signal circuit.

OK

↓

1. With ignition switch OFF, connect PCM coupler.
2. Check voltage at "PWR" terminal.

NG → Mode selector switch or its circuit faulty.

Mode selector switch position	"N" position	"P" position
Voltage	About 5V	0V

↓

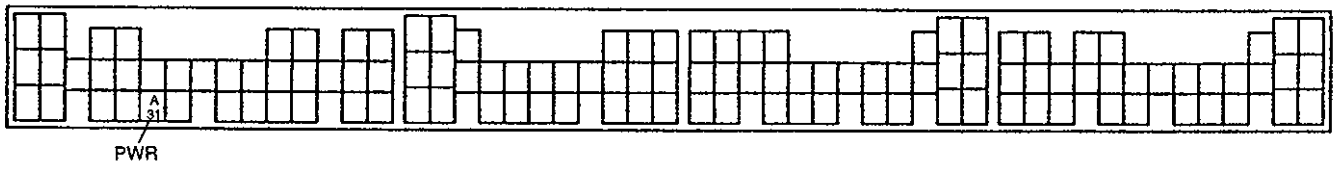
OK

↓

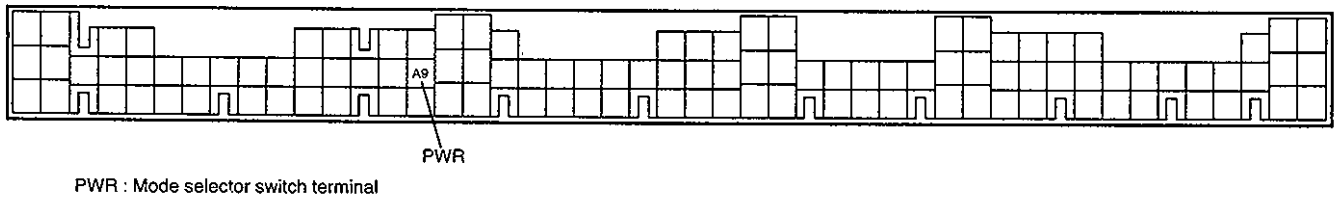
Replace PCM and recheck.

Terminal Arrangement of PCM Coupler (Viewed from harness side)

[G16 and J20 engines]



[H25 engine]



PWR : Mode selector switch terminal

DIAGNOSTIC CHART C

NO GEAR SHIFT TO O/D

↓

Warm up engine and transmission to normal operating temperature.

↓

Check diag. trouble code.

Trouble code indicated. → Go back to DIAG. FLOW CHART in this "DIAGNOSIS" section.

No trouble code indicated.

↓

Perform manual road test referring to "ON-VEHICLE SERVICE" in this section.
Does gear shift to O/D (4th gear) occur in manual road test?

NG → Manual select control system or transmission faulty.

OK

↓

1. With ignition switch OFF, connect solenoid valves coupler.
2. Conduct road test in "D" range and check voltage at each solenoid terminal.

Vehicle speed	1st range	2nd range	3rd range	4th range
Shift solenoid A	Battery voltage	Battery voltage	0V	0V
Shift solenoid B	0V	Battery voltage	Battery voltage	0V

OK → Shift solenoid valve A, B or transmission faulty.

NG

↓

1. With PCM coupler connected, turn ignition switch ON.
2. With select lever shifted to "D" range, check voltage at "L" and "2" range signal terminals. It should be 0V.

NG → Shift switch or its circuit faulty.

OK

↓

With coupler connected, check voltage at "O/D" terminal.

O/D cut switch position	OFF	ON
Voltage	Battery voltage	0V

NG → Faulty O/D cut switch or its circuit shorted.

OK

↓

To be continued

Continued

Check ECT sensor referring to Section 6E1 or 2. Is it in good condition?

NG → ECT sensor faulty.

OK

With coupler connected, check voltage at "L4" terminal.

NG → Faulty 4WD-Low switch or its circuit shorted.

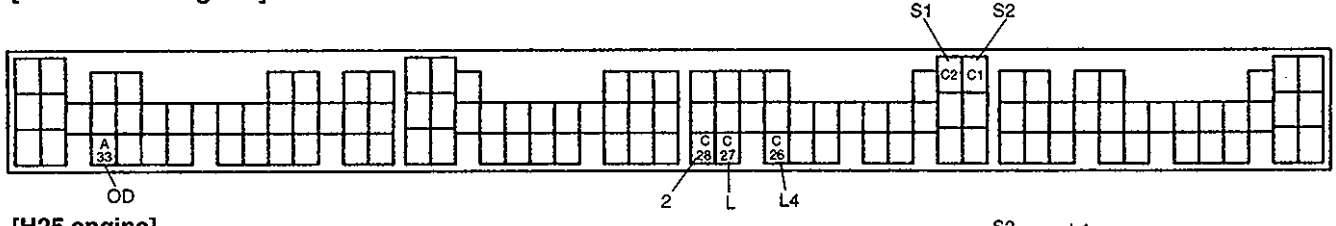
Transfer gear position	"4L" or "N" position	"4H" or "2H" position
Voltage	0V	Battery voltage

OK

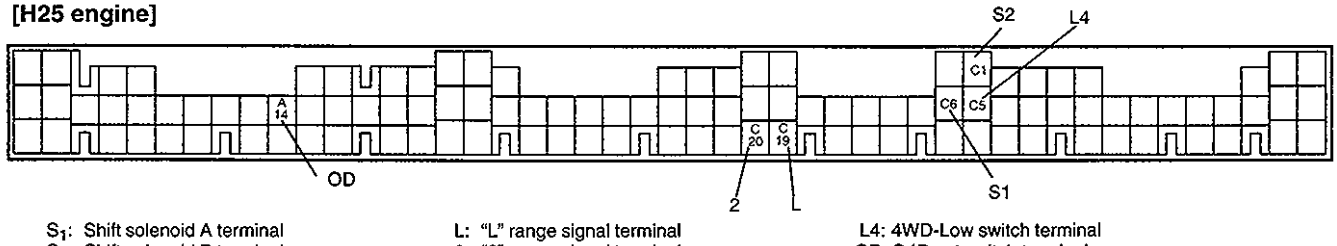
Replace PCM and recheck.

Terminal Arrangement of PCM Coupler (Viewed from harness side)

[G16 and J20 engines]



[H25 engine]



S_1: Shift solenoid A terminal
S_2: Shift solenoid B terminal
L: "L" range signal terminal
2: "2" range signal terminal
L4: 4WD-Low switch terminal
OD: O/D cut switch terminal

DIAGNOSTIC FLOW CHART D

NO TCC LOCK-UP OCCURS

↓

Warm up engine and transmission to normal operating temperature.

↓

Check diag. trouble code.

Trouble code indicated. → Go back to DIAG. FLOW CHART in this "DIAGNOSIS" section.

↓ **No trouble code indicated.**

Conduct road test under following conditions and check if battery voltage is obtained at "S_3" terminal.
- O/D cut switch OFF. (O/D OFF light turn ON.)
- Normal mode in "D" range.
- Transfer "2H" gear position.
- Accelerate till vehicle speed reaches about 80 km/h and reduce throttle valve opening so that it is open less than 20%.

OK → TCC solenoid valve or transmission faulty.

↓ **NG**

Check voltage at "BK" terminal.

Brake pedal	When released	When depressed
Voltage	0V	Battery voltage

NG → Faulty brake pedal switch or its circuit shorted.

↓ **OK**

Check ECT sensor referring to Section 6E1 or 2. Is it in good condition?

NG → ECT sensor faulty.

↓ **OK**

Check voltage at "L4" terminal.

Transfer gear position	"4L"or "N" position	"4H" or "2H" position
Voltage	0V	Battery voltage

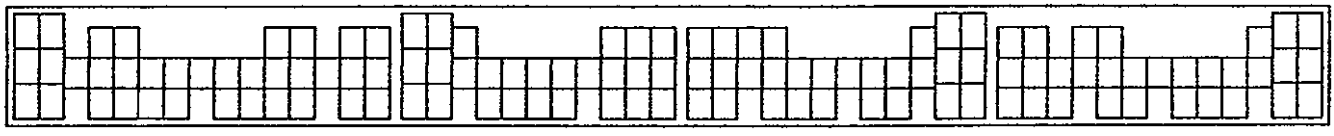
NG → Faulty 4WD-Low switch or its circuit shorted.

↓ **OK**

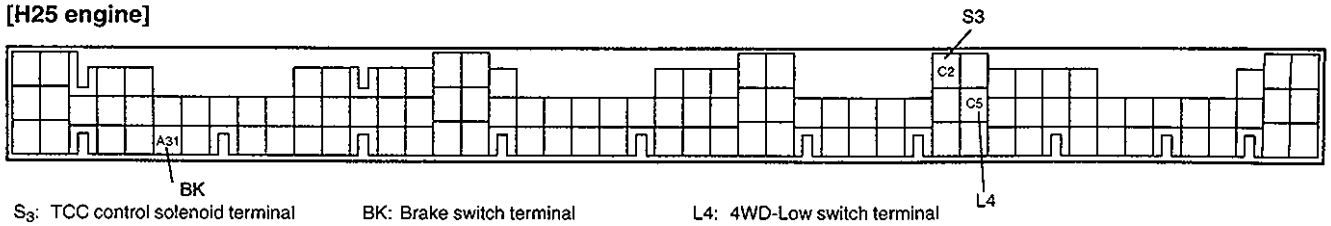
Replace PCM and recheck.

Terminal Arrangement of PCM Coupler (Viewed from harness side)

[G16 and J20 engines]



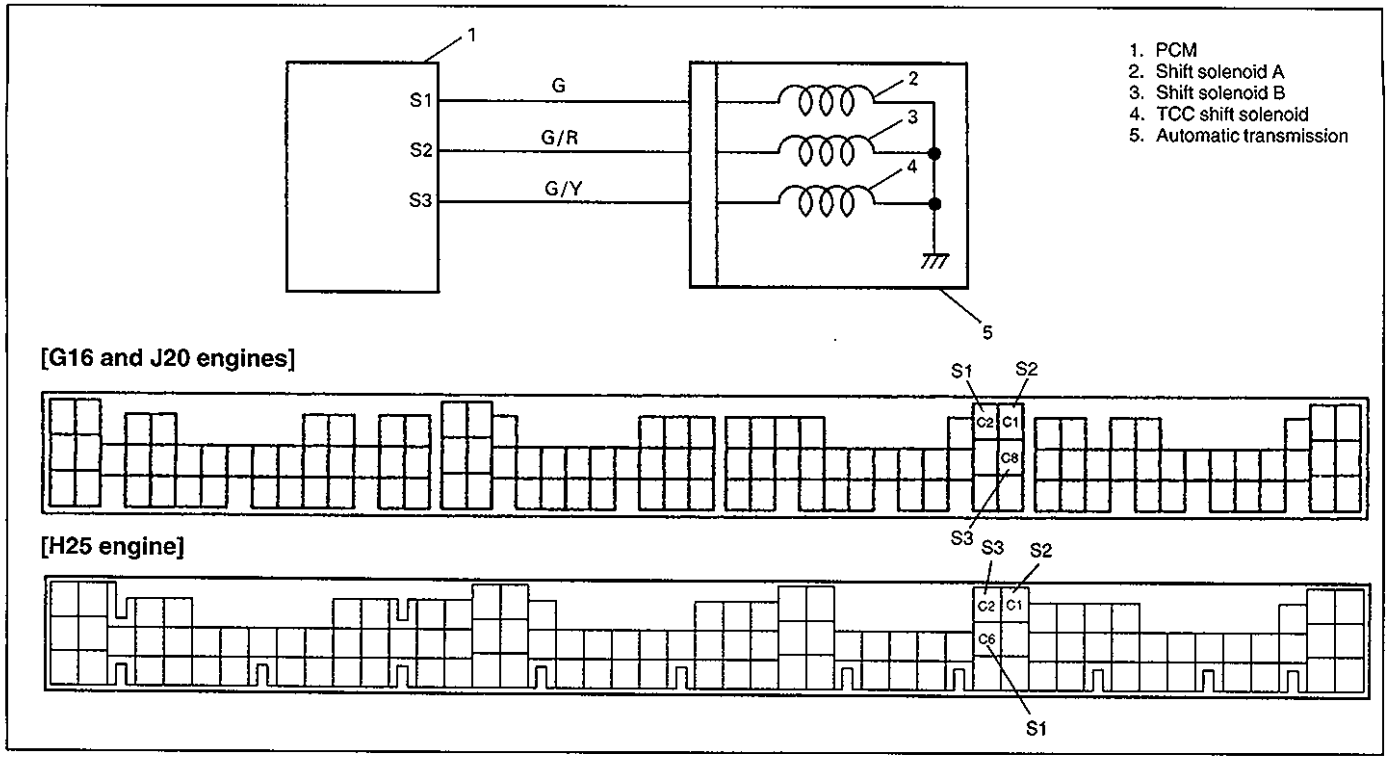
[H25 engine]



S_3: TCC control solenoid terminal BK: Brake switch terminal L4: 4WD-Low switch terminal

DTC 61 – SHIFT SOLENOID A CIRCUIT
DTC 63 – SHIFT SOLENOID B CIRCUIT
DTC 65 – TCC SOLENOID CIRCUIT

(OPEN OR SHORT TO POWER CIRCUIT)



1. Disconnect PCM coupler with ignition switch OFF.
2. Check resistance between "S_1", "S_2" or "S_3" terminal of disconnected PCM coupler and body ground.
3. Is it 11 – 15 Ω?

YES

1. Turn ON ignition switch with PCM coupler disconnected.
2. Check voltage between "S_1", "S_2" or "S_3" terminal of disconnected PCM coupler and body ground.
3. Is it about 0 V?

YES

Poor "S_1", "S_2" or "S_3" terminal connection of PCM coupler.
If connection is OK, substitute a known-good PCM and recheck.

NO

Check shift solenoid valve A, shift solenoid valve B or TCC solenoid valve, referring to SOLENOID VALVES in "ON-VEHICLE SERVICE" in this section.
Is it OK?

NO

Shift solenoid valve A, shift solenoid valve B or TCC solenoid valve faulty.

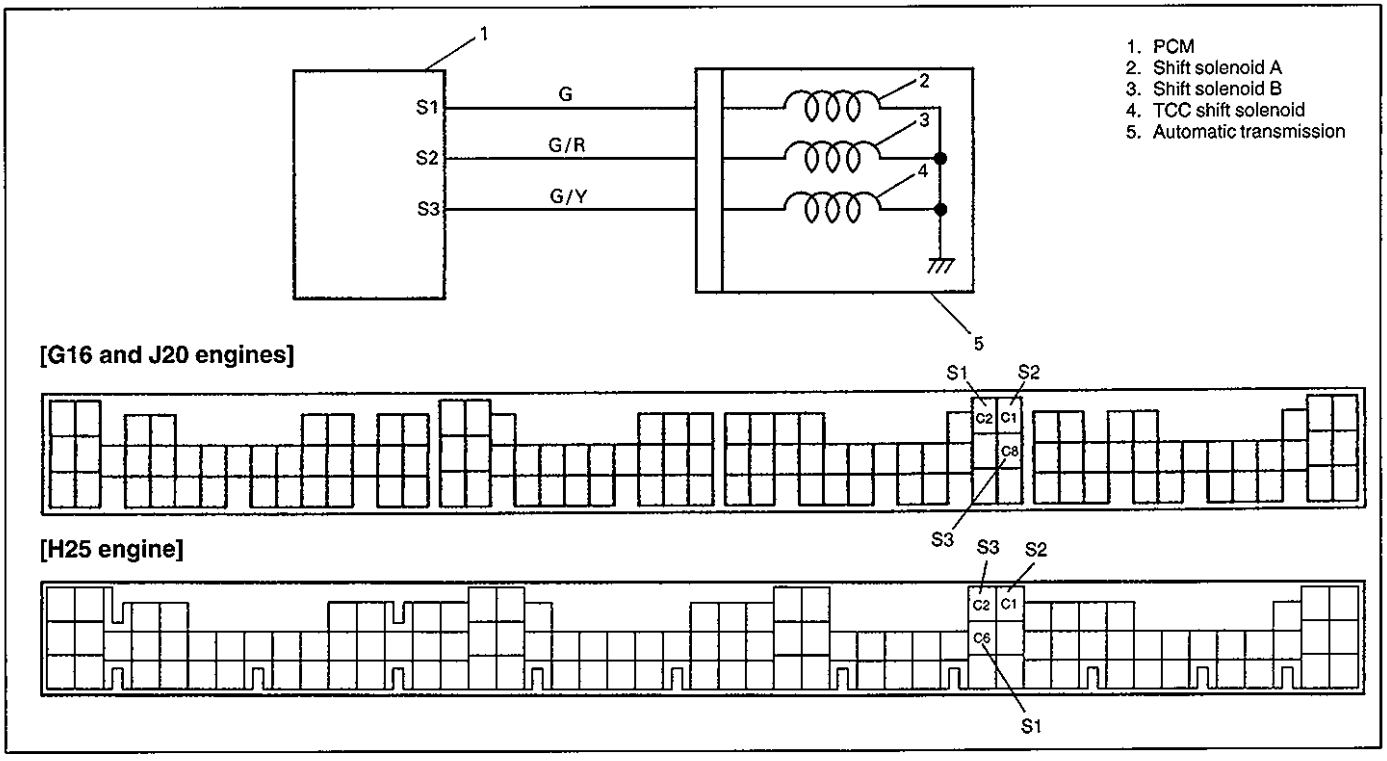
NO

YES

"G", "G/R" or "G/Y" wire open or shorted to power circuit.

DTC 62 – SHIFT SOLENOID A CIRCUIT
DTC 64 – SHIFT SOLENOID B CIRCUIT
DTC 66 – TCC SOLENOID CIRCUIT

(SHORT TO GROUND)



1. Disconnect PCM couplers with ignition switch OFF.
2. Check resistance between "S_1", "S_2" or "S_3" terminal of disconnected PCM coupler and body ground.
3. Is it 11 – 15 Ω?

YES

Poor "S_1", "S_2" or "S_3" terminal connection of PCM coupler.
If connection is OK, substitute a known-good PCM and recheck.

NO

Check shift solenoid valve A , shift solenoid valve B or TCC solenoid valve, referring to SOLENOID VALVES in "ON-VEHICLE SERVICE" in this section.
Is it OK?

YES

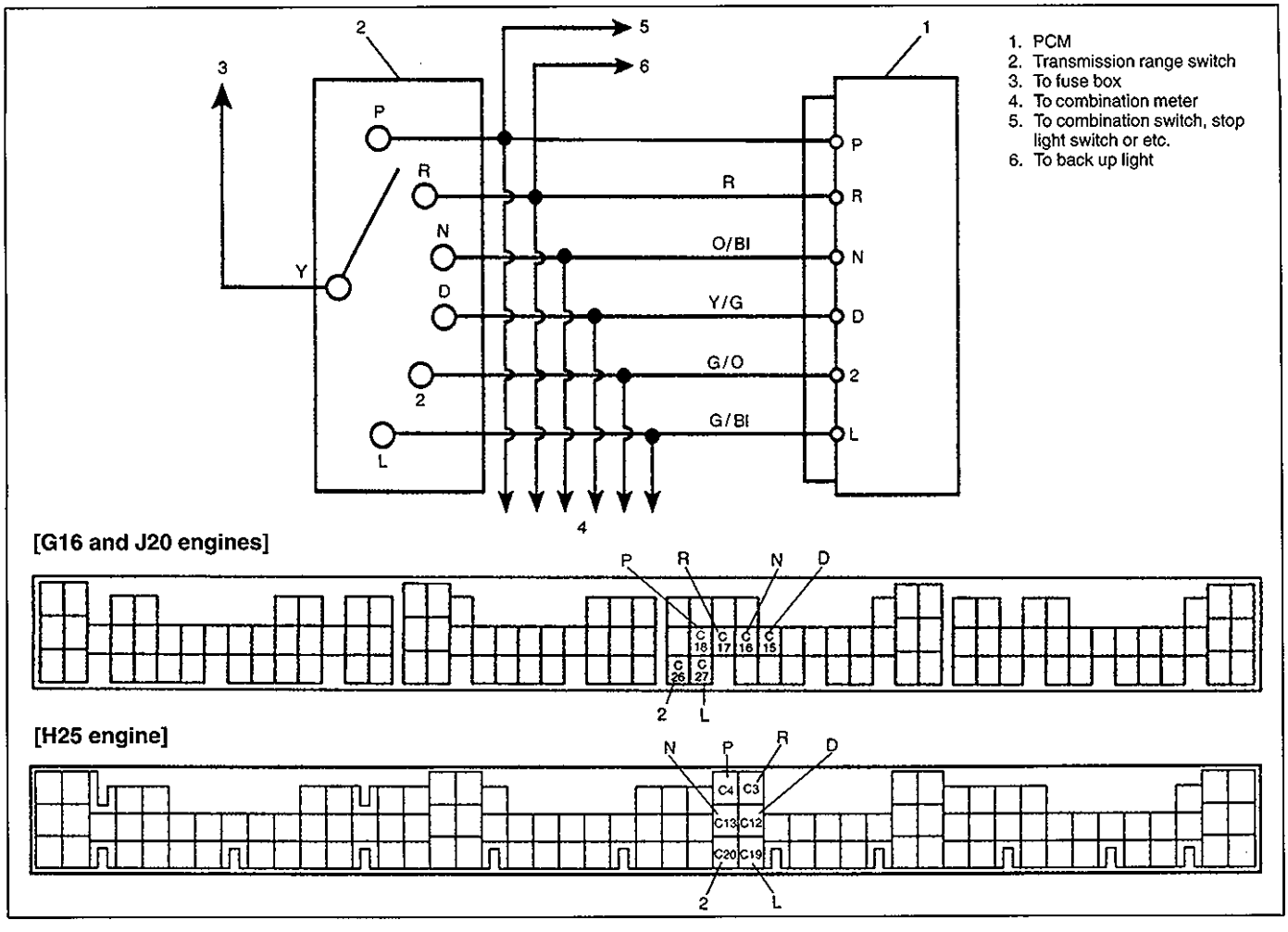
"G", "G/R" or "G/Y" wire shorted to ground.

NO

Shift solenoid valve A, shift solenoid valve B or TCC solenoid valve faulty.

DTC 72 – TRANSMISSION RANGE SWITCH CIRCUIT

(MORE THAN TWO SHIFT SWITCH SIGNALS INPUTTED OR SHIFT SWITCH SIGNAL NOT INPUTTED AT VEHICLE RUNNING)



Measure voltage between each PCM terminal of "P" "R", "N", "D", "2" and "L" and body ground with ignition switch ON and under following conditions.

Terminal	Standard voltage (condition)	
"P"	10 – 14 V (R range)	0 – 1 V (other than P range)
"R"	10 – 14 V (R range)	0 – 1 V (other than R range)
"N"	10 – 14 V (N range)	0 – 1 V (other than N range)
"D"	10 – 14 V (D range)	0 – 1 V (other than D range)
"2"	10 – 14 V (2 range)	0 – 1 V (other than 2 range)
"L"	10 – 14 V (L range)	0 – 1 V (other than L range)

Are all above OK?

NO

Check transmission range switch referring to "ON-VEHICLE SERVICE" in this section.
Is it in good condition?

YES

Transmission range switch or connection faulty.

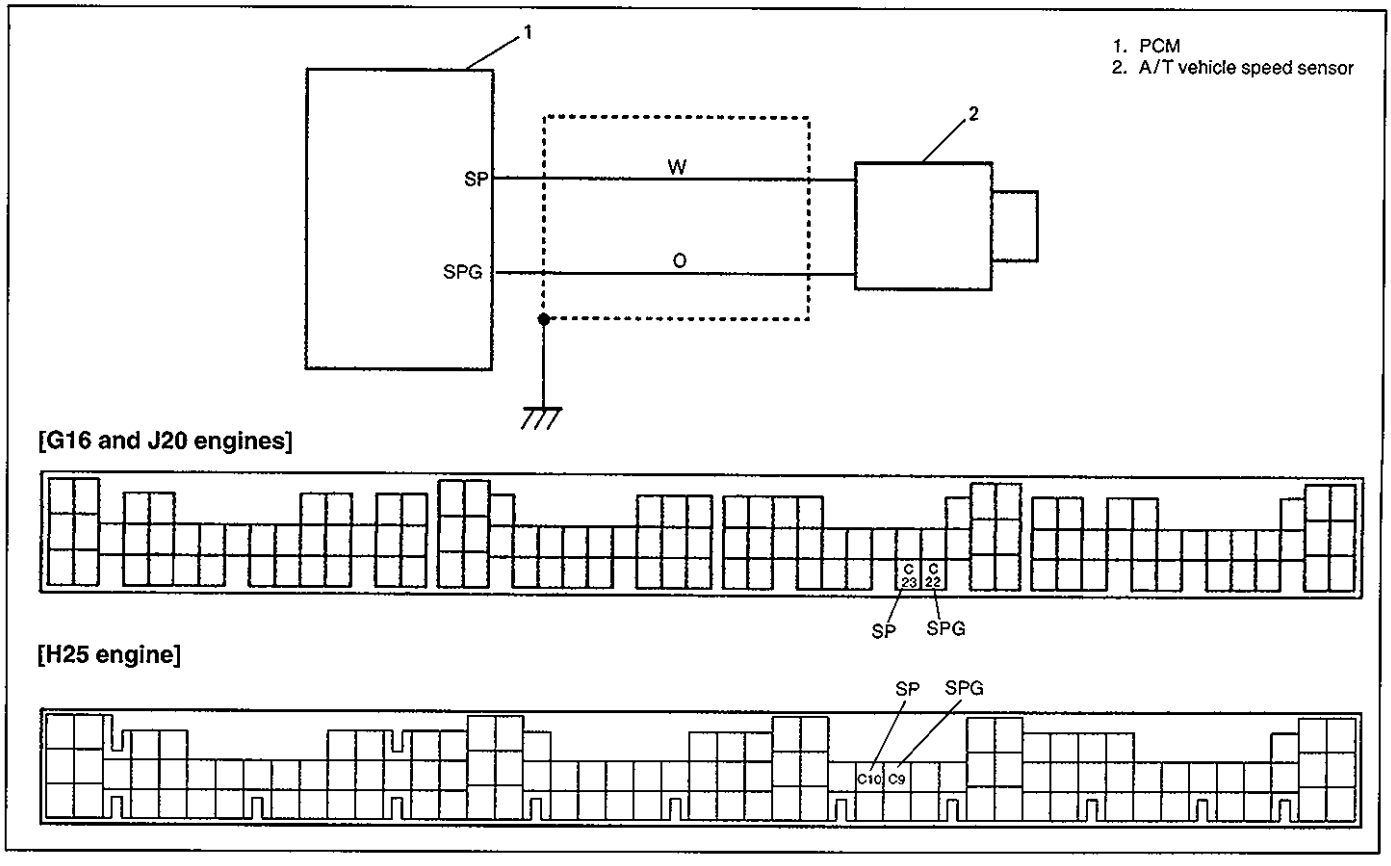
YES

Poor PCM coupler connection.
If connection are OK, intermittent trouble or faulty PCM.
Recheck for intermittent trouble referring to "Intermittent and Poor Connection" in Section 0A.

NO

Faulty or maladjusted transmission range switch.

DTC 75 – A/T VEHICLE SPEED SENSOR
(VEHICLE SPEED SIGNAL NOT INPUTTED)



1. Disconnect PCM coupler with ignition switch OFF.
2. Check resistance between "SP" and "SPG" terminal of disconnected PCM coupler.
   Is it 369 – 451 Ω?

YES

1. Connect PCM coupler with ignition switch OFF.
2. Hoist vehicle to rotate all wheels freely.

   WARNING:
   Before this test, check to make sure that no one or nothing is near wheels as they rotate at high speed during testing.

3. Check voltage between "SP" and "SPG" terminal of PCM coupler when vehicle running at 40 km/h on lift.
   Is it 0.5 – 1.0 V by using AC voltmeter?

YES

Poor "SP" or "SPG" terminal connection.
If connections are OK, substitute a known-good PCM and recheck.

NO

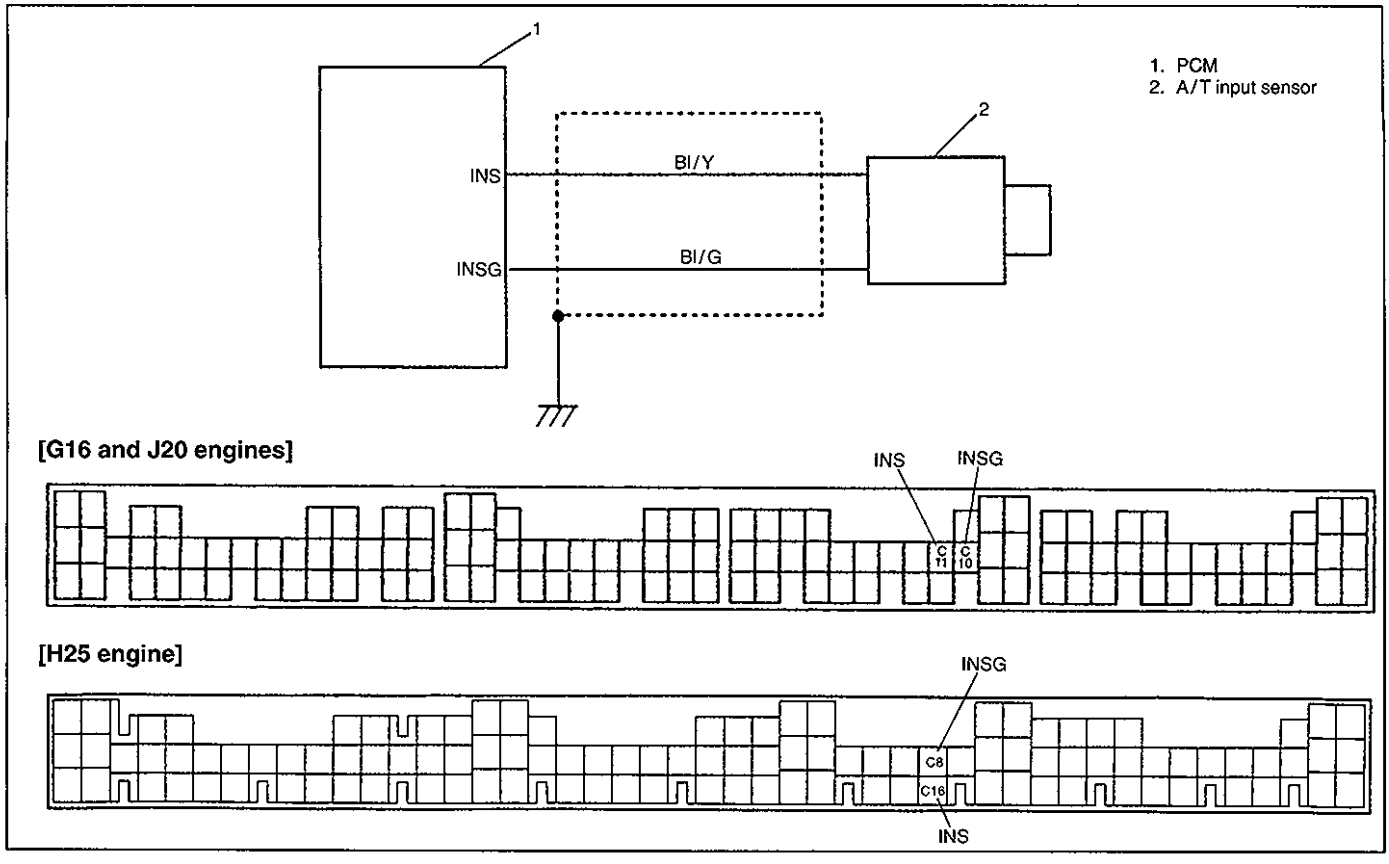
Improper installation or faulty A/T vehicle speed sensor.

NO

"W" or "O" wire open or poor coupler connection.
If wire and connection are OK, replace A/T vehicle speed sensor.

DTC 76 – INPUT SENSOR

(INPUT SENSOR SIGNAL NOT INPUTTED)



1. Disconnect input sensor coupler with ignition switch OFF.
2. Check resistance between the terminals of input sensor.
   Is it 530 – 650 Ω?

YES → 1. Connect coupler to input sensor and disconnect PCM coupler.
2. Check resistance between "INS" and "INSG" terminals of PCM coupler.
   Is it 530 – 650 Ω?

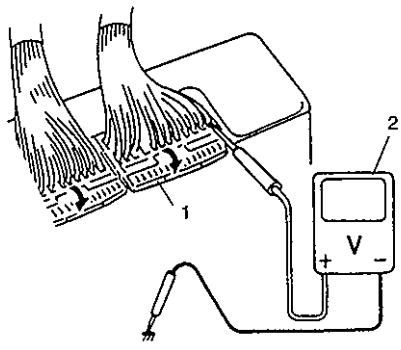
NO → Faulty input sensor.

YES → 1. Check resistance between "INS" and ground, and between "INSG" and ground.
   Is it about 0 Ω?

NO → "BI/Y" or "BI/G" wire open or shorted, or poor connection of input sensor coupler.
If wire and connection are OK, replace input sensor.

YES → "BI/Y" or "BI/G" wire shorted to ground or input sensor shorted to ground.

NO → Poor "INS" or "INSG" connection.
If connections are OK, substitute a known-good PCM and recheck.



1. PCM coupler connected
2. Voltmeter

INSPECTION OF PCM AND ITS CIRCUITS

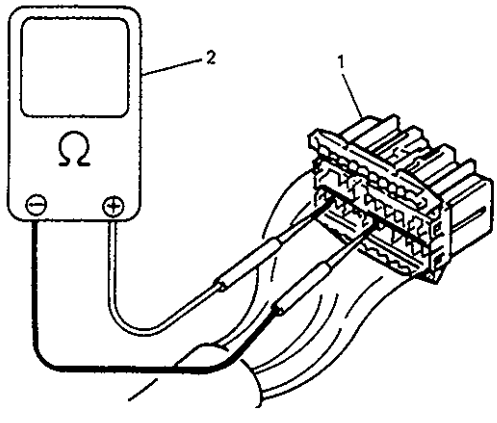
PCM and its circuits can be checked at PCM wiring couplers by measuring voltage and resistance.

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

VOLTAGE CHECK

1) Remove PCM from body referring to Section 6E1 or 2.
2) Connect PCM couplers to PCM.
3) Check voltage at each terminal of couplers connected as listed in table on Section 6E1 or 2.

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



1. PCM coupler disconnected
2. Ohmmeter

RESISTANCE CHECK

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

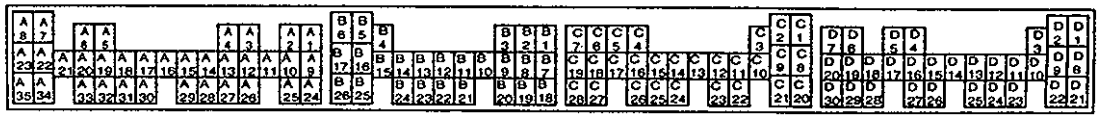
CAUTION:
Never touch terminals of PCM itself or connect voltmeter or ohmmeter.

2) Check resistance between each pair of terminals of disconnected couplers as listed in table on Section 6E1 or 2.

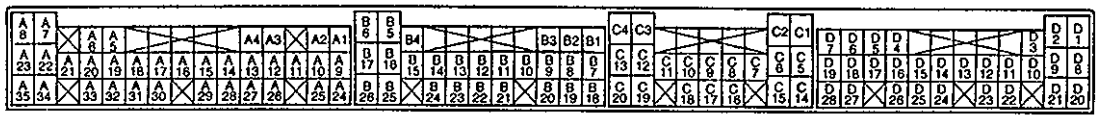
CAUTION:
- **Be sure to connect ohmmeter probe from wire harness side of coupler.**
- **Be sure to turn ignition switch OFF for this check.**
- **Resistance in table represents that when parts temperature is 20 °C (68 °F).**

Terminal Arrangement of PCM Coupler (Viewed from harness side)

[G16 and J20 engines]



[H25 engine]



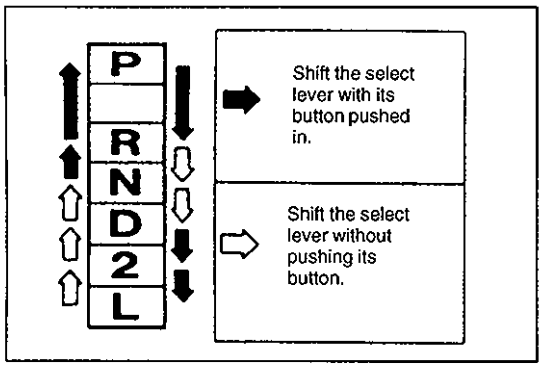
ON-VEHICLE SERVICE

FLUID INSPECTION

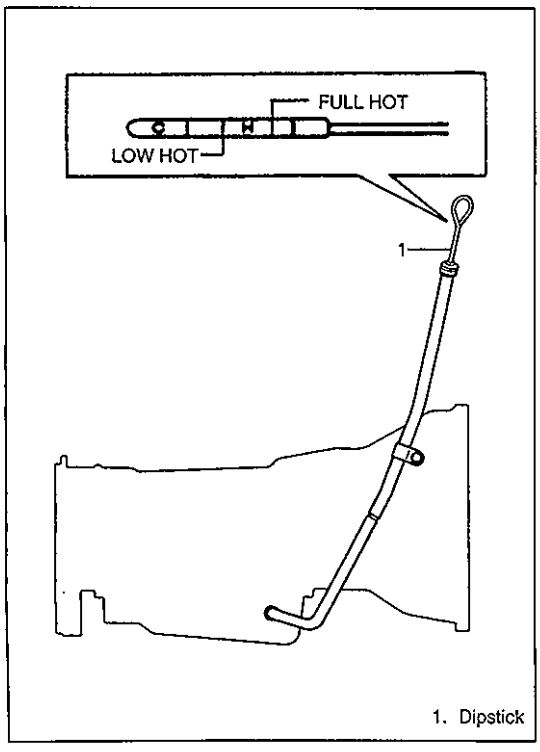
FLUID LEVEL

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 around 1 unit above "C" point.



5) Keep engine idling and shift selector lever 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.



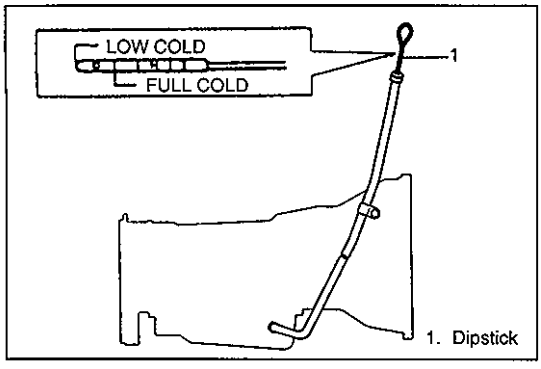
1. Dipstick

7) Pull out dipstick again and check fluid level indicated on it. Fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, add an equivalent of DEXRON®-II, DEXRON®-IIE or DEXRON®-III up to FULL HOT.

Fluid specification
An equivalent of DEXRON®-II, DEXRON®-IIE or DEXRON®-III

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 0.3 liters (0.64/0.53 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 the vehicle has stopped.**



LEVEL CHECK AT ROOM TEMPERATURE

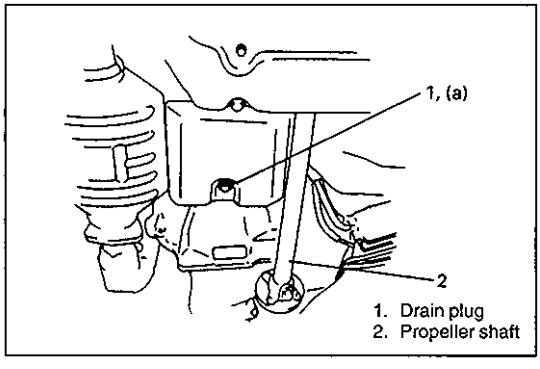
The fluid level check at room temperature performed after repair or fluid change before test driving is just preparation for level check of normal operating temperature. The checking procedure itself is the same as that described previously. If the fluid level is between FULL COLD and LOW COLD, proceed to test drive. And when the fluid temperature has reached the normal operating temperature, check fluid level again and adjust it as necessary.

FLUID CHANGE INTERVALS

The transmission operating temperature resulting from the type of driving conditions under which the vehicle is used, is the main consideration in establishing the proper frequency of transmission fluid changes.

Change the transmission fluid every 20,000 km (12,000 miles) or 12 months if the vehicle is usually driven under one or more of the following conditions which are considered severe transmission service.

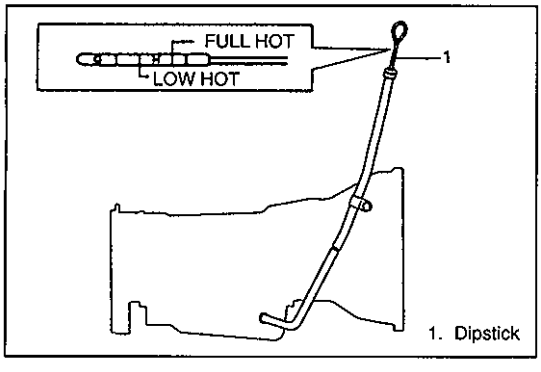
1) In heavy city traffic. Where the outside temperature regularly reaches 32°C (90°F).
2) In very hilly or mountainous areas.
3) Frequent trailer pulling.
4) Commercial use, such as taxi, police vehicle, delivery service, or rent-a-car. If the vehicle is not used under any of these conditions, change the fluid every 166,000 km (100,000 miles).



FLUID CHANGE

1) Lift up vehicle.
2) With engine cool, remove drain plug from oil pan and drain A/T fluid.
3) Install drain plug.

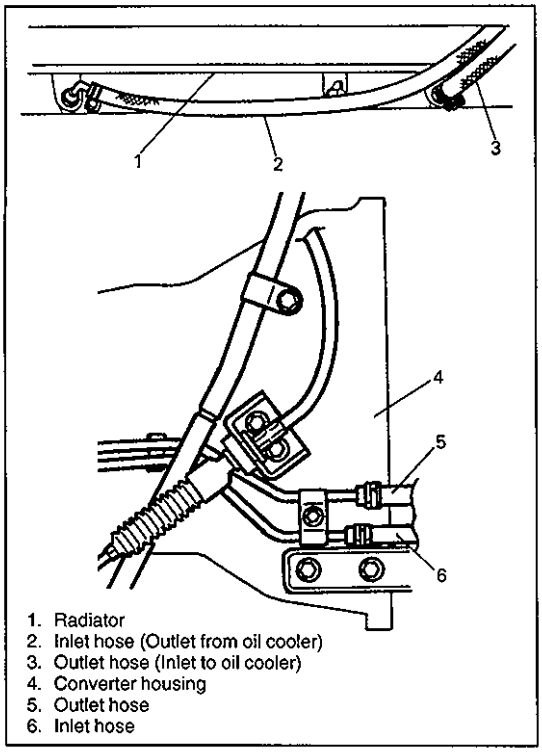
Tightening Torque
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



4) Lower vehicle and fill proper amount of an equivalent of DEXRON®-II, DEXRON®-IIE or DEXRON®-III.
5) Check fluid level according to procedure described under LEVEL CHECK AT NORMAL OPERATING TEMPERATURE.

Fluid specification
An equivalent of DEXRON®-II, DEXRON®-IIE or DEXRON®-III

Fluid capacity	
When draining from drain plug hole	2.5 liters (5.28/4.40 US/Imp.pt.)
When overhauling	7.1 liters (15.00/12.50 US/Imp.pt.) (J20 and H25 engines) 6.9 liters (14.58/12.14 US/Imp. pt.) (G16 engine)

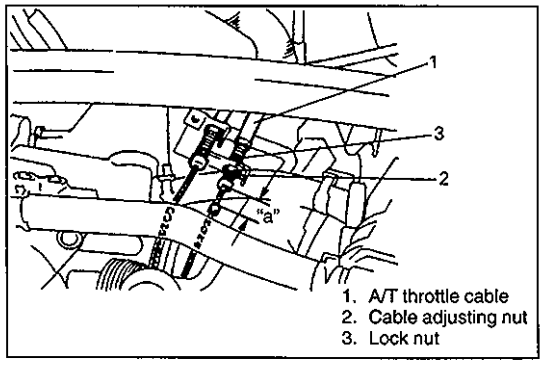


1. Radiator
2. Inlet hose (Outlet from oil cooler)
3. Outlet hose (Inlet to oil cooler)
4. Converter housing
5. Outlet hose
6. Inlet hose

OIL COOLER HOSES

The rubber hoses for the oil cooler should be replaced every 60,000 km (36,000 miles) or every 3 years. 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 tighten clamps to specified torque



1. A/T throttle cable
2. Cable adjusting nut
3. Lock nut

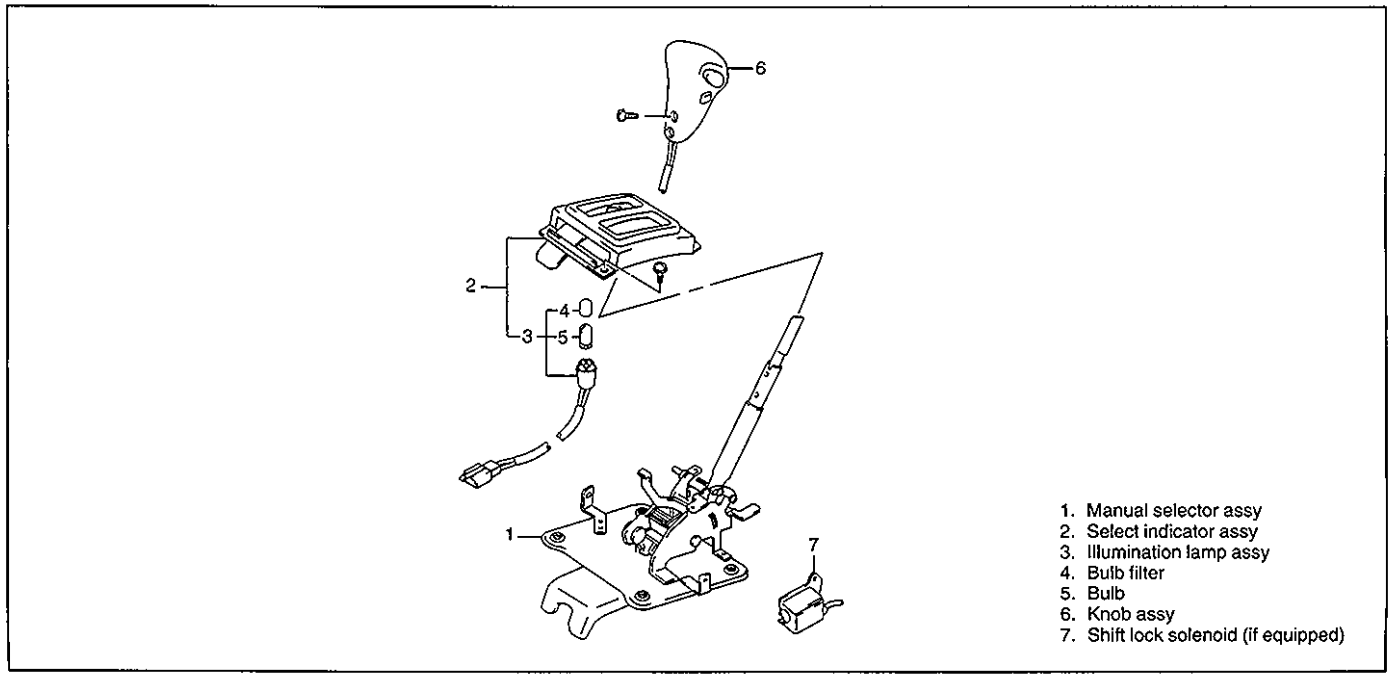
A/T THROTTLE CABLE

ADJUSTMENT

1) Warm up engine and transmission to normal operating temperature.
2) Measure distance between tip end of cable adjustment mark and end of boot (indicated as "a" in figure).

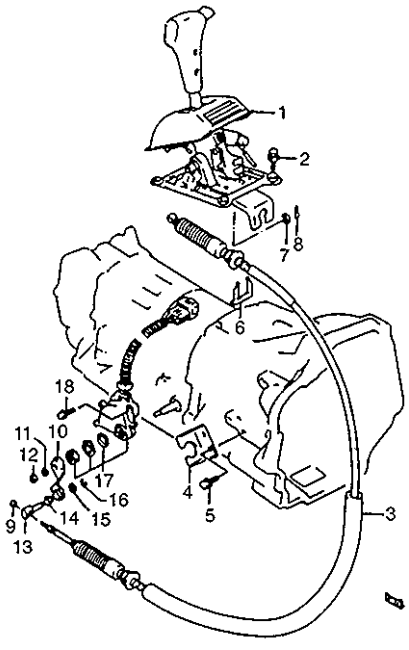
Standard distance "a": 0.8 – 1.5 mm (0.031 – 0.059 in)

SELECT LEVER

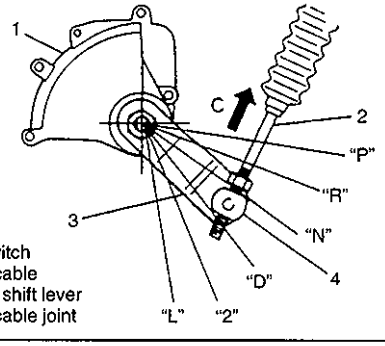


1. Manual selector assy
2. Select indicator assy
3. Illumination lamp assy
4. Bulb filter
5. Bulb
6. Knob assy
7. Shift lock solenoid (if equipped)

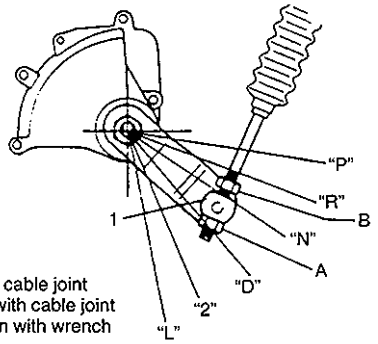
SELECT CABLE



1. Select lever assembly
2. Bolt
3. Select cable
4. Cable bracket
5. Bolt
6. E-ring
7. Washer
8. Clip
9. Nut
10. Manual select lever
11. Lock washer
12. Nut
13. Select cable joint
14. Bush
15. Washer
16. E-ring
17. Shift switch assembly
18. Bolt



1. Shift switch
2. Select cable
3. Manual shift lever
4. Select cable joint



1. Select cable joint
A: Align with cable joint
B: Tighten with wrench

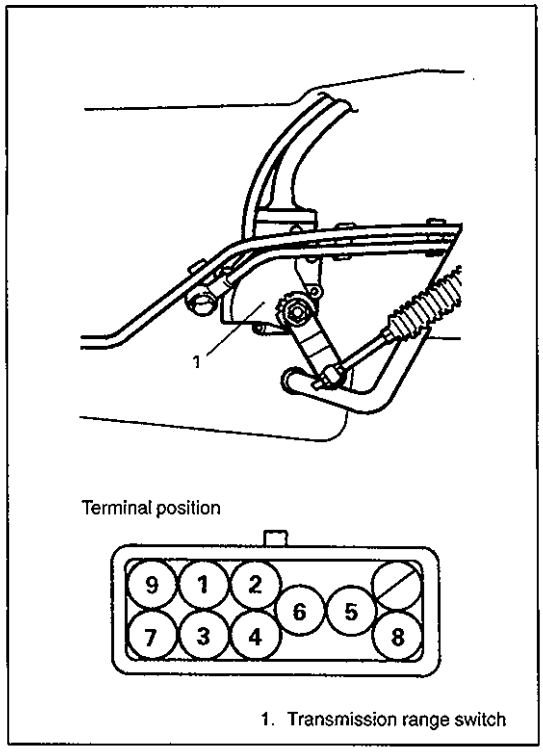
ADJUSTMENT

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 at the left 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".

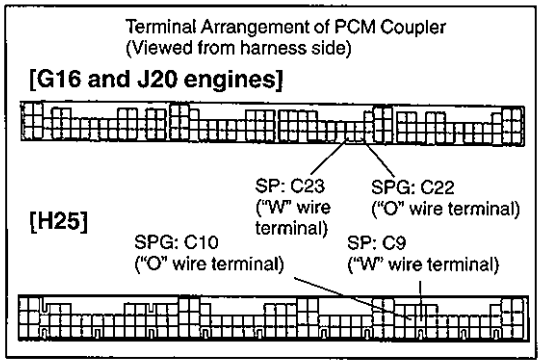


TRANSMISSION RANGE SWITCH

INSPECTION AND ADJUSTMENT

1) Shift select lever to "N" range.
2) Fix transmission range switch with groove in transmission range switch and match mark on shaft aligned.
3) 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 lights in "R" range.
4) If faulty condition cannot be corrected by adjustment, disconnect transmission range switch coupler and check that continuity exists as shown below by moving select lever.

Terminal position	6	5	9	8	4	7	3	2	1
P	○	○	○	○					
R			○		○				
N	○	○	○			○			
D			○				○		
2			○					○	
L			○						○

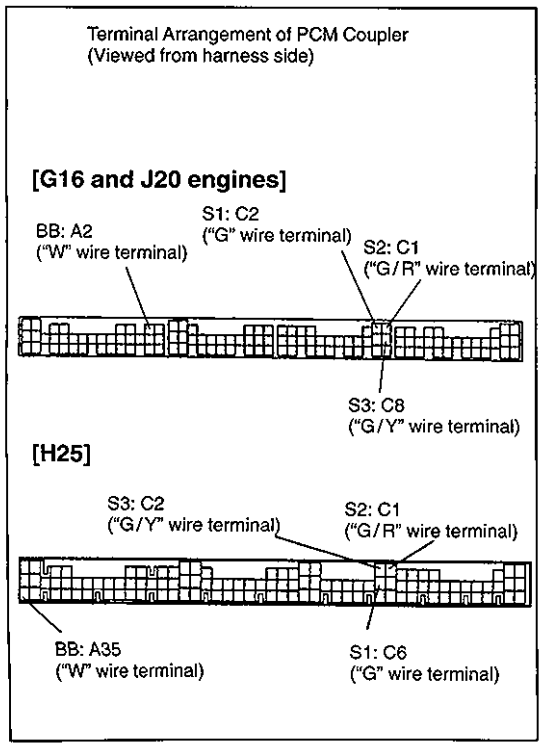


A/T VEHICLE SPEED SENSOR

INSPECTION

Disconnect PCM coupler and check resistance between "SP" terminal and "SPG" terminal.

A/T vehicle speed sensor resistance: 369 – 451 Ω



SOLENOID VALVES (SHIFT SOLENOID VALVES AND TCC SOLENOID VALVE)

INSPECTION

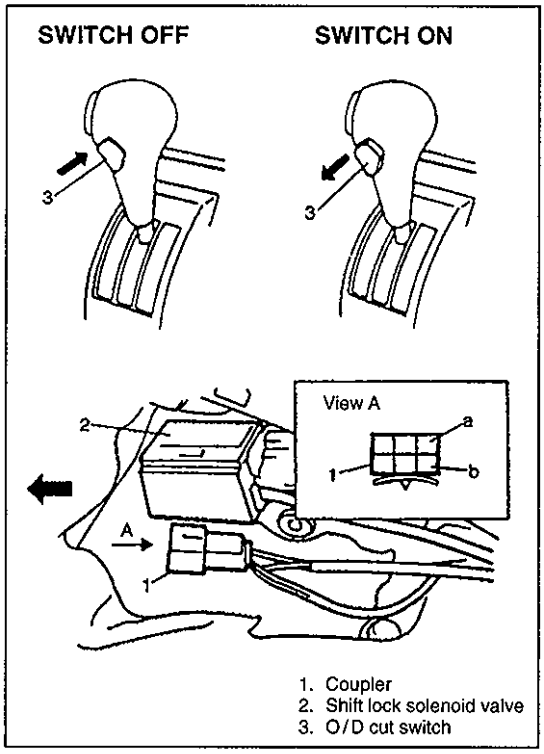
With coupler of PCM disconnected and using service wire, short between two terminals as shown below, check each solenoid valve for clicking sound.

Shift solenoid – A	"S_1" – "BB"
Shift solenoid – B	"S_2" – "BB"
TCC (Lock-up) solenoid	"S_3" – "BB"

THROTTLE POSITION (TP) SENSOR

INSPECTION AND ADJUSTMENT

Refer to Section 6E1 or 2.



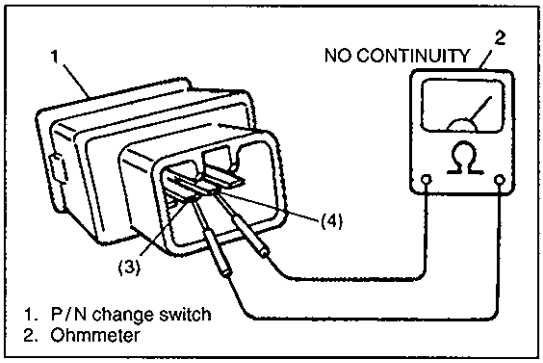
1. Coupler
2. Shift lock solenoid valve
3. O/D cut switch

O/D CUT SWITCH

INSPECTION

Remove front center console box and disconnect O/D cut switch coupler. Check its continuity between a and b terminals shown in figure.

- When this switch is ON, there should be no continuity.
- When this switch is OFF, there should be continuity.



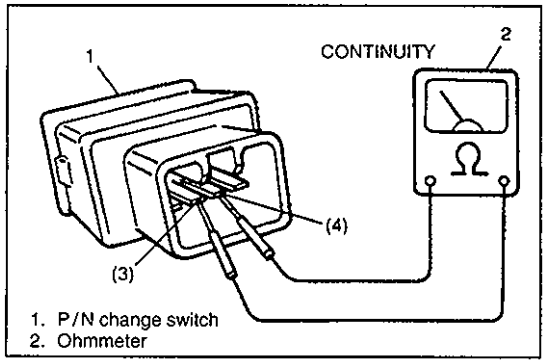
1. P/N change switch
2. Ohmmeter

P/N CHANGE SWITCH

INSPECTION

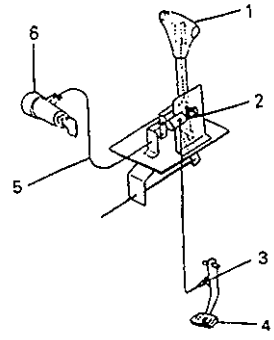
Check continuity between terminal (3) and terminal (4) as shown at the left.

1) When this switch is in "N" position, there should be no continuity.



1. P/N change switch
2. Ohmmeter

2) When this switch is in "P" position, there should be continuity.



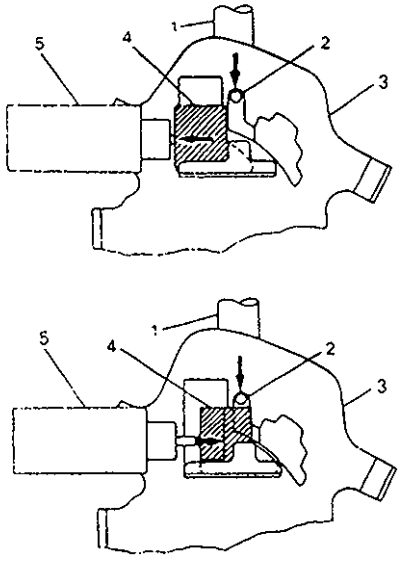
1. Selector lever
2. Shift lock solenoid
3. Brake light switch
4. Brake pedal
5. Cable
6. Ignition switch

BRAKE INTERLOCK SYSTEM (IF EQUIPPED)

SHIFT LOCK SOLENOID CONTROL

This system consists of shift lock solenoid control system and interlock cable control system.

The shift lock solenoid control system is so designed that the selector lever can not be shifted from "P" range position unless the ignition switch is turned ON and the brake pedal is depressed. And the interlock cable control system is so designed that the selector lever cannot be shifted from "P" range position unless the ignition switch is turned to "ACC" or "ON" position. Also, the ignition key cannot be pulled out of the key slot unless the selector lever is in "P" range.



1. Selector lever
2. Detent pin
3. Detent plate
4. Lock plate
5. Shift lock solenoid

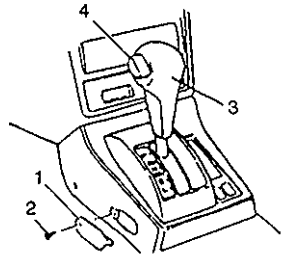
SHIFT LOCK SOLENOID CONTROL OPERATIONS

When the selector 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 selector lever to be shifted from "P" range to any other position.

Even when the selector 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.

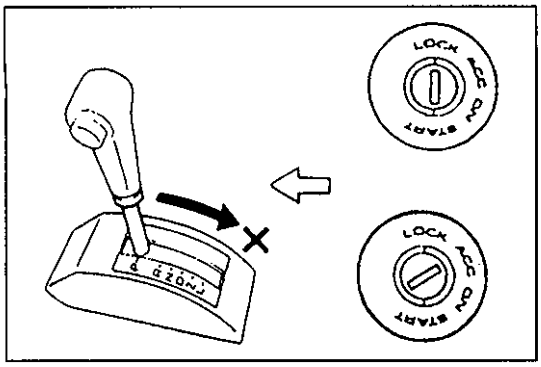
In this state, the lock plate is pushed away from the solenoid by spring force and it obstructs the detent pin movement. Thus the selector lever button does not work even when pressed and the selector lever shift is prevented.

1. Cover
2. Screw
3. Select lever
4. Button



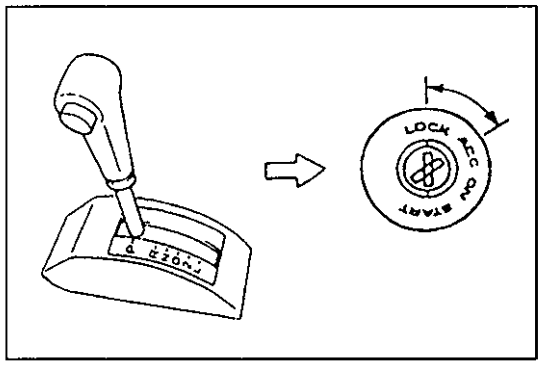
SHIFT LOCK SOLENOID MANUAL RELEASE

Without using brake pedal, shift lock can be moved by pushing lock plate with screw driver or the like through the hole. (To shift the selector lever from "P" range to any other position, turn the ignition switch to "ACC" or "ON" position.)

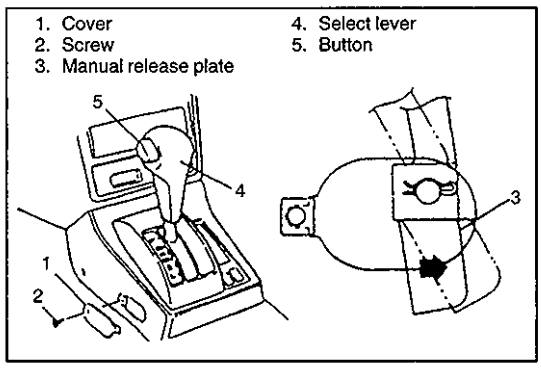


INSPECTION

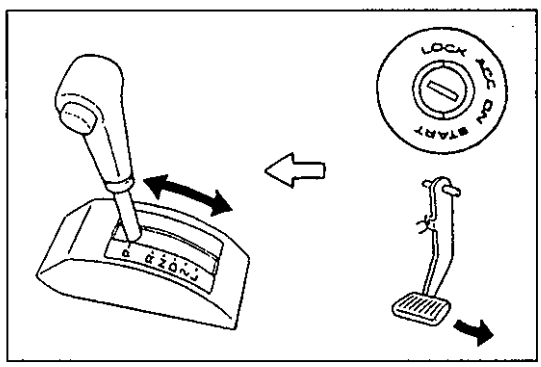
1) Check to make sure that select lever cannot be moved to any other range from "P" range position when ignition switch key is at "ACC" position, at "LOCK" position (or it is removed from keyhole of ignition switch) or brake pedal is not depressed.



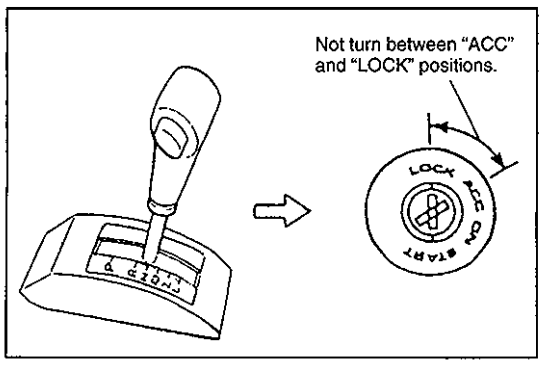
2) Shift select lever to "P" range position, release knob button and check for the following.
   - Ignition key can be turned between "LOCK" and "ACC" positions back and forth and also it can be removed from ignition switch.



   - With manual release plate moved in arrow direction and ignition key turned to "ACC" position, selector lever can be shifted from "P" range position 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 position to any other range.



   - When ignition switch is turned "ON" and brake pedal is depressed, select lever can be shifted from "P" range position to any other range.



3) With select lever shifted to any position other than "P" range, check that ignition key cannot be turned "LOCK" position and it cannot be removed from ignition switch unless it is at "LOCK" position.

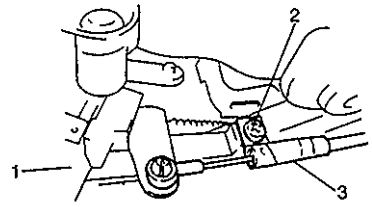
KEY INTERLOCK CABLE (IF EQUIPPED)

NOTE:
Don't bend interlock cable excessively when removing and installing it, or system will not operate correctly.

Removal

1) Disconnect negative (–) cable from battery.
2) If equipped with air bag system, disable air bag system. Refer to "Disabling Air bag System" in Section 10B.
3) Remove steering column hole cover.
4) Remove steering column cover and then meter hood.
5) Remove steering shaft upper joint bolt and steering column mounting bolts.
   For vehicle with air bag system, refer to Section 3C1,
   For vehicle without air bag system, refer to Section 3C.

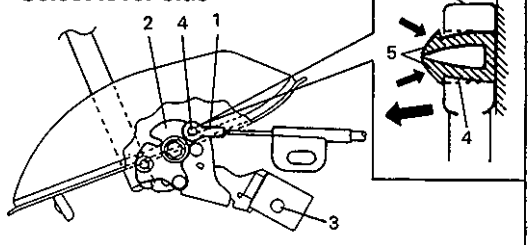
Ignition switch side



1. Ignition switch ass'y
2. Clamp screw
3. Interlock cable

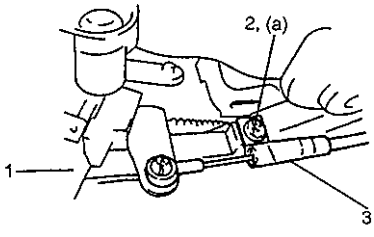
6) Remove interlock cable clamp screw located at ignition switch ass'y.
7) Remove disconnect interlock cable inner end. (Ignition switch side.)

Select lever side



1. Inner end of interlock cable
2. Key release cam
3. Stud bolt
4. Cam boss
5. Claw

8) With console box removed, take out interlock cable by loosening lock nuts.
9) Detach cable end from release cam while pressing claws of release cam boss. At this time, be careful not to cause damage to its claws.

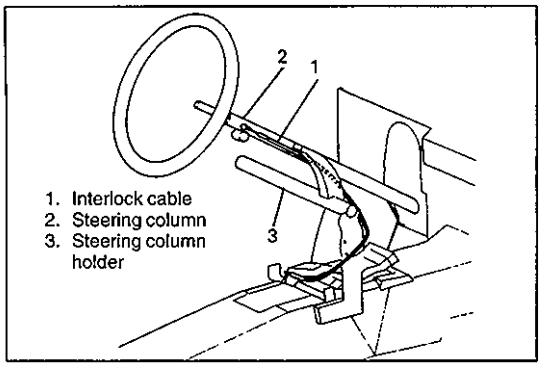


1. Ignition switch ass'y
2. Clamp screw
3. Outer end

Installation

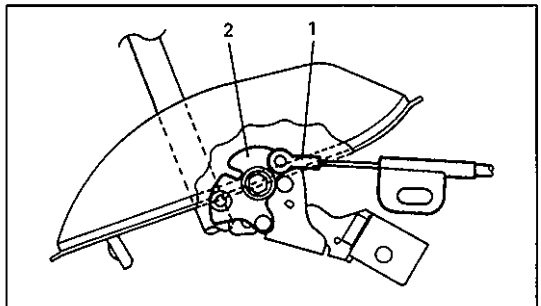
1) Shift select lever to "N" range (Refer to SHIFT LOCK RELEASE on same section of Service Manual mentioned in FOREWORD of this manual) and turn ignition key to "ACC" position.
2) Connect inner end of interlock cable to key interlock lever (Ignition switch side).
3) Install outer end bracket of interlock cable to ignition switch ass'y, and tighten screw to specified torque.

Tightening Torque
(a): 2.2 N·m (0.22 kg-m, 1.5 lb-ft)



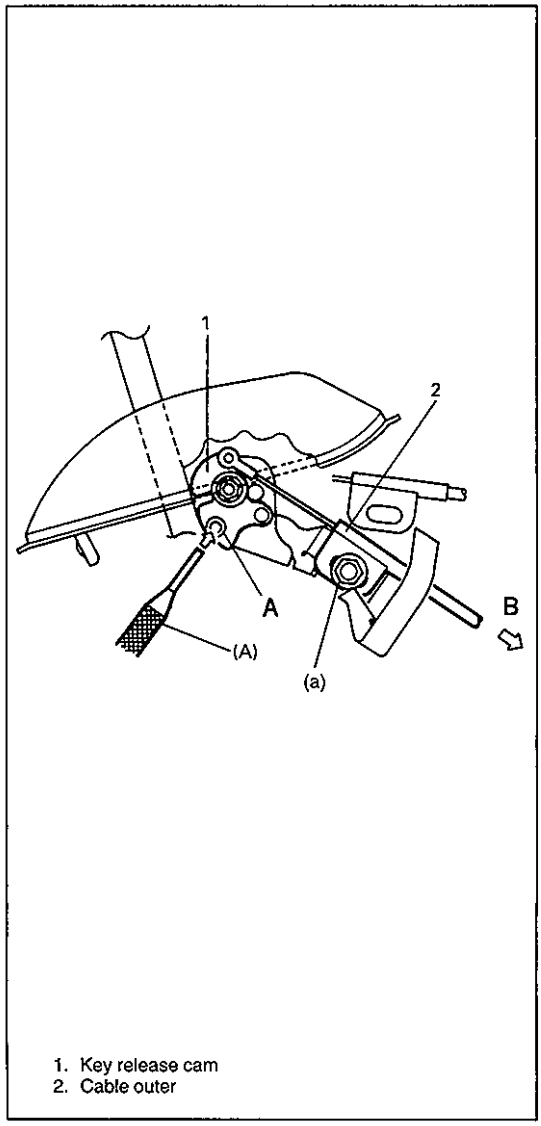
1. Interlock cable
2. Steering column
3. Steering column holder

4) Pass and connect interlock cable as shown at the left figure.



1. Inner end of interlock cable
2. Key release cam

5) With key release cam set as shown at the left figure, connect inner end of interlock cable to key release cam. (Select lever side)



1. Key release cam
2. Cable outer

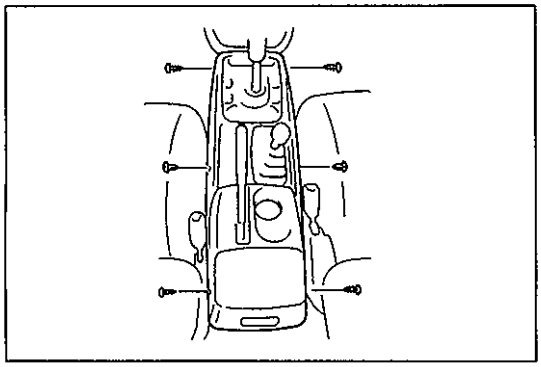
6) Move key release cam so that it is set at such angle as shown at the left figure and with special tool inserted in hole A , fix key release cam.

Special Tool
(A): 09925-78210 (6 mm)

7) With key release cam fixed with special tool, install cable outer to bracket and after making sure that cable outer is pushed in arrow direction B by leaf spring, tighten mounting nut to specified torque.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

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 console box.
10) Install steering column.
    For vehicle with air bag system, refer to Section 3C1.
    For vehicle without air bag system, refer to Section 3C.
11) Install meter hood.
12) Install steering column cover and steering column hole cover.
13) If equipped with air bag system, enable air bag system.
    Refer to "Enabling Air bag System" in Section 10B.

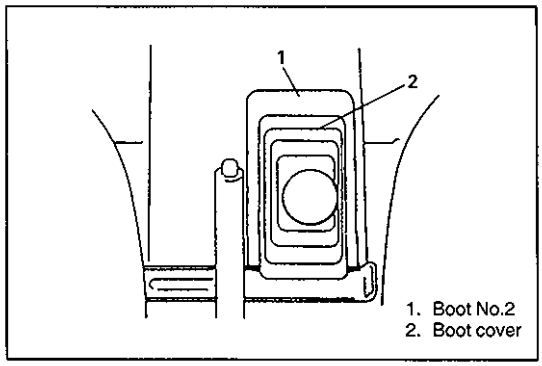


TRANSMISSION ASSEMBLY

DISMOUNTING OF TRANSMISSION WITH TRANSFER

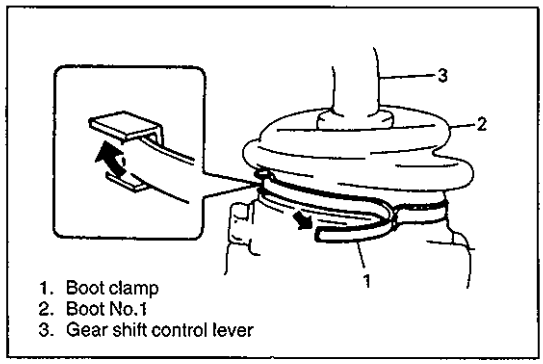
IN CABIN

1) Remove screws at the front and rear and 2 clips at the center, and then remove front console box.



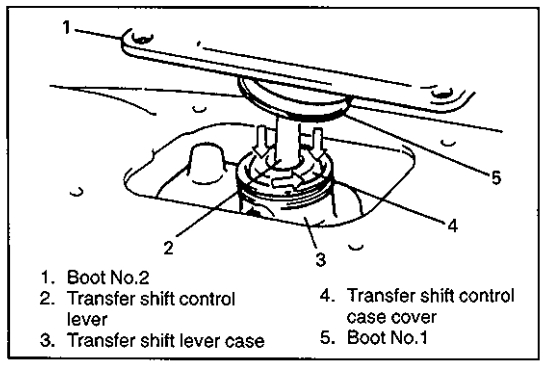
1. Boot No.2
2. Boot cover

2) Remove boot cover and boot No.2.



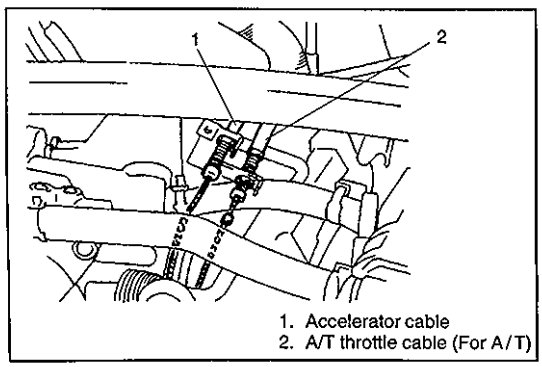
1. Boot clamp
2. Boot No.1
3. Gear shift control lever

3) Remove boot clamp and then remove boot No.1 from transfer gear shift lever case.



1. Boot No.2
2. Transfer shift control lever
3. Transfer shift lever case
4. Transfer shift control case cover
5. Boot No.1

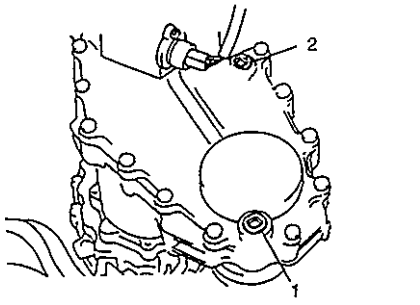
4) With transfer shift control case cover pushed down with fingers, turn it to counterclockwise and take out shift control lever.



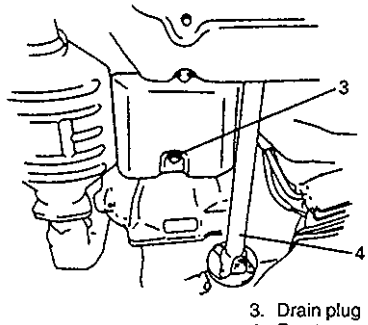
1. Accelerator cable
2. A/T throttle cable (For A/T)

IN ENGINE ROOM

1) Remove battery, dipstick and oil filler tube.
2) Disconnect A/T throttle cable from throttle cam and bracket.
3) Disconnect wiring harness couplers.
4) Remove starter motor. But don't disconnect its wiring harness.
5) Remove transmission to engine bolts.



1. Drain plug
2. Filler and level plug



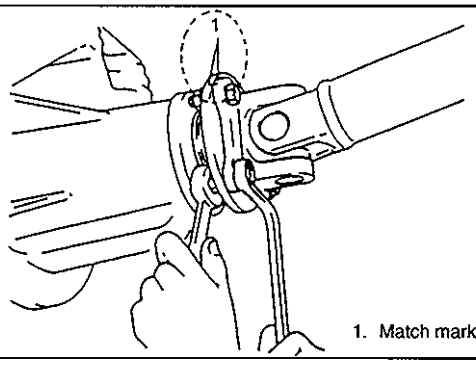
3. Drain plug
4. Front propeller shaft

ON LIFT

1) Drain transfer oil.

NOTE:
If automatic transmission is overhauled later on, draining A/T fluid at this point will facilitate work.

Tightening Torque
(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)

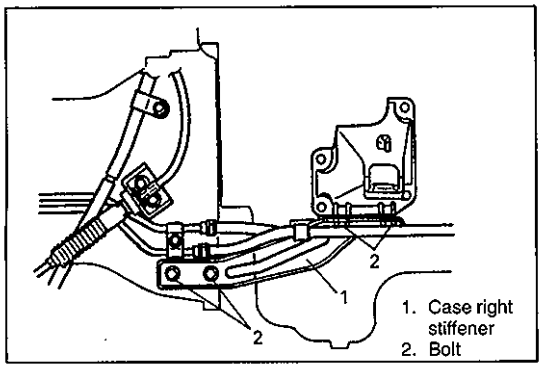


1. Match marks

2) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown in left figure.

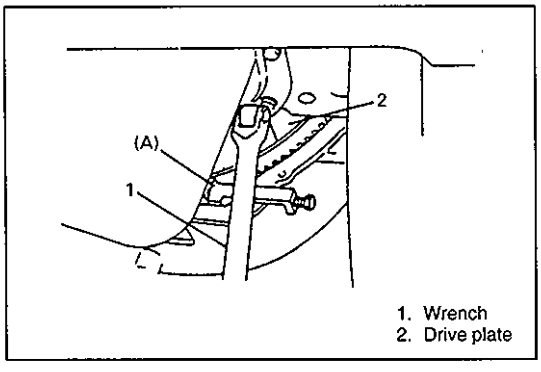
3) Remove universal joint flange bolts and take out rear propeller shaft.
4) Likewise, take out front propeller shaft.
5) Remove nut from the end of select cable and E-ring from bracket to set cable free.
6) Remove select cable bracket by removing its bolts.
7) Remove exhaust No.1 pipe (H25 engine only).
8) Loosen clamps and disconnect oil cooler hoses from pipes.

NOTE:
To avoid leakage of transmission fluid, plug open ends of oil cooler pipes and hoses right after they are disconnected.



1. Case right stiffener
2. Bolt

9) Remove case right stiffener.
10) Remove torque converter housing lower plate.

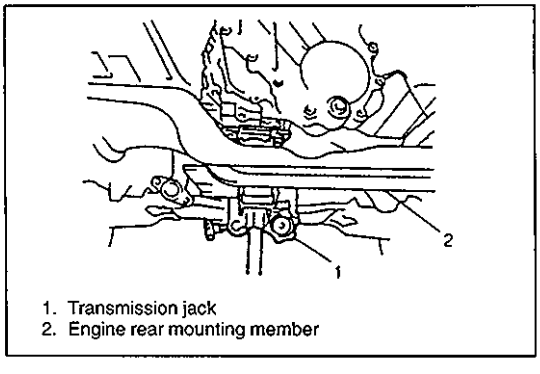


1. Wrench
2. Drive plate

11) Holding drive plate stationary with special tool, remove torque converter mounting bolts with wrench.

Special Tool
(A): 09927-56010

12) Remove engine to transmission nuts.
13) Disconnect speed sensor coupler on transfer.
14) Apply transmission jack and take off rear mounting member, torque stopper member and torque stopper bush by removing its bolts.



1. Transmission jack
2. Engine rear mounting member

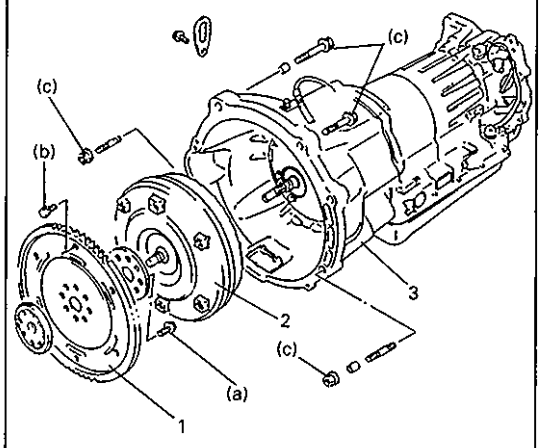
15) With transmission and transfer assemblies held up on jack, move them to the rear and lower them including torque converter.

WARNING:
Transmission and transfer assemblies may tilt rearward on jack. It is recommended to use an auxiliary arm of jack for the purpose of safety.

AFTER DISMOUNTING

WARNING:
Be sure to keep transmission and transfer assemblies horizontal throughout the work. Should they be tilted, torque converter may fall off and cause personal injury and A/T fluid may flow out.

1) Remove wiring harness and breather hoses.
2) Remove transfer by removing its bolts.



Tightening Torque
(a): 69 N·m (6.9 kg-m, 49.5 lb-ft)
(b): 65 N·m (6.5 kg-m, 47.0 lb-ft)
(c): 80 N·m (8.0 kg-m, 58.0 lb-ft)

1. Drive plate
2. Torque converter
3. Automatic transmission

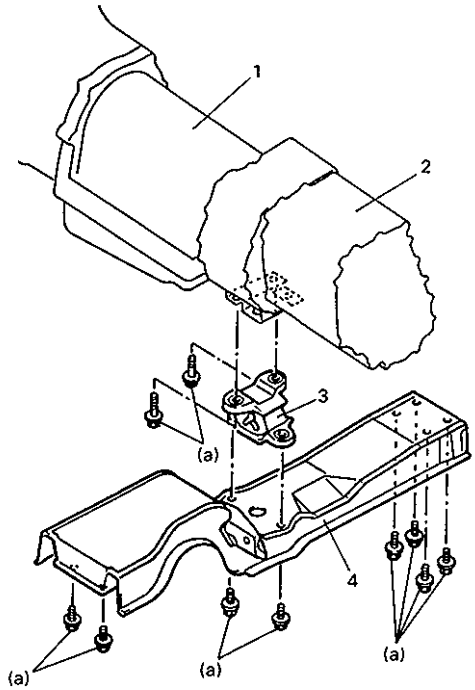
REMOUNTING:

WARNING:
When moving transmission assembly with torque converter equipped in it, be sure to keep it horizontal. Tilting it with its front facing down may allow converter to fall off, whereby an injury may result.

For remounting, reverse dismounting procedure. Use specified torque as given below and left.

Tightening torque	N·m	kg-m	lb-ft
• Exhaust No.1 pipe to manifold bolts • Case right stiffener bolts	50	5.0	36.5
Muffler to exhaust No.2 pipe nuts	60	6.0	43.0
Universal joint flange bolts and nuts	50	5.0	36.5
• Oil filler tube bolts • Select cable bracket bolts	23	2.3	16.5

- Clamp wiring harness and hoses securely.
- Adjust select cable.
- Refer to page 7B1-45 for tuning of A/T throttle cable.
- Follow fluid level check procedure in page 7B1-44 for refilling automatic transmission fluid and its level adjusting.
- Connect battery, and confirm that engine and transmission function acceptably.
- When remounting drive plate, use specified bolts.



Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

1. Automatic transmission
2. Transfer
3. Engine rear mounting
4. Engine rear mounting member

UNIT REPAIR

Refer to the same section of UNIT REPAIR MANUAL mentioned in FOREWORD of this manual.

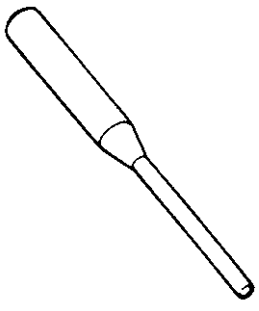
TIGHTENING TORQUE SPECIFICATIONS

Fastening portion		Tightening torque		
		N·m	kg-m	lb-ft
ON-VEHICLE SERVICE	Automatic transmission fluid drain plug	23	2.3	17.0
	Transfer oil filler / level and drain plugs	23	2.3	17.0
	Transmission case plug	17	1.7	12.5
	Oil house clamp bolt	29	2.9	21.0
MOUNT-	Transmission to engine bolts and nuts	85	8.5	61.5
	Engine rear mounting bracket bolts Engine rear mounting bolts Engine rear mounting member bolts Torque stopper bush bolt Torque stopper bracket bolts Torque stopper member bolts Transmission case right/left stiffener bolts Muffler to exhaust pipe bolts Exhaust pipe bracket bolts	50	5.0	36.5
	Exhaust pipe to manifold nuts	60	6.0	43.5
	Universal joint flange bolts and nuts	55	5.5	40.0
	Torque converter mounting bolts	65	6.5	47.0
	Select cable bracket bolts	23	2.3	17.0
EXTERNAL	Adapter case bolts (G16 engine)	35	3.5	25.5
	Adapter case bolts (J20 and H25 engines)	42	4.2	30.0
	Manual shift shaft set nut	4	0.4	3.0
	Shift switch lock bolt	5.5	0.55	4.0
	Oil pipe flare nuts	30	3.0	22.0
	Oil filler tube bolt	23	2.3	17.0
	Transfer to transmission bolts			
	Drive plate bolts Tightening torque	78	7.8	56.5
	Interlock cable clamp screw	2.2	0.22	1.5
	Interlock cable outer mounting nut	13	1.3	9.5

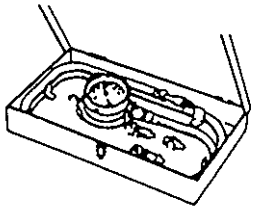
REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
A/T fluid	An equivalent of DEXRON®-II, DEXRON®-IIE or DEXRON®-III	• Automatic transmission • Parts lubrication when installing
Lithium grease	SUZUKI SUPER GREASE C (99000–25030)	• Retaining parts in place when assembling
	SUZUKI SUPER GREASE A (99000–25010)	• Cable ends

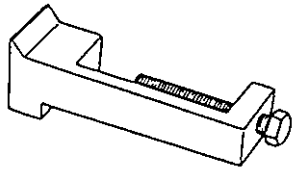
SPECIAL TOOLS



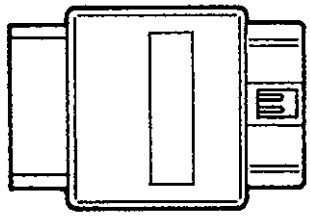
09925-78210
Spring pin remover
(6 mm)



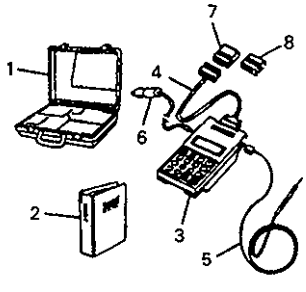
09925-37810
Oil pressure gauge



09927-56010
Gear stopper

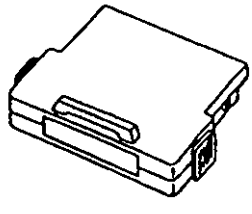


09931-96020
16/12 pin DLC adapter



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
Tech 1 (scan tool) kit



Mass storage cartridge

SECTION 7C1

CLUTCH

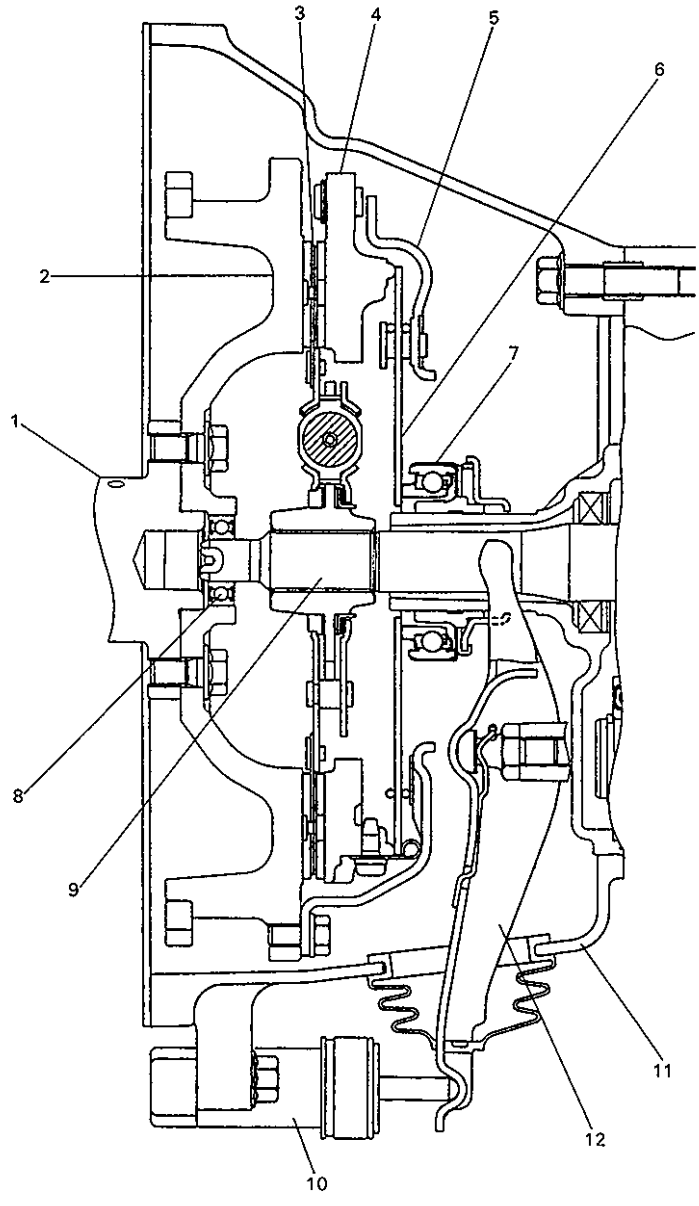
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GENERAL DESCRIPTION

The clutch is a 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 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 part 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.

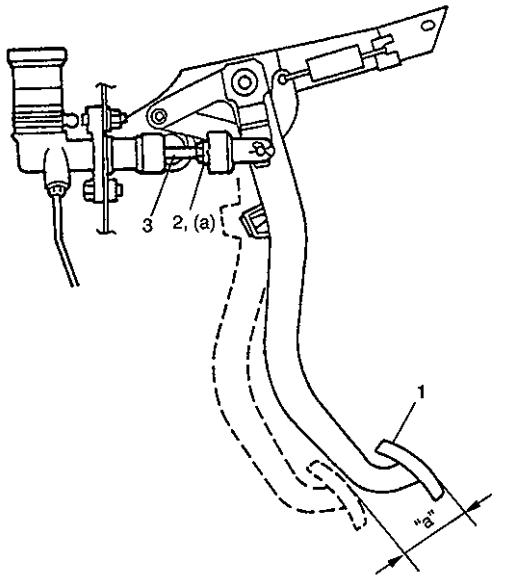
Depressing the clutch pedal causes the release bearing to advance and pushes on the tips of the tapered fingers of the diaphragm spring. When this happens, the diaphragm spring pulls the pressure plate away from the flywheel, thereby interrupting the flow of drive from flywheel through clutch disc to transmission input shaft.



1. Crankshaft
2. Flywheel
3. Clutch disc
4. Pressure plate
5. Clutch cover
6. Diaphragm spring
7. Release bearing
8. Input shaft bearing
9. Input shaft
10. Operating cylinder
11. Clutch housing
12. Release fork

DIAGNOSIS

Condition	Possible Cause	Correction
Slipping	• Improper clutch pedal free travel.	Bleed air or replace master cylinder.
	• Worn or oily clutch disc facing.	Replace disc.
	• Warped disc, pressure plate or flywheel surface.	Replace disc, clutch cover or flywheel.
	• Weakened diaphragm spring.	Replace clutch cover.
	• Master cylinder piston or seal cup not returning.	Repair master cylinder.
Dragging clutch	• Improper clutch pedal free travel.	Bleed air or replace master cylinder.
	• Weakened diaphragm spring, or worn spring tip.	Replace clutch cover.
	• Rusted input shaft splines.	Lubricate.
	• Damaged or worn splines of transmission input shaft.	Replace input shaft.
	• Excessively wobbly clutch disc.	Replace disc.
	• Clutch facings broken or dirty with oil.	Replace disc.
	• Fluid leakage.	Repair or replace.
Clutch vibration	• Glazed (glass-like) clutch facings.	Repair or replace disc.
	• Clutch facings dirty with oil.	Replace disc.
	• Release bearing slides unsmoothly on input shaft bearing retainer.	Lubricate or replace input shaft bearing retainer.
	• Wobbly clutch disc, or poor facing contact.	Replace disc.
	• Weakened torsion springs in clutch disc.	Replace disc.
	• Clutch disc rivets loose.	Replace disc.
	• Distorted pressure plate or flywheel surface.	Replace clutch cover or flywheel.
	• Weakened or loosened engine mounting bolt or nut.	Retighten or replace mounting.
Noisy clutch	• Worn or broken release bearing.	Replace release bearing.
	• Input shaft front bearing worn down.	Replace input shaft bearing.
	• Excessive rattle of clutch disc hub.	Replace disc.
	• Cracked clutch disc.	Replace disc.
	• Pressure plate and diaphragm spring rattling.	Replace clutch cover.
Grabbing clutch	• Clutch disc facings soaked with oil.	Replace disc.
	• Clutch disc facings excessively worn.	Replace disc.
	• Rivet heads showing out of facing.	Replace disc.
	• Weakened torsion springs.	Replace disc.



1. Clutch pedal
2. Clevis lock nut
3. Push rod

ON-VEHICLE SERVICE

CLUTCH PEDAL HEIGHT

Adjust clutch pedal height by loosening clevis lock nut and turning push rod as shown.

Clutch pedal height is normal if clutch pedal is about 20 mm (0.79 in.) higher than brake pedal.

After adjusting, tighten lock nut to specified torque.

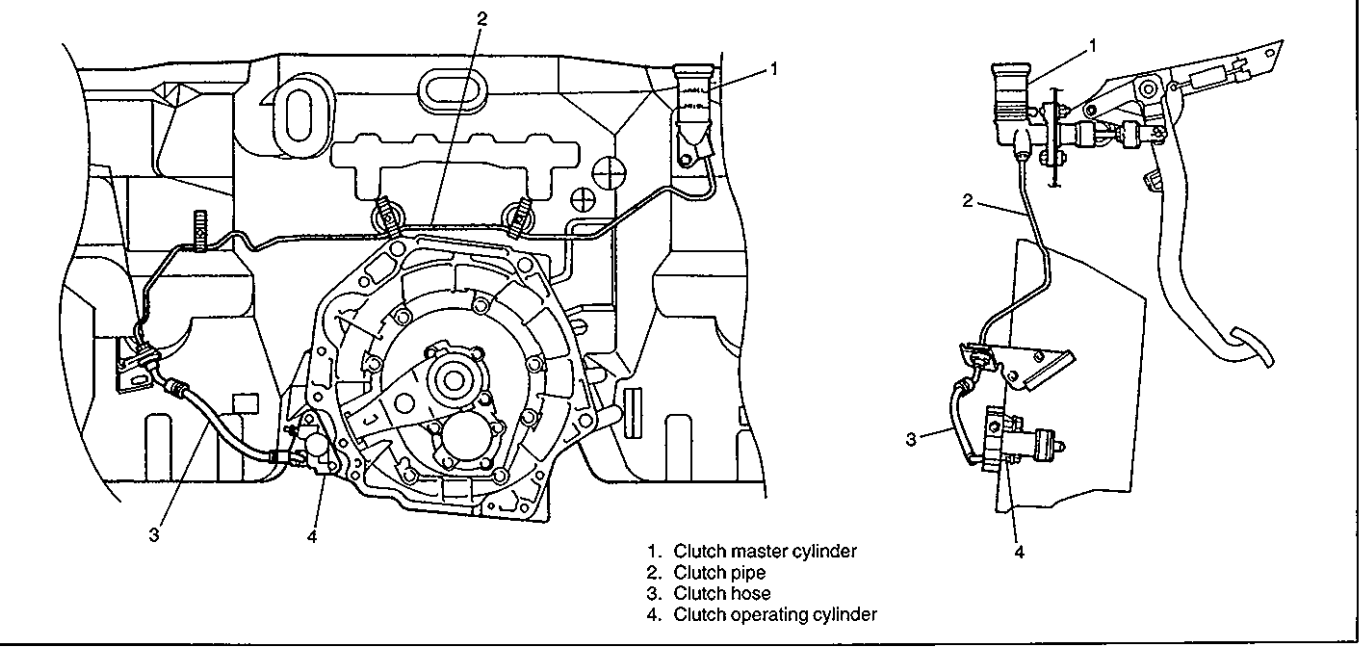
Tightening Torque
(a): 18 N·m (1.8 kg-m, 13.0 lb-ft)

CLUTCH PEDAL FREE TRAVEL

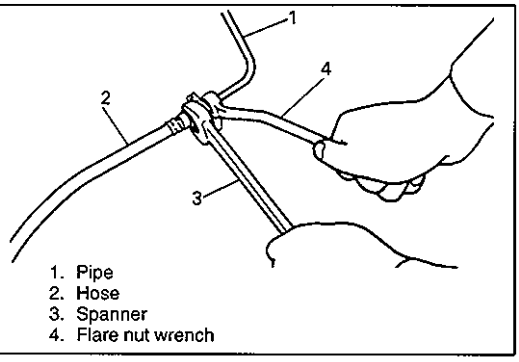
Depress clutch pedal, stop the moment clutch resistance is felt and measure distance (clutch pedal free travel). Free travel should be within following specification.

Pedal free travel "a": 15 – 25 mm (0.6 – 1.1 in.)

CLUTCH FLUID PIPE AND HOSE



1. Clutch master cylinder
2. Clutch pipe
3. Clutch hose
4. Clutch operating cylinder



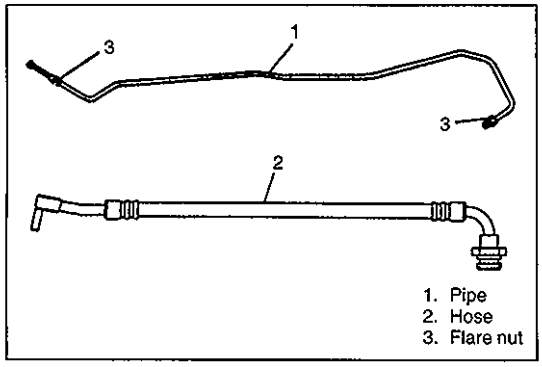
1. Pipe
2. Hose
3. Spanner
4. Flare nut wrench

REMOVAL

NOTE:
Do not allow fluid to get on painted surface.

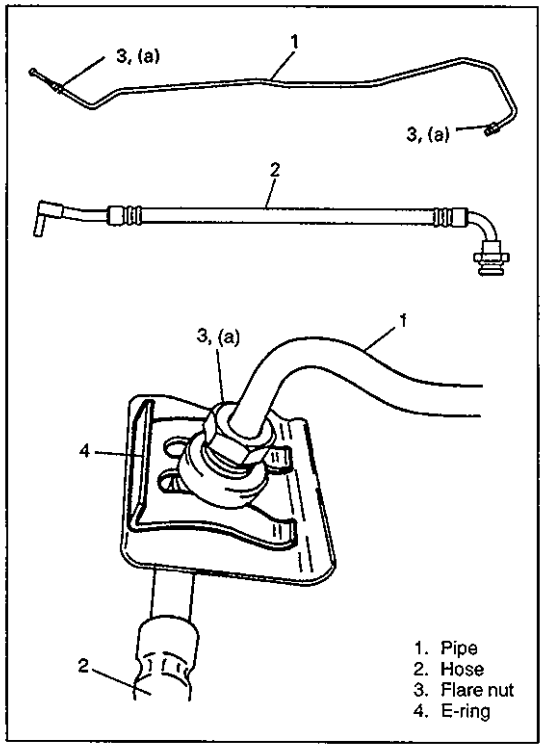
1) Remove dust and dirt from each joint of hose and pipe to be disconnected and clean around reservoir cap.
2) Take out fluid with syringe or such.
3) Disconnect fluid pipe from hose.

NOTE:
To disconnect pipe from hose, separate them by using flare nut wrench and spanner so as not to kink them.



INSPECTION

Check pipe and hose for dent, kink, crack, dirt and dust. Replace if check result is not satisfactory.



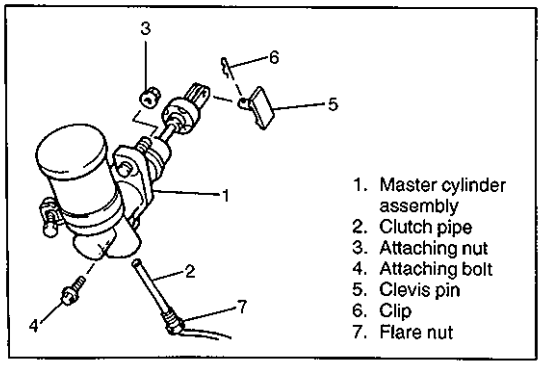
INSTALLATION

Reverse removal sequence noting following points.
Tighten flare nuts to specified torque.

Tightening Torque
(a): 16 N·m (1.6 kg-m, 11.5 lb-ft)

NOTE:

- **For air bleeding of master cylinder alone, it must be removed from vehicle.**
  (For procedures of removal and installation of master cylinder assembly and air bleeding, refer to CLUTCH MASTER CYLINDER section.)
- **Do not allow fluid to get on painted surface.**
- **Do not allow pipe and hose to contact hard against vehicle or other parts.**
- **Install each clamp securely.**
- **Install E-ring securely as shown.**
- **After installation, check clutch pedal free travel and bleed air from system.**
- **Check fluid leakage.**
- **Add fluid close to MAX level of reservoir.**



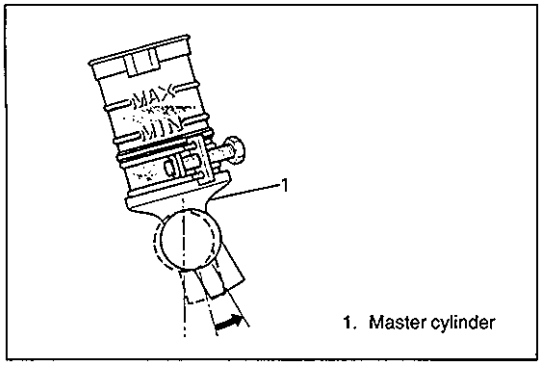
CLUTCH MASTER CYLINDER

REMOVAL

1) Clean around reservoir cap and take out fluid with syringe or such.
2) Remove push rod clevis pin.
3) Disconnect fluid pipe from master cylinder.

   NOTE:
   Do not allow fluid to get on painted surfaces.

4) Remove master cylinder attaching nut and bolt.
5) Remove master cylinder assembly and gasket.



1. Master cylinder

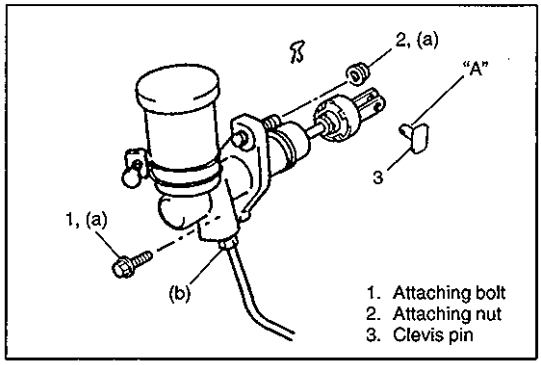
INSTALLATION

1) To bleed air from master cylinder itself, tilt it as shown in figure 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 bolt, nuts and push rod clevis pin.

   NOTE:
   Do not reuse gasket.



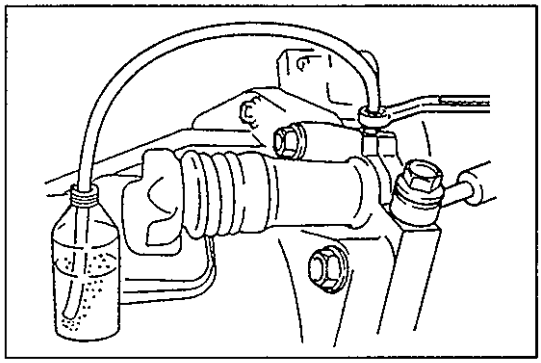
1. Attaching bolt
2. Attaching nut
3. Clevis pin

3) Torque attaching bolt and nut to specification.
4) Connect fluid pipe and torque flare nut to specification.

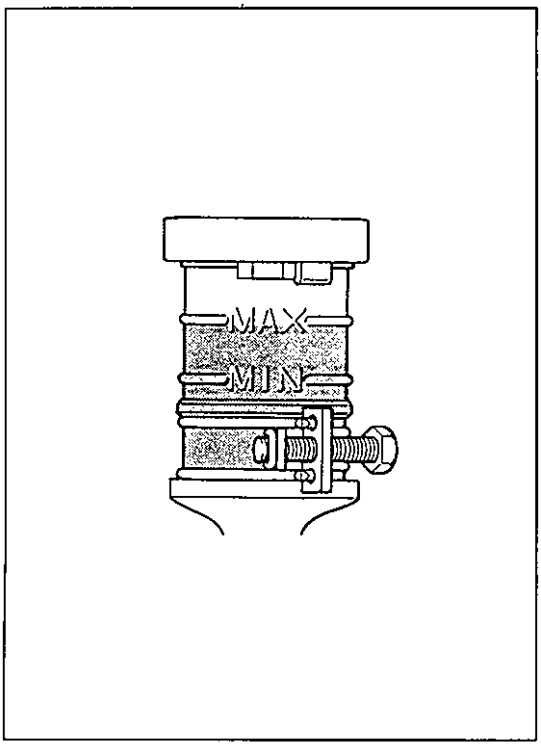
   Tightening Torque
   (a): 13 N·m (1.3 kg-m, 9.5 lb-ft)
   (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

5) Apply grease to clevis pin and install it.

   "A": Grease 99000-25010



6) Fill reservoir with specified brake fluid and check fluid leakage.
7) After installation, bleed air from system and check clutch pedal free travel. Refer to BRAKE section for air bleeding procedure.

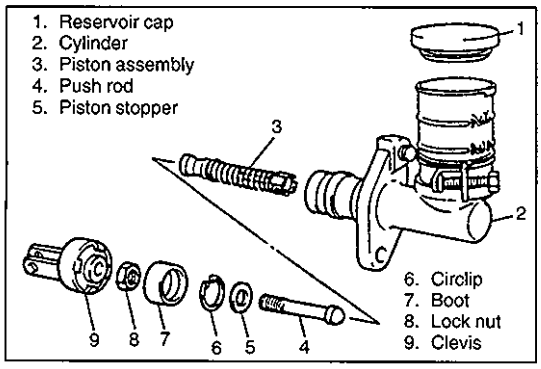


FLUID INSPECTION

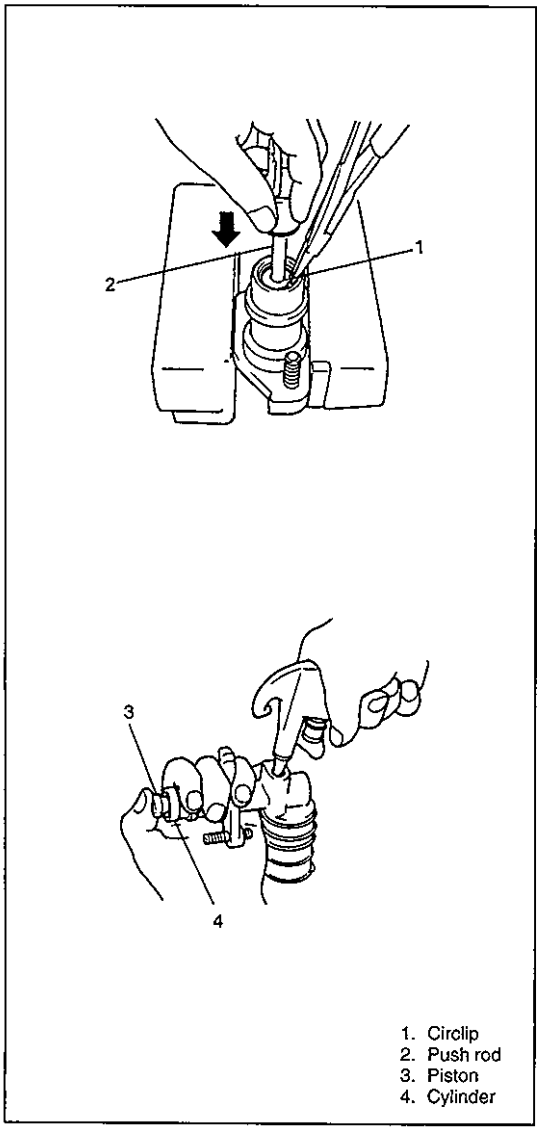
Fluid level should be always between MIN and MAX lines on reservoir. If fluid decreases quickly, check for leakage, repair leaky point, if any, and add fluid up to MAX level.

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.**



DISASSEMBLY AND ASSEMBLY CLUTCH MASTER CYLINDER



DISASSEMBLY

1) Remove boot and then circlip with piston pushed in.
2) Remove push rod and 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:

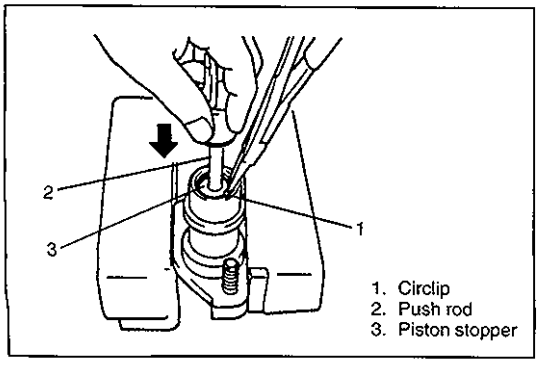
- **Wash disassembled parts with brake fluid.**
- **Do not reuse piston assembly and circlip.**

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 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.

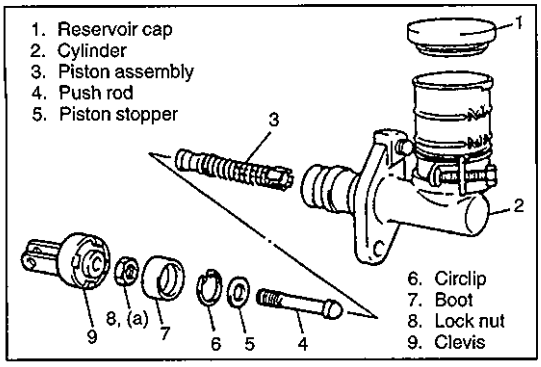


ASSEMBLY

NOTE:

Before installation, wash each part in specified brake fluid.

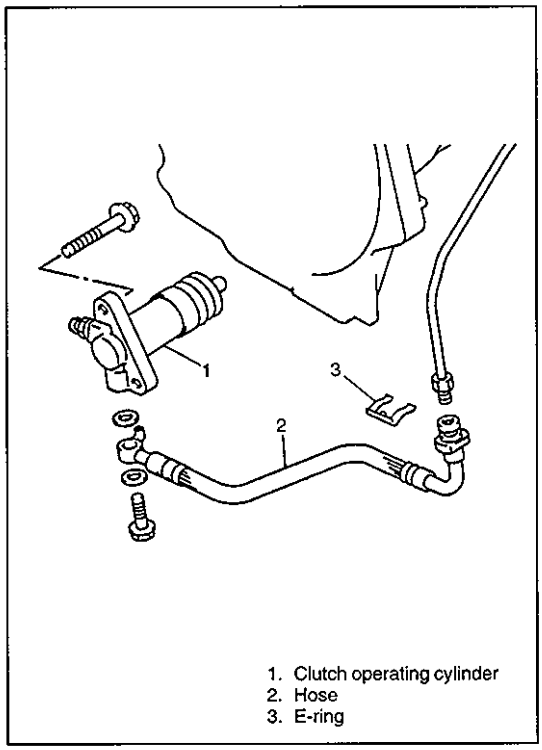
1) Apply brake fluid to inside of piston assembly and cylinder body.
2) Install piston assembly into cylinder.
3) With piston pushed down, install circlip as shown.
   And install boot.



4) Tighten lock nut to specified torque.

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

5) For installation of master cylinder to vehicle, refer to INSTALLATION described previously.

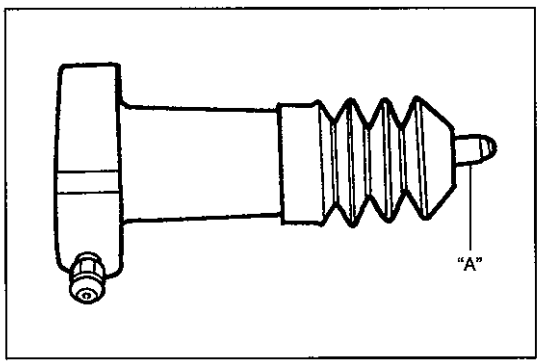


CLUTCH OPERATING CYLINDER

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.

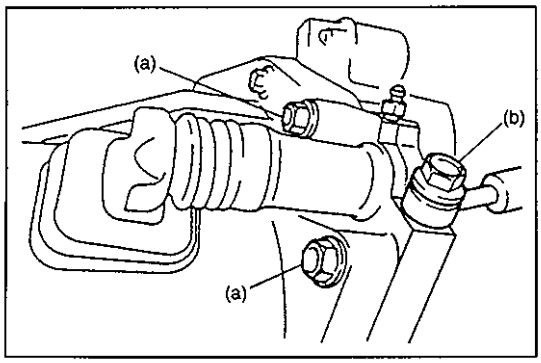


INSTALLATION

1) For air bleeding of master cylinder alone, it must be removed from vehicle.
   For procedures of removal and installation of master cylinder assembly and air bleeding, refer to CLUTCH MASTER CYLINDER section.
2) Apply small amount of grease to rod tip.

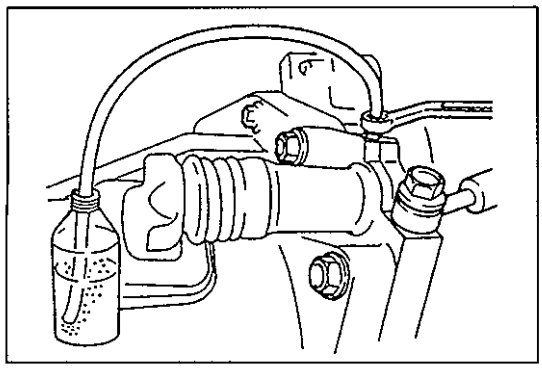
   "A": Grease 99000-25010

   NOTE:
   Don't allow any grease to be on boot.



3) Install clutch operating cylinder and torque attaching bolts to specification.
4) Connect clutch fluid hose and torque union bolt to specification.

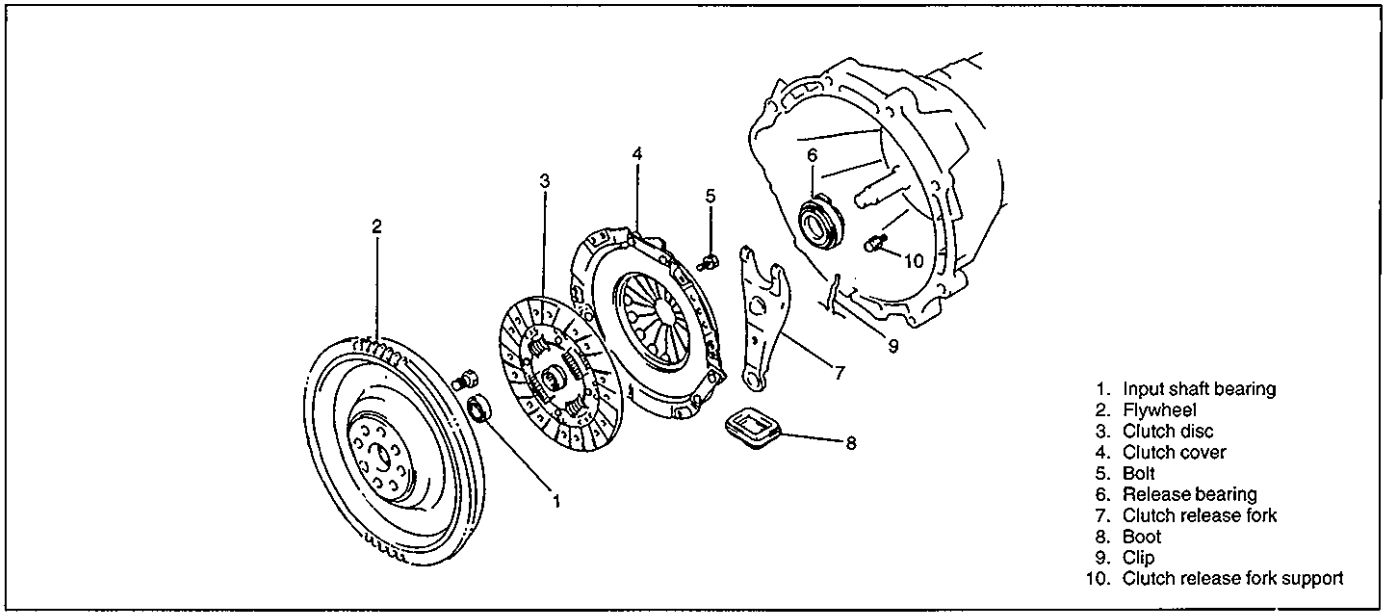
Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)
(b): 23 N·m (2.3 kg-m, 16.5 lb-ft)



5) Fill reservoir with specified brake fluid and check for fluid leakage.
6) Bleed air from system and check clutch pedal free travel. Refer to BRAKE section for air bleeding procedure.

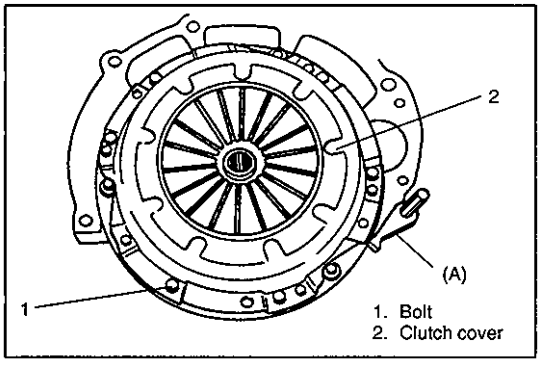
UNIT REPAIR

CLUTCH COVER, CLUTCH DISC AND FLYWHEEL



DISMOUNTING/REMOUNTING

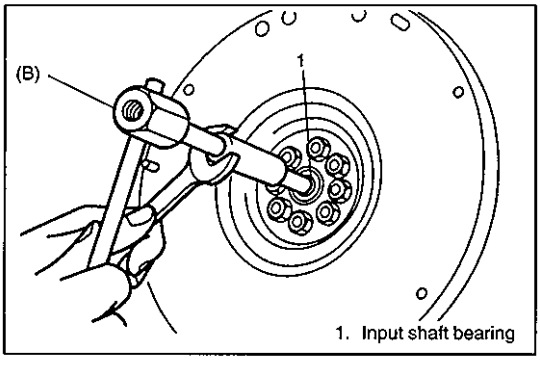
Refer to SECTION 7A "Dismounting/Remounting of Trans Unit".



REMOVAL

1) Hold flywheel stationary with special tool (A) and remove clutch cover bolts, clutch cover and clutch disc.

Special Tool
(A): 09924-17810



2) Pull out input shaft bearing by using special tool (B) and wrench.

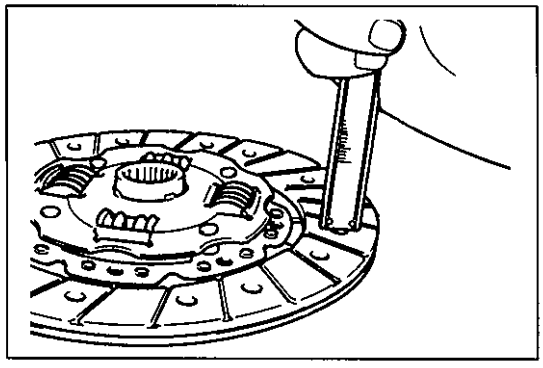
Special Tool
(B): 09917-58010 (G16 engine)
(B): 09923-73210 (J20 and H25 engines)

3) Remove release bearing and release fork.

INSPECTION

Input Shaft Bearing and Release Bearing

Check bearing for smooth rotation and replace it if abnormality is found.



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

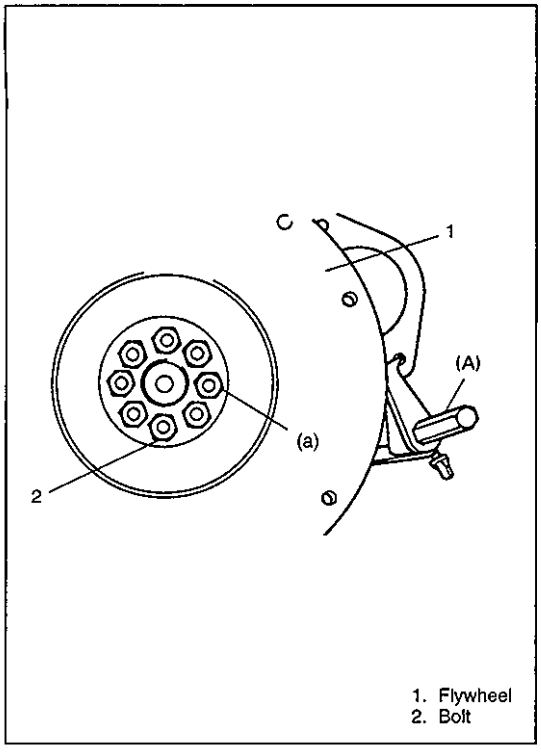
Standard: 1.6 mm (0.06 in.)
Service limit: 0.5 mm (0.02 in.)

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
2. Bolt

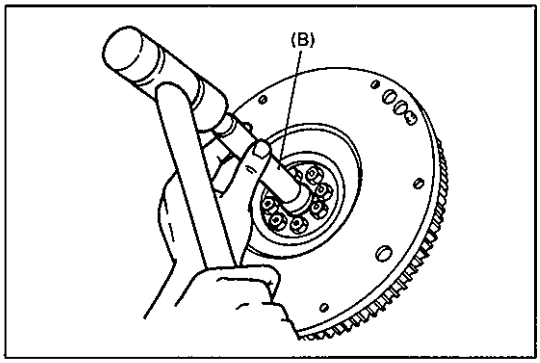
INSTALLATION

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.

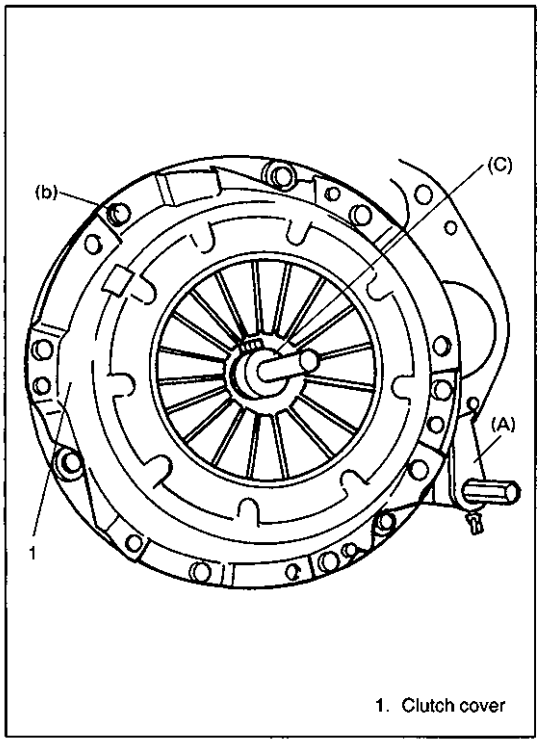
Special Tool
(A): 09924-17810

Tightening Torque
(a): 78 N·m (7.8 kg-m, 56.5 lb-ft) (G16 engine)
(a): 70 N·m (7.0 kg-m, 50.5 lb-ft) (J20 and H25 engines)



2) Using special tool (B), install input shaft bearing to flywheel.

Special Tool
(B): 09925-98210



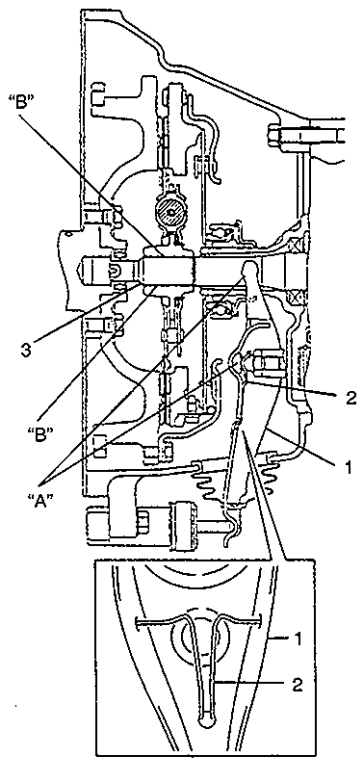
1. Clutch cover

3) Aligning clutch disc to flywheel center by using special tool (C), install clutch cover and bolts. Then tighten bolts to specification.

NOTE:
- **While tightening clutch cover bolts, compress clutch disc with special tool (C) by hand so that disc centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

Special Tools
(A): 09924-17810
(C): 09923-36330 (G16 engine)
(C): 09923-36320 (J20 and H25 engines)

Tightening Torque
(b): 23 N·m (2.3 kg-m, 16.5 lb-ft)



1. Release fork
2. Clip
3. Input shaft

4) Install clip to release fork and apply grease.

"A": Grease 99000-25010

Then install release fork and release bearing as shown in figure.

5) Slightly apply grease to input shaft and install clutch disc. Then join transmission transfer assembly with engine. Refer to SECTION 7A.

"B": Grease 99000-25210

NOTE:
Turn crankshaft with wrench from front while inserting transmission input shaft to clutch disc until splines mesh.

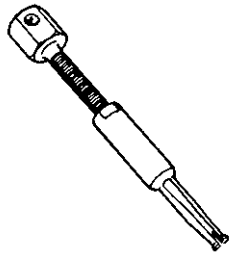
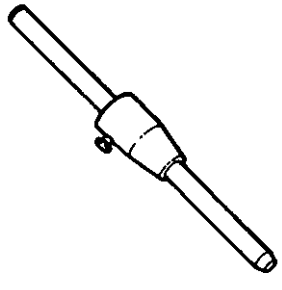
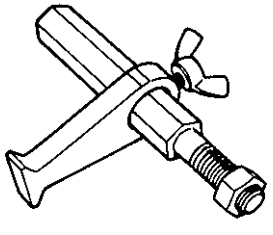
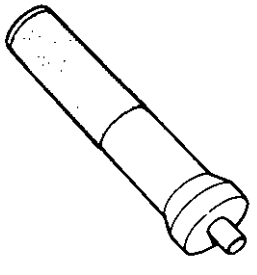
TIGHTENING TORQUE SPECIFICATIONS

Fastening portion		Tightening torque		
		N·m	kg-m	lb-ft
Flare nut		16	1.6	11.5
Master cylinder nut		13	1.3	9.5
Lock nut		18	1.8	13.0
Flywheel bolts	G16 engine	78	7.8	56.5
	J20 and H25 engines	70	7.0	50.5
Clutch cover bolts		23	2.3	16.5
Operating cylinder bolt		50	5.0	36.5
Clutch hose union bolt		23	2.3	16.5

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Clutch master cylinder clevis pin. • Release fork. • 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 TOOLS

			
09917-58010 (G16 engine) 09923-73210 (J20 and H25 engines) Bearing remover	09923-36330 (G16 engine) 09923-36320 (J20 and H25 engines) Clutch center guide	09924-17810 Flywheel holder	09925-98210 Input shaft bearing installer

SECTION 7D

TRANSFER (4WD)

CONTENTS

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Diagnosis Table 7D- 2
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Gear Oil 7D- 3
Transfer Oil Seals 7D- 3
Speedometer Driven Gear 7D- 4
Engine Rear Mounting 7D- 4
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UNIT REPAIR 7D- 7
TIGHTENING TORQUE SPECIFICATIONS 7D- 7
REQUIRED SERVICE MATERIALS 7D- 7
SPECIAL TOOL 7D- 7

GENERAL DESCRIPTION

The aluminum transfer case directly connected to the back of the transmission contains the input gear, countershaft & gear, output rear shaft, output low gear and output front shaft (for front drive) connected by way of the hyvo-chain.
The transfer has such a selective mechanism as to enable the shift control lever to make selection of high speed (direct connection with transmission output: main shaft), low speed (speed reduction by input gear, counter gear and output low gear) or neutral by way of the reduction sleeve located between input gear and output low gear, and selection of two-wheel-drive (high speed only) or four-wheel-drive (high or low speed) by way of the front drive clutch sleeve located at the center of the output rear shaft. Also, with a synchronizer installed to the front drive clutch, it is possible to change the drive mode between 2WD (high speed only) and 4WD (high speed only) even while running.
The front drive shift fork has an auxiliary spring to make a smooth shift from 4H to 2H possible.
The case has an oil gutter and a plate at synchronizer to provide proper lubrication even under the strict conditions of use.

WARNING:
For towing the vehicle for the purpose of repair or the like, follow the towing instructions in OWNER'S MANUAL.

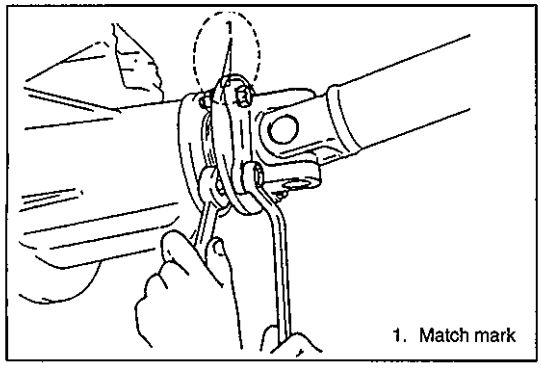
DIAGNOSIS

DIAGNOSIS TABLE

Before attempting to repair the transfer or related components for any reason other than mechanical failure, the condition and probable causes should be identified.
Transfer failures are revealed by shifting difficulties such as excessive shifting effort, gear clash, or gear grinding. When any of these conditions occur, the following inspections should be made before disassembling the transfer.

1) Check transfer oil level for insufficient or incorrect oil. Refer to "Transfer and Differential Oil Inspection and Change" in SECTION 0B "MAINTENANCE AND LUBRICATION".
2) Check transfer mountings for wear or looseness.
3) Check gearshift control lever for distortion or excessive wear.
   After performing the above inspections, refer to following diagnosis table.

Condition	Possible Cause	Correction
Gear slipping out of mesh	• Worn shift fork shaft	Replace
	• Worn shift fork or synchronizer sleeve	Replace
	• Weak or damaged locating spring	Replace
	• Worn bearings on input shaft or mainshaft	Replace
	• Worn chamfered tooth on sleeve or gear	Replace sleeve and gear
	• Missing or disengagement of circlip(s)	Install
Gears refusing to disengage	• Weakened or broken synchronizer spring	Replace
	• Distorted shift shaft or shift fork	Replace
Hard shifting	• Weakened front drive shift shaft spring	Replace
	• Distorted or mispositioned front drive shift shaft circlip and washer	Replace
	• Inadequate or insufficient	Replenish
	• Worn synchronizer ring	Replace
	• Worn chamfered tooth on sleeve or gear	Replace sleeve and gear
	• 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 ring	Replace
	• Damaged or worn chamfered tooth on sleeve or gear	Replace



ON-VEHICLE SERVICE

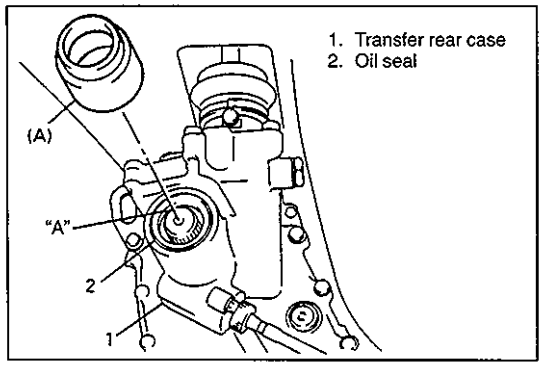
GEAR OIL

Refer to "ON-VEHICLE SERVICE" of Section 7A.

TRANSFER OIL SEALS

REAR CASE OIL SEAL

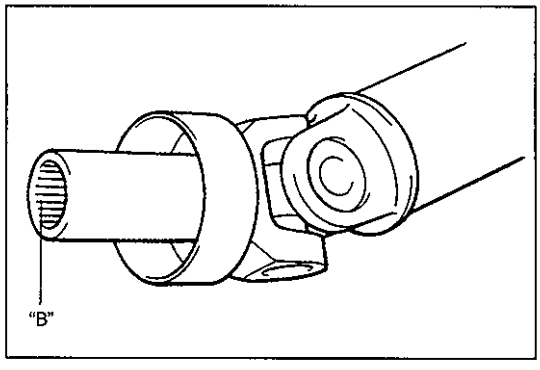
1) Lift up vehicle horizontally.
2) Give match marks on joint flange and propeller shaft as shown in figure.
3) Remove 4 bolts from rear propeller shaft flange and remove propeller shaft.
4) Using screwdriver, remove oil seal.



5) Using special tool(A) and plastic hammer, pressfit new oil seal up to case surface. Be sure to apply grease to oil seal lip.

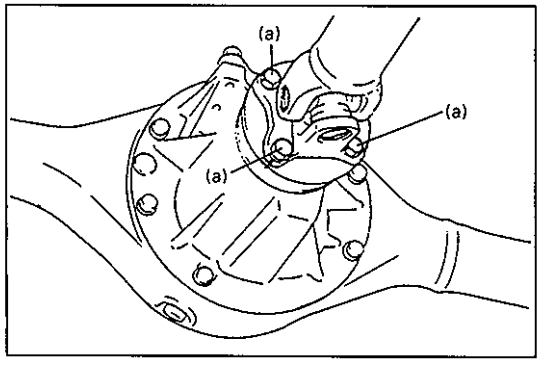
"A": Grease 99000-25010

Special Tool
(A): 09940-53111



6) Clean and inspect sliding portion of propeller shaft front end (where oil seal contacts) before installation and if even small dent or scratch exists, correct and clean it again.
Then apply grease inside splines of propeller shaft.

"B": Grease 99000-25010



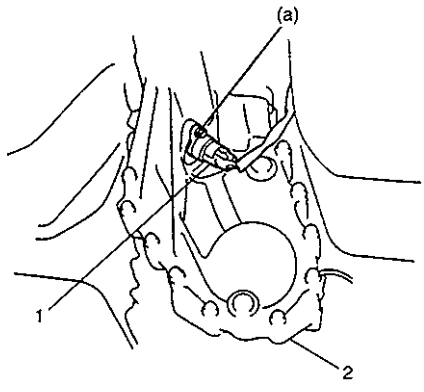
7) Install propeller shaft and torque universal joint flange bolts to specification.

> **CAUTION:**
> **Be sure to use only specified bolts, nuts and lock washers for universal joint flange.**

Tightening Torque:
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

CENTER CASE OIL SEAL (Front side)

In addition to the procedure for rear case oil seal, it is necessary to drain and refill gear oil of transfer. Refer to Section 7A "ON-VEHICLE SERVICE" for oil specification.



1. Speed sensor assembly
2. Transfer

SPEEDOMETER DRIVEN GEAR

REMOVAL

1) Lift up vehicle horizontally or rear up.
2) Disconnect speed sensor coupler at transfer case.
3) Remove bolt and take off speed sensor from transfer.

INSTALLATION

1) Make sure that O-ring and speed sensor have not been damaged.
2) Inspect speedometer driven gear for abnormal wear of gear teeth or bend of shaft portion and replace it if necessary.
3) Make sure its smooth rotation.
4) Install speed sensor assembly to transfer and connect coupler as it was.

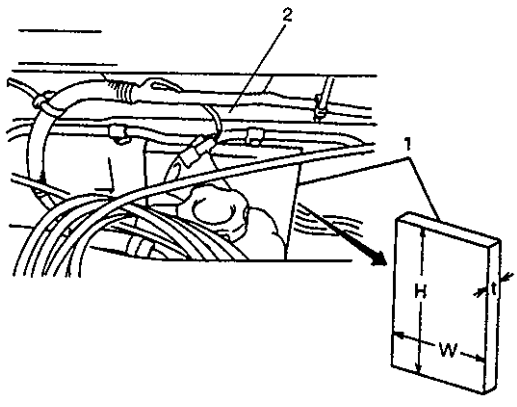
Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.5 lb-ft)

ENGINE REAR MOUNTING

Refer to "ON-VEHICLE SERVICE" of Section 7A.

TRANSFER ASSEMBLY

Dismounting and remounting of transfer and transmission together as a unit is described in Section 7A for Manual Transmission or 7B1 for Automatic Transmission, but it is also possible to dismount and remount transfer assembly by itself as described below.



1. Wood block
2. Dash panel
t: 45 mm/1.8 in.
H: 200 mm/8 in.
W: 100 – 150 mm/4 – 6 in.

DISMOUNTING

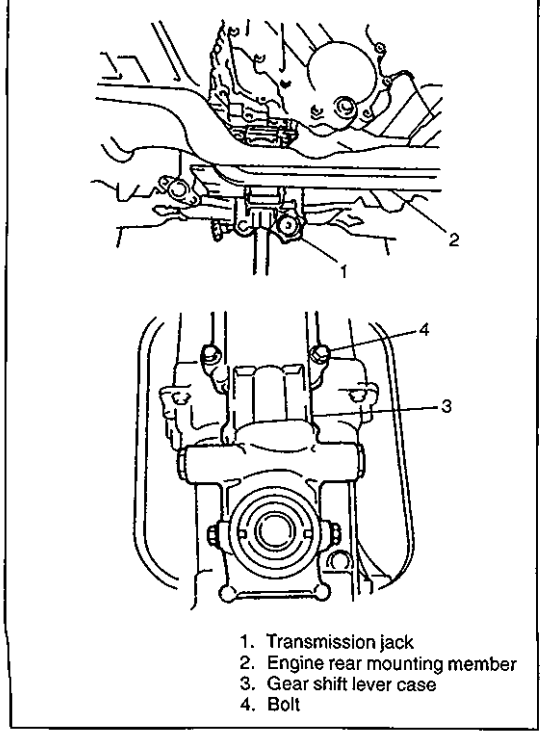
IN ENGINE ROOM

1) Disconnect negative (–) cable from battery.
2) Remove distributor assembly.
3) Place wood block between engine and dash panel so that it serves as stopper when engine, transmission and transfer unit hangs down as rear mounting member is removed.

CAUTION:
Make sure to use wood block to prevent contact which may occur between dash panel and CMP sensor case (G16), CMP sensor (J20) or intake manifold (H25), and fan and shroud.

IN CABIN

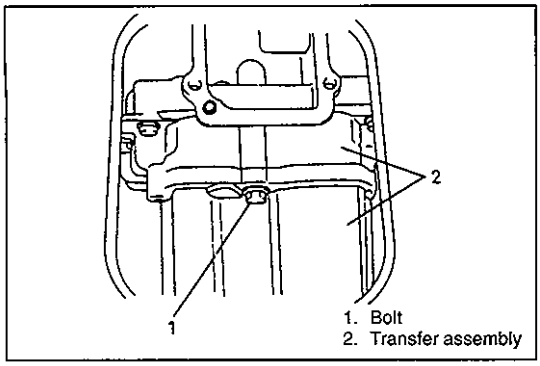
1) Remove console box.
2) Remove shift lever of transmission and transfer.



1. Transmission jack
2. Engine rear mounting member
3. Gear shift lever case
4. Bolt

ON LIFT

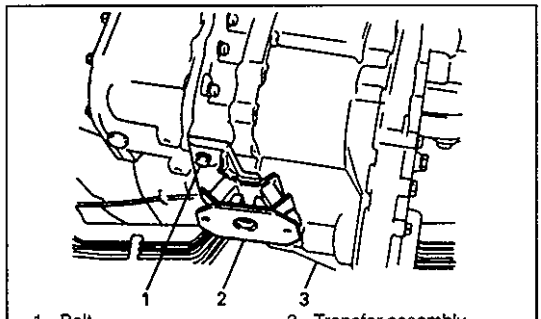
1) Drain transfer oil.
2) Remove rear propeller shaft.
3) Remove front propeller shaft.
4) Disconnect exhaust center pipe.
5) Disconnect speed sensor coupler.
6) Place transmission jack and remove mounting member.
7) Lower transmission jack gradually and check to ensure that wood block serves as stopper between engine and dash panel.
8) Remove bolts for gear shift lever case.
9) Pull off breather hose.



1. Bolt
2. Transfer assembly

IN CABIN

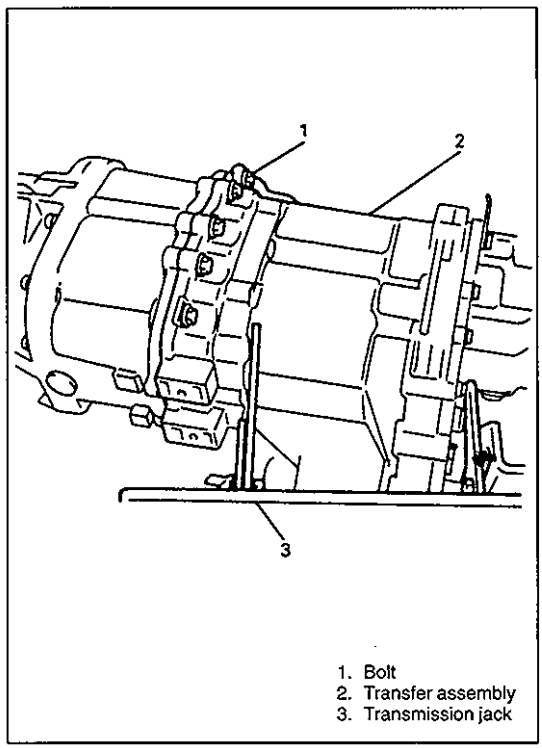
Remove gear shift lever case and then remove transfer center case bolt.



1. Bolt
2. Engine rear mounting
3. Transfer assembly

ON LIFT

1) Remove transfer mounting (engine rear mounting) by removing bolts.



1. Bolt
2. Transfer assembly
3. Transmission jack

2) Apply transmission jack to transfer to support it.
3) Remove couplers for 4WD/4WD-LOW switches lead.
4) Remove transfer front case bolts.
5) With transfer assembly supported with transmission jack, slide it rearward and when it is apart from transmission, lower it.

REMOUNTING

For remounting, reverse dismounting procedure described above, noting following.

- Be sure to use specified torque for tightening.
- Clamp wiring and breather hose securely.
- Clamp shift lever boot securely.
- Fill specified gear oil by specified amount.
- Connect battery and check for function.

UNIT REPAIR

Refer to the same section of UNIT REPAIR MANUAL mentioned in FOREWORD of this manual.

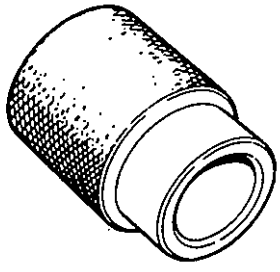
TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
Oil filler/level and drain plugs	23	2.3	17.0
Engine rear mounting bolts	50	5.0	36.5
Universal joint flange bolts	50	5.0	36.5
Speed sensor bolt	6	0.6	4.5

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Oil seal lips and O-rings. • Splines of propeller shaft. • Select return system. • Shift control lever.
Thread lock cement	THREAD LOCK CEMENT SUPER 1333B (99000-32020)	• Control lever locating bolts.

SPECIAL TOOL



09940-53111
Bearing installer

SECTION 7E

DIFFERENTIAL (FRONT)

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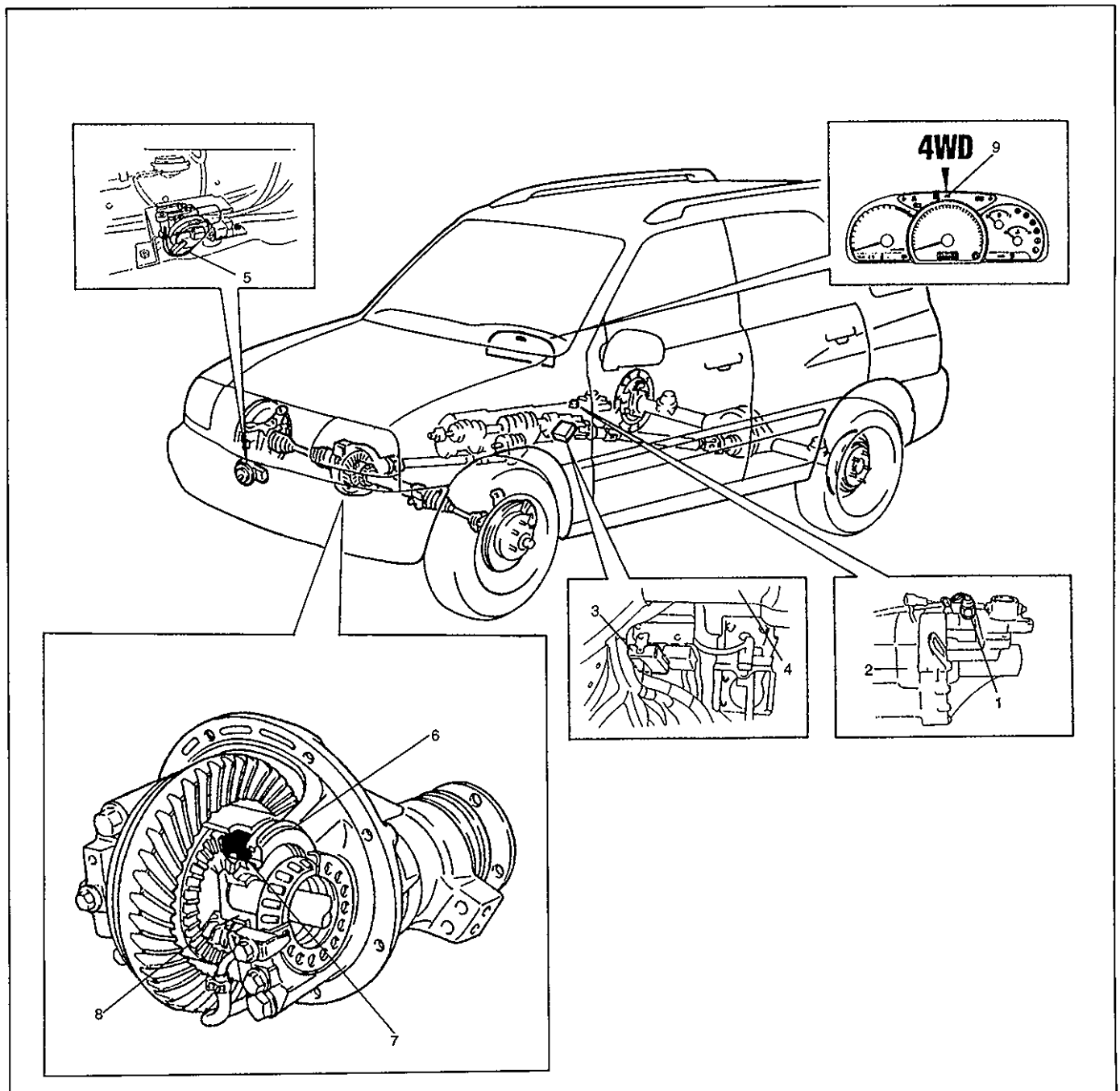
GENERAL DESCRIPTION

The differential assembly using a hypoid bevel pinion and gear is installed to the front axle.
4WD control system (if equipped) controls drive force to be transmitted to front axles or not. The reduction ratio for the manual transmission model is different from that for the automatic transmission model.

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.

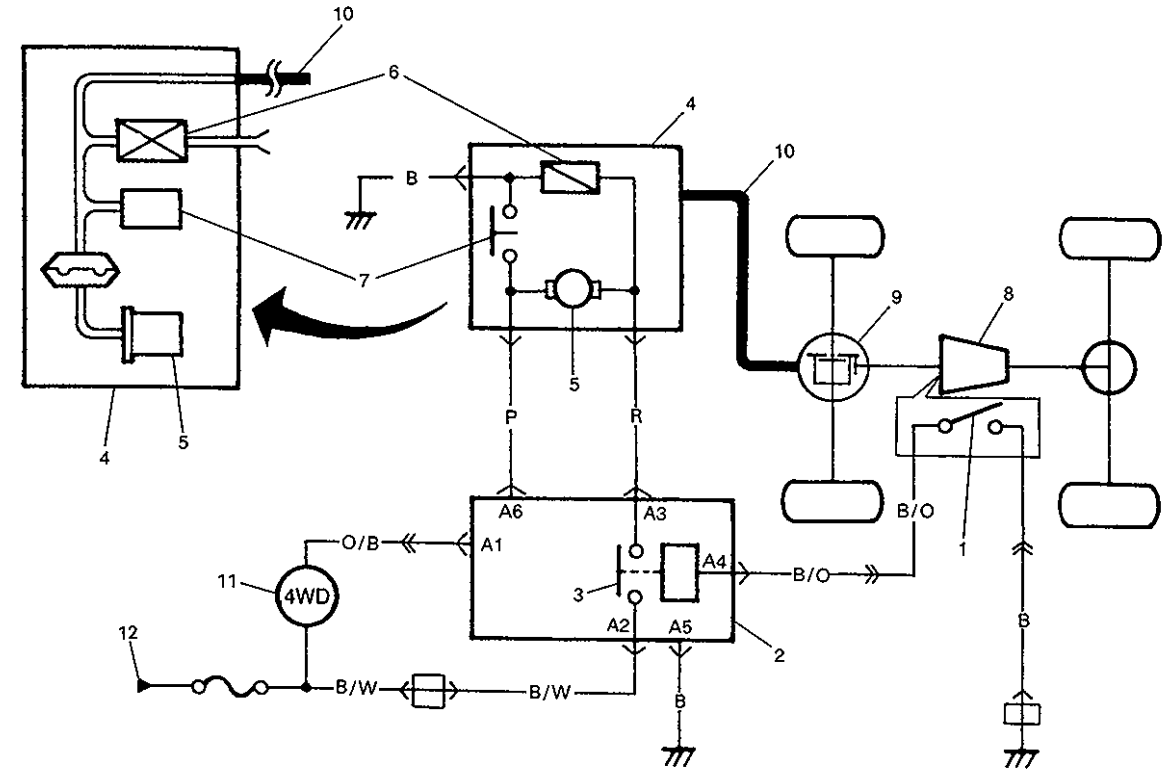
4WD CONTROL SYSTEM

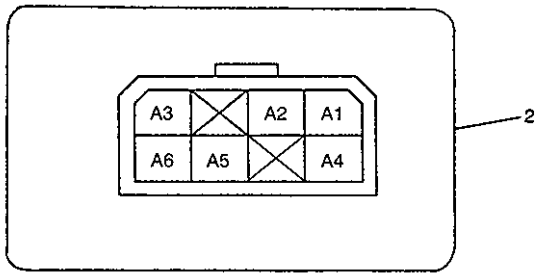
When the 4WD switch is turned ON by shifting the transfer shift lever, the 4WD controller actuates (energizes) the air pump assembly. Then positive pressure is sent from the air pump assembly to the actuator installed to the differential case and causes the axle lock clutch and the free axle hub in the differential case to be engaged, resulting in the 4WD mode. Only when running in the 4WD mode, front axles are joined to differential case, and they become free when 2WD mode is used (or when transfer shift lever is shifted to N position) there by reducing the power loss.

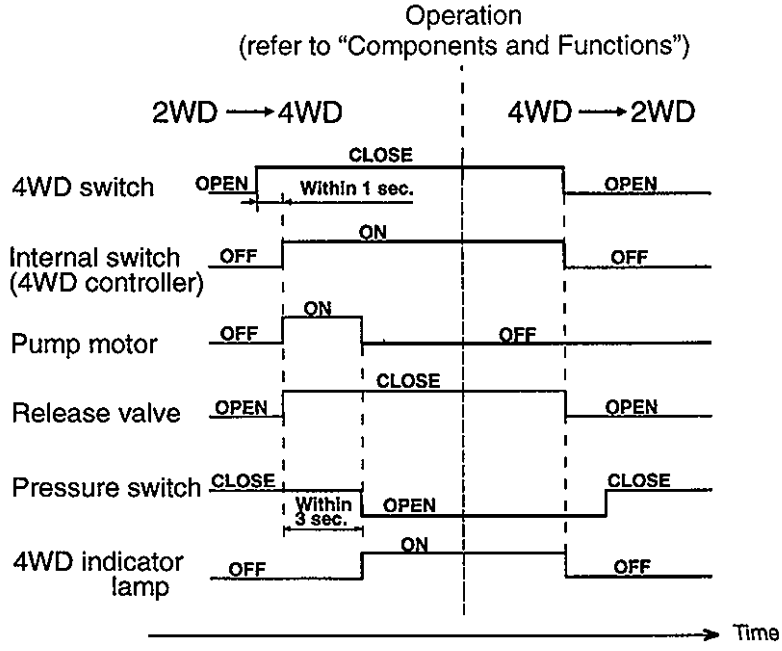


1. 4WD switch
2. Transfer
3. 4WD controller
4. Steering support member
5. Air pump assembly
6. Actuator
7. Axle lock clutch
8. Free axle hub
9. 4WD indicator lamp

System Circuit and Operation







1. 4WD switch
2. 4WD controller
3. Internal switch
4. Air pump assembly
5. Pump motor
6. Release valve
7. Pressure switch
8. Transfer
9. Front differential
10. Air hose and pipe
11. 4WD indicator lamp
12. To ignition switch

Components and Functions

Component	Function
4WD switch	When the transfer shift lever is shifted to 4L or 4H position, this switch turns ON and causes the 4WD control system to turn ON, unless it is shifted to N or 2H within 1 second.
4WD controller	When the 4WD switch turns ON [unless it turns OFF within 1 second], the 4WD controller actuates the pump assembly. If the pressure in the air pump assembly fails to increase higher than the set level even after the pump motor has run more than 10 seconds, the 4WD controller stops the motor to protect it.
Air pump assembly ● Pump motor ● Release valve ● Pressure switch	The air pump assembly consists of a pump motor, release valve and a pressure switch. Pump motor: Produces positive pressure which actuates the actuator. Release valve: Closes when transfer shift lever is shifted to 4H or 4L so that the positive pressure is applied to the actuator, and opens when N or 2H to release the pressure to the atmosphere. Pressure switch: Turns ON and OFF depending on the pressure level in the pump assembly (whether higher or lower than the set pressure level). The 4WD controller detects the pressure level through this switch.
Differential case assembly ● Free axle hub ● Axle lock clutch ● Actuator	The free axle hub, axle lock clutch and actuator are installed in the differential left case. The positive pressure produced in the pump assembly is applied to the actuator which then pushes the axle lock clutch to be engaged with the free axle hub. In this state, the drive force is transmitted to the front axle, resulting in the 4WD mode. When the actuator is free from the positive pressure [when it is under the atmospheric pressure], the axle lock clutch is pushed back by the return spring force and cannot be engaged with the free axle hub, resulting in the 2WD mode.
"4WD" indicator lamp	It lights up when 4WD control system is in the 4WD mode.

DIAGNOSIS

DIAGNOSIS TABLE

Differential Assembly

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
	• 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 diff. side bearing(s) or axle bearing(s)	Replace
Oil leakage	• Worn or damaged oil seal	Replace
	• Excessive oil	Adjust oil level
	• Loose differential carrier bolts	Replace or retighten
2WD/4WD switching error	• Defective actuator	Replace
	• Abnormality in 4WD control system	Inspect referring to "4WD CONTROL SYSTEM DIAGNOSTIC FLOW TABLE".

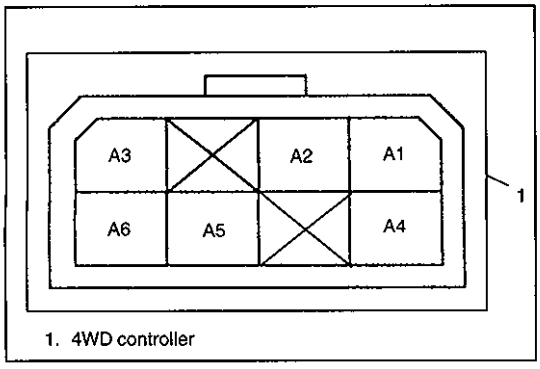
4WD Control System Diagnostic Flow Table

Before performing the trouble diagnosis, check that the transfer and front differential are in good condition and there is no air leakage from air hoses and the actuator. Refer to "ON-VEHICLE SERVICE" in this section for air leakage.

[NOTES ON SYSTEM CIRCUIT INSPECTION]

- Be sure to read "Precautions for Electrical Circuit Service" in Section 0A before circuit inspection and observe what is written there.
- For system circuit, refer to the figure of "GENERAL DESCRIPTION" in this section.

STEP	ACTION	YES	NO
1	Check ground circuit. 1) Disconnect coupler from 4WD controller with ignition switch OFF. 2) Check for proper connection to 4WD controller at all terminals. 3) If OK, check continuity between A5 terminal and body ground. Is there continuity between A5 terminal and body ground?	Go to Step 2.	"B" wire is open.
2	Check power circuit. 1) Disconnect coupler from 4WD controller. 2) Turn ignition switch ON. 3) Check voltage between A2 terminal and ground. Is it 10 – 14 V?	Go to Step 3.	"B/W" circuit is open or short.
3	Check 4WD switch circuit. 1) Connect coupler to 4WD controller. 2) Turn ignition switch ON and check voltage between A4 terminal and ground. Transfer lever is in N or 2H: about 6.8 V Transfer lever is in 4L or 4H: about 0 V Is check result satisfactory?	Go to Step 4.	Check 4WD switch (refer to SECTION 7A), "B/O" and "B" circuits of 4WD switch. If OK, substitute a known-good 4WD controller and recheck.
4	Check 4WD controller. 1) Turn ignition switch ON. 2) Check voltage between A3 terminal and ground. Is it about 0 V when transfer lever is in 2H or N range and 10 – 14 V within 1 second after it is shifted to 4H or 4L range?	Go to Step 5.	Substitute a known-good 4WD controller and recheck.
5	Check 4WD controller. 1) Check for proper connection to air pump assembly at all terminals. 2) Turn ignition switch ON. 3) Check voltage between A6 terminal and ground. Is it about 0 V when transfer lever is in 2H or N range and 10 – 14 V within 4 seconds after it is shifted to 4H or 4L range?	Go to Step 6.	Check air pump assembly referring to "ON-VEHICLE SERVICE", and then "P" circuit. If OK, substitute a known-good 4WD controller and recheck.
6	Check 4WD indicator lamp circuit. 1) Turn ignition switch ON. 2) Check voltage between A1 terminal and ground. Is it 10 – 14 V when transfer lever is in 2H or N range and about 0 V within 4 seconds after it is shifted to 4H or 4L range?	Substitute a known-good 4WD controller and recheck.	Check "O/B" circuit (including indicator lamp and combination meter). If OK, substitute a known-good 4WD controller and recheck.



1. 4WD controller

4WD CONTROLLER AND ITS CIRCUIT INSPECTION

Voltage Check

Check for input or output voltage of 4WD controller (voltage between each circuit and body ground) with 4WD controller connector connected and ignition switch turned ON.

TERMINAL	CIRCUIT	WIRE COLOR	NORMAL VOLTAGE	CONDITION
A1	4WD Indicator lamp	O/B	10 – 14 V	Transfer shift lever: 2H or N
			about 0 V	4 seconds after transfer shift lever shifted to 4H or 4L
A2	Ignition switch	B/W	10 – 14 V	Ignition switch: ON
A3	Air pump assembly (Pump motor and release valve)	R	about 0 V	Transfer shift lever: 2H or N
			10 – 14 V	1 seconds after transfer shift lever shifted to 4H or 4L
A4	4WD switch	B/O	about 6.8 V	Transfer shift lever: 2H or N
			about 0 V	Transfer shift lever: 4H or 4L
A5	Ground	B	about 0 V	–
A6	Air pump assembly (pressure switch)	P	about 0 V	Transfer shift lever: 2H or N
			10 – 14 V	4 seconds after transfer shift lever shifted to 4H or 4L

ON-VEHICLE SERVICE

MAINTENANCE SERVICE

NOTE:

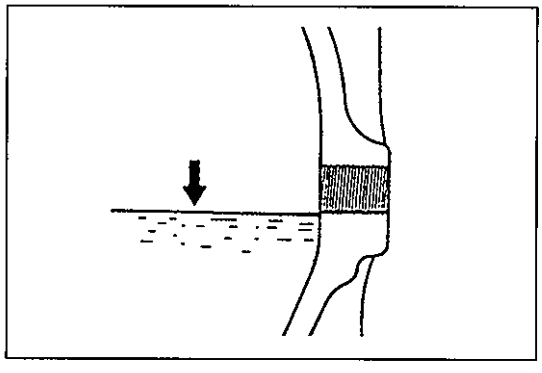
- **When having driven through water, check immediately if water has entered (if so, oil is cloudy). Water mixed oil must be changed at once.**
- **Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage and status of breather hoses.**

Gear Oil Change

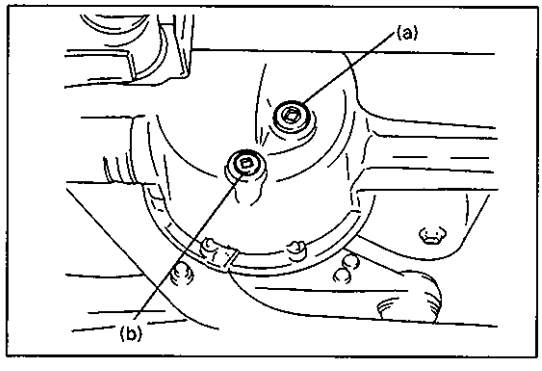
NOTE:

- **Hypoid gear oil must be used for differential.**
- **It is highly recommended to use SAE 80W – 90 viscosity.**

1) Before oil change or inspection, be sure to stop engine and lift up vehicle horizontally.



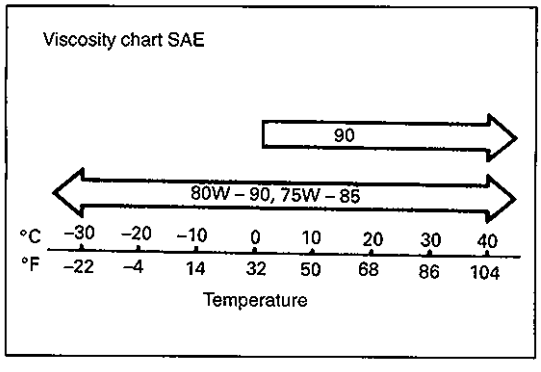
2) Check oil level and existence of leakage. If leakage is found, correct its cause.
3) Drain old oil and pour proper amount of gear oil as specified below (roughly up to level hole).



4) Apply sealant to thread of drain and level/filler plugs (a) and (b) and torque plugs to specification.

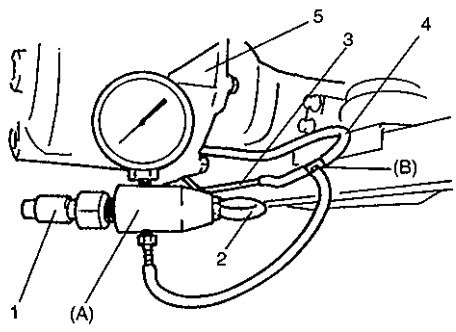
Sealant 99000-31110

Tightening Torque
(a): 40 N·m (4.0 kg-m, 29.0 lb-ft)
(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)



Specified gear oil: Hypoid gear oil API GL-5
SAE 75W – 85, 90 or 80W – 90
For oil viscosity, refer to left chart.

Oil capacity: 1.0 liters (2.1/1.8 US/Imp. pt)



1. Plugged hose
2. Adjusting screw
3. Pipe (to air pump assembly)
4. Hose (to differential carrier)
5. Differential housing

INSPECTION

4WD Control System

1) Install special tool to air hose connecting between air pump assembly and differential (actuator) as shown in figure. Tighten adjusting screw of special tool as far as it stops. Close air check side opening by using fuel hose as blind plug.

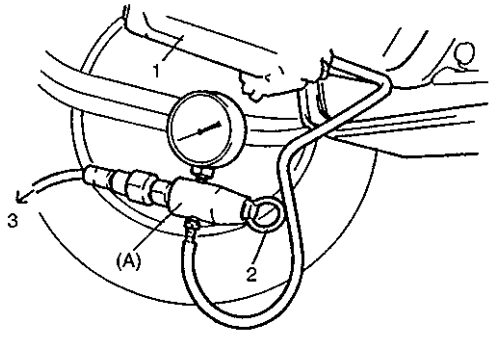
   Special Tool
   (A): 09918-18110
   (B): 09367-04002

   NOTE:
   Use care not to bend any part of hose.

2) Turn ON ignition switch and shift transfer lever from 2H to 4H range.
3) Check that motor starts running (a sound can be heard) within 1 second and it stops when gauge of special tool indicates specified pressure value.
   Check also for air leakage.

   Pressure specification:
   38.0 – 58.0 kPa (0.38 – 0.58 kg/cm^2, 5.40 – 8.25 psi)

4) Check that pressure value indicated on gauge of special tool drops as soon as transfer lever is shifted to 2H position.
5) Start motor by shifting transfer lever to 4H position again.Loosen adjusting screw to lower pressure value on gauge. Motor should start to run again and stop in about 4 seconds.
6) With the adjusting screw of special tool loosened, shift transfer shift lever to N or 2H position and then 4L or 4H position.
   Pump motor should stop about 10 seconds after motor starts to run.



1. Differential housing
2. Adjusting screw
3. To air compressor

Actuator

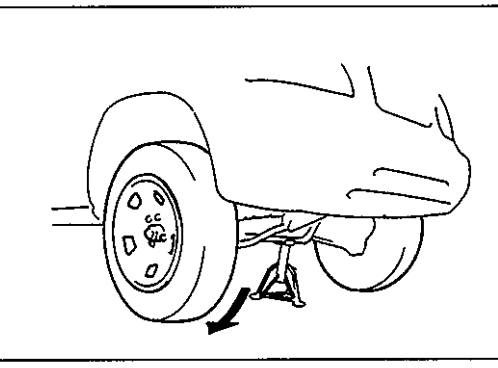
1) Disconnect air hose from pump assembly and install special tool to air hose as shown in figure. Loosen adjusting screw of special tool.

Special Tool
(A): 09918-18110

2) Connect compressor air hose to special tool.
Blow air and turn adjusting screw to obtain specified pressure.

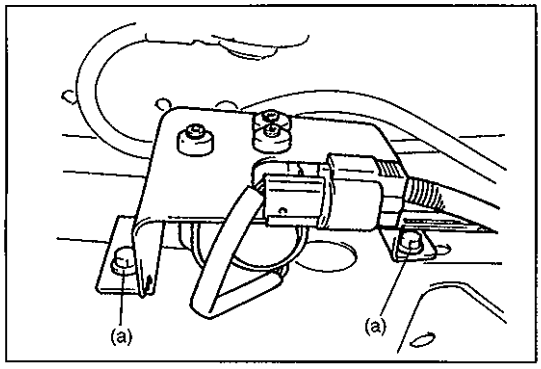
Specified pressure: 38.0 kPa (0.38 kg/cm^2, 5.40 psi)

CAUTION:
Do not apply a pressure exceeding 200 kPa (2.0 kg/cm^2, 28.4 psi) which may cause damage to diaphragm.



3) With the vehicle lifted so that both of the front wheels are off the ground, turn one of the front wheels by hand and check the other wheel, which should act as described below.
- When actuator is working (when applying pressure):
  The other front wheel should turn in the direction opposite to the tire being turned by hand.
- When actuator is not working (when not applying pressure):
  The other front wheel should remain stationary while the tire pushed by hand is turning.

If the result is not satisfactory, inspect differential assembly. Refer to "INSPECTON" of SECTION 7E in UNIT REPAIR MANUAL.

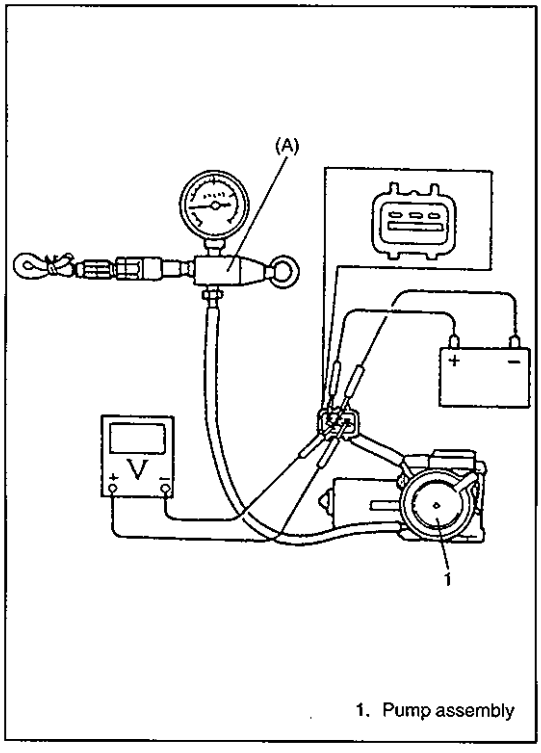


Pump Assembly

Removal/Installation

1) Disconnect air hoses and coupler from air pump assembly.
2) Remove pump assembly by removing bolts.
3) Reverse removal procedure for installation.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)



1. Pump assembly

Inspection

1) Install special tool, voltmeter and battery to pump assembly as shown in figure.
2) Tighten adjusting screw of special tool as far as it stops and close its air check side opening by using fuel hose as blind plug.

Special Tool
(A): 09918-18110

3) Check that motor starts to run (a sound can be heard) when battery is connected and it stops when specified pressure is obtained.
   Check also for air leakage.

Specified pressure: 38.0 – 58.0 kPa
(0.38 – 0.58 kg/cm^2, 5.40 – 8.25 psi)

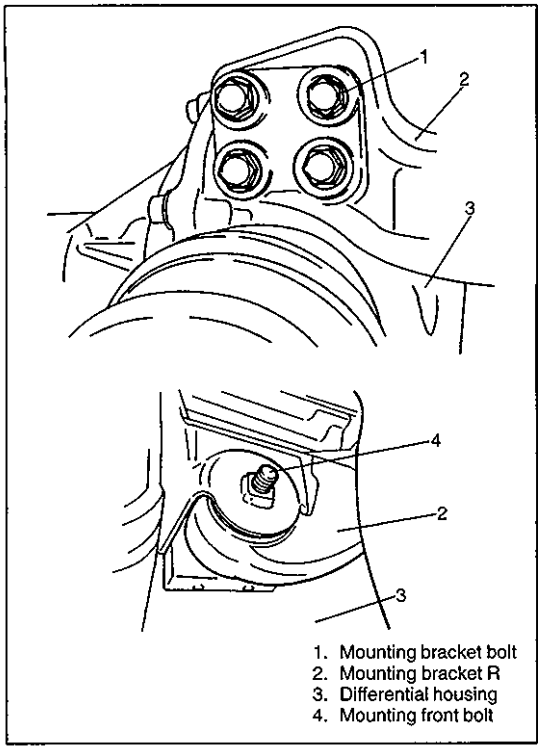
4) Check that value indicated on voltmeter is within specification shown below.

When motor is running: About 0 V
When motor has stopped running: 10 – 14 V

REMOVAL AND INSTALLATION

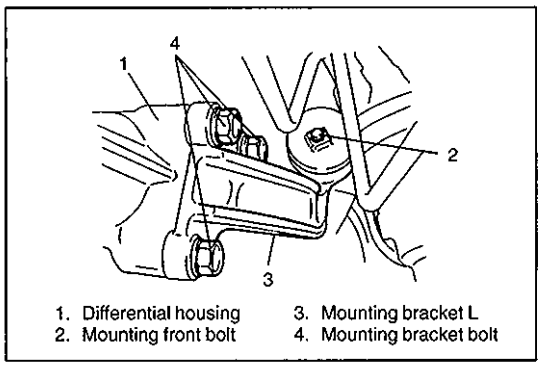
Differential Mountings

1) Lift up vehicle and turn steering wheel all way to the right.
2) Separate mounting bracket R from differential housing by removing bolts from its lower part.
3) Remove mounting bracket R by removing mounting front bolt from its upper part.



1. Mounting bracket bolt
2. Mounting bracket R
3. Differential housing
4. Mounting front bolt

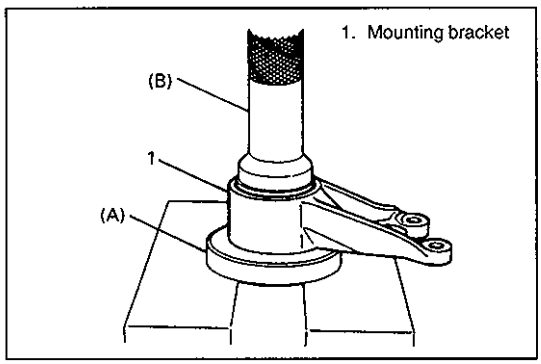
4) Remove mounting bracket L by removing upper and lower fastening bolts.



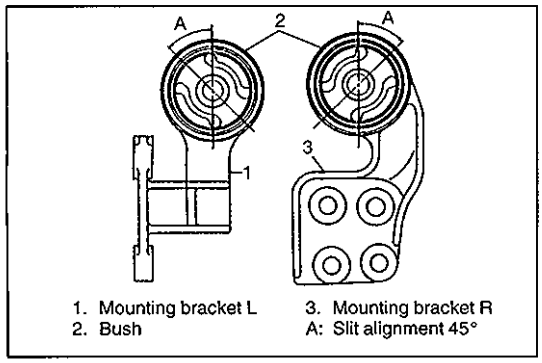
1. Differential housing
2. Mounting front bolt
3. Mounting bracket L
4. Mounting bracket bolt

5) Check conditions of each bush. If it is damaged or deteriorated, drive it out with special tools and press for replacement.

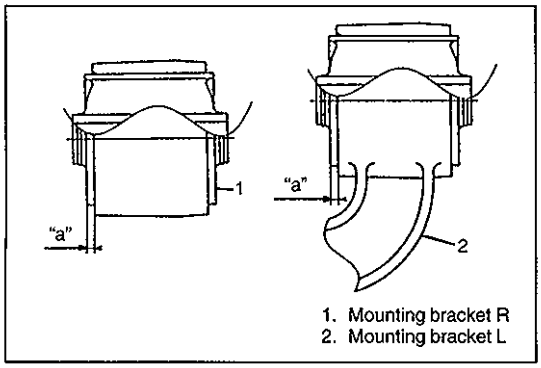
Special Tool
(A): 09951-26010
(B): 09951-16080



6) Position slit in each bush as shown when press-fitting it.



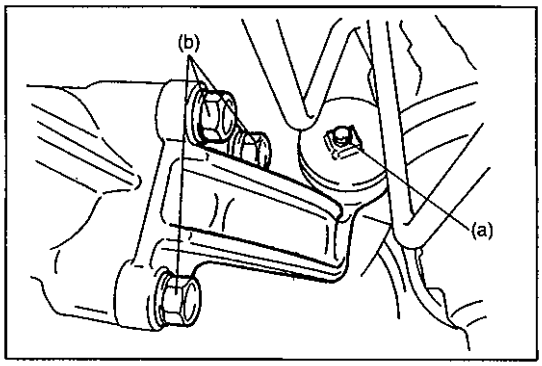
1. Mounting bracket L
2. Bush
3. Mounting bracket R
A: Slit alignment 45°



1. Mounting bracket R
2. Mounting bracket L

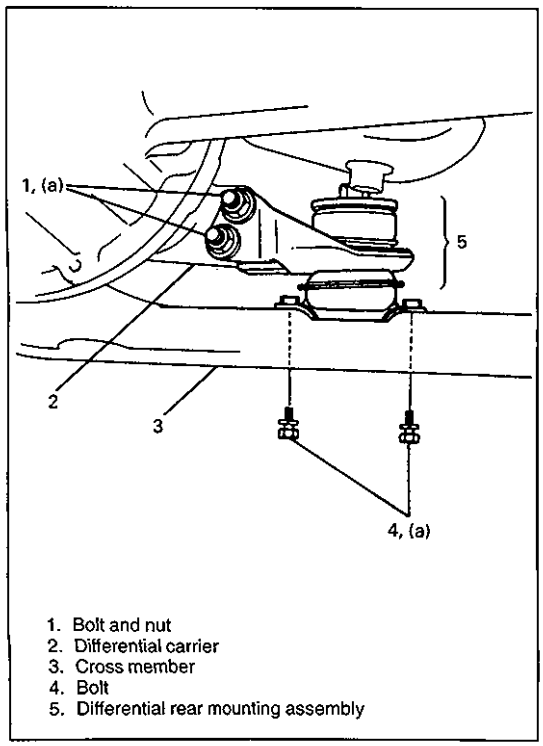
7) Position each bush to bracket as shown.

Length "a": 3.0 mm (0.12 in.)



8) Use following torque for reinstallation.

Tightening Torque
(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)
(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)



1. Bolt and nut
2. Differential carrier
3. Cross member
4. Bolt
5. Differential rear mounting assembly

REAR MOUNTING

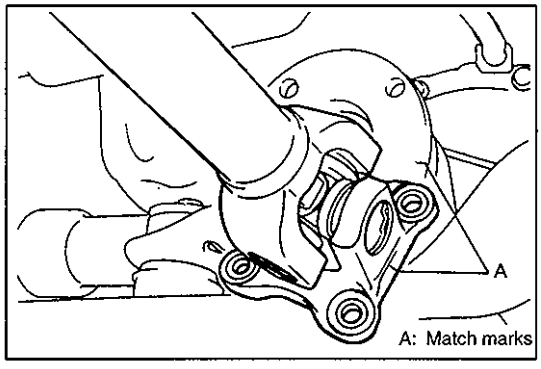
(For front differential carrier)

1) Lift up vehicle and remove mounting assembly by removing 2 bolts and nuts from differential carrier side and 2 bolts from cross member side.
2) Check mounting rubber for damage or deterioration and replace as necessary.
3) Use following torque for reinstallation.

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

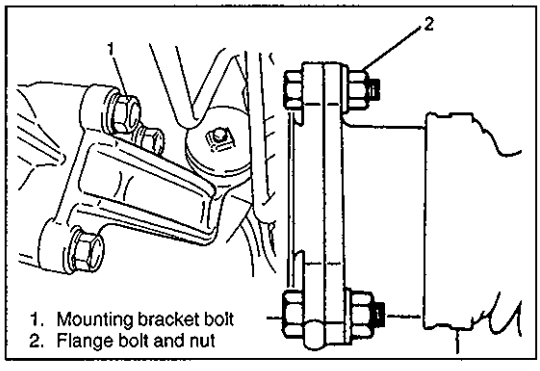
DISMOUNTING

1) Lift up vehicle and drain oil.
2) Disconnect air hose and breather hose from differential housing.

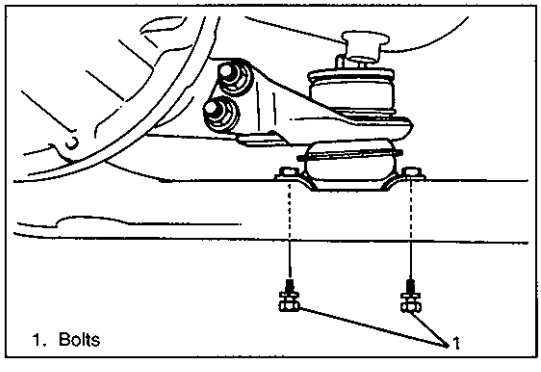


3) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown.
4) Remove propeller shaft flange by removing its 4 bolts and suspend it with cord or the like.

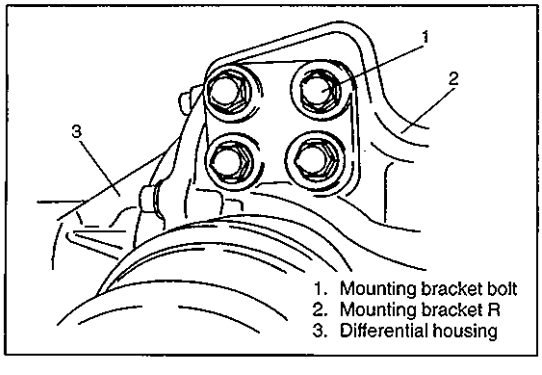
NOTE:
If pull out propeller shaft, transfer oil must be drained before pulling out.



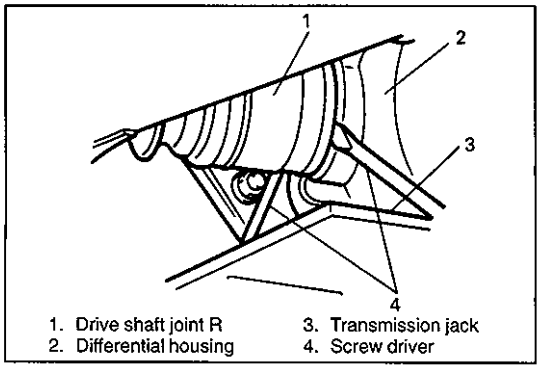
5) Remove 3 bolts for left mounting bracket and 3 bolts for drive shaft flange to set left side of differential free.



6) Remove 2 bolts from cross member to set differential rear mounting free.



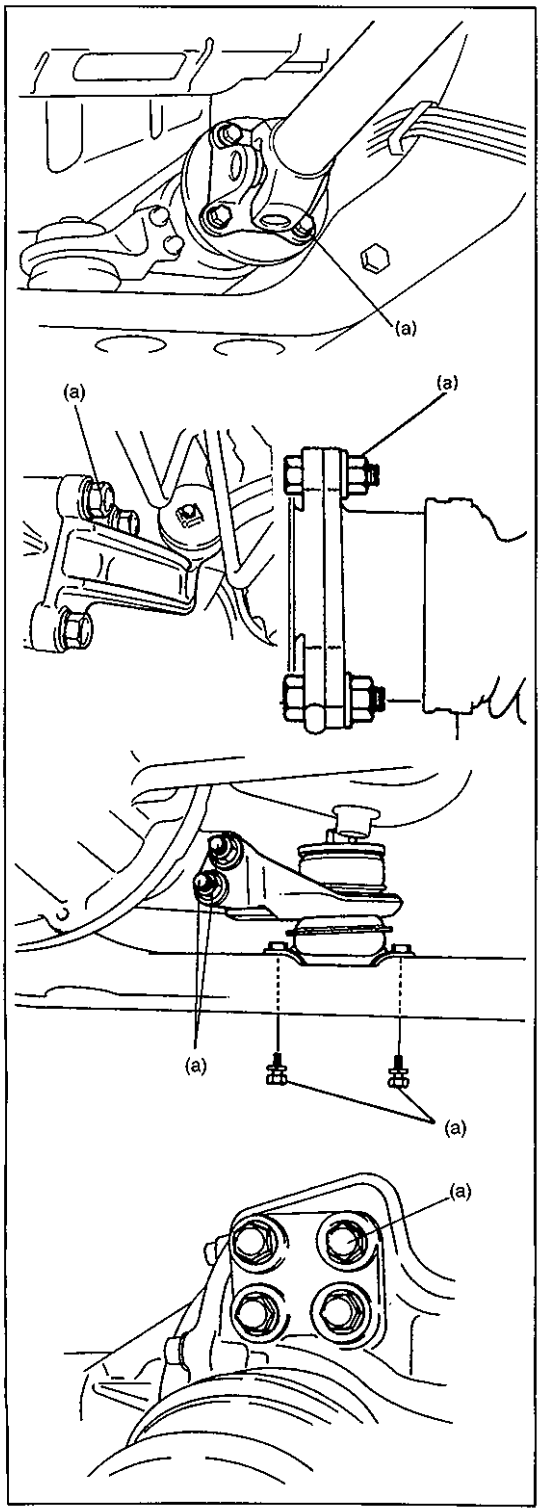
7) With differential housing assembly held with transmission jack, remove mounting bolts on right end of housing.



1. Drive shaft joint R
2. Differential housing
3. Transmission jack
4. Screw driver

8) Using 2 large screwdrivers as levers, pull out right side drive shaft joint from differential and dismount housing assembly from vehicle.

CAUTION:
During above work, use care not to cause damage to drive shaft boot.



REMOUNTING

For remounting, reverse dismounting procedure and use following tightening torque.

Tightening Torque
(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

After tightening all fasteners properly, fill hypoid gear oil as specified and check tightening of plugs with specification.

UNIT REPAIR

Refer to the same section of UNIT REPAIR MANUAL mentioned in FOREWORD of this manual.

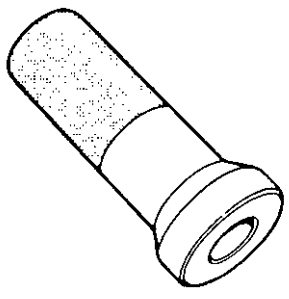
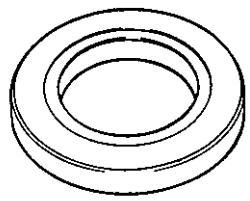
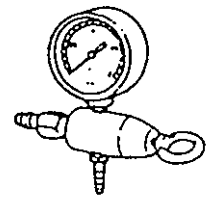
TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening torque		
	N·m	Kg-m	lb-ft
Differential oil filler/level plug	40	4.0	29.0
Differential oil drain plug	25	2.5	18.0
Differential mounting front bolts	85	8.5	61.5
Differential mounting bracket bolts	50	5.0	36.5
Front drive shaft flange bolts	50	5.0	36.5
Propeller shaft flange bolts	50	5.0	36.5
Pump assembly bolts	13	1.3	9.5

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Front differential drain and filler plug

SPECIAL TOOLS

 09951-16080 Bearing installer	 09951-26010 Bush remover plate	 09918-18110 Air pressure regulator 09367-04002 3-way joint

SECTION 7F

DIFFERENTIAL (REAR)

CONTENTS

GENERAL DESCRIPTION 7F-1
DIAGNOSIS 7F-2
ON-VEHICLE SERVICE 7F-3
Maintenance Service 7F-3
Dismounting 7F-4
Remounting 7F-5
UNIT REPAIR 7F-5
TIGHTENING TORQUE SPECIFICATIONS 7F-6
REQUIRED SERVICE MATERIALS 7F-6

GENERAL DESCRIPTION

The differential assembly using a hypoid bevel pinion and gear is installed to the rear axle. It is set in the conventional type axle housing.

The reduction ratio and the differential case for the manual transmission model are different from that for the automatic transmission model.

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.

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 diff. side bearing(s) or axle bearing(s)	Replace
Oil leakage	• Clogged breather plug	Clean
	• Worn or damaged oil seal	Replace
	• Excessive oil	Adjust oil level

ON-VEHICLE SERVICE

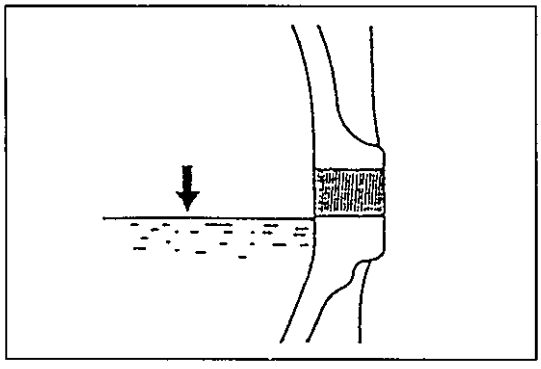
MAINTENANCE SERVICE

NOTE:
- **When having driven through water, check immediately if water has entered (if so, oil is cloudy). Water mixed oil must be changed at once.**
- **Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage and status of breather hoses.**

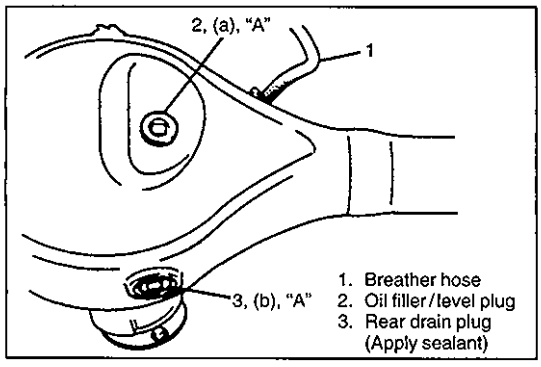
CHANGING OIL

NOTE:
- **Hypoid gear oil must be used for differential.**
- **It is highly recommended to use SAE 80W-90 viscosity.**

1) Before oil change or inspection, be sure to stop engine and lift up vehicle horizontally.



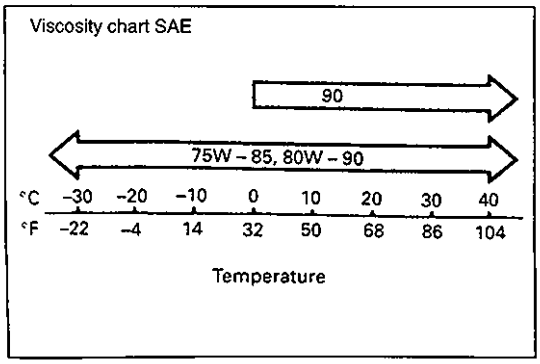
2) Check oil level and existence of leakage. If leakage is found, correct its cause.
3) Drain old oil and pour proper amount of gear oil as specified (roughly up to level hole).



4) Torque drain and level/filler plugs to specification.

"A": Sealant 99000-31110

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)

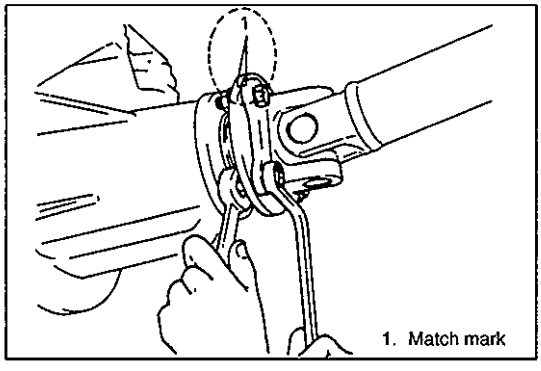


Specified gear oil: Hypoid gear oil API GL-5
SAE 75W-85, 80W-90 or 90
For oil viscosity, refer to the chart at the left.

Oil capacity : 2.2 liters (4.6/3.9 US/Imp. pt.)

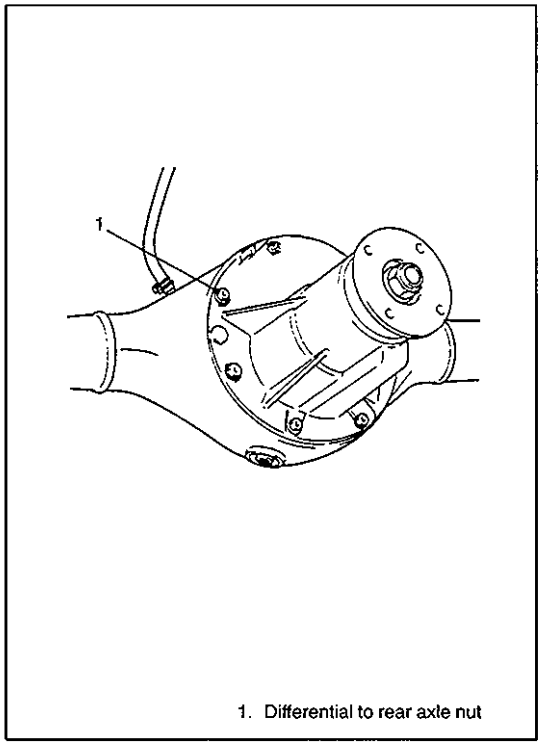
DISMOUNTING

1) Lift up vehicle and drain oil from rear differential housing.
2) Remove rear brake drums and pull out right and left rear axle shafts. (Refer to rear axle shaft removal of SECTION 3E.)



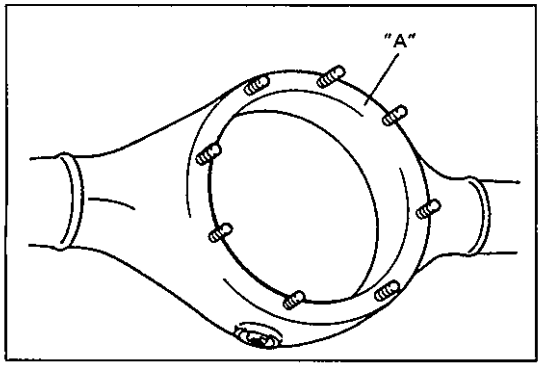
1. Match mark

3) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown.
4) Remove propeller shaft by removing its 4 flange bolts and nuts.



1. Differential to rear axle nut

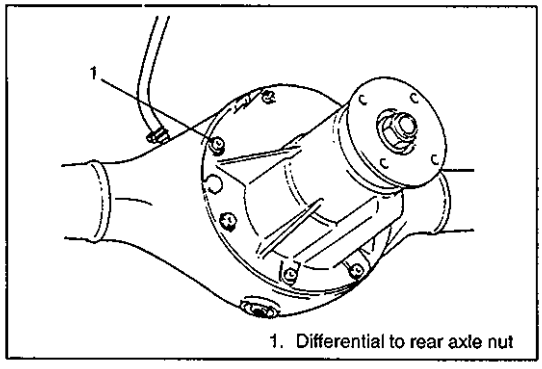
5) Remove differential assembly by removing its 8 fastening nuts.



REMOUNTING

1) Clean mating surfaces of rear axle and differential assembly and apply sealant (Suzuki bond 1215) to axle side evenly.

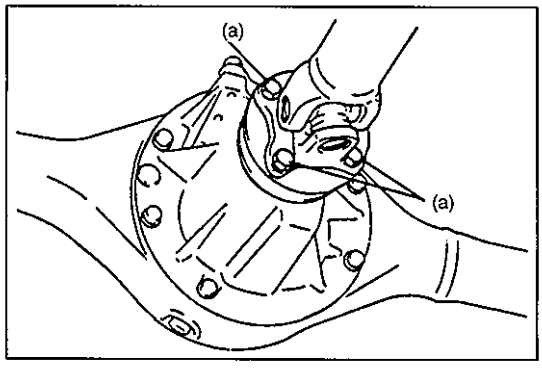
   "A": Sealant 99000-31110



1. Differential to rear axle nut

2) Install differential assembly to axle and fix it with nuts tightened to specified torque.

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



3) Install propeller shaft to joint flange aligning match marks and torque flange bolts to specification.

   Tightening Torque
   (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

4) Install right and left rear axle shafts and drums.
   (Refer to rear axle installation of SECTION 3E and rear brake drum installation of SECTION 5.)
5) Install wheels.
6) Fill hypoid gear oil as specified and tighten plug to specification. Lower lift.

UNIT REPAIR

Refer to the same section of UNIT REPAIR MANUAL mentioned in Foreword of this manual.

TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
Differential oil filler/level plug	50	5.0	36.5
Differential oil drain plug	28	2.8	20.5
Propeller shaft flange bolts	50	5.0	36.5
Differential carrier nuts	55	5.5	40.0

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	● Rear differential oil drain and level/ filler plugs ● Mating surface of differential housing ● Mating surface of rear axle housing

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).**

WIRING SYSTEM
(Harnesses, Connectors, Fuses, Relay, Switches, Grounds, System Circuit Diagram) ..... Section 8A
LIGHTING SYSTEM ..... Section 8B
INSTRUMENTATION AND DRIVER INFORMATION ..... Section 8C
WINDOWS, MIRRORS, SECURITY AND LOCKS ..... Section 8D
IMMOBILIZER CONTROL SYSTEM ..... Section 8F

CONTENTS

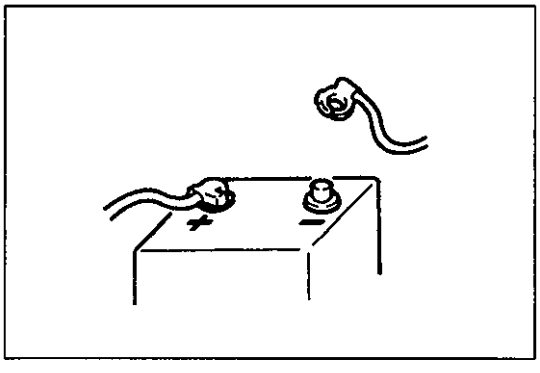
GENERAL DESCRIPTION 8-2
Cautions in Servicing 8-2
Symbols and Marks 8-4
Abbreviations 8-4
Wiring Color Symbols 8-5
Joint Connector 8-5
Fuse Box and Relay 8-5
Power Supply Diagram 8-6

GENERAL DESCRIPTION

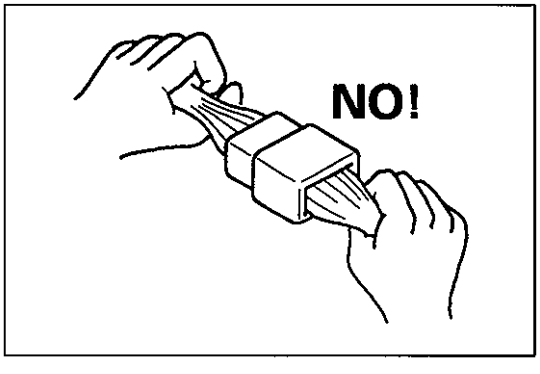
The body electrical components of this vehicle are designed to operate on 12 Volts power supplied by the battery. The electrical system utilizes negative ground polarity.

CAUTIONS IN SERVICING

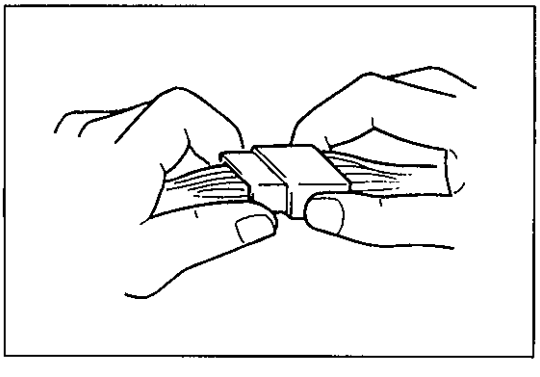
When performing works related to electric systems, observe following cautions for the purpose of protection of electrical parts and prevention of a fire from occurrence.



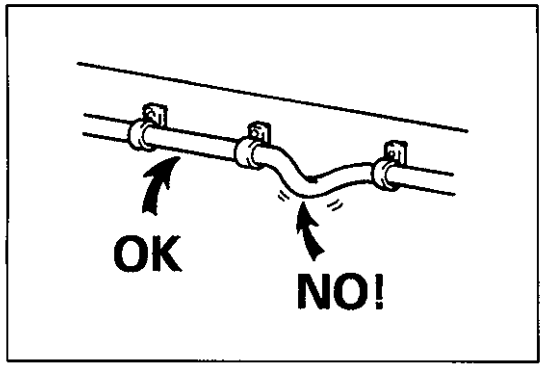
- When removing the battery from the vehicle or disconnecting the cable from the battery terminals for inspection or service works on the electric systems, always confirm first that the ignition switch and all the other switches have been turned OFF. Otherwise, the semi-conductor part may be damaged.
- When disconnecting cables from the battery, be sure to disconnect the one from the negative (–) terminal first and then the other from the positive (+) terminal.
- Reverse the above order when connecting the cables to the battery terminals.



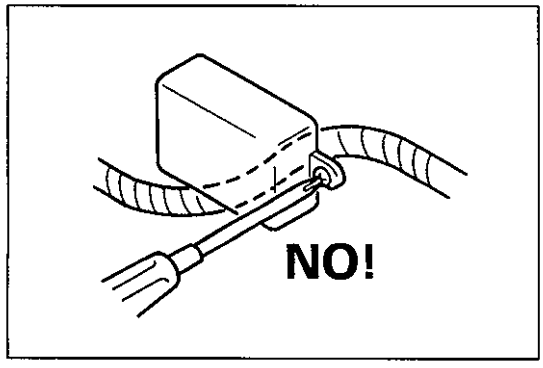
- When disconnecting connectors, never pull the wiring harnesses. Unlock the connector lock first and then pull them apart by holding connectors themselves.



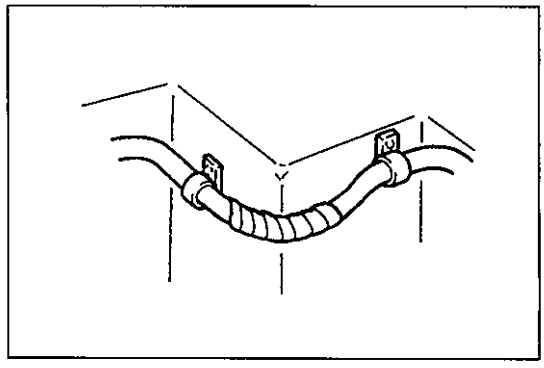
- When connecting connectors, also hold connectors and put them together until they lock securely (a click is heard).



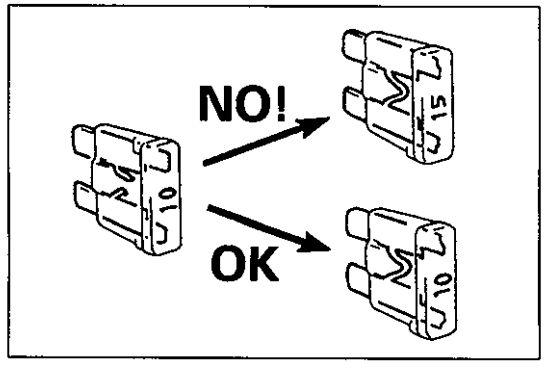
- When installing the wiring harness, fix it with clamps so that no slack is left.



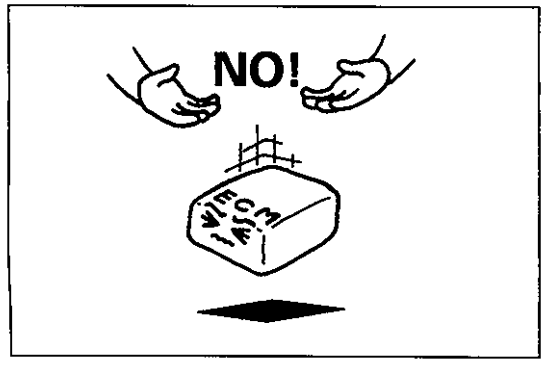
- When installing vehicle parts, be careful so that the wiring harness is not interfered with or caught by any other part.



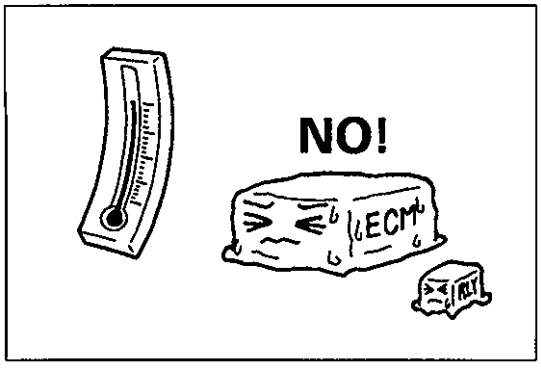
- To avoid damage to the harness, protect its part which may contact against a part forming a sharp angle by winding tape or the like around it.



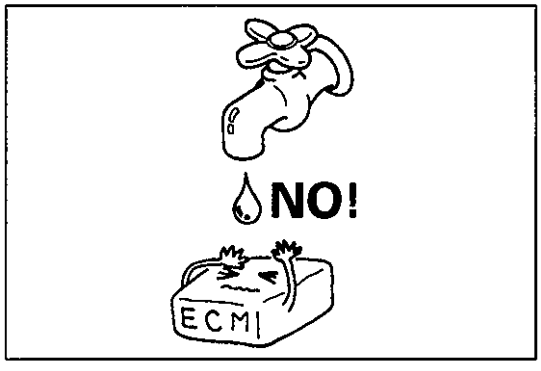
- When replacing a fuse, make sure to use a fuse of the specified capacity. Use of a fuse with a larger capacity will cause a damage to the electrical parts and a fire.



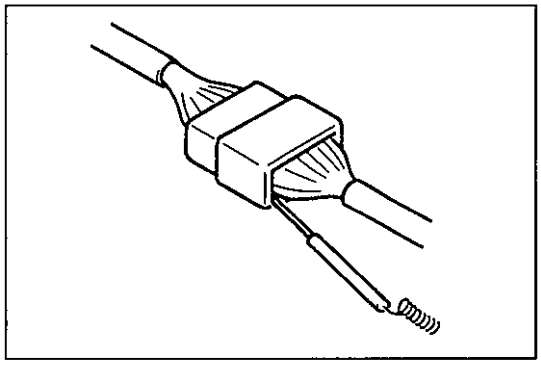
- Always be careful not to handle electrical parts (computer, relay, etc.) in a rough manner or drop them.



- 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.



- When using a tester for checking continuity or measuring voltage, be sure to insert the tester probe from the wire harness side.

SYMBOLS AND MARKS

Refer to Section 8A.

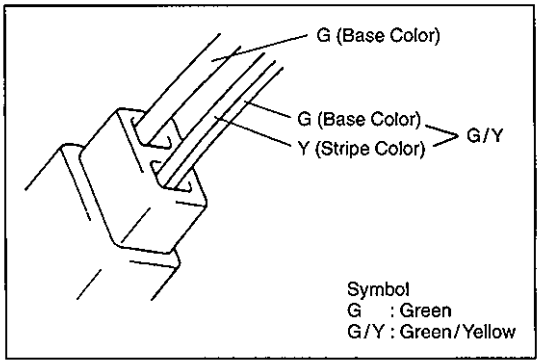
ABBREVIATIONS

Refer to Section 8A.

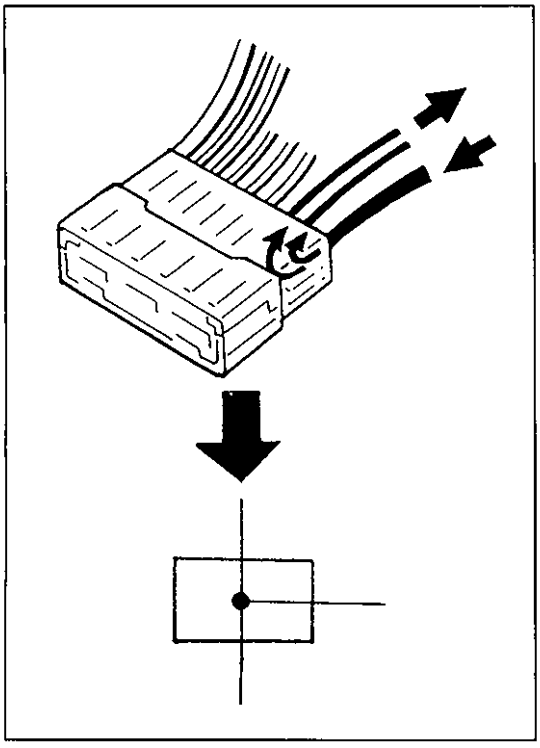
Symbol	Wire Color	Symbol	Wire Color
B	Black	O	Orange
Bl	Blue	R	Red
Br	Brown	W	White
G	Green	Y	Yellow
Gr	Gray	P	Pink
Lbl	Light blue	V	Violet
Lg	Light green		

WIRE COLOR SYMBOLS

The wire color is abbreviated to the first (or first two) alphabet(s) of each color.



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 symbol (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).



JOINT CONNECTOR (J/C)

- Wiring of this vehicle employs joint connector (J/C) which divide one wire into several different wires or combine several different wires into one wire.
- The joint connector is as shown in the figure.

FUSE BOX AND RELAY

Refer to Section 8A.

POWER SUPPLY DIAGRAM

Refer to Section 8A.

SECTION 8B

LIGHTING 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).**

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GENERAL DESCRIPTION

CAUTIONS IN SERVICING

Refer to Section 8.

SYMBOLS AND MARKS

Refer to Section 8.

WIRING COLOR SYMBOLS

Refer to Section 8.

ABBREVIATIONS

Refer to Section 8.

JOINT CONNECTOR

Refer to Section 8.

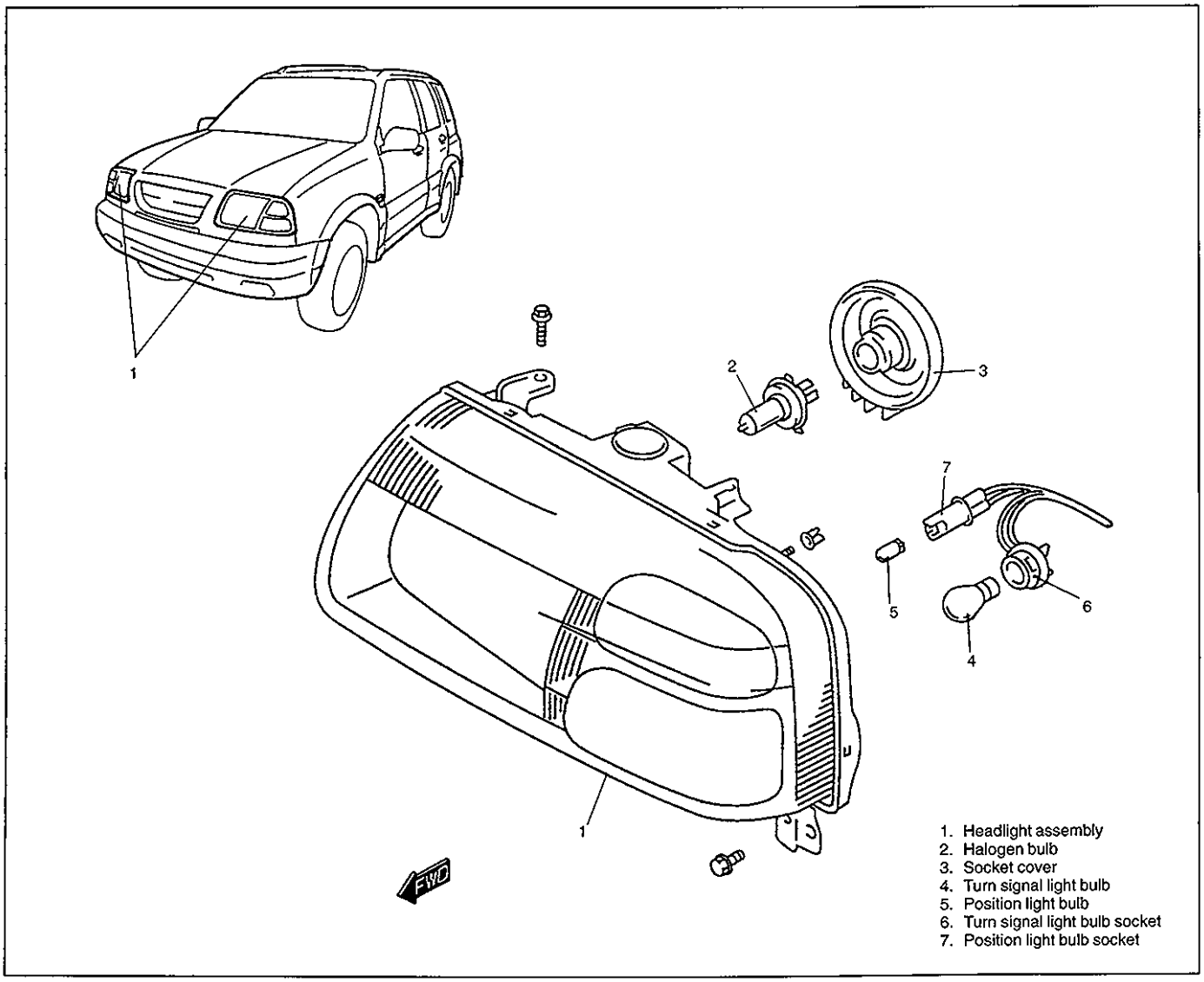
FUSE BOX AND RELAY

Refer to Section 8.

POWER SUPPLY DIAGRAM

Refer to Section 8.

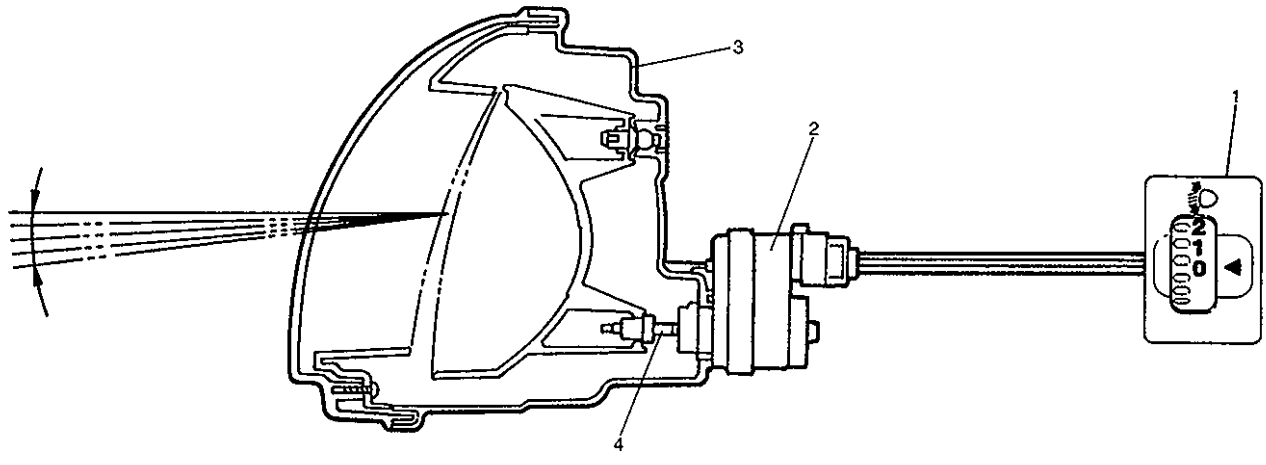
HEADLIGHTS



1. Headlight assembly
2. Halogen bulb
3. Socket cover
4. Turn signal light bulb
5. Position light bulb
6. Turn signal light bulb socket
7. Position light bulb socket

HEADLIGHT WITH LEVELING SYSTEM (IF EQUIPPED)

1. Headlight leveling switch
2. Headlight leveling unit (actuator)
3. Headlight
4. Headlight leveling unit shaft



Switch Position	Headlight beam down angle
0	———
1	0.624°
2	1.243°
3	1.867°
4	2.479°

DIAGNOSIS

HEADLIGHTS

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 switch faulty • Defective light relay • Wiring or grounding faulty	Replace main fuse and/or fuses to check for short Check switches Replace light relay Repair as necessary
Only one beam ("Hi" or "Lo") does not light	• Bulb burnt out • Lighting or dimmer switch faulty	Replace bulb Check switch

HEADLIGHTS WITH LEVELING SYSTEM (IF EQUIPPED)

Trouble	Possible cause	Correction
Both headlights do not move	• Fuse blown • Leveling switch faulty • Supply voltage too low	Check circuit and replace fuse Check switch or replace it as necessary Recharge or replace battery
One of headlights (either Right or Left) does not move	• Socket, wiring or grounding faulty • Actuator faulty • Vehicle body around headlight deformed • Headlight ass'y itself deformed	Repair as necessary Replace actuator Repair body Replace headlight ass'y

TURN SIGNAL AND HAZARD WARNING LIGHTS

Trouble	Possible cause	Correction
Flash rate high or one side only flashes	• Faulty ground • Incorrect bulb • One of light bulbs burnt out • Turn signal/hazard warning relay faulty • Open circuit or high resistance existing between turn signal/hazard warning switch and lights on one side	Repair Replace Replace Replace Repair
No flashing	• Blown fuse on turn signal/hazard warning circuit • Open circuit or high resistance existing between battery and switch • Relay faulty • Switch faulty	Replace Repair Replace Replace
Flash rate low	• Supply voltage too low • Relay faulty	Recharge battery Repair

CLEARANCE, TAIL AND LICENCE PLATE LIGHTS

Trouble	Possible cause	Correction
All lights do not light	• Main fuse and/or fuses blown • Lighting switch faulty • Wiring or grounding faulty	Replace fuses to check for short Check switch Repair as necessary
One of lights does not light	• Bulb burnt out • Wiring or grounding faulty	Replace Repair as necessary

BACK-UP LIGHTS

Trouble	Possible cause	Correction
Back-up lights do not light	• Fuse blown • Bulb burnt out • Back-up light switch or shift switch faulty • Wiring or grounding faulty	Replace fuse to check for short Replace Check switch Repair as necessary
Back-up lights remains ON	• Back-up light switch or shift switch faulty • Wiring or grounding faulty	Check switch Repair as necessary

BRAKE LIGHTS

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
Only one light does not light	• Bulb burnt out • Wiring or grounding faulty	Replace Repair as necessary

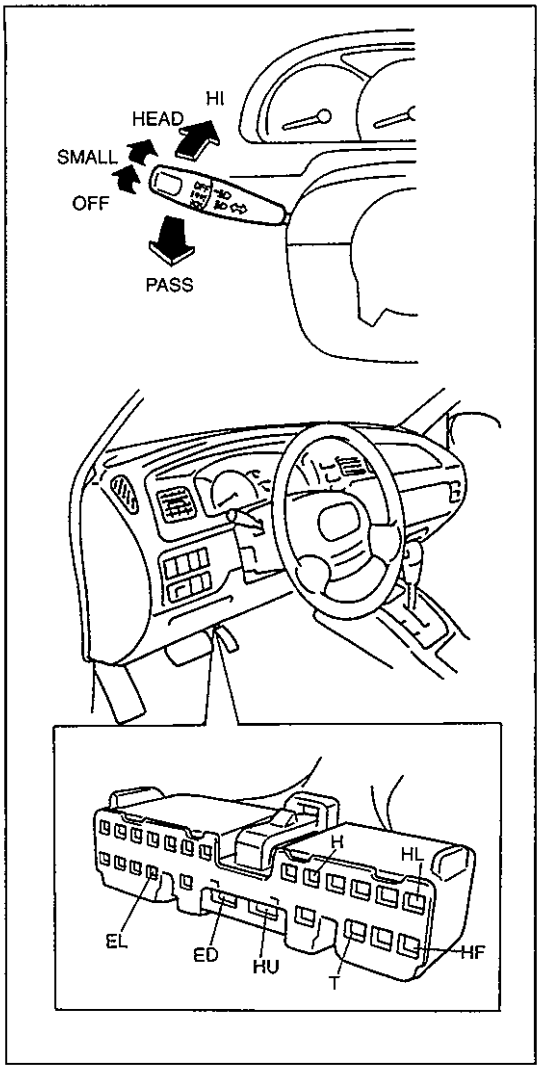
REAR FOG LIGHT (If equipped)

Trouble	Possible cause	Correction
Rear fog light does not come on	• Main fuse and/or fuses blown • Rear fog light switch faulty • Lighting switch faulty • Wiring or grounding faulty • Bulb burnt out	Replace main fuse and/or fuses to check for short Check fog light switch Check switch Repair as necessary Replace

INTERIOR LIGHTS

Trouble	Possible cause	Correction
Interior light (s) does (do) not light up	• Bulb burnt out • Fuse blown • Wiring or grounding faulty • Door open switch faulty • Interior light (s) faulty	Replace Replace Repair as necessary Check switch Check light (s)
Front spot light (s) does (do) not light up	• Bulb burnt out • Wiring or grounding faulty • Spot light faulty	Replace Repair as necessary Check light

ON-VEHICLE SERVICE



HEADLIGHTS

HEADLIGHT SWITCH (in COMBINATION SWITCH)

INSPECTION

1) Disconnect negative (–) cable at battery.
2) Disconnect combination switch lead wire couplers.
3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

Lighting Switch

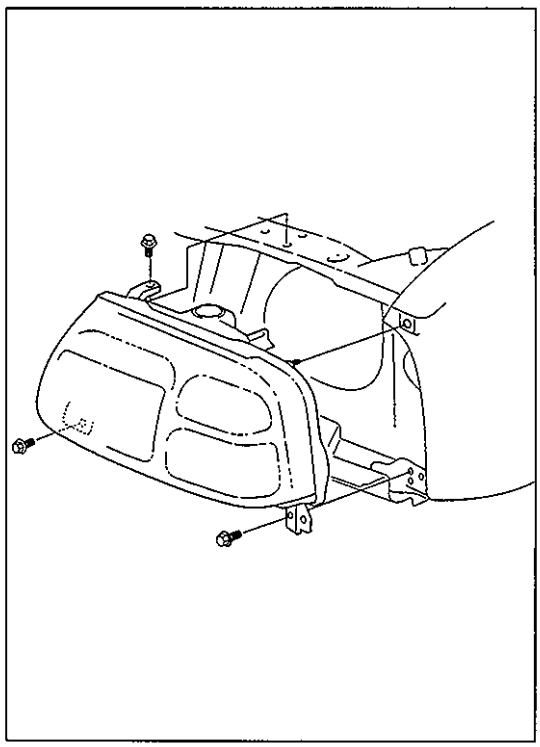
Terminal / Switch Position / Wire Color	EL	T	H
	W	G	R
OFF			
SMALL	○	○	
HEAD	○	○	○

Dimmer & Passing Switch

Terminal / Switch Position / Wire Color	ED	HL	HU	HF
	W/B	R/W	R	R/B
Passing (PASS)	○		○	○
Low Beam	○	○		
High Beam (HI)	○		○	

REMOVAL AND INSTALLATION

For vehicle without air bag system, refer to Section 3C COMBINATION SWITCH, and for vehicle with air bag system, refer to Section 3C1 CONTACT COIL AND COMBINATION SWITCH.

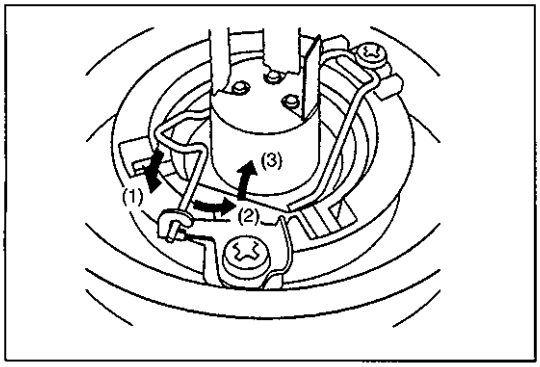


REMOVAL

1) Disconnect negative cable at battery.
2) Remove front grille.
3) Disconnect harness and couplers from headlight assembly.
4) Remove three bolts and pull headlight assembly off vehicle.

INSTALLATION

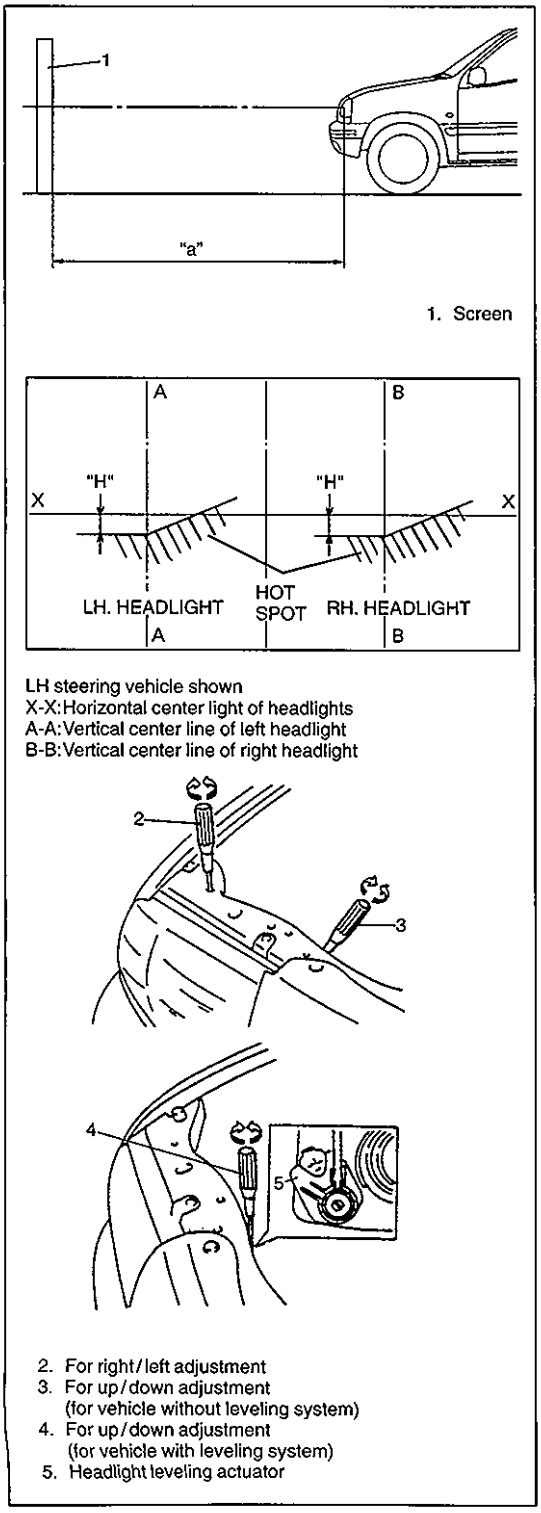
Reverse removal procedure for installation.
Make sure to follow HEADLIGHT AIMING WITH SCREEN and aim headlight after installation.



BULB REPLACEMENT

WARNING:
Don't touch when the bulb is hot.

1) Disconnect negative (–) cable at battery.
2) Disconnect harness from bulb.
3) Remove socket cover and bulb.
4) Replace bulb and install in reverse removal procedure.



1. Screen

LH steering vehicle shown
X-X: Horizontal center light of headlights
A-A: Vertical center line of left headlight
B-B: Vertical center line of right headlight

2. For right/left adjustment
3. For up/down adjustment
   (for vehicle without leveling system)
4. For up/down adjustment
   (for vehicle with leveling system)
5. Headlight leveling actuator

HEADLIGHT AIMING WITH SCREEN

NOTE:
- **Unless otherwise obligated by local regulations, adjust headlight aiming according to following procedure.**
- **After replacing headlight, be sure to perform its aiming.**
- **When inspecting and adjusting headlight with leveling system, make sure to set the leveling switch to "0" position with IG switch ON.**

Before adjustment, make sure the following.

a) Place vehicle on a flat surface in front of blank wall as below ahead of headlight surface.

   Clearance "a": 10 m (32.8 ft)

b) Adjust air pressure of all tires to a specified value respectively.
c) Bounce vehicle body up and down by hand to stabilize suspension.
d) Carry out one driver aboard.

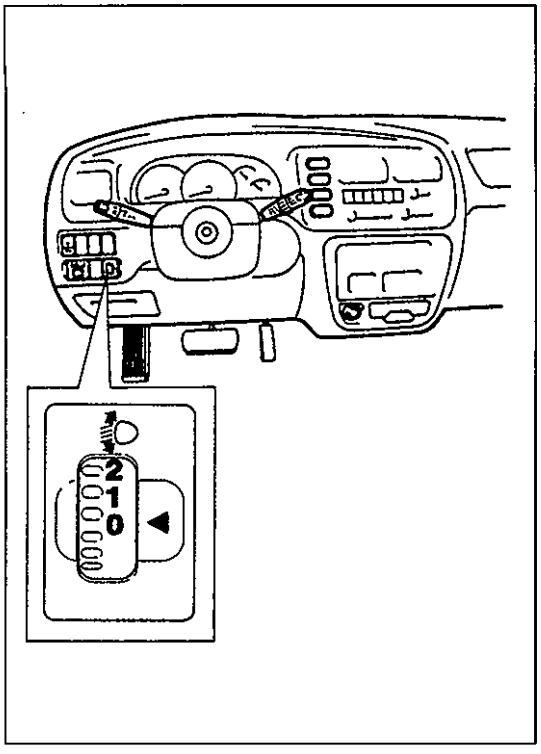
   Driver's weight: 75 kg (165 lb)

Adjustment

1) Check to see if hot spot (high intensity zone) of each main (low) beam axis falls as illustrated.

   Clearance "H": Approx. 130 mm (5.15 in.)

2) If headlight aiming is not set properly, align it to specification by adjusting aiming screw and aiming gear.



HEADLIGHTS WITH LEVELING SYSTEM (IF EQUIPPED)

LEVELING SWITCH

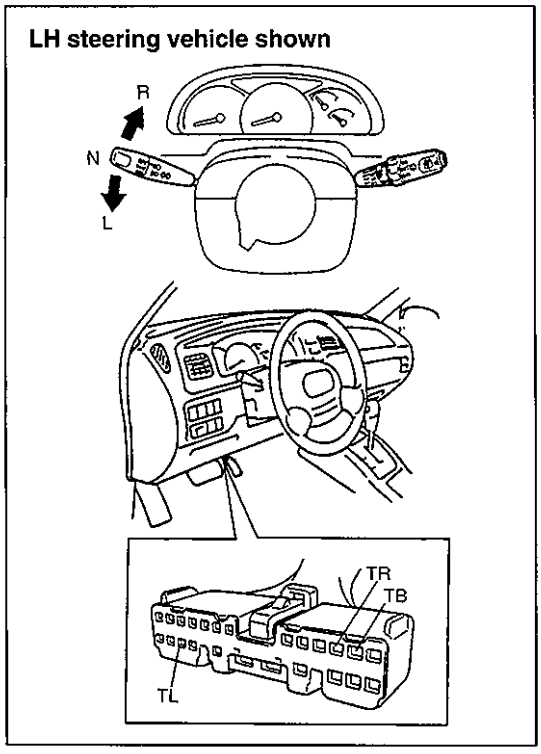
INSPECTION

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

INSPECTION

All headlight system couples 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.



TURN SIGNAL AND HAZARD WARNING LIGHTS

TURN SIGNAL SWITCH (in COMBINATION SWITCH)

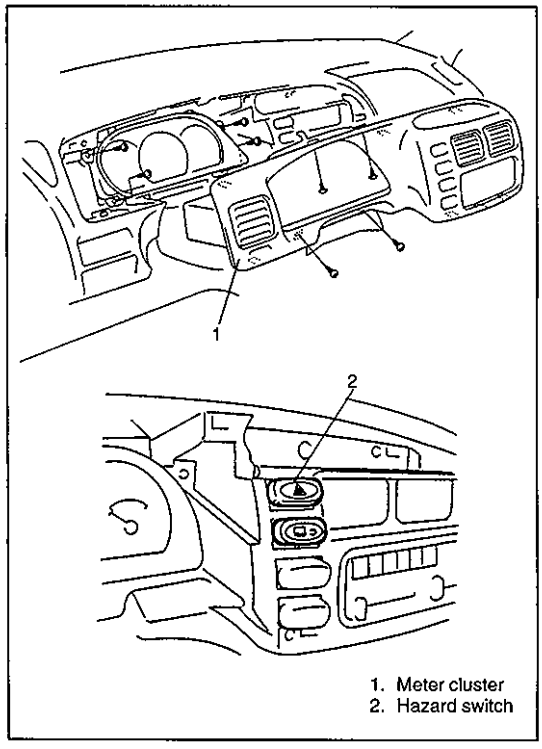
INSPECTION

1) Disconnect negative cable at battery.
2) Disconnect combination switch lead wire.
3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

Terminal / Switch Position / Wire Color	TL	TB	TR
	G/R	G	G/Y
L	○—○		
N			
R		○—○	

REMOVAL AND INSTALLATION

Refer to Section 3C COMBINATION SWITCH for vehicle without AIR BAG SYSTEM and Section 3C1 CONTACT COIL AND COMBINATION SWITCH for vehicle with AIR BAG SYSTEM.



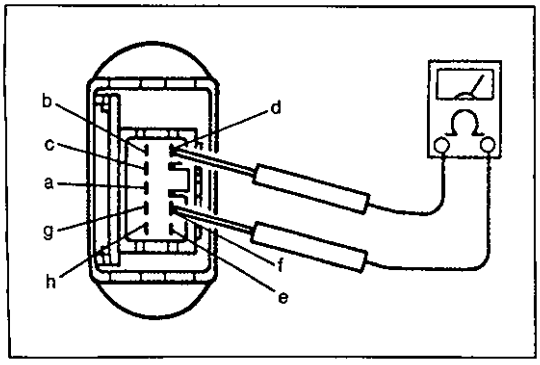
HAZARD SWITCH

REMOVAL

1) Remove meter cluster.
2) Pull hazard switch out of instrument panel.
3) Disconnect coupler from hazard switch.
4) Remove hazard switch.

INSTALLATION

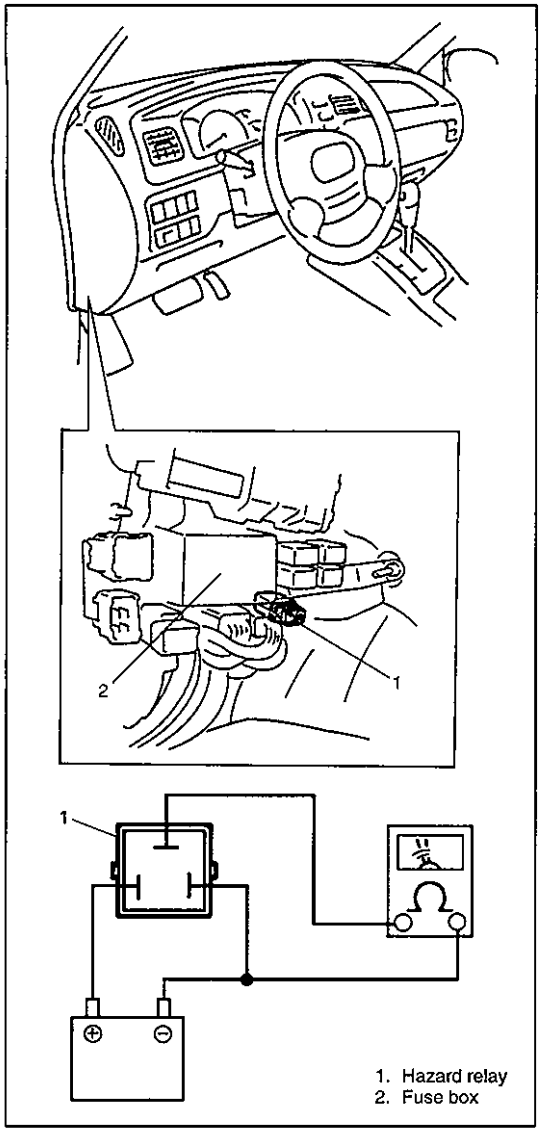
Reverse removal procedure.



INSPECTION

Use a circuit tester to check the continuity of each switch position. If any continuity is not obtained replace switch.

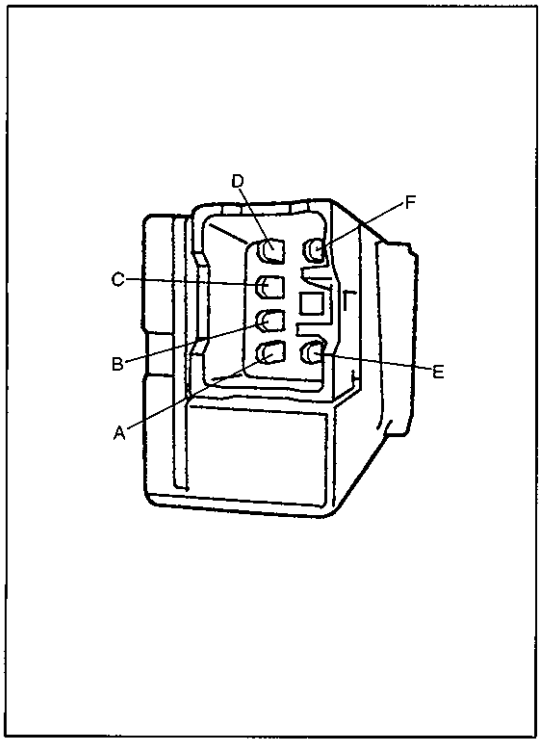
	a	b	c	d	e	f	g	h
OFF	○—○						○—◎—○	
ON		○—○		○—○		○—○	○—◎—○	



HAZARD RELAY

INSPECTION

Connect battery and tester as shown.
Unless a continued click sound is heard, replace relay.



REAR FOG LIGHT (if equipped)

REAR FOG LIGHT SWITCH

INSPECTION

Use a circuit tester to check rear fog light switch for continuity. Hold the switch button (ON or OFF) pushed in during checking switch.

RR FOG SW \ OFF SW / TERMINAL		B	E	D	A	C	F
FREE	FREE						
	PUSH						
PUSH	FREE						
	PUSH						

NOTE:
Rear fog light lights up only when headlights (low or high beams) or front fog lights (if equipped) are ON.
Rear fog lights turns OFF automatically when headlights or front lights are turned OFF.

SECTION 8C

INSTRUMENTATION/DRIVER INFORMATION

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

CAUTIONS IN SERVICING

Refer to Section 8.

SYMBOLS AND MARKS

Refer to Section 8.

WIRING COLOR SYMBOLS

Refer to Section 8.

ABBREVIATIONS

Refer to Section 8.

JOINT CONNECTOR

Refer to Section 8.

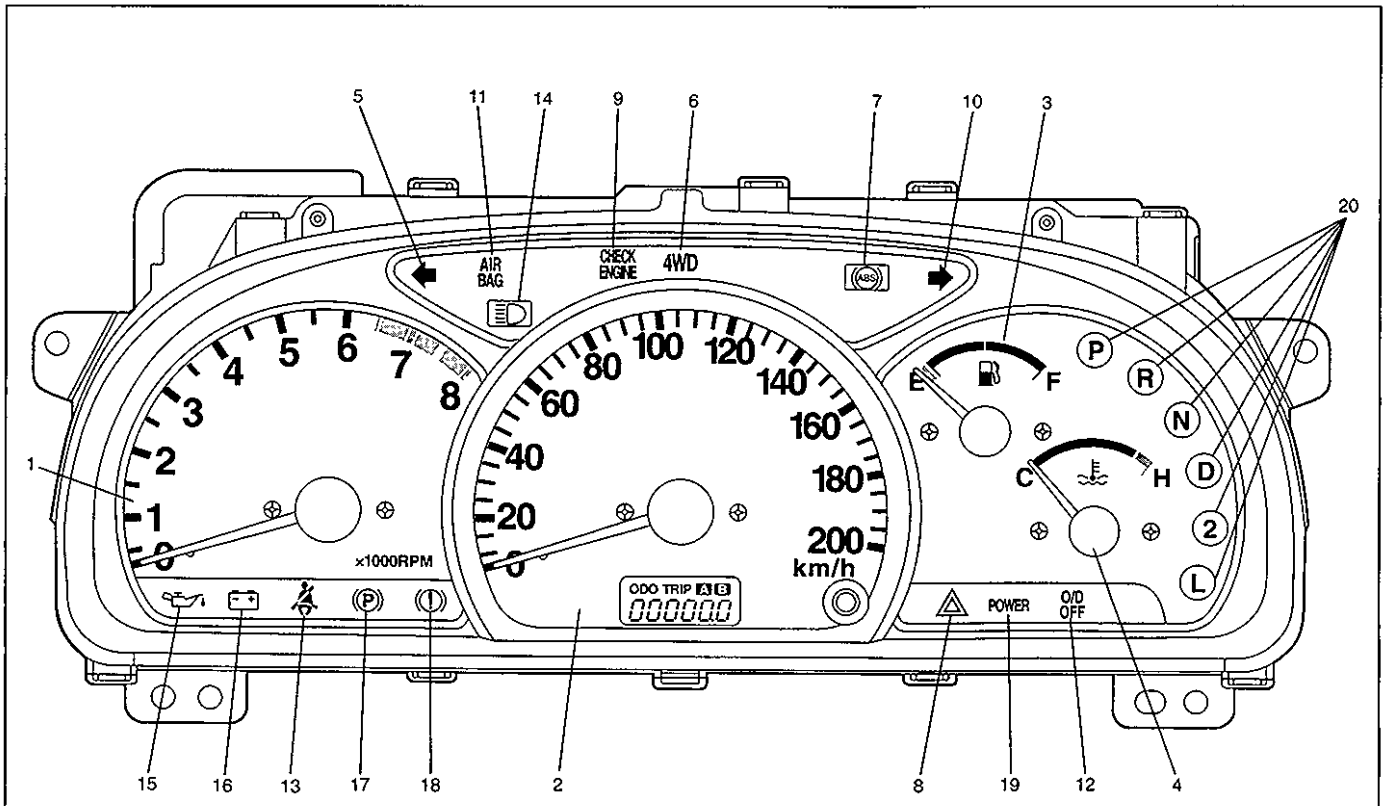
FUSE BOX AND RELAY

Refer to Section 8.

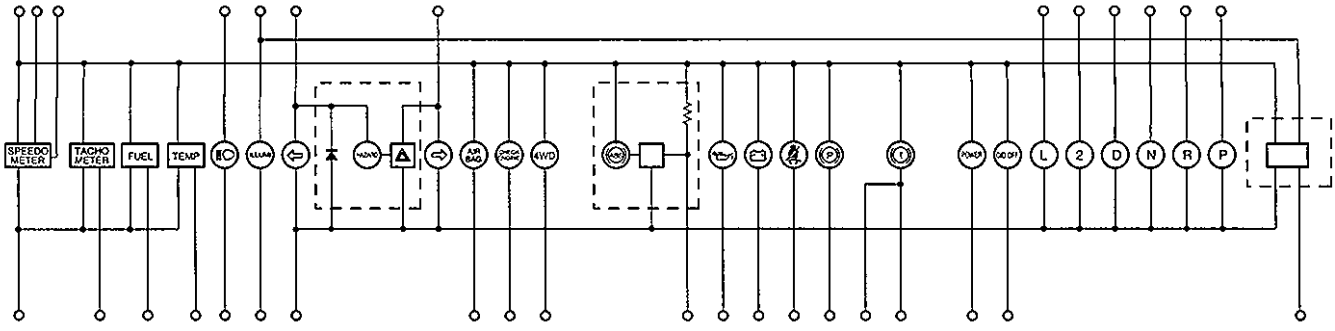
POWER SUPPLY DIAGRAM

Refer to Section 8.

COMBINATION METER

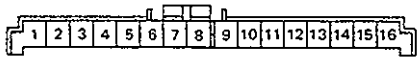


1. Tachometer
2. Speedometer
3. Fuel level meter
4. Water temperature meter
5. Turn signal pilot light (LH)
6. 4WD indicator
7. ABS warning light (if equipped)
8. Hazard pilot light (if equipped)
9. CHECK ENGINE light
10. Turn signal pilot light (RH)
11. AIR BAG warning light (if equipped)
12. O/D OFF light (A/T vehicle only)
13. Fasten seat belt light (if equipped)
14. High beam light
15. Oil pressure warning light
16. Charge warning light
17. Parking brake warning light (if equipped)
18. Brake warning light
19. POWER indicator light (A/T vehicle only)
20. Shift position indicator (A/T vehicle, if equipped)

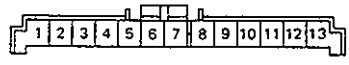


NOTE:
Terminal arrangement of coupler viewed from harness side.

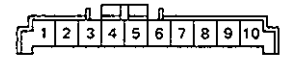
Coupler A



Coupler B



Coupler C



Coupler A

1.	Blank	—
2.	Blank	—
3.	To ignition switch	B/W
4.	Blank	—
5.	To ABS control module	Bl/O
6.	To PCM (A/T vehicle only)	Gr/Bl
7.	Blank	—
8.	To VSS	Bl/Y
9.	To combination switch	G/R
10.	To SDM	Y/G
11.	To main fuse	W/Bl
12.	To fuse box	W
13.	To combination switch	R
14.	Blank	—
15.	To ECM (PCM for A/T vehicle)	V/Y
16.	To 4WD controller	O/B

Coupler B

1.	To door switch (driver side)	B/Bl
2.	To shift switch (A/T vehicle only) L	G/Bl
3.	To shift switch (A/T vehicle only) 2	G/O
4.	To shift switch (A/T vehicle only) D	Y/G
5.	To shift switch (A/T vehicle only) N	O/Bl
6.	To shift switch (A/T vehicle only) P	O/G
7.	To shift switch (A/T vehicle only) R	R
8.	To ground	B
9.	To PCM (A/T vehicle only)	W/B
10.	To ECT sensor	Y/W
11.	To fuel level gauge	Bl/W
12.	To ground	B/Y
13.	To combination switch	G/Y

Coupler C

1.	To ground	B
2.	To ECM (PCM for A/T vehicle)	Br
3.	To ignition switch	V/R
4.	To brake fluid level switch	R/B
5.	To parking brake switch	V
6.	To seat belt switch (if equipped)	Gr/R
7.	To generator	W/R
8.	To oil pressure switch	Y/B
9.	To combination switch	R/Y
10.	Blank	—

DIAGNOSIS

SPEEDOMETER AND VSS

Trouble	Possible Cause	Correction
Speedometer shows no operation	IG METER fuse blown	Check fuse
	VSS faulty	Check VSS
	Speedometer faulty	Check speedometer
	Wiring or grounding faulty	Repair

FUEL METER AND FUEL GAUGE UNIT

Trouble	Possible Cause	Correction
Fuel meter shows no operation	IG METER fuse blown	Check fuse
	Fuel gauge unit faulty	Check fuel gauge unit
	Fuel meter faulty	Check fuel meter
	Wiring or grounding faulty	Repair

ENGINE COOLANT TEMP. (ECT) METER AND SENSOR

Trouble	Possible Cause	Correction
Engine coolant temp. meter shows no operation	IG METER fuse blown	Check fuse
	ECT meter faulty	Check ECT meter
	ECT sensor faulty	Check ECT sensor
	Wiring or grounding faulty	Repair

OIL PRESSURE LIGHT

Trouble	Possible Cause	Correction
Oil pressure warning light does not light up	Bulb blown	Check bulb
	IG METER fuse blown	Check fuse
	Combination meter wiring circuit faulty	Check wiring circuit
	Oil pressure switch faulty	Check oil pressure switch
	Wiring or grounding faulty	Repair

BRAKE WARNING LIGHT

Trouble	Possible Cause	Correction
Brake warning light does not light up	Bulb blown	Check bulb
	IG METER fuse blown	Check fuse
	Combination meter wiring circuit faulty	Check combination meter wiring circuit
	Parking brake switch faulty	Check parking brake switch
	Brake fluid level switch faulty	Check brake fluid level switch
	Wiring or grounding faulty	Repair

LIGHT REMAINDER WARNING BUZZER

Trouble	Possible Cause	Correction
Light remainder warning buzzer shows no sounding (Applicable to vehicle equipped with buzzer.)	TAIL fuse blown	Check fuse
	Buzzer faulty	Replace buzzer
	Wiring or grounding faulty	Repair
	Driver side door switch faulty	Check door switch

SEAT BELT WARNING LIGHT (IF EQUIPPED)

Trouble	Possible Cause	Correction
Seat belt warning light does not light up	Bulb blown	Check bulb
	IG METER fuse blown	Check fuse
	Seat belt switch faulty	Check seat belt switch
	Wiring or grounding faulty	Repair

IGNITION KEY REMAINDER WARNING BUZZER (IF EQUIPPED)

Trouble	Possible Cause	Correction
Ignition key remainder warning buzzer shows no sounding	DOME fuse blown	Check fuse
	Buzzer faulty	Replace buzzer
	Wiring or grounding faulty	Repair
	Driver side door switch faulty	Check door switch

CIGARETTE LIGHTER AND ACCESSORY SOCKET

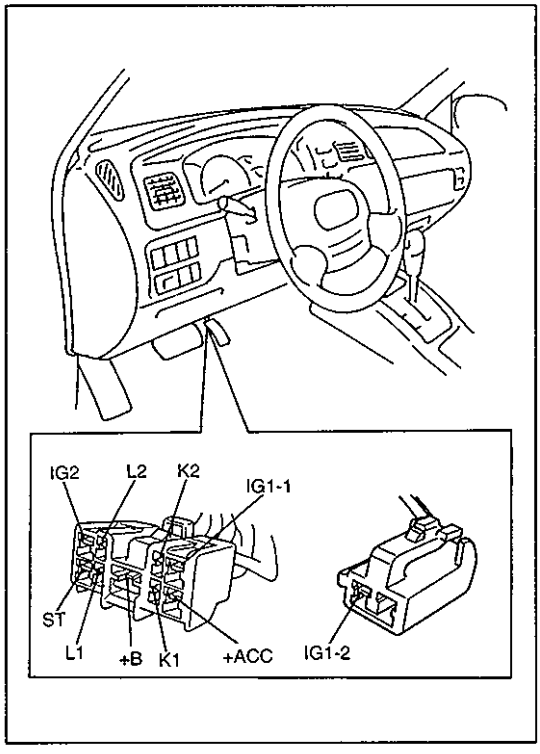
Trouble	Possible Cause	Correction
Cigarette lighter/accessory socket shows no operation	CIGAR RADIO fuse blown	Check fuse
	Ignition switch faulty	Check ignition switch
	Cigarette lighter/accessory socket faulty	Check cigarette lighter/accessory socket
	Wiring or grounding faulty	Repair

ON-VEHICLE SERVICE

IGNITION (MAIN) SWITCH

INSPECTION

1) Disconnect negative cable at battery.
2) Disable air bag system. Refer to "Disabling Air Bag System" in Section 10B of this manual.
3) Disconnect main switch lead wire coupler.



4) Check continuity between terminals. Use circuit tester to check continuity at each switch position. If continuity is not obtained according to the table below, replace ignition (main) switch.

Key Position \ Terminal / Wire color		+B W/Y	+ACC Bl	IG1-1 B/W	IG1-2 B/W	IG2 Y/B	ST B/Y	L1 B	L2 B	K1 G	K2 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 10B of this manual.
3) Remove steering column referring to Section 3C1 of this manual. Then remove steering lock/ignition (main) switch from steering column.

INSTALLATION

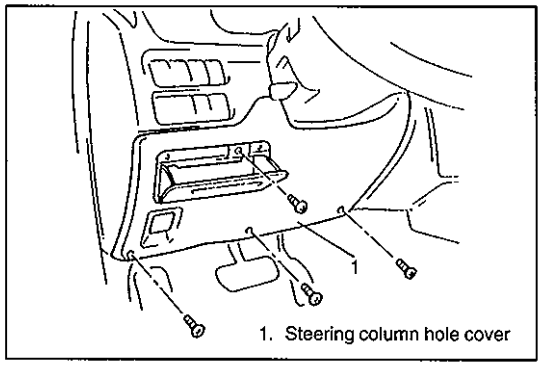
1) Install steering lock/ignition (main) switch to steering column. Install steering column ass'y referring to Section 3C1 of this manual.
2) Enable air bag system. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

NOTE:
When installing steering column, special care must be taken for tightening sequence and its torque.

COMBINATION METER

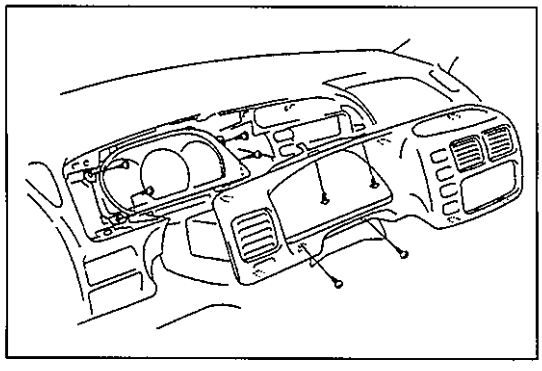
REMOVAL

1) Disconnect negative cable at battery.
2) If the vehicle is equipped with air bag system, disable air bag system. Refer to DISABLING AIR BAG SYSTEM in Section 10B.

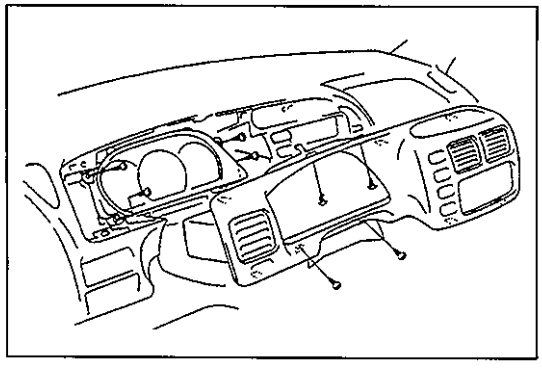


1. Steering column hole cover

3) Remove column hole cover.



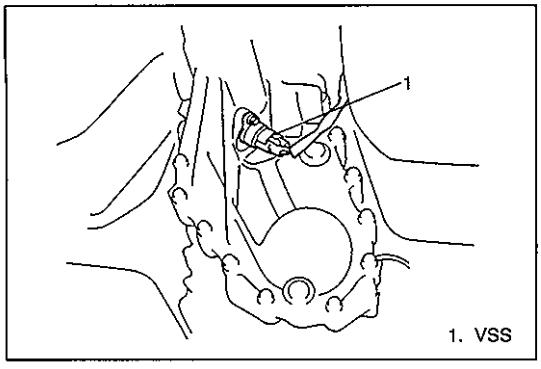
4) Remove instrument cluster panel.
5) Remove screws fastening combination meter.
6) Disconnect couplers from combination meter.
7) Remove combination meter from instrument panel.



INSTALLATION

Reverse removal procedure for installation, noting the following.

- If the vehicle is equipped with air bag system, be sure to enable air bag system after installation. Refer to ENABLING AIR BAG SYSTEM in Section 10B for details.

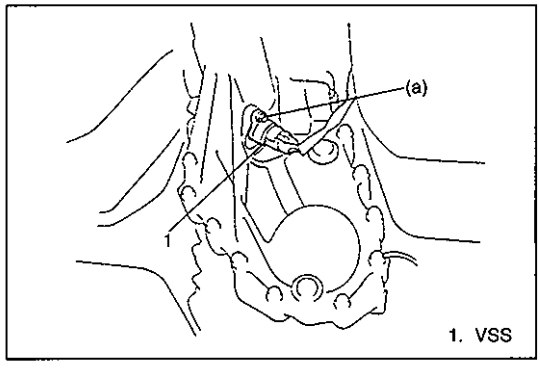


SPEEDOMETER AND SENSOR

VEHICLE SPEED SENSOR (VSS)

REMOVAL

1) Hoist vehicle.
2) Disconnect coupler from VSS.
3) Remove speed sensor.

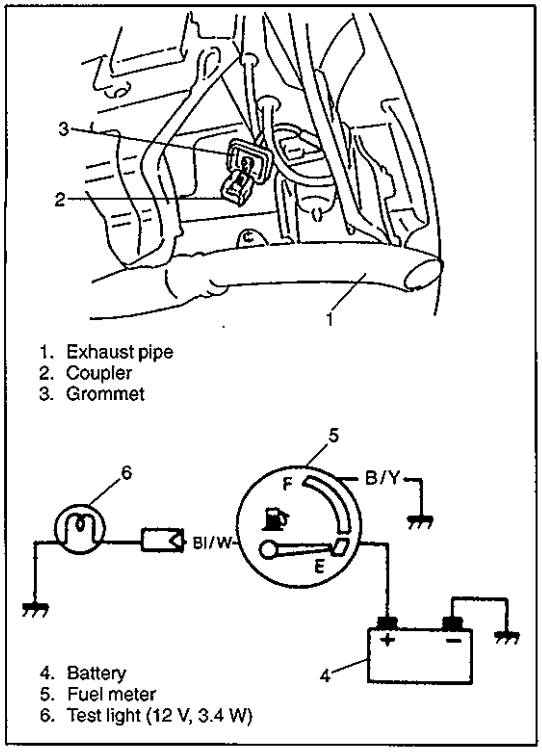


INSTALLATION

Reverse removal procedure for installation.

Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



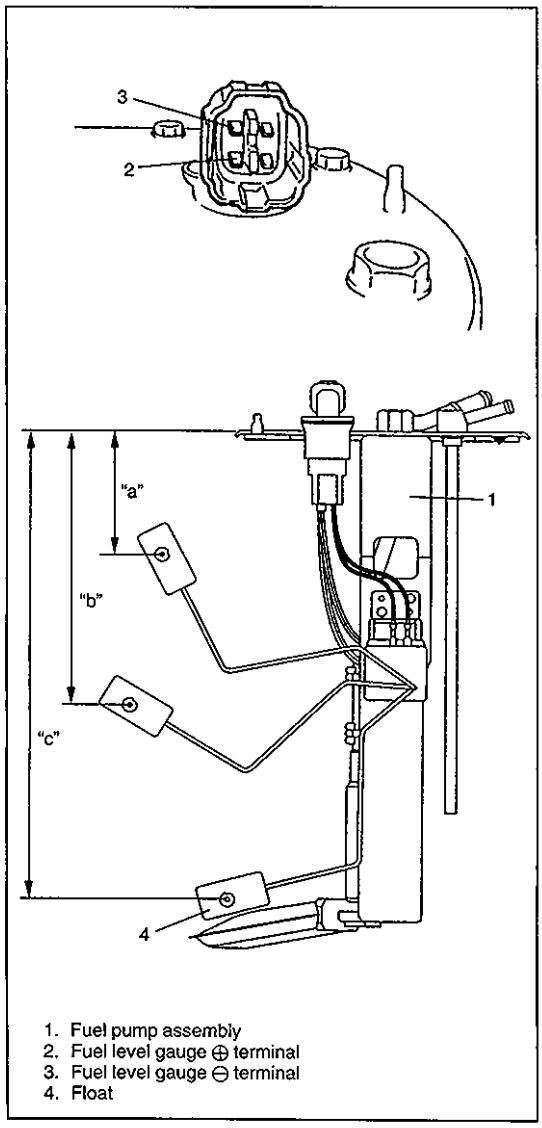
1. Exhaust pipe
2. Coupler
3. Grommet
4. Battery
5. Fuel meter
6. Test light (12 V, 3.4 W)

FUEL METER/FUEL GAUGE UNIT

FUEL METER

INSPECTION

1) Remove rear bumper facing.
2) Detach grommet from vehicle.
3) Disconnect coupler.
4) Connect Bl/W terminal of coupler to a light bulb (12 V, 3.4 W) as shown.
5) Turn ignition switch ON.
   Make sure that bulb is lighted with meter pointer fluctuating several seconds thereafter. If meter is faulty, replace.



1. Fuel pump assembly
2. Fuel level gauge ⊕ terminal
3. Fuel level gauge ⊖ terminal
4. Float

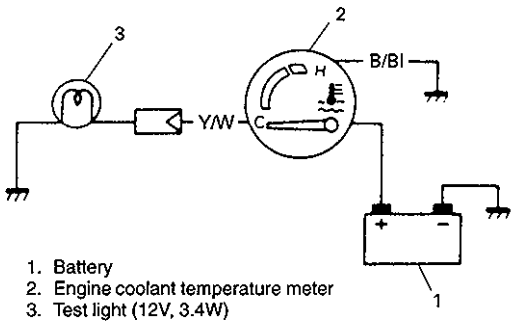
FUEL SENDER GAUGE

INSPECTION

Remove fuel pump assembly referring to Section 6C of this manual. Use an ohmmeter to confirm that resistance of sender gauge unit changes with change of float position.

	Float Position		Fuel Meter	Resistance (Ω)
	56 ℓ model	66 ℓ model		
"a"	88.3 mm (3.48 in.)	51.7 mm (2.04 in.)	F	6 – 8
"b"	157.2 mm (6.20 in.)	139.6 mm (5.50 in.)	1/2	29.5 – 35.5
"c"	254.9 mm (10.0 in.)	254.9 mm (10.0 in.)	E	94 – 96

If measured valve is out of specification, replace fuel sender gauge.



1. Battery
2. Engine coolant temperature meter
3. Test light (12V, 3.4W)

ENGINE COOLANT TEMP. (ECT) METER AND SENSOR

ENGINE COOLANT TEMPERATURE METER

INSPECTION

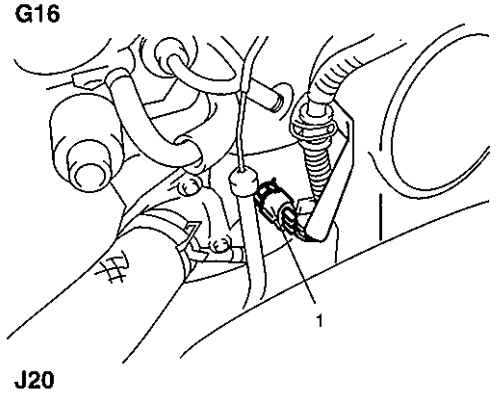
1) Disconnect Y/W lead wire going to sender gauge installed to thermostat case.
2) Use a bulb (12 V, 3.4 W) in position to ground wire as illustrated.
3) Turn main switch ON. Confirm that bulb is lighted with meter pointer fluctuating several seconds thereafter.
   If meter does not fluctuate, replace.

ENGINE COOLANT TEMP. SENSOR

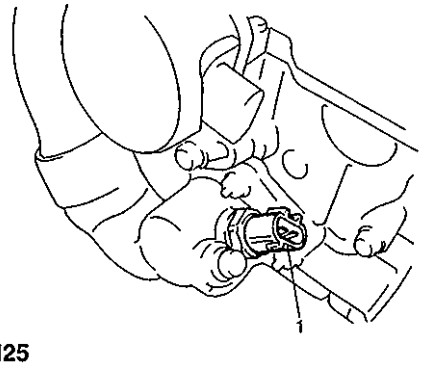
REMOVAL AND INSTALLATION

Refer to ECT SENSOR in ON-VEHICLE SERVICE of Section 6E1 (for G16 and J20) or Section 6E2 (for H25) of this manual for details.

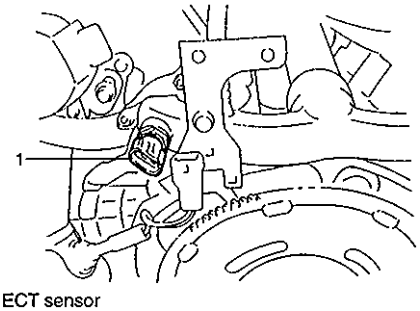
G16



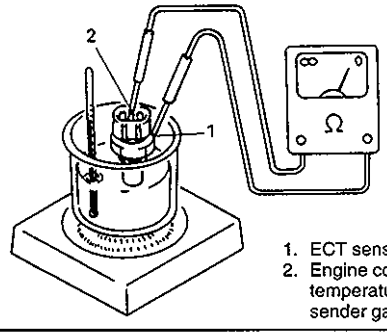
J20



H25



1. ECT sensor



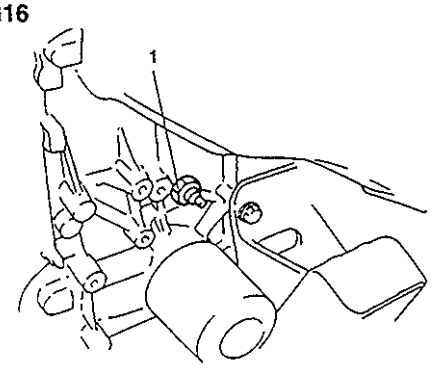
1. ECT sensor
2. Engine coolant temperature sender gauge

INSPECTION

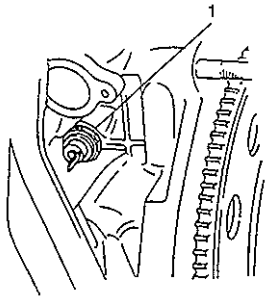
Warm up sender gauge. Thus make sure its resistance is decreased with increase of its temperature.

Temperature	Resistance
50°C (122°F)	136 – 216 Ω
120°C (248°F)	16.4 – 19.4 Ω

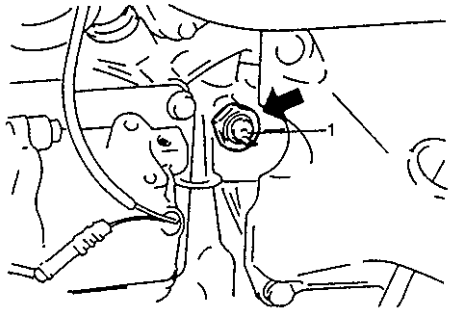
G16



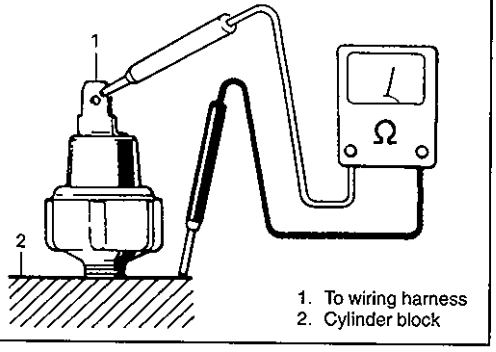
J20



H25



1. Oil pressure switch



1. To wiring harness
2. Cylinder block

OIL PRESSURE LIGHT

OIL PRESSURE SWITCH

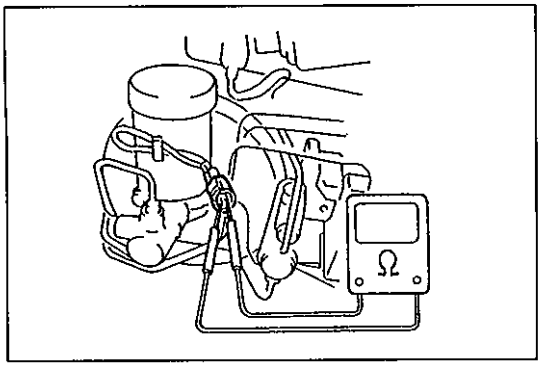
REMOVAL AND INSTALLATION

Refer to OIL PRESSURE CHECK in Section 6A1 (for G16), Section 6A2 (for H25), and Section 6A4 (for J20) of this manual for details.

INSPECTION

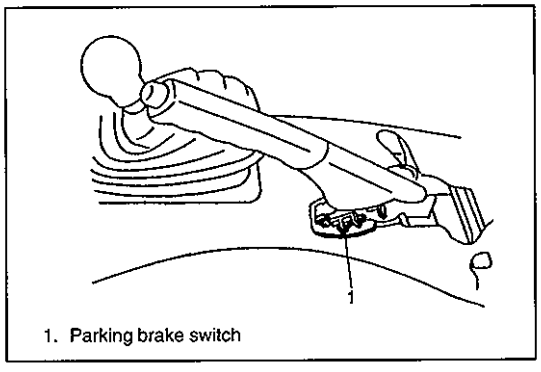
Use an ohmmeter to check switch continuity.

During Engine Running	No continuity (∞ Ω)
At Engine Stop	Continuity (0 Ω)



BRAKE WARNING LIGHT
PARKING BRAKE WARNING LIGHT (If equipped)
BRAKE FLUID LEVEL SWITCH
INSPECTION
Use an ohmmeter to check switch for continuity.
If found defective, replace switch (reservoir).

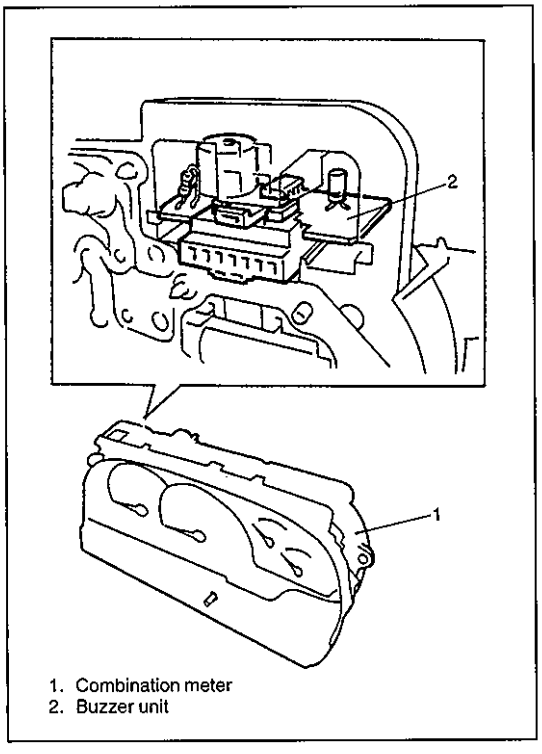
OFF position (float up)	No continuity
ON position (float down)	Continuity



1. Parking brake switch

PARKING BRAKE SWITCH
INSPECTION
Use an ohmmeter to check switch for continuity.
If found defective, replace switch.

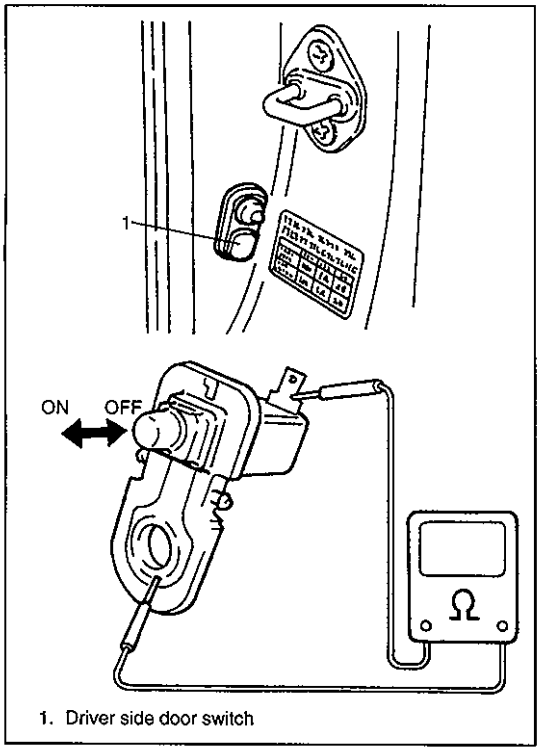
OFF position (parking brake lever released)	No continuity
ON position (parking brake lever pulled up)	Continuity



1. Combination meter
2. Buzzer unit

LIGHT REMAINDER WARNING BUZZER
BUZZER UNIT
REMOVAL
1) Remove combination meter. Refer to COMBINATION METER in this section.
2) Remove buzzer unit from combination meter.

INSTALLATION
Reverse removal procedure for installation.



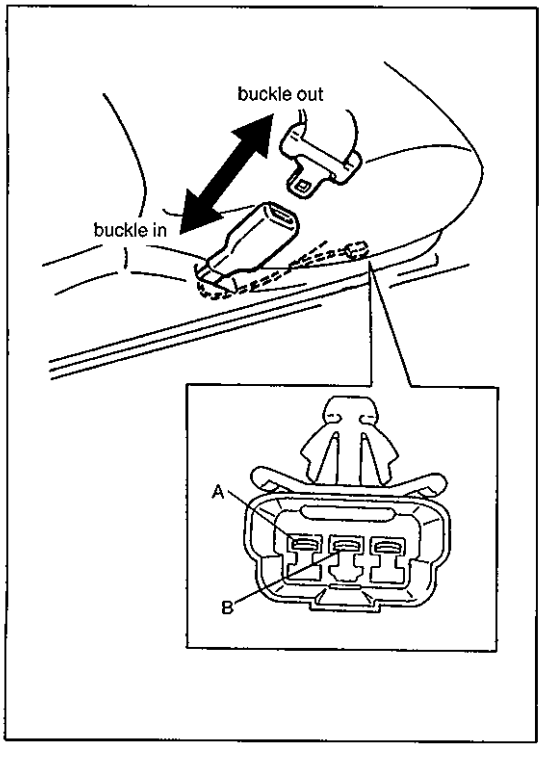
1. Driver side door switch

DRIVER SIDE DOOR SWITCH

INSPECTION

Use an ohmmeter to check switch for continuity.
If found defective, replace switch.

OFF position (Door closed)	No continuity
ON position (Door open)	Continuity



SEAT BELT WARNING LIGHT/BUZZER (If equipped)

SEAT BELT BUCKLE SWITCH

INSPECTION

Check continuity between seat belt buckle switch terminal A and B at following condition.
Buckle out (seat belt not fastened): Continuity
Buckle in (seat belt fastened): No Continuity
If seat belt buckle switch does not follow the above condition, replace seat belt buckle switch.

BUZZER UNIT

REMOVAL AND INSTALLATION

Refer to LIGHT REMAINDER WARNING BUZZER in this section for details.

SECTION 8D

WINDOWS, MIRRORS, SECURITY AND LOCKS

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

CAUTIONS IN SERVICING

Refer to Section 8.

SYMBOLS AND MARKS

Refer to Section 8.

WIRING COLOR SYMBOLS

Refer to Section 8.

ABBREVIATIONS

Refer to Section 8.

JOINT CONNECTOR

Refer to Section 8.

FUSE BOX AND RELAY

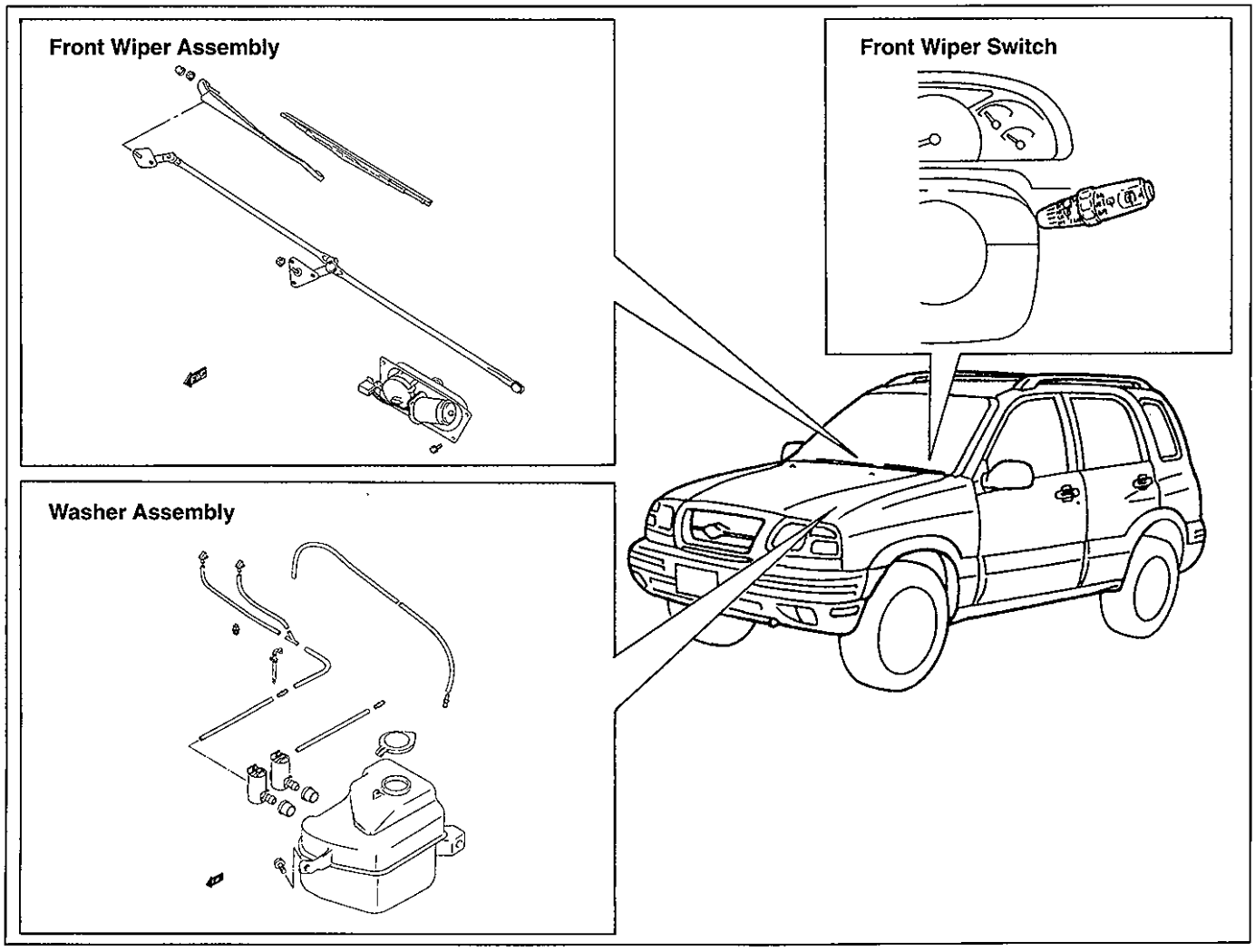
Refer to Section 8.

POWER SUPPLY DIAGRAM

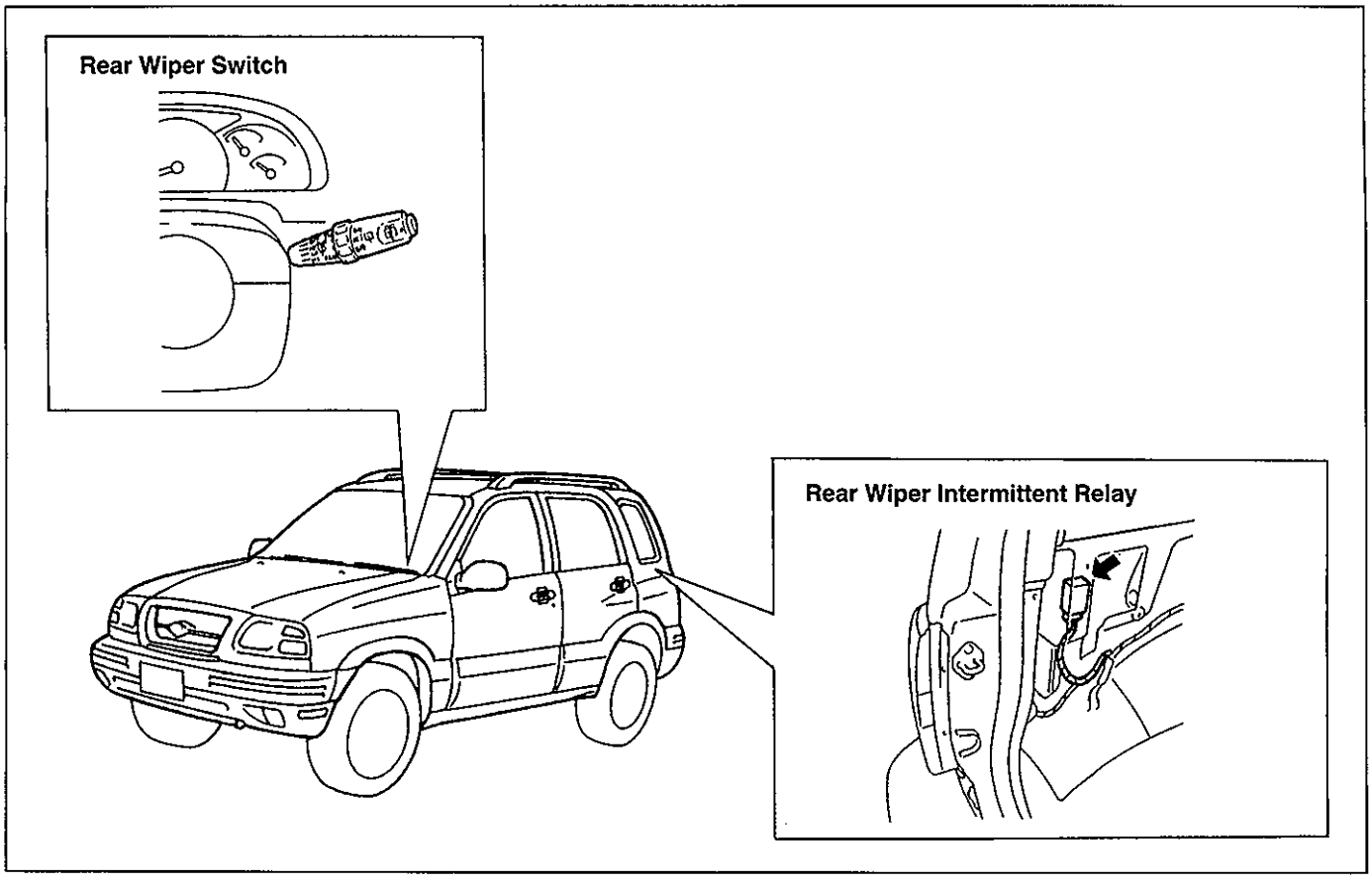
Refer to Section 8.

WINDSHIELD WIPER AND WASHER

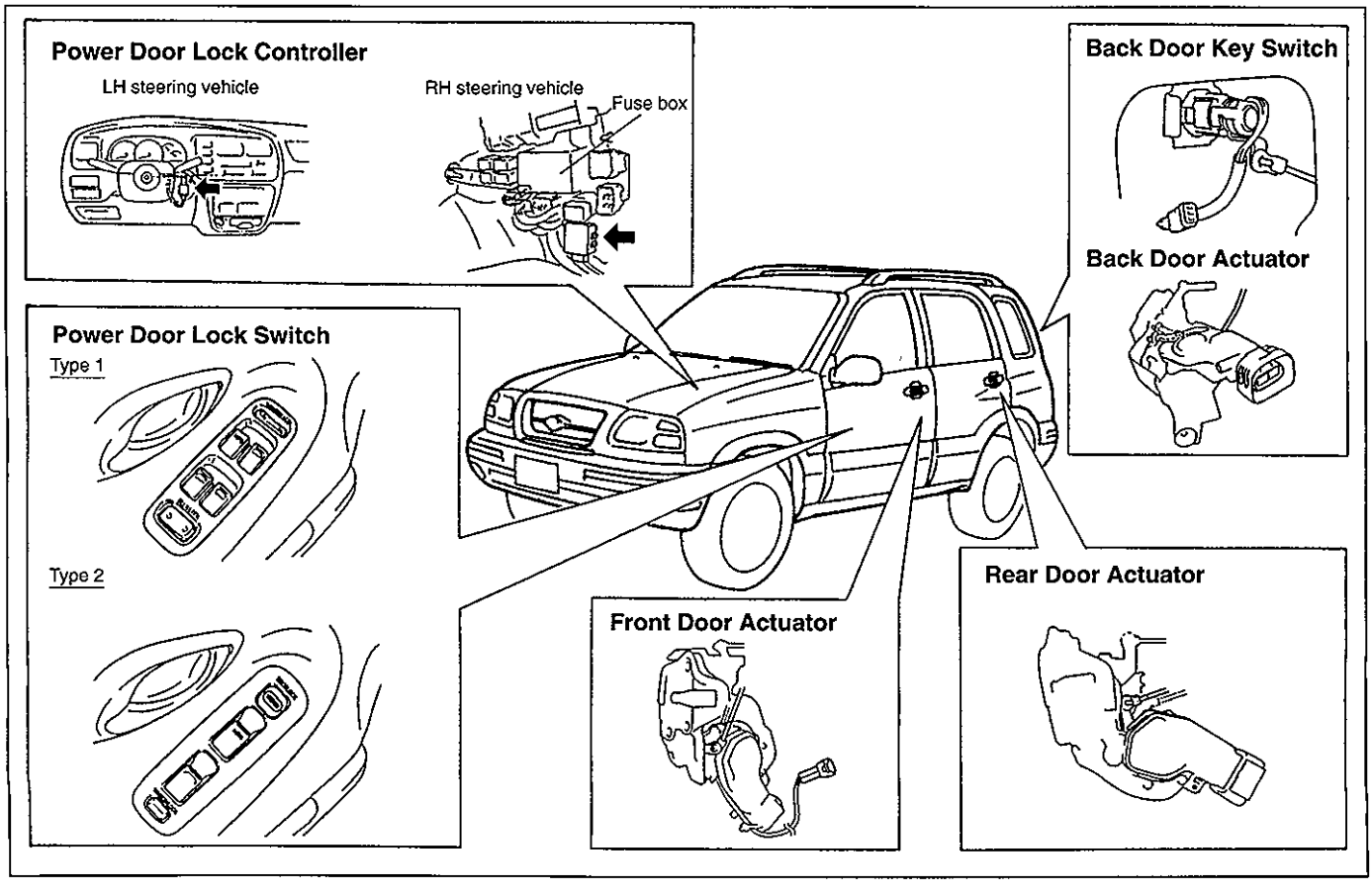
FRONT WIPER AND WASHER



REAR WIPER AND WASHER



POWER DOOR LOCK SYSTEM



DIAGNOSIS

WINDSHIELD WIPER AND WASHER

FRONT WIPER AND WASHER

REAR WIPER AND WASHER

Trouble	Possible cause	Correction
Wiper malfunctions or does not return to original position	• WIPER WASHER fuse blown	Replace blown fuse to check for short
	• Wiper motor faulty	Check motor
	• Wiper switch faulty	Check switch
	• Wiring or grounding faulty	Repair
Washer malfunctions	• Washer hose or nozzle clogged	Repair
	• Washer motor faulty	Check motor
	• Washer switch faulty	Check switch
	• Wiring faulty	Repair

REAR WINDOW DEFOGGER

Trouble	Possible cause	Correction
Defogger does not work	• REAR DEFG fuse blown	Replace fuse to check for short
	• Defogger switch faulty	Check switch
	• Defogger heat wire faulty	Check heat wire
	• Wiring or grounding faulty	Repair as necessary

POWER WINDOW CONTROL SYSTEM

Trouble	Possible cause	Correction
None of power windows functions	• Main and/or POWER WINDOW fuse blown	Replace fuse to check for short
	• Ignition switch faulty	Check switch
	• Wiring or grounding faulty	Repair as necessary
Only one power window does not function	• Power window main switch faulty	Check switch
	• Power window switch faulty	Check switch
	• Power window motor (actuator) faulty	Check motor
	• Window lock switch faulty	Check switch
	• Wiring or grounding faulty	Repair as necessary

POWER DOOR LOCK SYSTEM

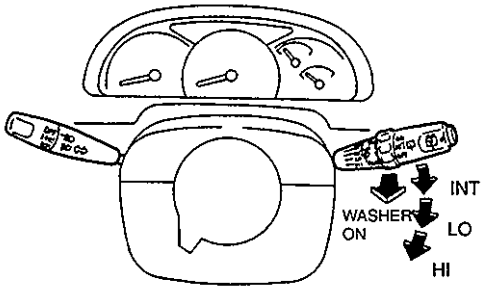
Condition	Possible cause	Correction
All power door locks do not operate	• DOOR LOCK fuse blown	Replace fuse to check for short
	• Power door lock controller faulty	Check controller
	• Wiring or grounding faulty	Repair as necessary
Power door locks do not operate by power door lock switch	• Power door lock switch faulty	Check switch
	• Power door lock controller faulty	Check controller
	• Wiring or grounding faulty	Repair as necessary
Only one power door lock does not operate	• Actuator (door lock motor) faulty	Repair as necessary
	• Wiring or grounding faulty	Repair as necessary

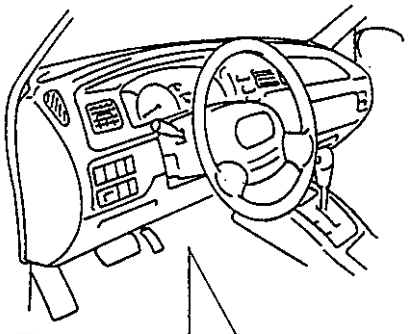
POWER DOOR MIRROR CONTROL SYSTEM

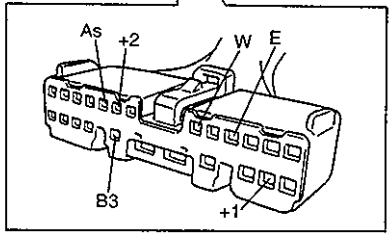
Condition	Possible cause	Correction
All power mirrors do not operate	• CIGAR RADIO fuse blown	Replace fuse to check for short
	• Power door mirror switch faulty	Check switch
	• Wiring or grounding faulty	Repair as necessary
One power mirror does not operate	• Power door mirror switch faulty	Check switch
	• Actuator (power door mirror motor) faulty	Check actuator
	• Wiring or grounding faulty	Repair as necessary

POWER SLIDING ROOF (IF EQUIPPED)

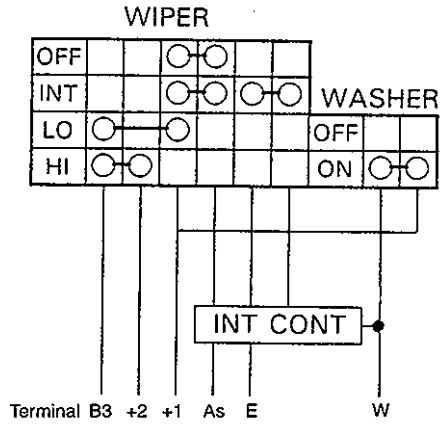
Condition	Possible cause	Correction
Sliding roof does not operate (sliding roof motor runs OK)	• Foreign object stuck in sliding roof rail	Remove or clean stuck object
	• Misinstallation of sliding roof rail	Install correctly
	• Conflicts of sliding roof parts	Fix conflicts
	• Misinstallation of sliding roof drive cable	Install correctly
Sliding roof does not operate (sliding roof motor does not run)	• SUN ROOF fuse blown	Replace fuse to check for short
	• Sliding roof switch faulty	Check switch
	• Sliding roof motor ass'y faulty	Check motor
	• Wiring or grounding faulty	Repair as necessary







Continuity



ON-VEHICLE SERVICE

WINDSHIELD WIPERS

For system circuit, refer to section 8A.

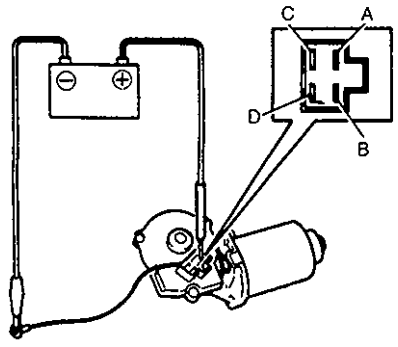
FRONT WIPER AND WASHER

INSPECTION

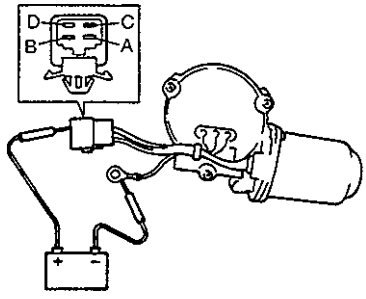
Front Wiper and Washer Switch (in Combination Switch)

1) Disconnect negative cable at battery.
2) Disconnect combination switch lead wire coupler.
3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

LH steering vehicle



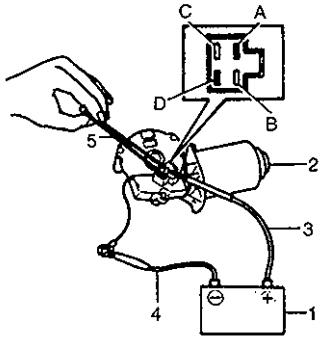
RH steering vehicle



Wiper Motor

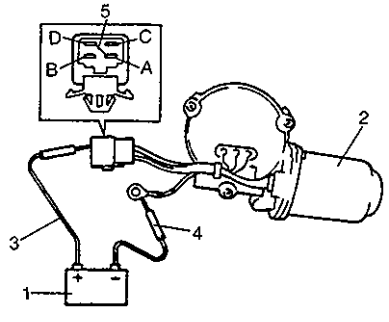
1) As illustrated, use a 12 V battery to connect its (+) terminal to terminal "A", and its (–) terminal to Black lead wire.
   If motor rotates at a low revolution speed of 45 to 55 rpm, it is proper. For high speed check, connect battery (+) terminal to terminal "B", and its (–) terminal to Black lead wire. If motor rotates at a high revolution speed of 67 to 83 rpm, it is proper.

LH steering vehicle

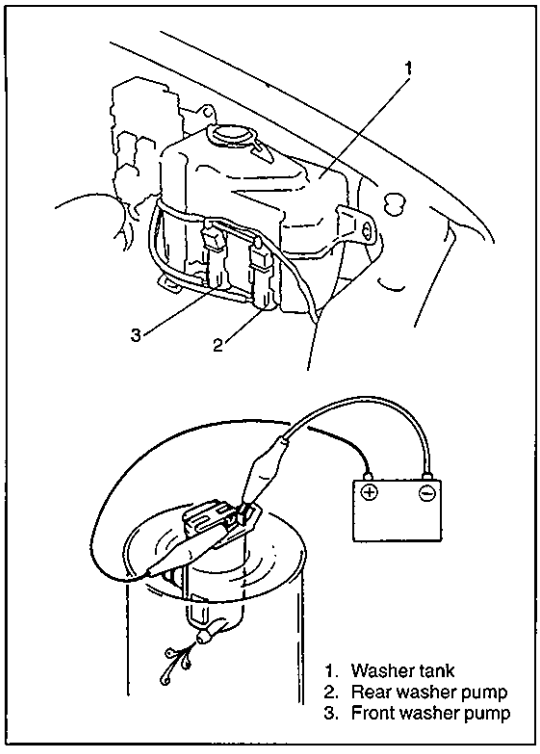


1. Battery
2. Wiper motor
3. ⊕-Red lead
4. ⊖-Black lead
5. Jumper

RH steering vehicle



2) Testing automatic stop action.
   a) Connect 12 V battery (+) terminal to terminal "A" of wiper motor and (–) terminal to Black lead wire and let the motor turn.
   b) Disconnect terminal "A" from battery, and let the motor stop.
   c) Connect terminal "A" and "D" with a jumper wire, and connect terminal "C" to battery (+) terminal. Observe the motor turns once again then stops at a given position.
   d) Repeat a) thru c) several times and inspect if the motor stops at the given position every time.



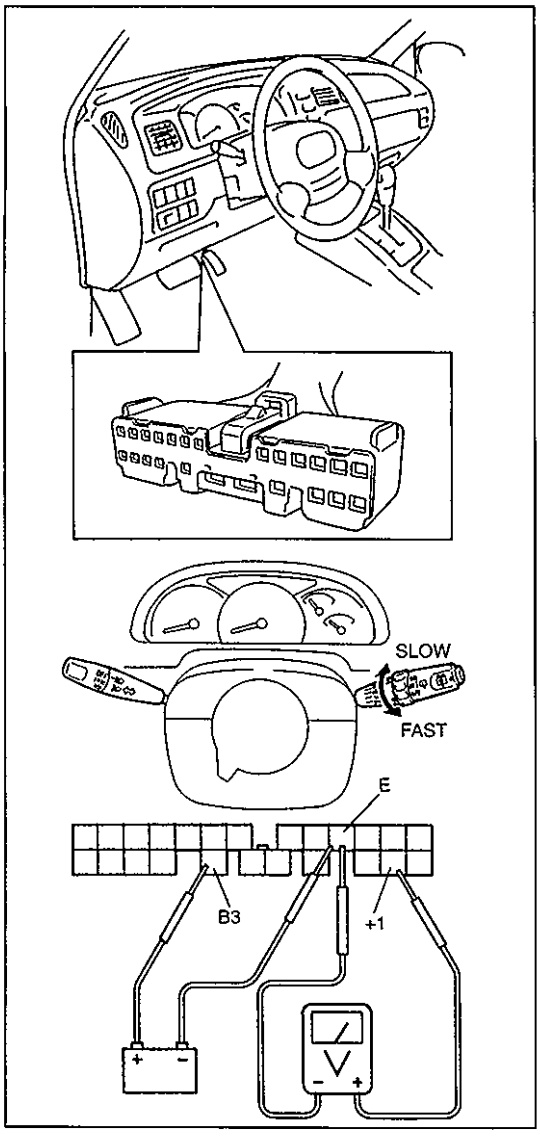
Washer Pump

Connect battery (+) and (–) terminals to pump (+) and (–) terminals respectively to check pumping rate.

Check for both front and rear washer pump.

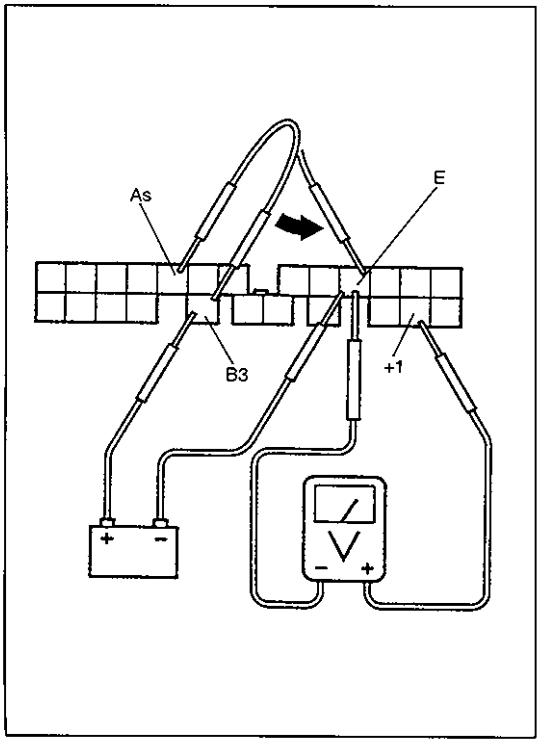
Pumping Rate:

Front and Rear	**more than 1.0 l/min (2.1 US pt./min, 1.76 Imp pt./min).**

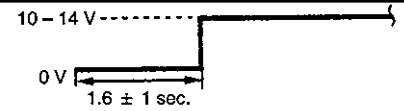
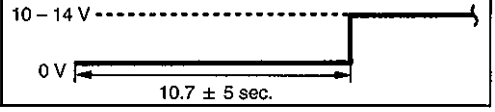


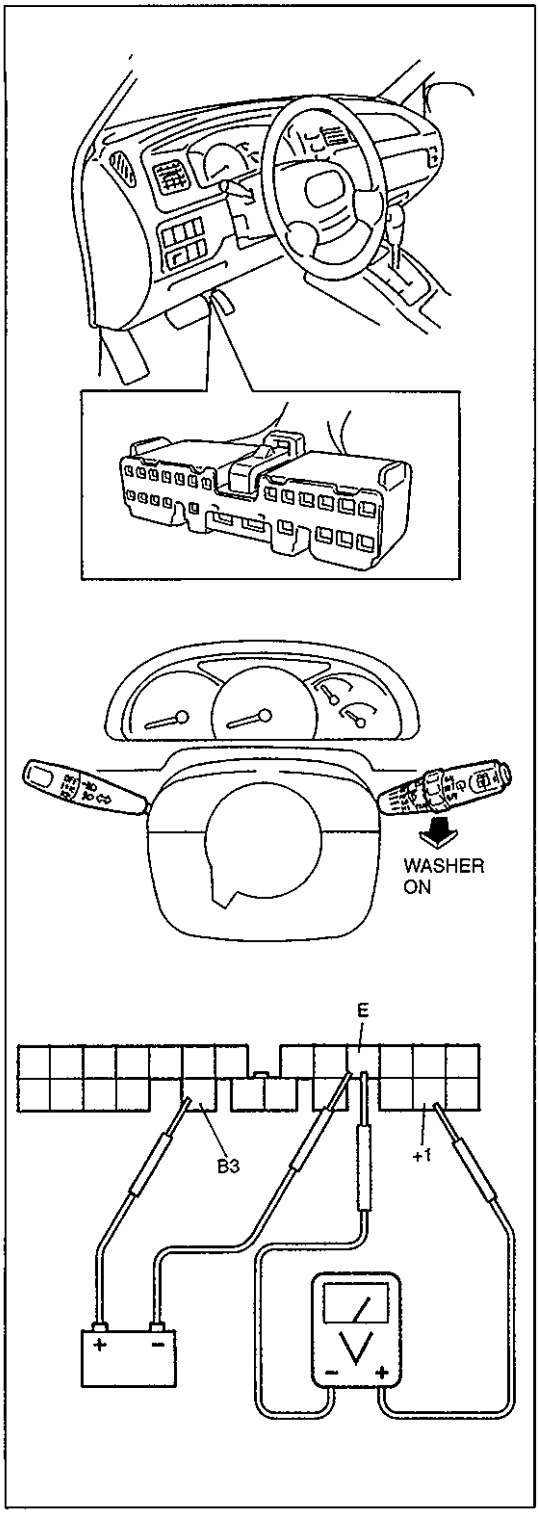
Intermittent Wiper Relay Circuit

1) Disconnect negative cable at battery.
2) Disconnect combination switch lead wire coupler.
3) Turn the front wiper switch to INT position.
4) Turn the intermittent time control switch to FAST position.
5) Connect battery positive terminal to terminal "B3" and battery negative terminal to terminal "E".
6) Connect voltmeter positive lead to terminal "+1" and negative lead to terminal "E".
   Check that the voltmeter indicates the battery voltage (10 – 14 V).



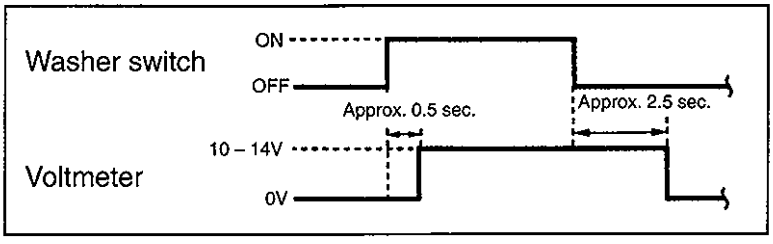
7) Connect terminal "As" and terminal "B3" by a jumper wire. Then connect terminal "B3" end to terminal "E".
   Observe the voltmeter voltage drops to 0 V right after connecting the jumper wire from terminal "B3" to "E". Then the voltage rises to battery voltage (10 – 14 V) within the time shown in the table below.

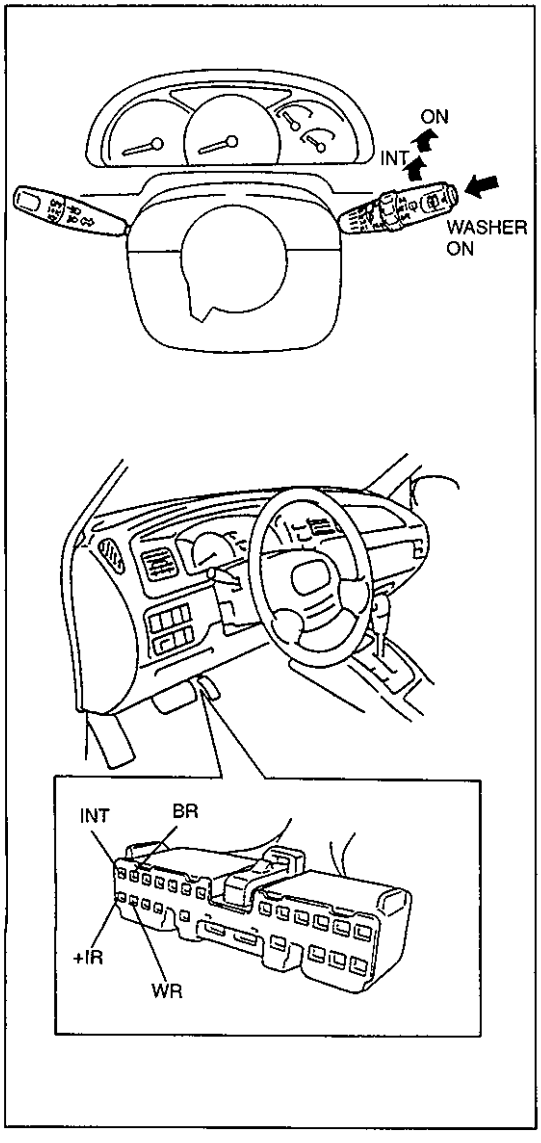
INT time control switch position	Voltage
FAST	
SLOW	



Washer Linked Operation

1) Disconnect negative cable at battery.
2) Disconnect combination switch lead wire coupler.
3) Make sure that front wiper switch is at OFF position.
4) Connect battery positive terminal to terminal "B3" and battery negative terminal to terminal "E".
5) Connect voltmeter positive lead to terminal "+1" and negative lead to terminal "E".
6) Push washer switch check that voltage changes as shown in the table.





REAR WINDOW WIPER AND WASHER

INSPECTION

Rear Wiper and Washer Switch (in Combination Switch)

1) Disconnect negative cable at battery.
2) Disconnect combination switch lead wire coupler.
3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

Rear Wiper Switch

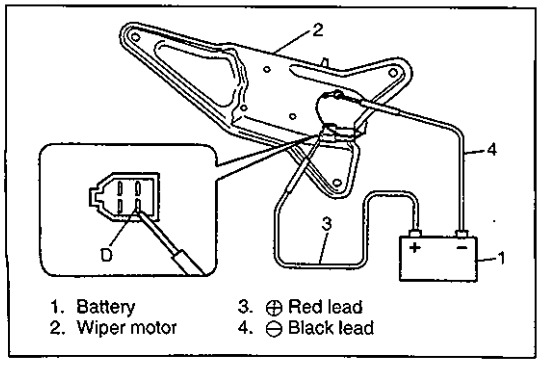
Switch \ Terminal	BR	INT	+IR
OFF			
INT	○	○	
ON	○		○

Rear Washer Switch

Switch \ Terminal	BR	WR
OFF		
ON	○	○

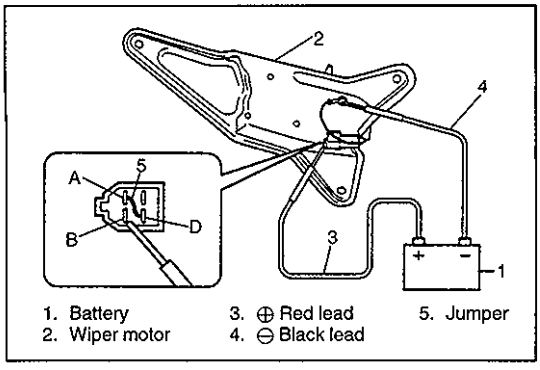
Washer Pump

Refer to FRONT WIPER AND WASHER INSPECTION in this section.



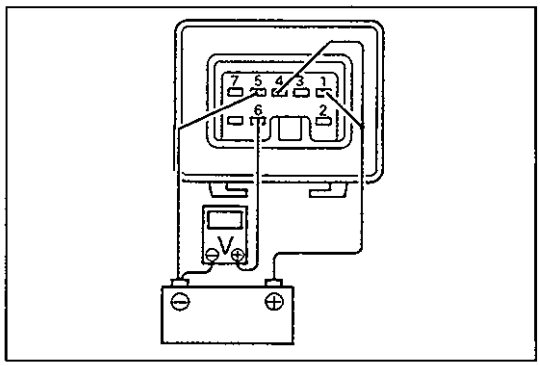
Wiper Motor

1) TESTING WIPER MOTOR
   As shown left, use a 12 V battery to connect its (+) and (–) terminals to terminal "D" and Black lead wire respectively. Then motor should rotate at 35 to 45 rpm.



1. Battery
2. Wiper motor
3. ⊕ Red lead
4. ⊖ Black lead
5. Jumper

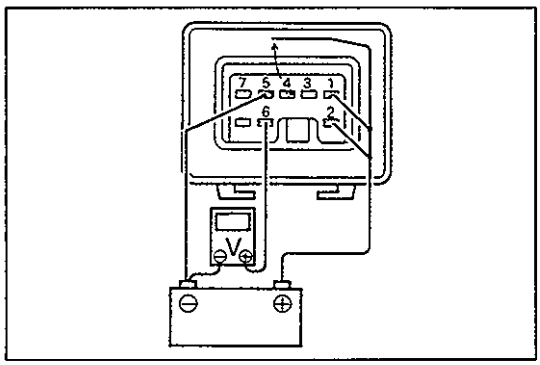
2) TESTING AUTOMATIC STOP ACTION
   a) First, connect battery (+) terminal to terminal "D" and battery (–) terminal to black lead wire and let the motor turn.
   b) Then disconnect terminal "D" from battery and let the motor stop.
   c) Next connect terminal "D" and terminal "A" with a jumper wire and connect terminal "B" 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.



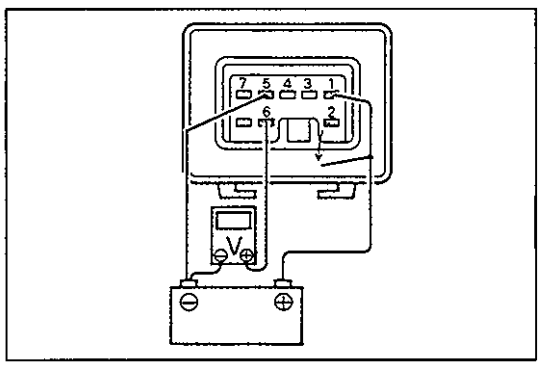
Rear Wiper Intermittent Relay

[ON circuit]

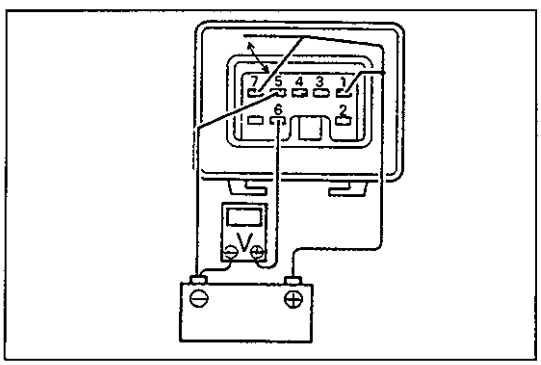
1. Connect positive terminal of battery to terminals "1" and "4" of controller, negative terminal to terminal "5" of controller and check voltage between terminals "6" and "5" of controller.
   If measured voltage is battery voltage, controller is in good condition.
   If not, replace controller.



2. Connect positive terminal of battery to terminal "2" of controller, then disconnect positive terminal from terminal "4" of controller and check voltage between terminals "6" and "5" of controller.
   If measured voltage is battery voltage, controller is in good condition.
   If not, replace controller.

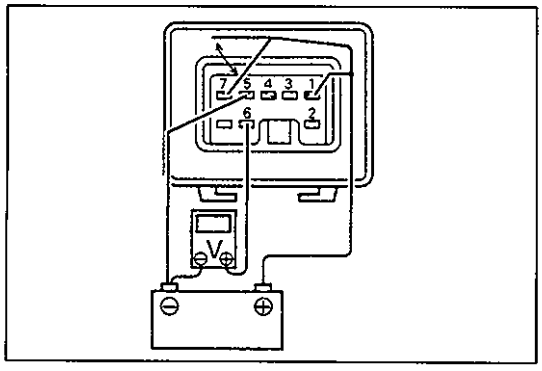


3. Disconnect positive terminal from terminal "2" of controller and check voltage between terminals "6" and "5" of controller.
   If measured voltage is about 0 V, controller is in good condition.
   If not, replace controller.

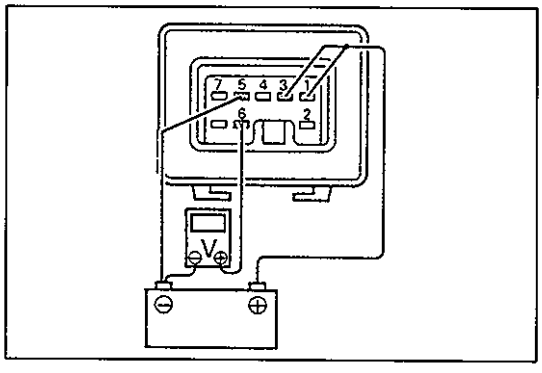


[WASH circuit]

1. Connect positive terminal of battery to terminal "1" of controller and negative terminal to terminal "5" of controller. Then connect positive terminal to terminal "7" checking voltage between terminals "6" and "5" of controller.
   If measured voltage changes from about 0 V to battery voltage 0.6 to 1.5 seconds after connecting positive terminal to terminal "7", controller is in good condition. If not, replace controller.

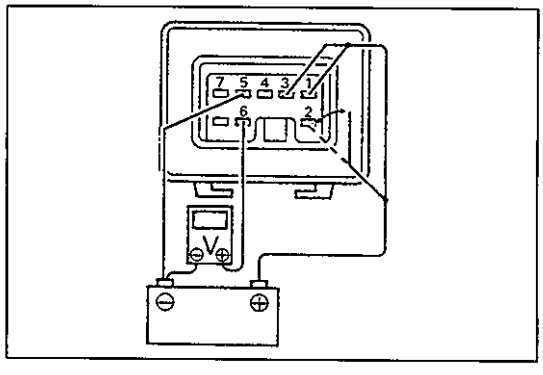


2. Disconnect positive terminal from terminal "7" checking voltage between terminal "6" and "5" of controller.
   If measured voltage changes from battery voltage to about 0 V 2.7 to 4.6 seconds after disconnecting positive terminal from terminal "7", controller is in good condition.
   If not, replace controller.

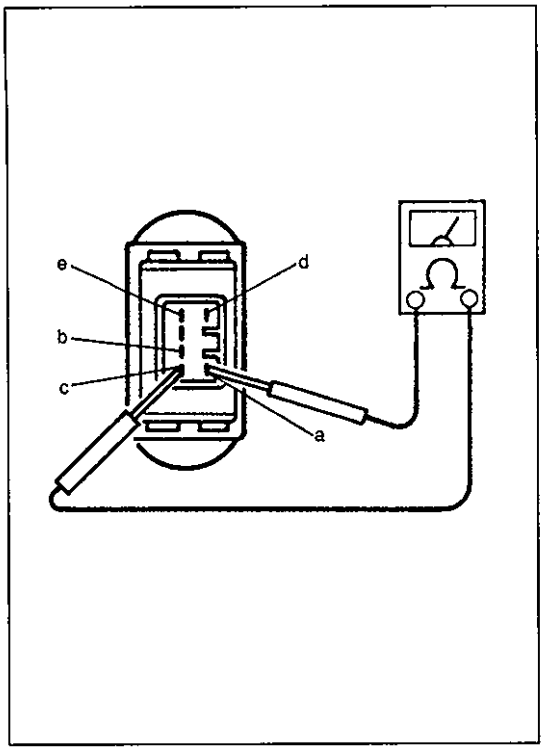


[INT circuit]

1. Connect positive terminal of battery to terminals "1" of controller and negative terminal to terminal "5" of controller. Then positive terminal to terminal "3" of controller checking voltage between terminals "6" and "5" of controller.
   If measured voltage changes from about 0 V to battery voltage when connecting positive terminal to terminal "3", controller is in good condition.
   If not, replace controller.



2. Connect positive terminal of battery to terminal "2" of controller, then disconnect positive terminal from terminal "2" of controller checking voltage between terminals "6" and "5" of controller.
   If measured voltage changes from battery voltage to about 0 V when disconnecting positive terminal from terminal "2" and about 0 V to battery voltage 8 ± 2 seconds after disconnecting positive terminal from terminal "2", controller is in good condition.
   If not, replace controller.



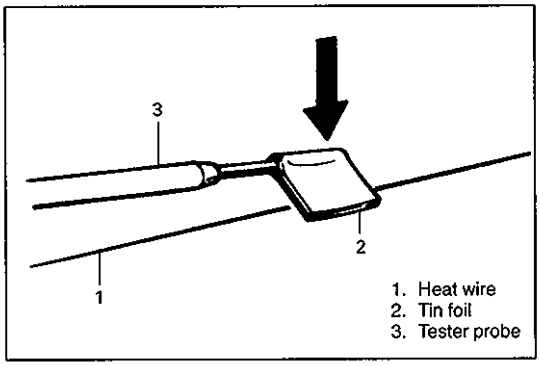
REAR WINDOW DEFOGGER

INSPECTION

DEFOGGER SWITCH

Use a circuit tester to check defogger switch for continuity.
If switch has no continuity between terminals, replace.

Terminal / Switch Position	a	b	c	d	e
OFF		○	○	○	○
ON (PUSH IN)	○	○	○		

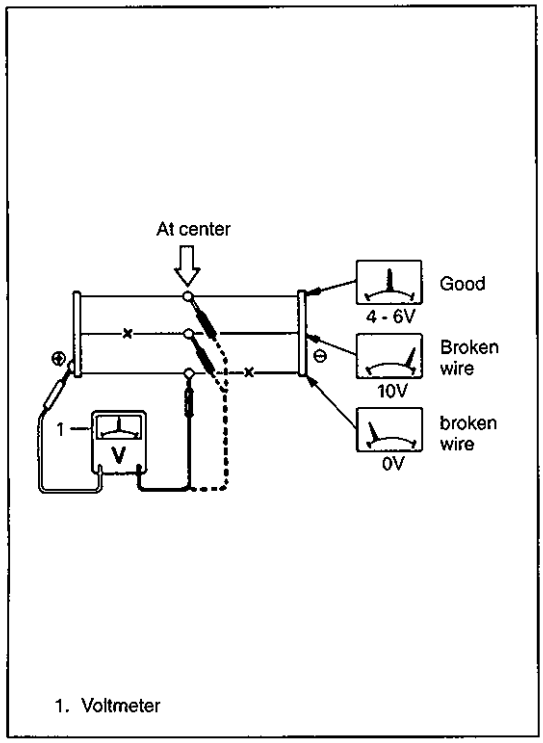


DEFOGGER WIRE

NOTE:

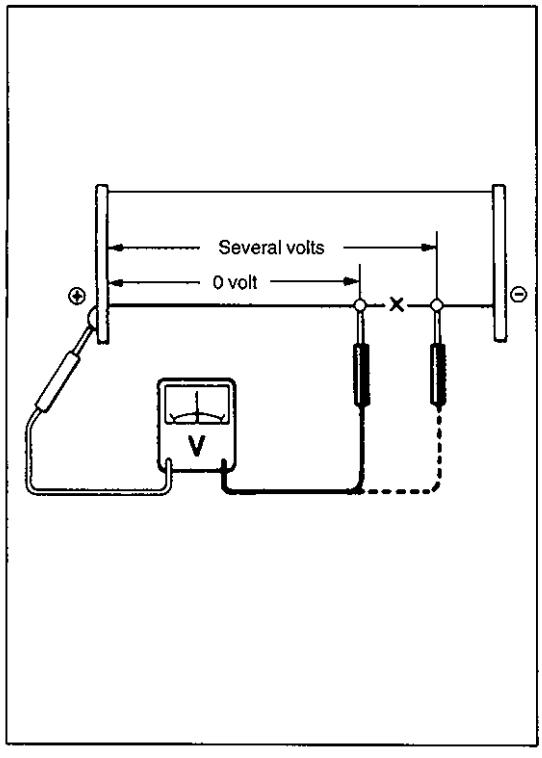
- **When cleaning rear window glass, use a dry cloth to wipe it along wire direction.**
- **When cleaning glass, do not use detergent or abrassive-containing glass cleaner.**
- **When measuring wire voltage, use a tester with negative probe wrapped with a tin foil which should be held down on wire by finger pressure.**

1) 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.



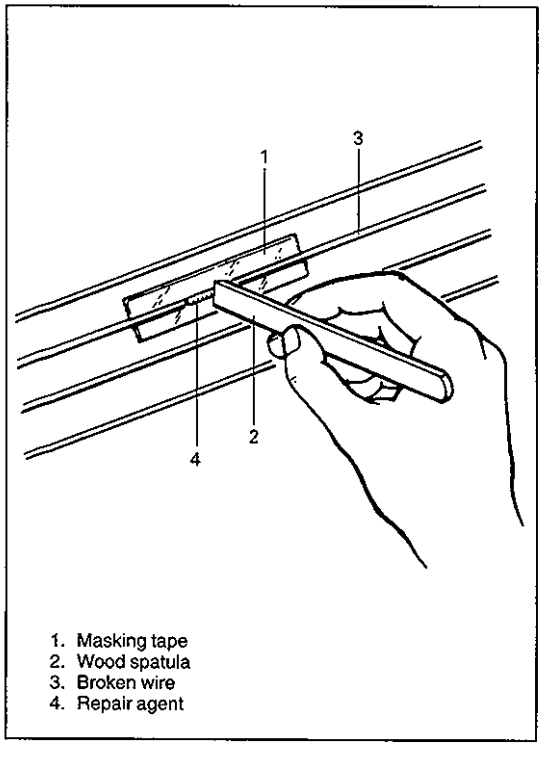
Voltage	Criteria
Approx. 5V	Good (No break in wire)
Approx. 10V or 0V	Broken wire

If measured voltage is 10V, wire must be damaged between its center and positive end. If voltage is zero, 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 zero 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).



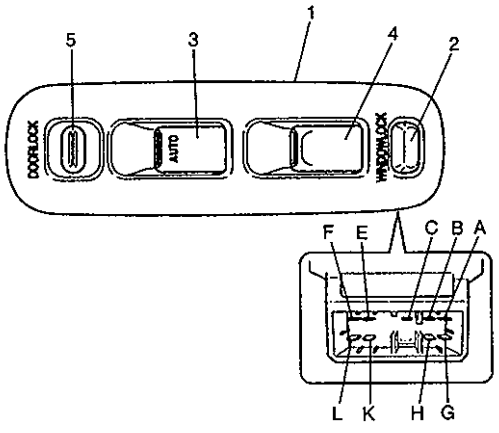
1. Masking tape
2. Wood spatula
3. Broken wire
4. Repair agent

REPAIR

DEFOGGER CIRCUIT

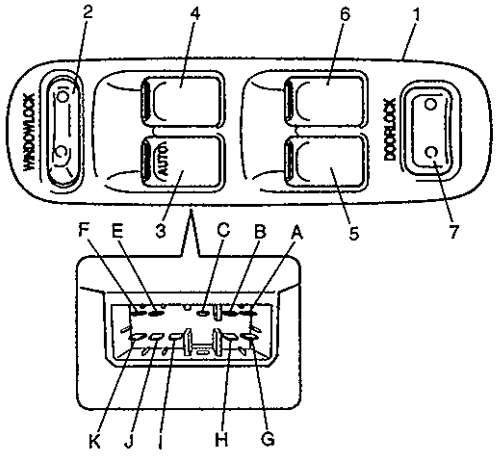
1) Use white gasoline for cleaning.
2) Apply masking tape at both upper and lower sides of heat wire to be repaired.
3) Apply commercially-available repair agent with a fine-tip brush.
4) Two to three minutes later, remove masking tapes previously applied.
5) Leave repaired heat wire as it is for at least 24 hours before operating defogger again.

Type 1



1. Power window main switch
2. Power window lock switch
3. Driver side window switch
4. Passenger side window switch
5. Door lock switch

Type 2
LH steering vehicle



1. Power window main switch
2. Power window lock switch
3. Driver side window switch
4. Passenger side window switch
5. Rear LH window switch
6. Rear RH window switch
7. Door lock switch

POWER WINDOW CONTROL SYSTEM

INSPECTION

POWER WINDOW MAIN SWITCH

Inspect switch continuity between terminals.

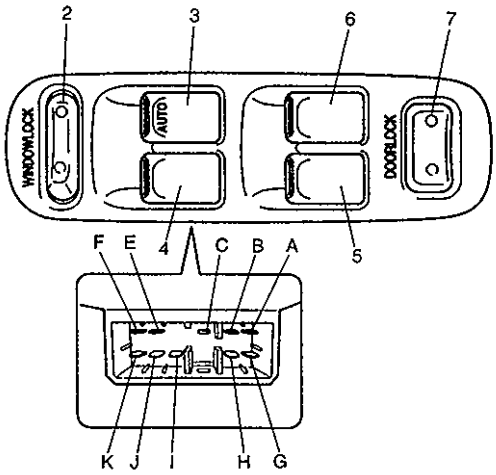
Type 1

Window Lock Switch	Terminal / Switch	Driver Side Window Switch				Passenger Side Window Switch					
		C	H	G	A	C	E	B	A	A	F
OFF	UP	○	○			○	○				
				○	○			○	○		
	OFF		○		○		○		○	○	○
				○	○			○	○		
	DOWN	○		○		○		○			
			○		○		○		○		
ON	UP	○	○			○	○				
				○	○						
	OFF		○		○		○				
				○	○						
	DOWN	○		○		○		○			
			○		○						

Type 2 LH steering vehicle

Window Lock Switch	Terminal / Switch	Driver Side Window Switch				Passenger Side Window Switch				Rear RH Window Switch				Rear LH Window Switch			
		K	C	A	B	K	C	E	F	K	C	I	J	K	C	G	H
OFF	UP	○	○			○	○			○	○			○	○		
			○	○			○	○			○	○			○	○	
	OFF		○		○		○		○		○		○		○		○
			○	○			○	○			○	○			○	○	
	DOWN	○			○	○			○	○			○	○			○
			○	○			○	○			○	○			○	○	
ON	UP	○	○			○	○			○	○			○	○		
			○	○													
	OFF		○		○			○	○			○	○			○	○
			○		○												
	DOWN	○			○	○			○	○			○	○			○
			○	○													

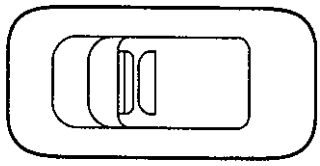
Type 2
RH steering vehicle

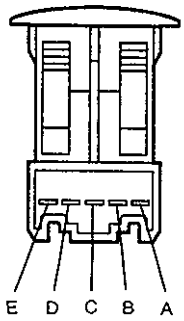


1. Power window main switch
2. Power window lock switch
3. Driver side window switch
4. Passenger side window switch
5. Rear LH window switch
6. Rear RH window switch
7. Door lock switch

Type 2 RH steering vehicle

Window Lock Switch	Switch \ Terminal	Driver Side Window Switch				Passenger Side Window Switch				Rear RH Window Switch				Rear LH Window Switch			
		K	C	E	F	K	C	A	B	K	C	I	J	K	C	G	H
OFF	UP	○		○		○		○		○		○		○		○	
			○		○		○		○		○		○		○		○
	OFF		○	○			○	○			○	○			○	○	
			○		○		○		○		○		○		○		○
	DOWN	○			○	○			○	○			○	○			○
			○	○			○	○			○	○			○	○	
ON	UP	○		○		○		○		○		○		○		○	
			○		○												
	OFF		○	○				○	○			○	○			○	○
			○		○												
	DOWN	○			○	○			○	○			○	○			○
			○	○													

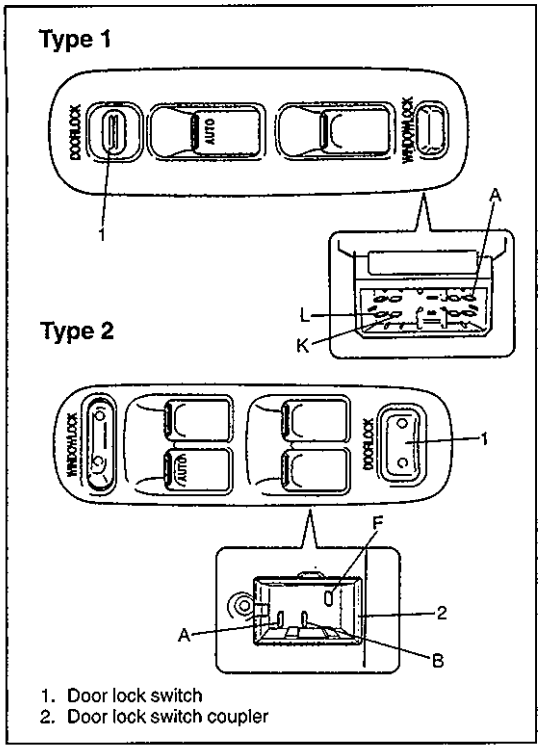




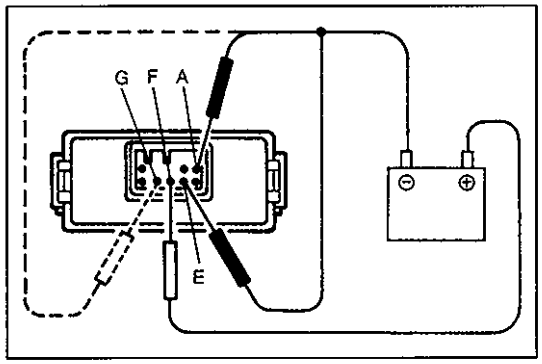
POWER WINDOW SUB SWITCH

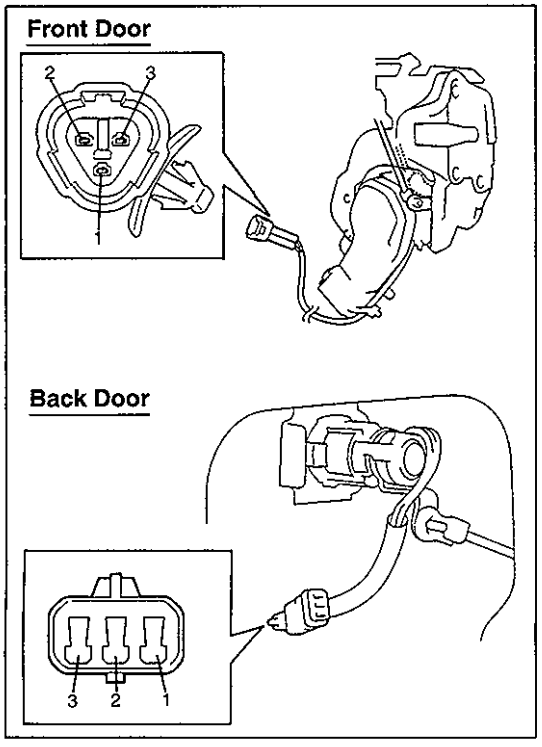
Inspect switch continuity between terminal.

Switch Position \ Terminal	C	B	E	A	D
UP		○		○	
	○				○
OFF		○		○	
			○		○
DOWN	○			○	
			○		○



1. Door lock switch
2. Door lock switch coupler





POWER DOOR LOCK SYSTEM

INSPECTION

POWER DOOR LOCK SWITCH

Inspect continuity at terminals according to the door lock switch action.

Type 1

Switch \ Terminal	A	L	K
LOCK	○——	——○	
NEUTRAL			
UNLOCK	○——		——○

Type 2

Switch \ Terminal	A	B	F
LOCK	○——		——○
OFF			
UNLOCK	○——	——○	

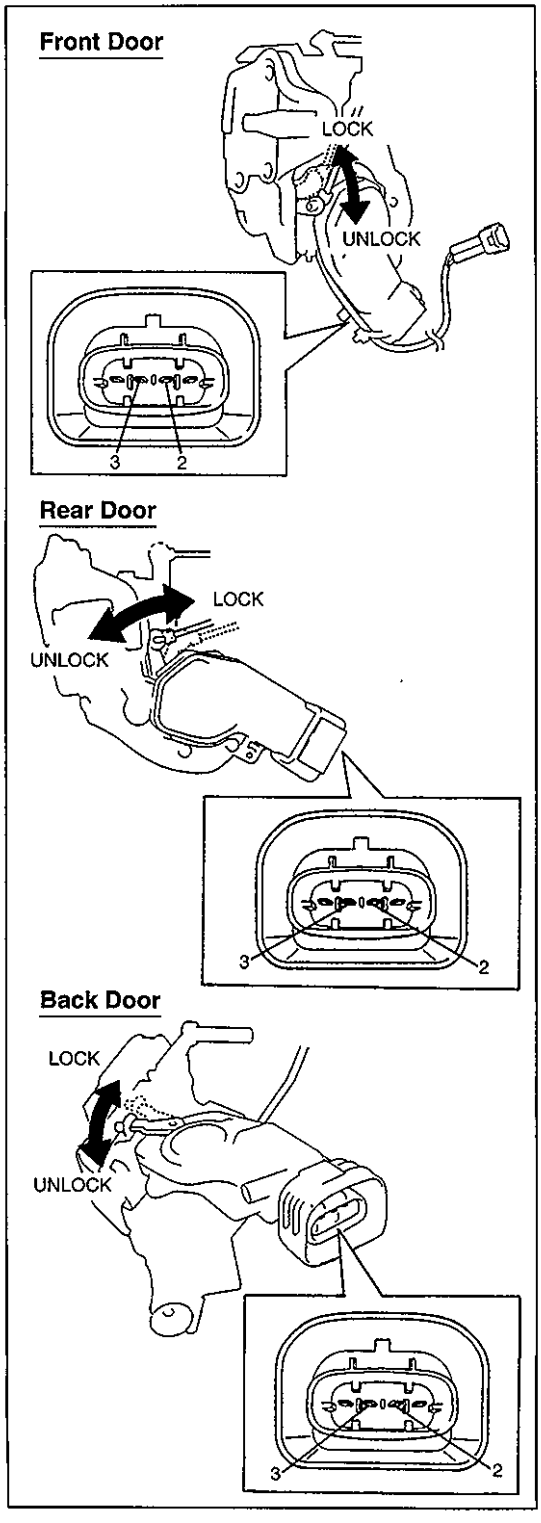
POWER DOOR LOCK CONTROLLER

1) Disconnect power door lock controller coupler.
2) Connect (+) wire and (–) wire of 12 V battery to terminal "A", "E" and "F" as shown in figure.
3) Disconnect cord from terminal "E" and connect it to terminal "G".
4) Repeat Steps 2) and 3) several times and if relay operation is heard every time, it means that controller is operating.

KEY CYLINDER SWITCH

Inspect continuity at terminals according to the key action.

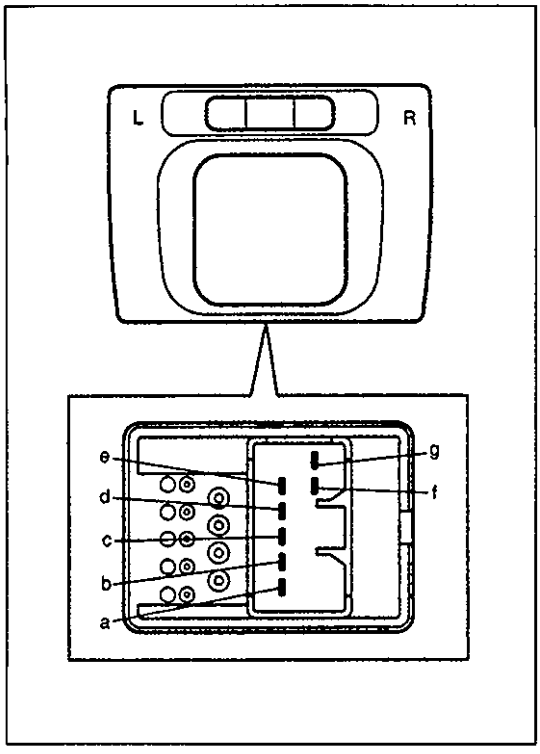
Key \ Terminal	3	2	1
LOCK	○——	——○	
OFF			
UNLOCK		○——	——○



POWER DOOR LOCK ACTUATOR

1) Disconnect power door lock actuator coupler.
2) Connect 12V battery positive and negative terminals to the door lock actuator terminals shown below.
   If it does not follow the table's operation, replace the faulty door lock actuator.

Terminal \ Operation	UNLOCK	LOCK
2	⊖	⊕
3	⊕	⊖



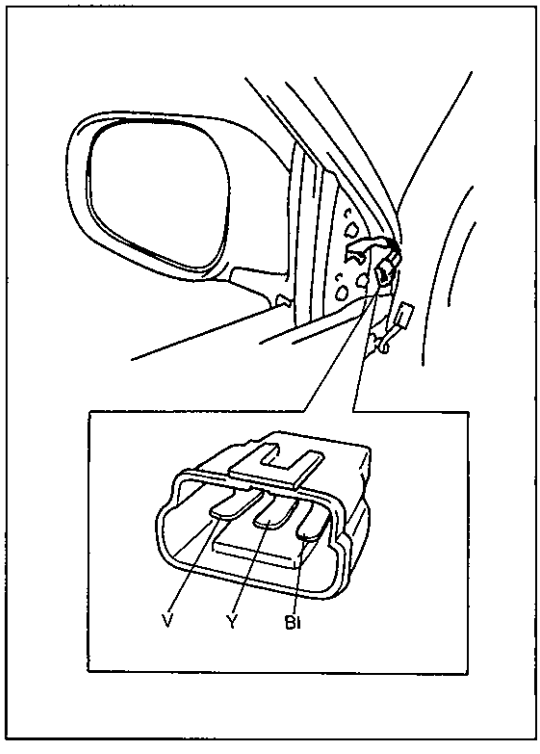
POWER DOOR MIRROR CONTROL SYSTEM

INSPECTION

MIRROR SWITCH

1) Remove 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.

L / R	a	b	c	d / e	g / f
UP	○	○	○		○
DOWN	○	○	○		○
LEFT	○	○	○	○	
RIGHT	○	○	○	○	

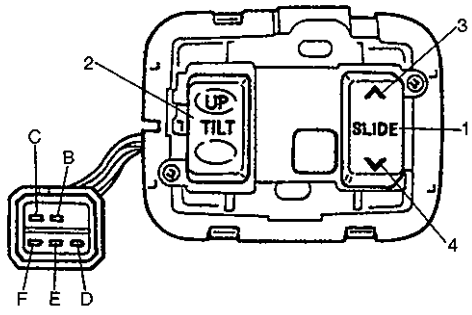


DOOR MIRROR ACTUATOR

1) Remove garnish from door.
2) Disconnect door mirror coupler.
3) Check that door mirror operates properly when battery voltage is applied to connector terminals.
   Connect battery positive and negative terminal to the door mirror terminal shown below.
   If it does not follow the table's operation, replace door mirror assembly.

Terminal / Operation	V	Bl	Y
Up	⊖	⊕	
Down	⊕	⊖	
Left	⊖		⊕
Right	⊕		⊖

NOTE:
When installing door mirror to door, be careful not to pinch harness between door and door mirror.



1. Slide switch
2. Tilt switch
3. To open
4. To close

POWER SLIDING ROOF (If equipped)

INSPECTION

SLIDING ROOF SWITCH

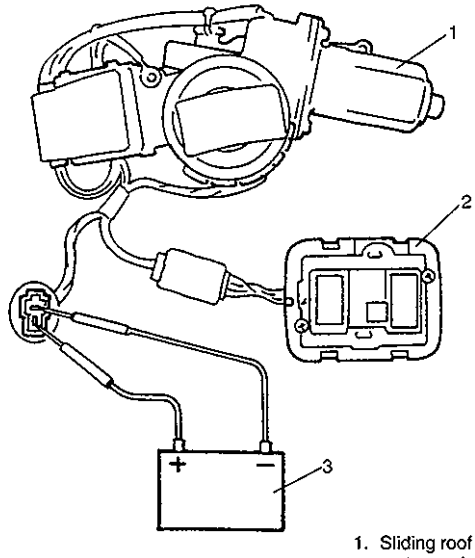
Inspect switch continuity between terminals.

Slide Switch

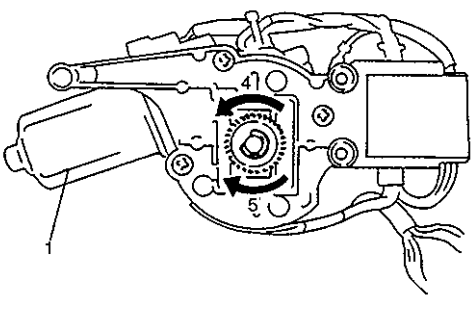
Switch \ Terminal	C	D	F
OPEN	○	○	
OFF			
CLOSE		○	○

Tilt Switch

Switch \ Terminal	E	D	B
UP	○	○	
OFF			
DOWN		○	○



1. Sliding roof motor ass'y
2. Sliding roof switch
3. 12 V battery



4. Left turn
5. Right turn

SLIDING ROOF MOTOR ASSEMBLY

1) Remove head lining. Refer to Section 9 for detail.
2) Remove sliding roof motor assembly.
3) Connect known-good sliding roof switch to sliding roof motor assembly.
4) Connect 12 V battery positive terminal to terminal "A" of motor assembly and battery negative terminal to terminal "B" of motor assembly.
5) Check that the sliding roof motor runs according to the movement of the sliding roof switch.

Sliding Roof Switch	Motor
Tilt up	turns left
Tilt down	turns right
Slide open	turns right
Slide close	turns left

If motor does not operate as above, replace sliding roof motor assembly.

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 designed to prevent vehicle burglar consists of following components.

- Engine control module (ECM)
- Immobilizer control module
- Ignition key (with built-in transponder)
- Coil antenna

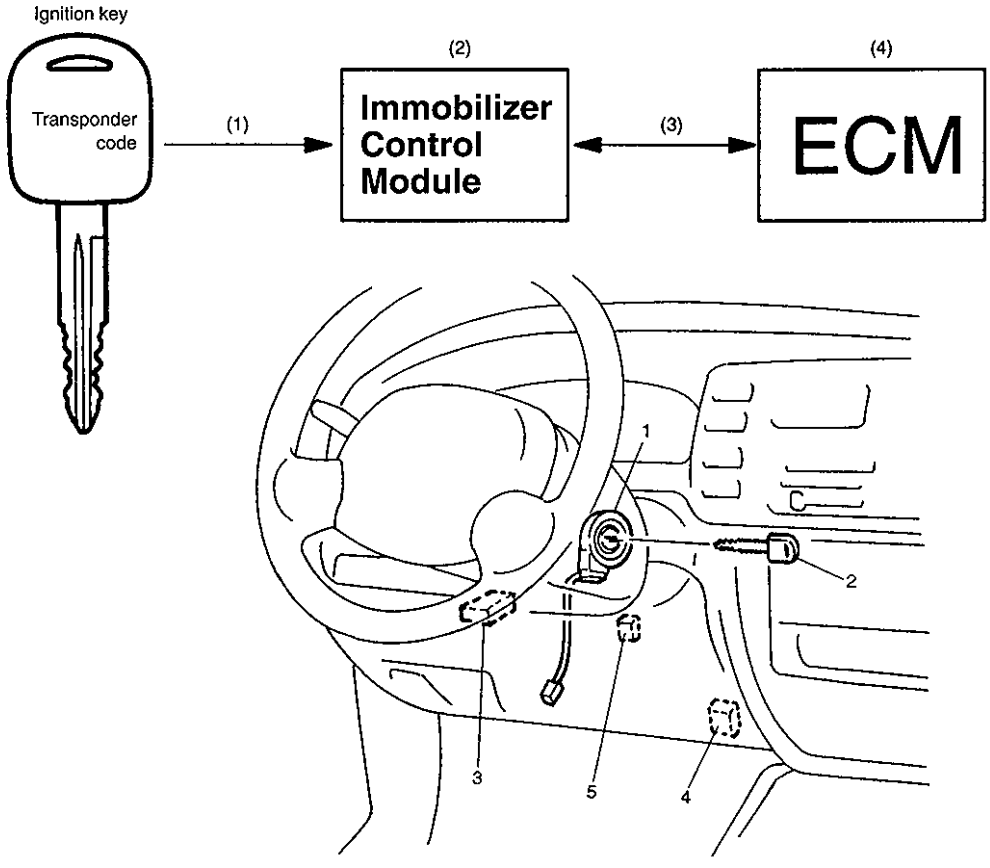
Operation of this system is as follows.

(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.

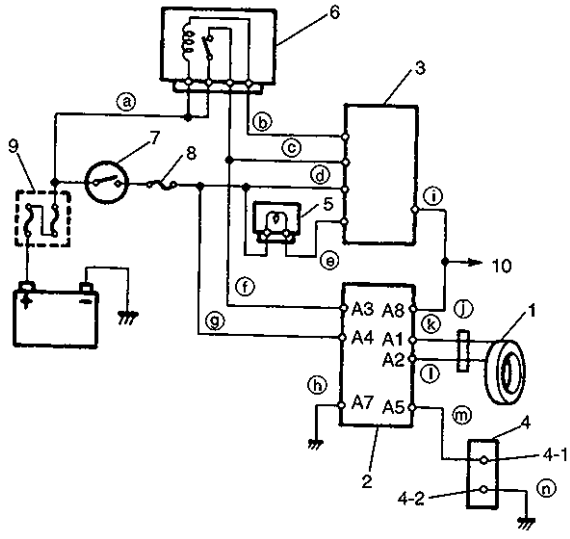
(2) Immobilizer Control Module compares the Transponder code read in (1) and that registered in Immobilizer Control Module and checks if they match.

(3) When it is confirmed that two Transponder codes match each other as described above, Immobilizer Control Module and ECM check if ECM/Immobilizer Control Module codes registered in them respectively match.

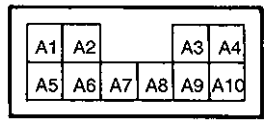
(4) Only when it is confirmed that ECM/Immobilizer Control Module codes match, the engine starts running. If Transponder codes in Step (2) or ECM/Immobilizer Control Module codes in Step (3) do not match, ECM will stop operation of the injector and ignition of spark plug.



1. Coil antenna
2. Ignition key
3. Immobilizer control module
4. Data link connector (DLC)
5. Immobilizer diagnostic coupler

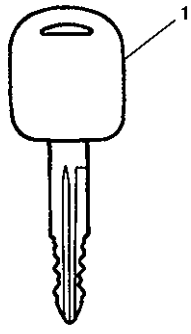


WIRE SYMBOL	WIRE COLOR
ⓐ	B/R
ⓑ	Bl
ⓒ	Bl/B
ⓓ	B/W
ⓔ	V/Y
ⓕ	Bl/B
ⓖ	B/W
ⓗ	B
ⓘ	V/W
ⓙ	V/W
ⓚ	Bl
ⓛ	R
ⓜ	Sbl
ⓝ	B



Terminal arrangement of Immobilizer Control Module coupler (Viewed from harness side)

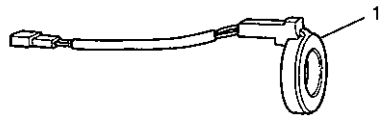
1. Coil antenna
2. Immobilizer Control Module
3. ECM
4. Immobilizer diagnostic coupler
4-1. Diagnostic output terminal
4-2. Ground terminal
5. Malfunction indicator lamp ("CHECK ENGINE" light)
6. Main relay
7. Ignition switch
8. Fuse
9. Main fuse
10. To Data link connector



1. Ignition key with built-in transponder

IGNITION KEY

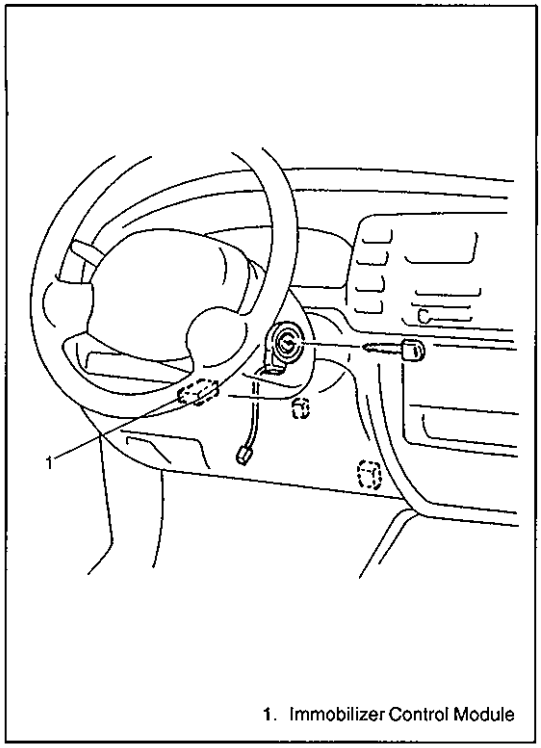
The ignition key for the immobilizer control system has a built-in transponder. Each transponder in the key has an each transmitting code (Transponder code). The code will transmitted from the key via the coil antenna to Immobilizer Control Module when the ignition switch is turned ON.



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

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 and that registered in Immobilizer Control Module. In addition, it has an on-board diagnostic system (self-diagnosis function) which is described in "On-Board Diagnostic System (Self Diagnosis Function)" in this section.

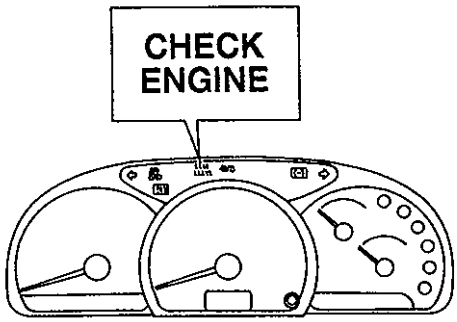
ECM

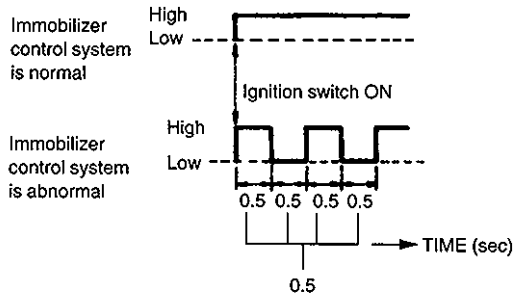
As main functions, ECM not only checks matching of ECM/Immobilizer Control Module codes but also has an on-board diagnostic system (self-diagnosis function) as described in "On-Board Diagnostic System (Self Diagnosis Function)" in this section.
For installation position of ECM, refer to SECTION 6E1 or 6E2.

ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION)

Immobilizer Control Module and ECM diagnose troubles which may occur in the area including the following parts when the ignition switch is ON.

ECM: ●ECM/Immobilizer Control Module code ●Serial data link circuit ●ECM	Immobilizer Control Module: ●Transponder code ●Coil antenna ●ECM/Immobilizer Control Module code ●Serial data link circuit ●Immobilizer Control Module ●Ignition signal





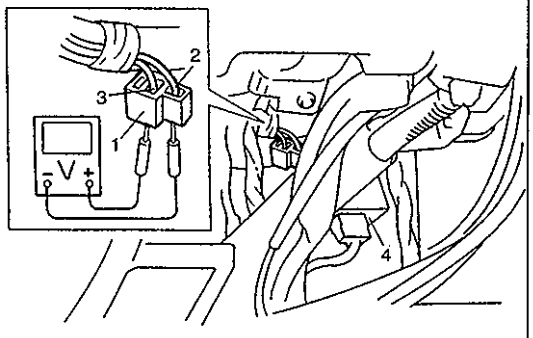
With the diagnosis switch terminal of monitor coupler for ECM not grounded, the ignition switch turned ON (but the engine at stop) and regardless of the condition of the electronic fuel injection system, ECM indicates whether a trouble has occurred in the immobilizer control system or not by causing the malfunction indicator lamp ("CHECK ENGINE" light) to flash or turn ON.

"CHECK ENGINE" light is ON:
No trouble exists in the immobilizer control system.
"CHECK ENGINE" light is flashing:
ECM or Immobilizer Control Module has detected some trouble in the immobilizer control system.

NOTE:
As soon as the ignition switch is turned ON, ECM 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 ("CHECK ENGINE" light) 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.

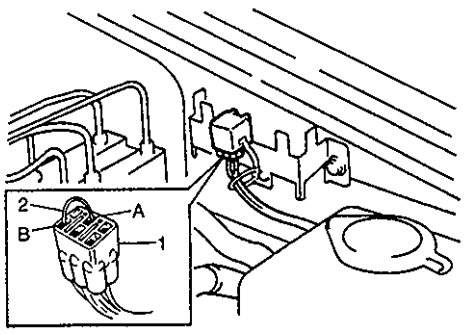
When ECM and Immobilizer Control Module detects a trouble which has occurred in the above areas it stores DTC corresponding to the exact trouble area in ECM and Immobilizer Control Module memory.

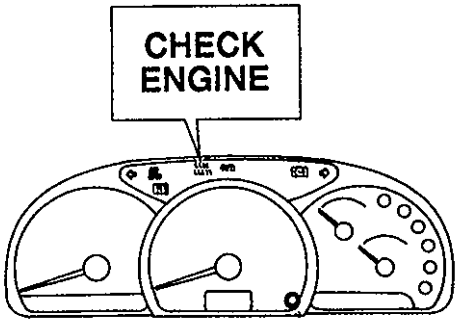
DTCs stored in memory of each controller (Immobilizer Control Module and ECM) can be read by using the following procedure.



1. Immobilizer diagnostic coupler
2. Ground terminal
3. Diagnostic output terminal
4. Power door lock controller

For Immobilizer Control Module
With the ignition switch turned ON, Immobilizer Control Module outputs the result (Diagnostic trouble code (DTC)) of diagnosing the above area through the diagnostic output terminal of the immobilizer diagnostic coupler. This can be read by checking deflection of the voltmeter indicator as it deflects when the positive probe and the negative probe of the voltmeter are connected to the diagnostic output terminal and the ground terminal respectively.





1. Monitor coupler
2. Service wire
A: Diagnosis switch terminal
B: Ground terminal

For ECM

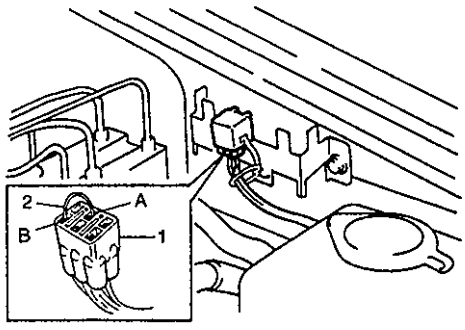
With the ignition switch turned ON and the diagnostic switch terminal grounded, ECM outputs the result (Diagnostic trouble code (DTC)) of diagnosing above area of the immobilizer control system and the result (Diagnostic trouble code) of the electronic fuel injection system by flashing the malfunction indicator lamp ("CHECK ENGINE" light).

NOTE:

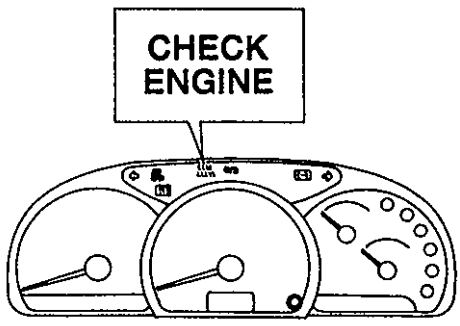
When a trouble exists in the immobilizer control system (when Immobilizer Control Module or ECM detects a diagnostic trouble code (DTC)), ECM will stop operation of the injector and ignition of spark plug.

DIAGNOSIS

ECM 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.



1. Monitor Coupler
2. Service wire
A: Diagnosis switch terminal
B: Ground terminal

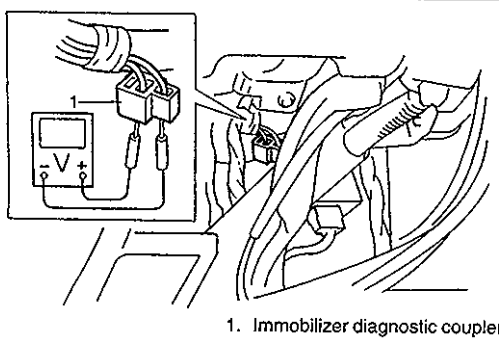


PRECAUTIONS IN DIAGNOSING TROUBLES

[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

ECM

- Before identifying diagnostic trouble code indicated by malfunction indicator lamp ("CHECK ENGINE" light), don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine.
  Such disconnection will clear trouble codes for electronic fuel injection system stored in memory of ECM.
- If abnormality or malfunction lies in two or more areas, malfunction indicator lamp ("CHECK ENGINE" light) 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 detects a trouble in both electronic fuel injection system and immobilizer control system, malfunction indicator lamp ("CHECK ENGINE" light) 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.



1. Immobilizer diagnostic coupler

Immobilizer Control Module

- Take a note of diagnostic trouble code indicated first.

[INTERMITTENT TROUBLES]

- There are cases where output of diagnostic output terminal and/or malfunction indicator lamp ("CHECK ENGINE" light) 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 and recheck.
  * When trouble can not be identified but output of diagnostic output terminal and/or malfunction indicator lamp ("CHECK ENGINE" light) 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 ("CHECK ENGINE" light) and/or output of diagnostic output terminal indicate.
Only when they indicate trouble code again, substitute a known-good ECM 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 or Immobilizer Control Module]

- When ECM was replaced, including when replaced because rechecking by using a known-good ECM was necessary during trouble diagnosis, the ECM/Immobilizer Control Module code must be registered in ECM and Immobilizer Control Module by performing procedure described in "Procedure after ECM Replacement" on p.8G-27. 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 by performing procedure described in "Procedure after Immobilizer Control Module Replacement" on p.8G-26. If they are not registered, the engine would not start and accurate trouble diagnosis would not be assured.

DIAGNOSTIC FLOW TABLE

STEP	ACTION	YES	NO
1	1) Make sure that diagnosis switch terminal for Electronic Fuel Injection System is not grounded by service wire. See Fig. 1. 2) Check malfunction indicator lamp ("CHECK ENGINE" light) while ignition switch is ON (but without starting engine). See Fig. 2. Does 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	Using service wire, ground diagnosis switch terminal for Electronic Fuel Injection System. See Fig. 3. Does malfunction indicator lamp ("CHECK ENGINE" light) flash?	Immobilizer control system is in good condition.	Go to "MALFUNCTION INDICATOR LAMP CHECK" in Section 6.
3	Does malfunction indicator lamp ("CHECK ENGINE" light) flash as Fig. 4.	Go to Step 4.	Go to "MALFUNCTION INDICATOR LAMP CHECK" in Section 6.
4	1) Connect positive probe of analog type voltmeter to diagnostic output terminal of immobilizer diagnostic coupler and negative probe to ground of immobilizer diagnostic coupler with ignition switch turned ON. See Fig. 5. 2) Is it possible to read diagnostic trouble code (DTC) by checking deflection of voltmeter indicator? (Refer to Immobilizer Control Module side in "DIAGNOSTIC TROUBLE CODE TABLE" section.)	• If deflection of voltmeter indicates "No code", go to Step 5. • If deflection of voltmeter indicates DTC No., go to flow table for DTC No.	Go to table A.
5	Using service wire, ground diagnosis switch terminal for Electronic Fuel Injection System. See Fig. 3. Is there diagnostic trouble code (DTC) for immobilizer control system? (Refer to ECM side in "DIAGNOSTIC TROUBLE CODE TABLE" section.)	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

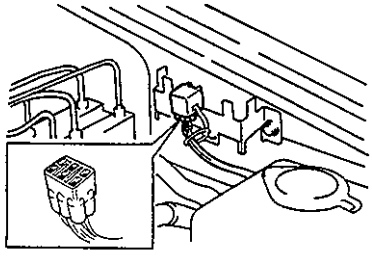


Fig. 2 for Step 1

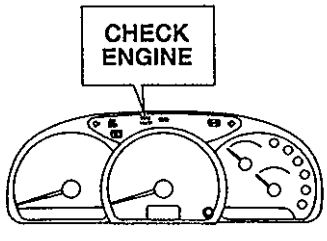
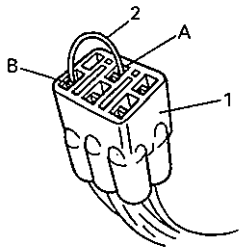


Fig. 3 for Step 2 and Step 5



1. Monitor coupler
2. Service wire
A: Diagnosis switch terminal
B: Ground terminal

Fig. 4 for Step 3

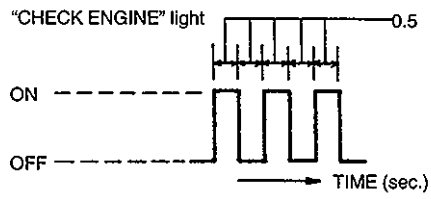
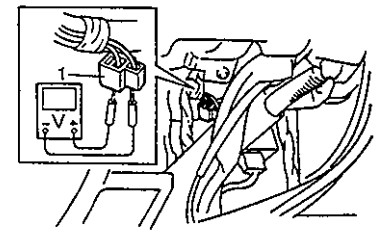


Fig. 5 for Step 4

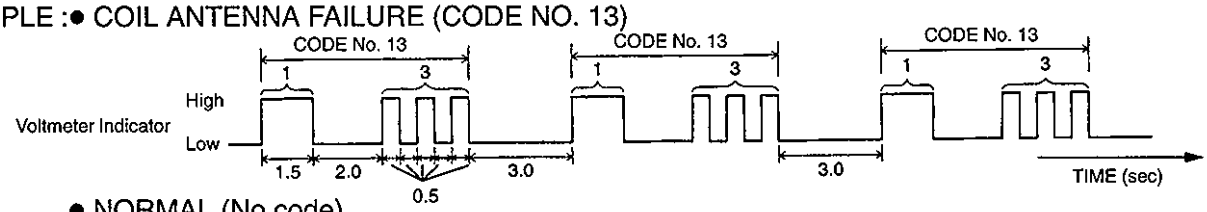


1. Immobilizer diagnosis coupler

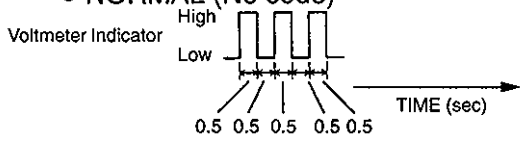
DIAGNOSTIC TROUBLE CODE TABLE

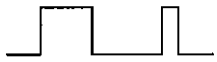
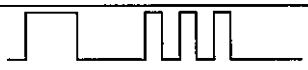
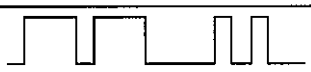
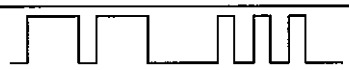
Immobilizer Control Module side

EXAMPLE :● COIL ANTENNA FAILURE (CODE NO. 13)



● NORMAL (No code)



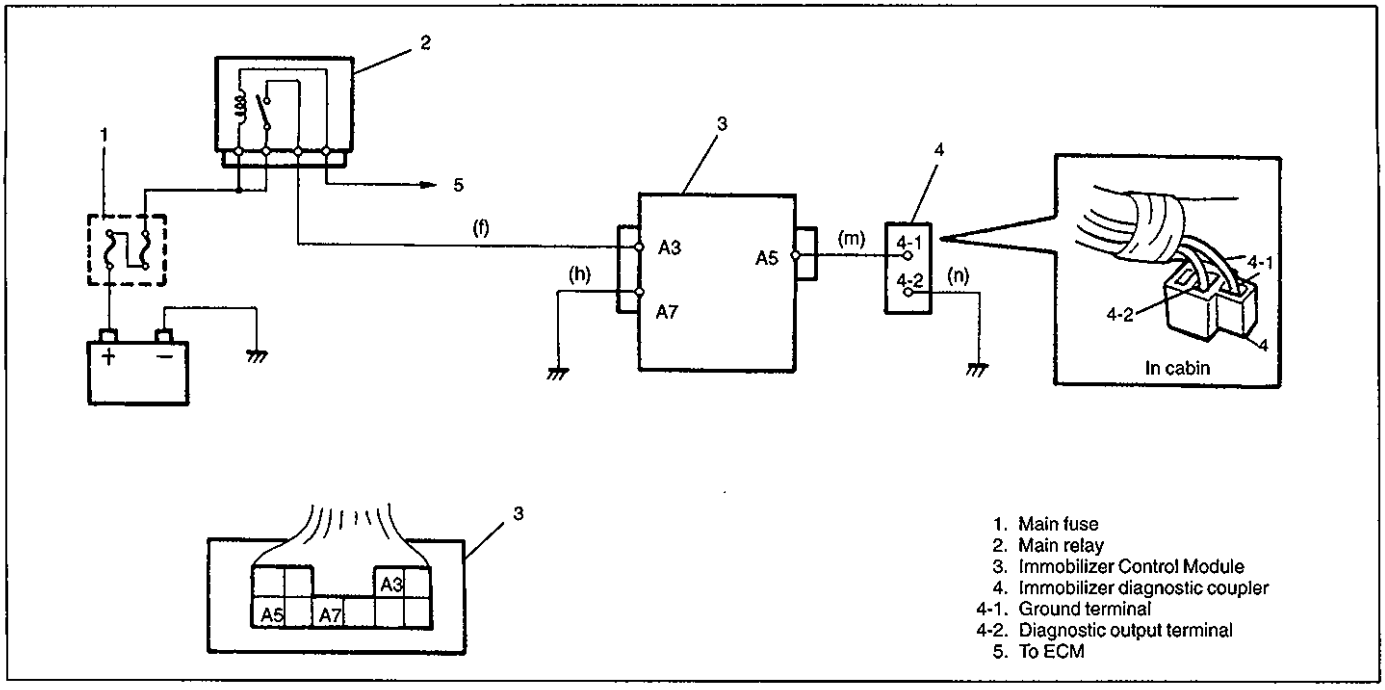
DIAGNOSTIC TROUBLE CODE		DIAGNOSTIC AREA	DIAGNOSIS
NO.	VOLTMETER INDICATION		
–		Normal (No code)	This code appears when none of the other codes are identified.
11		Transponder code	Diagnose trouble according to "DIAGNOSTIC FLOW TABLE" corresponding to each code No.
31			
12		Immobilizer Control Module	
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 side

To learn how to read diagnostic trouble code (DTC) from flashing of malfunction indicator lamp ("CHECK ENGINE" light), refer to SECTION 6E1 or 6E2.

DIAGNOSTIC TROUBLE CODE		DIAGNOSTIC AREA	DIAGNOSIS
NO.	MALFUNCTION INDICATOR lamp ("CHECK ENGINE" light) INDICATION		
12		Normal	This code appears when it is confirmed that none of other trouble codes is set for immobilizer control system or electronic fuel injection system.
81		ECM/Immobilizer Control Module code	Diagnose trouble according to "DIAGNOSTIC FLOW TABLE" corresponding to each code No.
84			
82		ECM	
83		Serial data link wire	

TABLE A DTC IS NOT OUTPUT FROM DIAGNOSTIC OUTPUT TERMINAL



1. Main fuse
2. Main relay
3. Immobilizer Control Module
4. Immobilizer diagnostic coupler
4-1. Ground terminal
4-2. Diagnostic output terminal
5. To ECM

STEP	ACTION	YES	NO
1	Check voltage between A3 terminal and body ground with ignition switch turned ON. Is it 10-14V?	Go to Step 2.	"(f)" wire open.
2	1) Connect voltmeter between A5 terminal and body ground. 2) Does voltmeter indicator deflect?	Go to Step 3.	• Poor A3, A5 or A7 connection. • "(h)" wire of A7 terminal open. • "(m)" wire between A5 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 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?	"(n)" wire of ground terminal for immobilizer diagnostic coupler open.	"(m)" wire between A5 terminal and diagnostic output terminal of immobilizer diagnostic coupler open.

DTC11 TRANSPONDER CODE NOT MATCHED

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, this DTC is set.

INSPECTION:

Register ignition key with built-in transponder by using TECH1 (TECH1 cartridge for immobilizer control system and TECH 1A kit) and performing following steps.

1) Register Transponder code in Immobilizer Control Module by performing procedure described in "How to register ignition key" section.
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 TECH1 (TECH1 cartridge for immobilizer control system and TECH 1A kit) and performing following steps.

1) Register Transponder code in Immobilizer Control Module by performing procedure described in "How to register ignition key" section.
2) Turn ignition switch OFF, then turn it ON and check that DTC31 is not set.

DTC12 FAULT IN IMMOBILIZER CONTROL MODULE

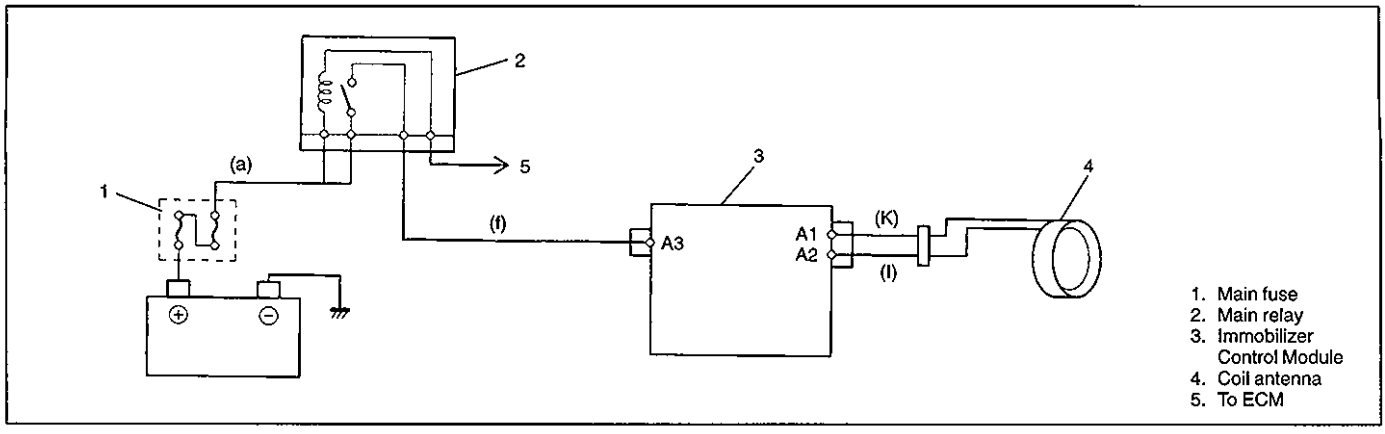
DESCRIPTION:

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 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



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) Ω ?	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) Ω ?	Go to Step 5.	"(k)" wire shorted to "(I)"wire.
5	Measure resistance between terminal A1 of Immobilizer Control Module coupler and body ground. (See Fig. 5) Is it ∞ (infinity) Ω ?	Go to Step 6.	"(k)" wire shorted to ground.
6	Measure resistance between terminal A2 of Immobilizer Control Module coupler and body ground. (See Fig. 6) Is it ∞ (infinity) Ω ?	Go to Step 7.	"(I)" wire shorted to ground.
7	1) Connect coil antenna coupler. 2) Is there continuity between Immobilizer Control Module coupler terminals A1 and A2? (See Fig. 7)	Go to Step 8.	• "(k)" or "(I)" wire open • Poor coil antenna-to-coupler

DTC13 NO TRANSPONDER CODE TRANSMITTED OR COIL ANTENNA OPENED/SHORTED (CONTINUED)

STEP	ACTION	YES	NO
8	Poor A1 or A2 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 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

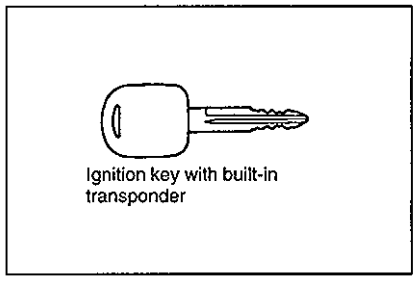


Fig. 2 for step 2

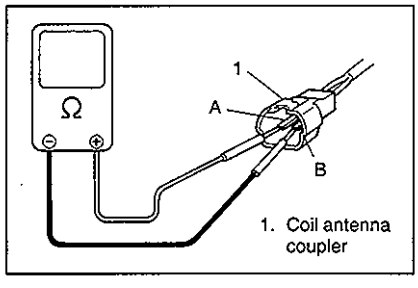


Fig. 3 for step 3

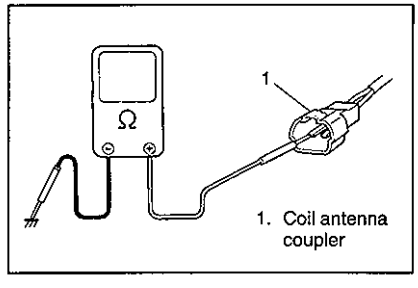


Fig. 4 for step 4

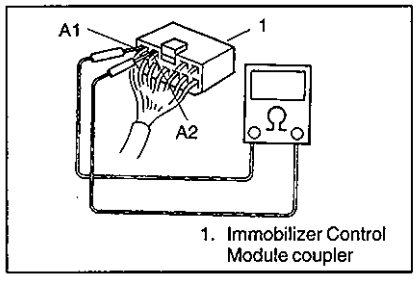


Fig. 5 for step 5

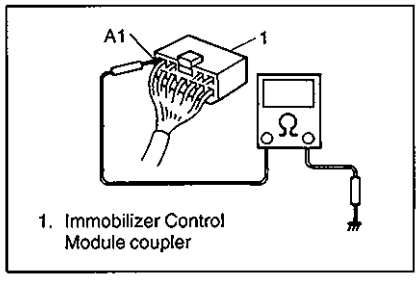


Fig. 6 for step 6

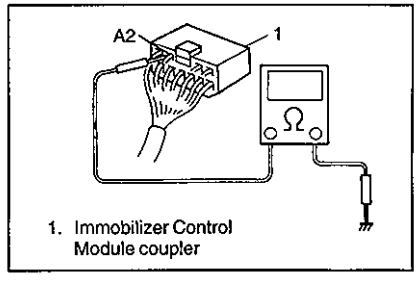
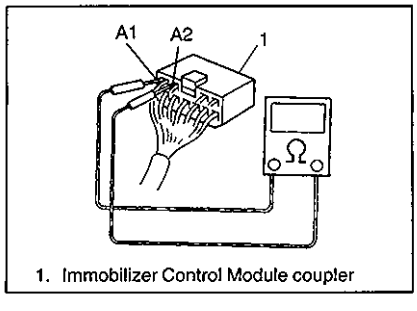


Fig. 7 for step 7



DTC21 ECM/IMMOBILIZER CONTROL MODULE CODE NOT MATCHED (IMMOBILIZER CONTROL MODULE SIDE)
DTC81 ECM/IMMOBILIZER CONTROL MODULE CODE NOT MATCHED (ECM SIDE)
DTC84 ECM/IMMOBILIZER CONTROL MODULE CODE NOT REGISTERED

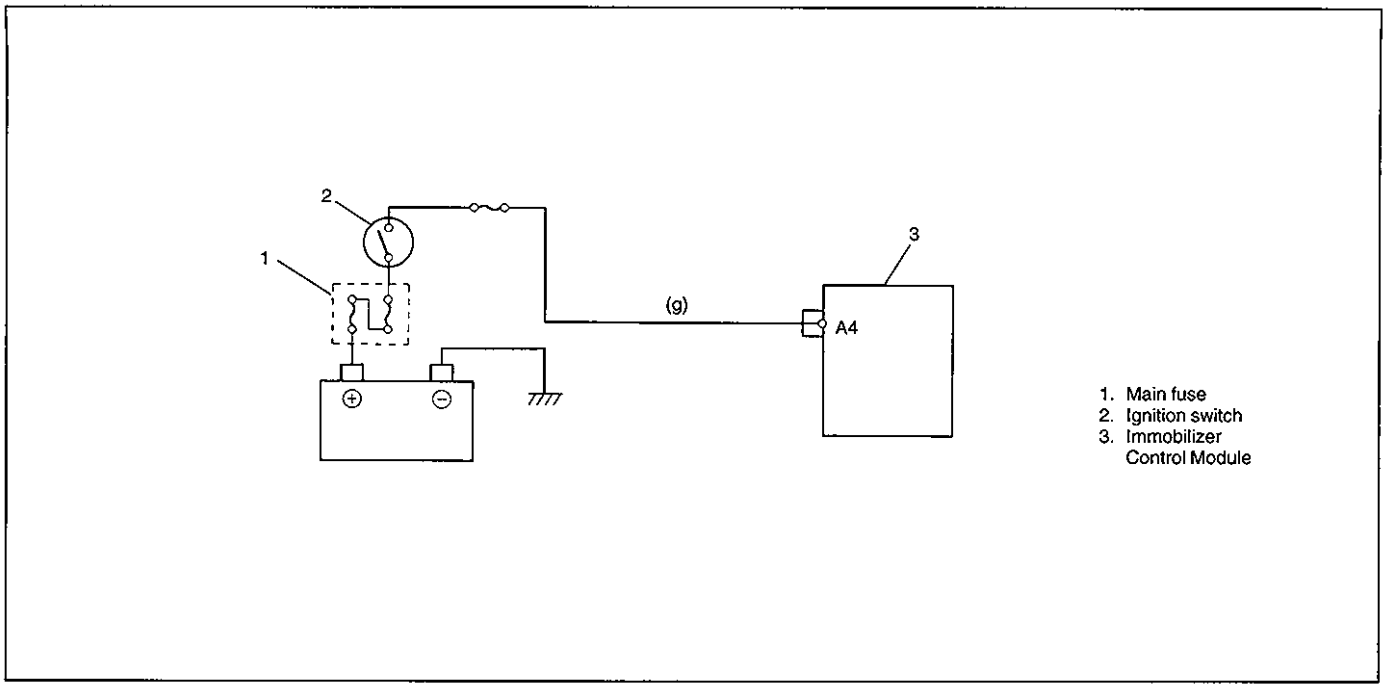
DESCRIPTION:

- DTC21
  Immobilizer Control Module checks if ECM/Immobilizer Control Module code transmitted from ECM and that registered in Immobilizer Control Module match when ignition switch is ON. If they do not, this DTC is set.
- DTC81
  ECM checks if ECM/Immobilizer Control Module code transmitted from Immobilizer Control Module and that registered in ECM match when ignition switch is ON. If they do not, this DTC is set.
- DTC84
  ECM checks if code transmitted from Immobilizer Control Module and that registered in ECM match when ignition switch is ON. If there is no ECM/Immobilizer Control Module code registered in ECM, this DTC is set.

INSPECTION:

Perform procedure described in "Procedure after ECM Replacement" section.

DTC22 IGNITION SWITCH CIRCUIT OPEN/SHORT



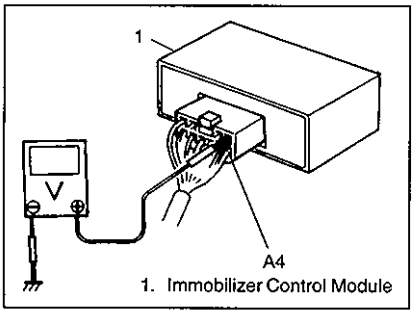
DESCRIPTION:

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.

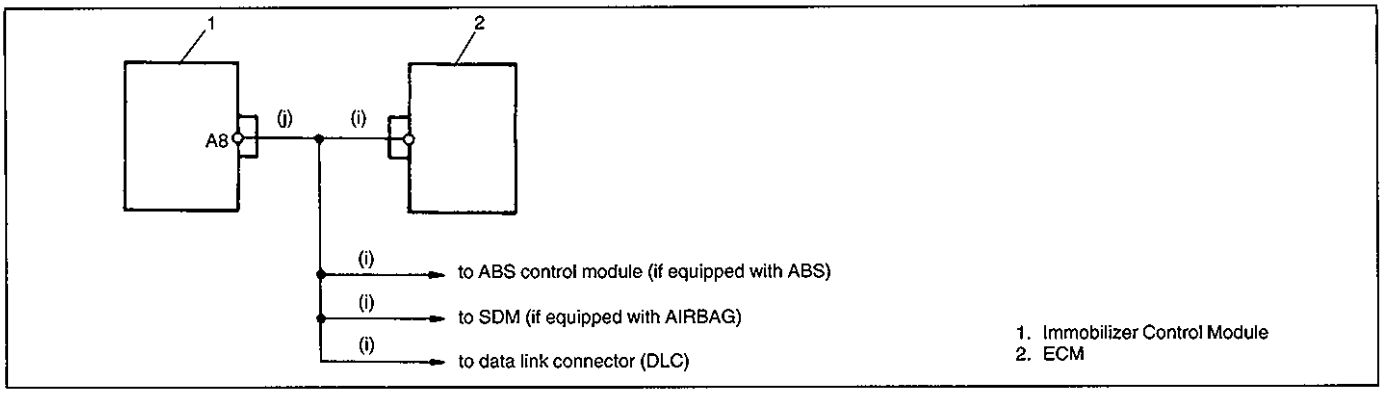
INSPECTION:

STEP	ACTION	YES	NO
1	Check voltage between Immobilizer Control Module coupler terminal A4 and body ground with ignition switch turned ON. (See Fig.1) Is it 10–14V?	Poor A4 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 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.**	"(g)" wire open or short.

Fig. 1 for step 1



DTC23 NO ECM/IMMOBILIZER CONTROL MODULE CODE TRANSMITTED FROM ECM OR DLC CIRCUIT OPENED/SHORTED
DTC83 NO ECM/IMMOBILIZER CONTROL MODULE CODE TRANSMITTED FROM IMMOBILIZER CONTROL MODULE OR DLC CIRCUIT OPENED/SHORTED



DESCRIPTION

When the ignition switch is ON, Immobilizer Control Module requests ECM and ECM requests Immobilizer Control Module to transmit ECM/Immobilizer Control Module code. If ECM/Immobilizer Control Module code is not transmitted from ECM or Immobilizer Control Module, Immobilizer Control Module sets DTC23 and ECM sets DTC83.

INSPECTION:

STEP	ACTION	YES	NO
1	Check voltage between Immobilizer Control Module coupler terminal A8 and body ground with ignition switch turned ON. Is it 4–5V?	Go to Step 2.	"(i)" or "(j)" wire short.
2	1) Disconnect ECM coupler with ignition switch turned OFF. 2) Is there continuity between Immobilizer Control Module coupler terminal A8 and Data link connector terminal of ECM coupler? (For positions of Data link connector terminal of ECM coupler, refer to Section 6E1 or 6E2.	Poor A8 connection (Immobilizer Control Module) or Poor Data link connector terminal connection (ECM). If connections are OK, substitute a known-good ECM or Immobilizer Control Module and recheck. **NOTE :** **• After replacing with a known-good ECM, register ECM/Immobilizer Control Module code in ECM by performing procedure described in "Procedure after ECM Replacement" section.** **• After replacing with a known-good Immobilizer Control Module, register ECM/Immobilizer Control Module code in ECM 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.**	"(i)" or "(j)" wire between Immobilizer Control Module and ECM open.

Fig. 1 for step 1

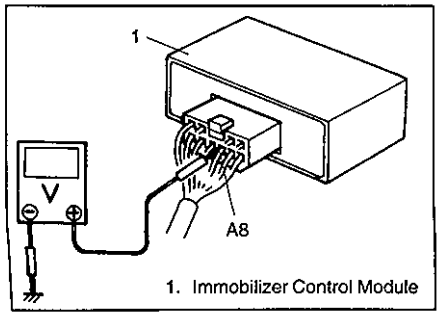
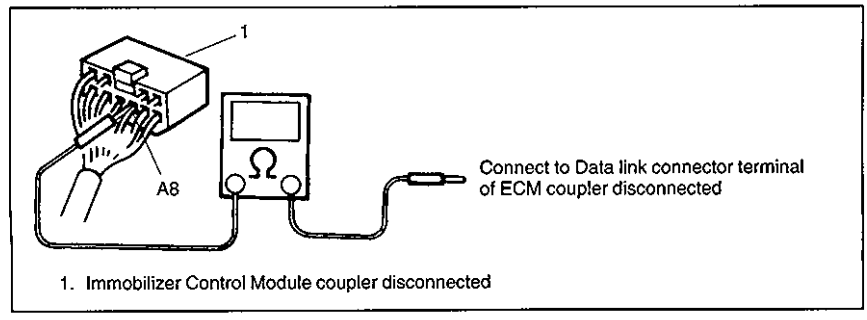


Fig. 2 for step 2



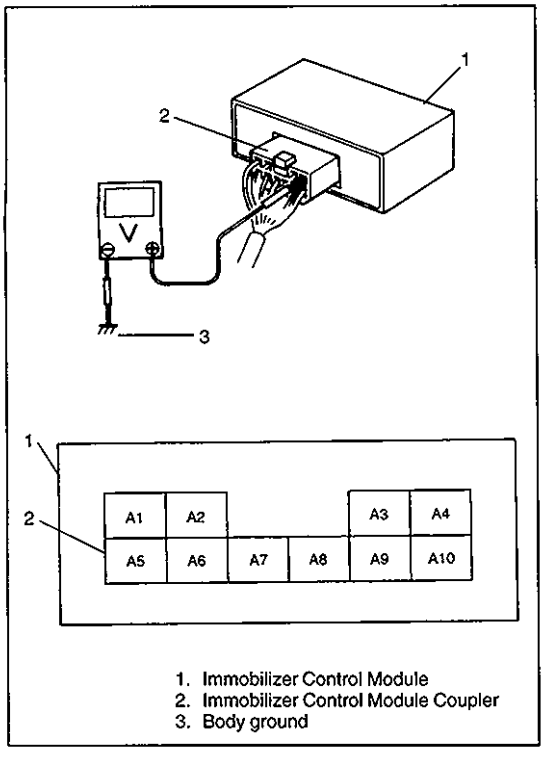
DTC82 FAULT IN ECM

DESCRIPTION:

This DTC is set when an internal fault is detected in ECM.

INSPECTION:

STEP	ACTION	YES	NO
1	1) Ignition switch "OFF". 2) Disconnect connectors from ECM. 3) Check for proper connection to ECM at all terminals. Are they in good condition?	Substitute a known-good ECM and recheck. **NOTE:** **After replacing with a known-good ECM, register ECM/Immobilizer Control Module code in ECM by performing procedure described in "Procedure after ECM Replacement" section.**	Repair or replace.



1. Immobilizer Control Module
2. Immobilizer Control Module Coupler
3. Body ground

INSPECTION OF ECM, IMMOBILIZER CONTROL MODULE AND ITS CIRCUIT

ECM, Immobilizer Control Module and its circuit can be checked at ECM 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, refer to "SECTION 6E1 or 6E2".

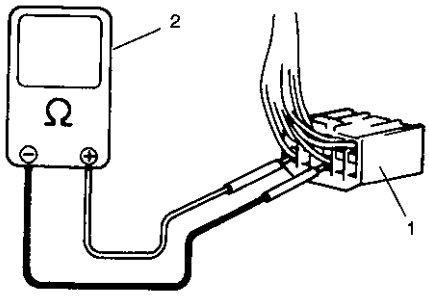
CAUTION:
Immobilizer Control Module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to Immobilizer Control Module with coupler disconnected from it.

Voltage Check

1) Remove Immobilizer Control Module from body with ignition switch OFF, referring to p. 8G-24.
2) Connect Immobilizer Control Module coupler to Immobilizer Control Module.
3) Check voltage at each terminal of coupler 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
A1	Coil antenna 1	0V	Ignition switch ON
A2	Coil antenna 2	0V	
A3	Power source	10 – 14V	
A4	Ignition signal	10 – 14V	Ignition switch ON
		0 – 0.8V	Ignition switch OFF
A5	Diagnosis output	0 – 14V	Ignition switch ON
		0V	Ignition switch OFF
A6	Blank	–	–
A7	Ground	–	–
A8	Data link connector (Serial data terminal)	4 – 5V	Ignition switch ON
A9 A10	Blank	–	–

NOTE:
When measuring voltage at A1 and A2 terminals with ignition switch turned ON, be sure to turn ignition switch ON before connecting positive probe of voltmeter to A1 or A2 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

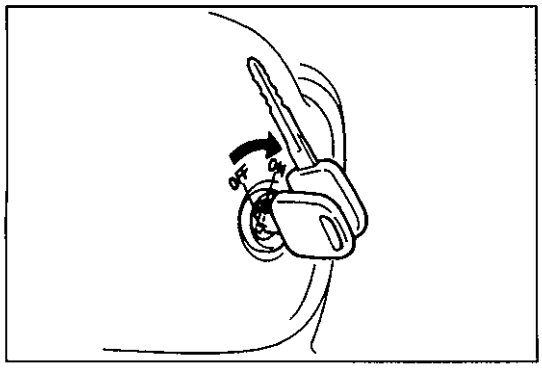
1) Disconnect Immobilizer Control Module couplers from Immobilizer Control Module with ignition switch OFF.

CAUTION:
Never touch terminals of Immobilizer Control Module itself or connect voltmeter or ohmmeter.

2) Check resistance between each terminal of coupler 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).**

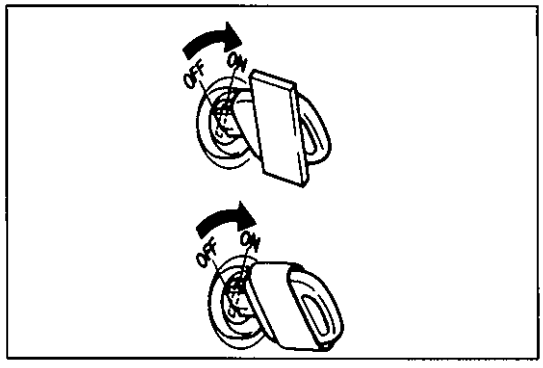
TERMINAL	CIRCUIT	NORMAL RESISTANCE	CONDITION
A1 – A2	Coil antenna	Continuity	–



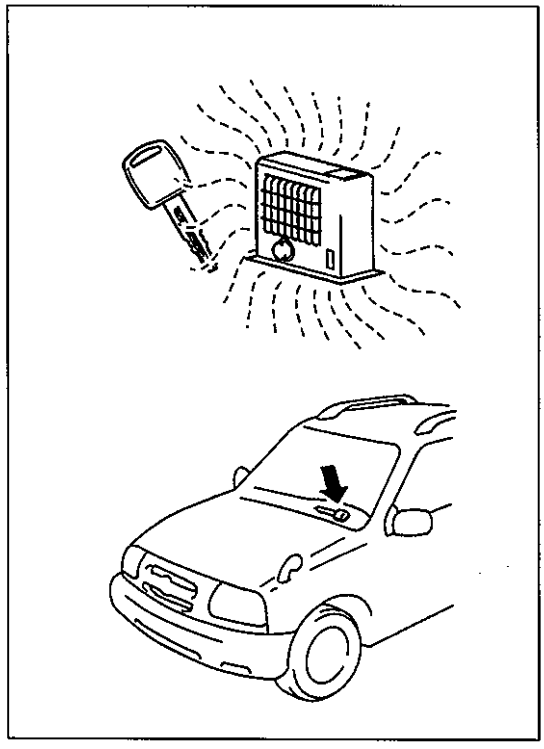
ON-VEHICLE SERVICE

PRECAUTIONS IN HANDLING IMMOBILIZER CONTROL SYSTEM

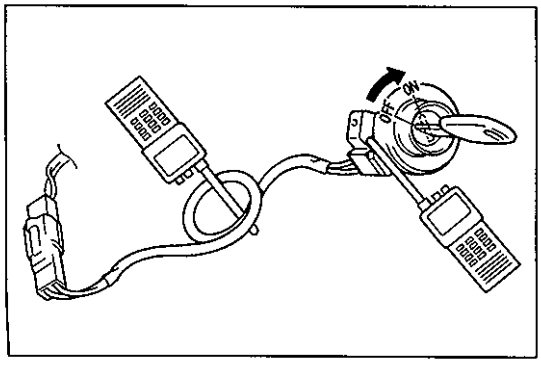
- Don't turn ON ignition switch with ignition key for immobilizer control system put together with another one or placed quite close to another one. Or the system may detect abnormal condition and prevent engine from starting.



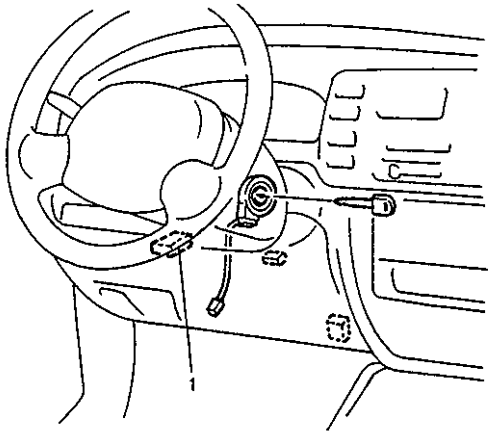
- Do not turn ON ignition switch by using ignition key with any type of metal wound around its grip or in contact with it. Or the system may detect abnormal condition and prevent engine from starting.



- 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.



1. Immobilizer Control Module

IMMOBILIZER CONTROL MODULE

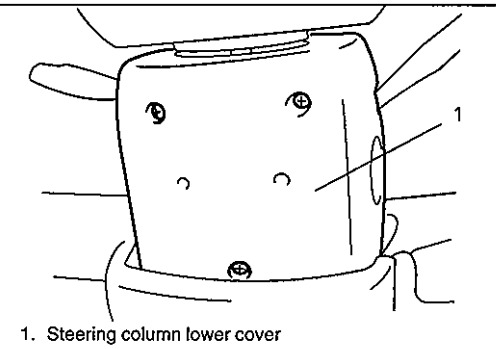
Removal

1) Disconnect negative (–) cable at battery.
2) Remove steering column hole cover.
3) Disconnect coupler at Immobilizer Control Module.
4) 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 by performing procedure described in "Procedure after Immobilizer Control Module Replacement" section.

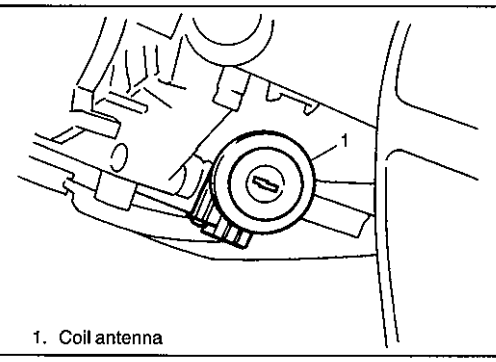


1. Steering column lower cover

COIL ANTENNA

Removal

1) Disconnect negative (–) cable at battery.
2) Remove steering column upper and lower cover by removing 3 screws.
3) Remove steering column hole cover.

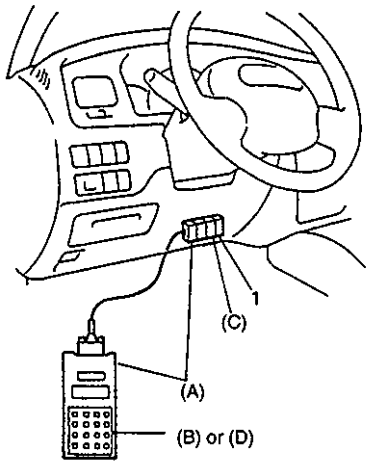


1. Coil antenna

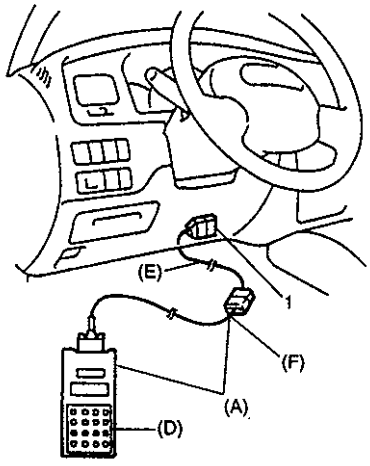
4) Remove coil antenna.

Installation

For installation, reverse removal procedure.



OR



1. Data link connector (DLC)

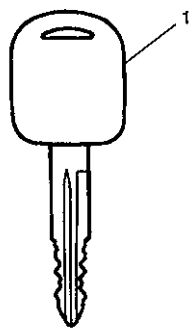
HOW TO REGISTER IGNITION KEY

Register the ignition key with a built-in transponder in Immobilizer Control Module by using the following procedure.

1) Prepare TECH 1 (TECH 1A kit and cartridge for immobilizer control system).
2) With ignition switch OFF, connect TECH 1 to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special Tool
(A): Tech 1A
(B): 96 immobilizer cartridge or (D): Immobilizer cartridge 1.1
(C): 16/12 pin DLC adapter
OR
(A): Tech 1A
(D): Immobilizer cartridge 1.1
(E): 16/14 pin DLC cable
(F): 14/26 pin DLC cable (Use this cable if 16/14 pin DLC cable is not available)

NOTE:
For operation procedure of TECH 1, refer to TECH 1 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 TECH 1.

NOTE:
When "CLR. TRANS COD (CLEAR TP CODE)" command is executed with the malfunction indicator lamp ("CHECK ENGINE" light) 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 TECH 1, register Transponder code in Immobilizer Control Module by executing "ENT. TRANS COD (ENT. TP CODE)" command in SELECT MODE menu.
6) Make sure that malfunction indicator lamp ("CHECK ENGINE" light) 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 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 TECH 1, 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 ("CHECK ENGINE" light) 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 TECH 1, register Transponder code in Immobilizer Control Module by executing "ENT. TRANS COD (ENT. TP CODE)" command in SELECT MODE menu.
5) Using TECH 1, register ECM/Immobilizer Control Module code in both Immobilizer Control Module and ECM by executing "RECORD ECU (RECORD ECM/ICM)" command in SELECT MODE menu.
6) Make sure that malfunction indicator lamp ("CHECK ENGINE" light) 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 REPLACEMENT

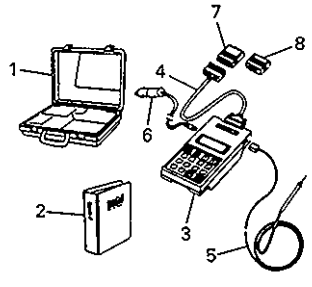
When ECM was replaced, including when replaced because re-checking by using a known-good ECM was necessary during trouble diagnosis, register ECM/Immobilizer Control Module code in ECM by performing following procedure.

1) Perform steps 1) and 2) described in "How to register ignition key" section. And then turn ignition switch ON.
2) Using TECH1, register ECM/Immobilizer Control Module code in ECM by executing "RECORD ECU (RECORD ECM/ICM)" command in SELECT MODE menu.

   NOTE:
   For operation procedure of TECH 1, refer to TECH1 operator's manual.

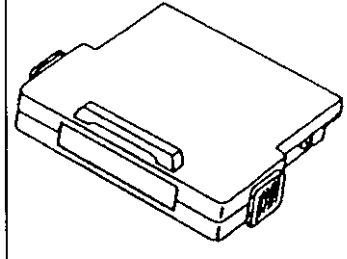
3) Make sure that malfunction indicator lamp ("CHECK ENGINE" light) lights when ignition switch is turned OFF once and then ON.

SPECIAL TOOLS

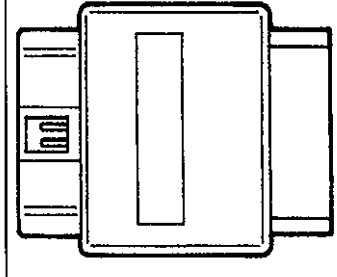


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable (14/26 pin, 09931-76040)
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter

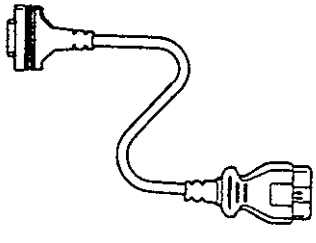
09931-76011
Tech-1 (scan tool) kit



96 immobilizer cartridge or immobilizer cartridge 1.1



09931-96020
16/12 pin DLC adapter



NOTE:
Use this cable only with Immobilizer cartridge 1.1.
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).**
- **When body servicing, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)**

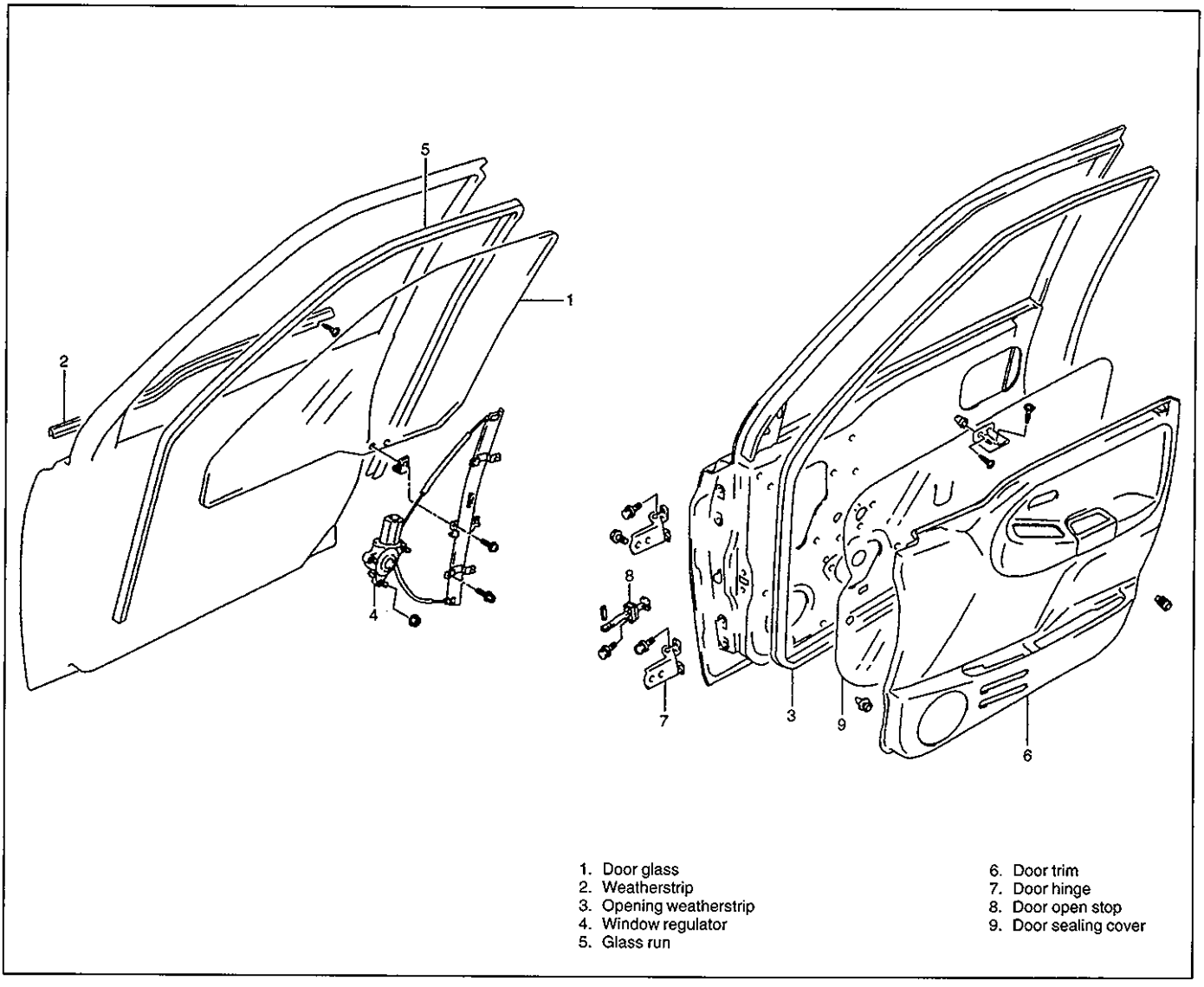
NOTE:
Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number of with an equivalent part if replacement becomes necessary.
Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

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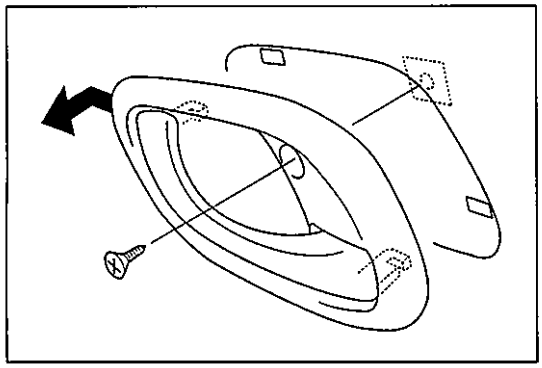
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GLASS, WINDOWS AND MIRROR

FRONT DOOR GLASS

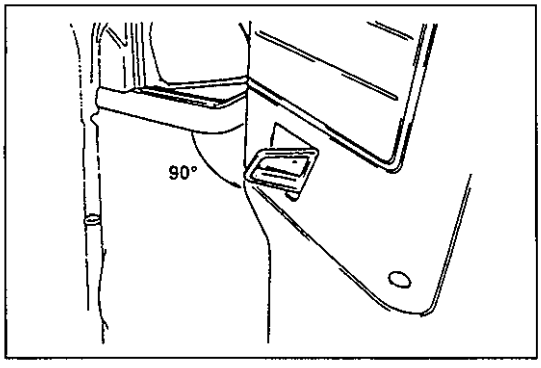


1. Door glass
2. Weatherstrip
3. Opening weatherstrip
4. Window regulator
5. Glass run
6. Door trim
7. Door hinge
8. Door open stop
9. Door sealing cover

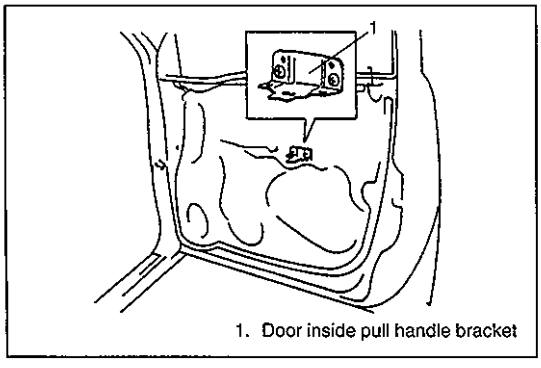


REMOVAL

1) Remove inside handle bezel.
2) Remove door mirror bezel (if equipped).
3) Remove inside lock knob and door inside pull handle case fitting screw.

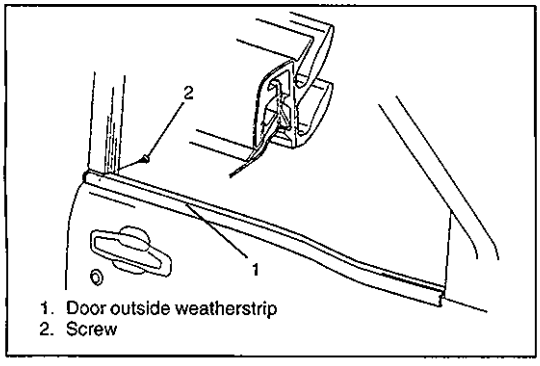


4) Remove door trim.
   With inside handle bezel tilted as shown in figure, turn door trim 90° counterclockwise to remove it.
   And disconnect power window switch lead wire at coupler (if equipped).



1. Door inside pull handle bracket

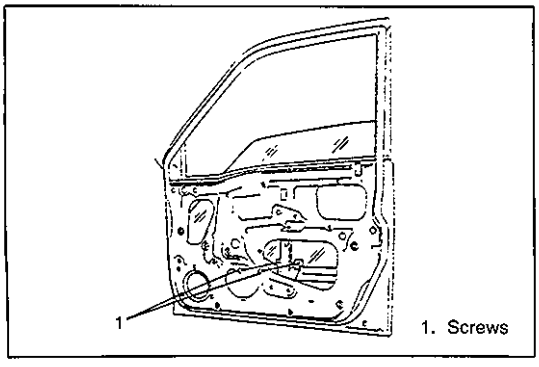
5) Remove door inside pull hundle bracket.
6) Remove door sealing cover.



1. Door outside weatherstrip
2. Screw

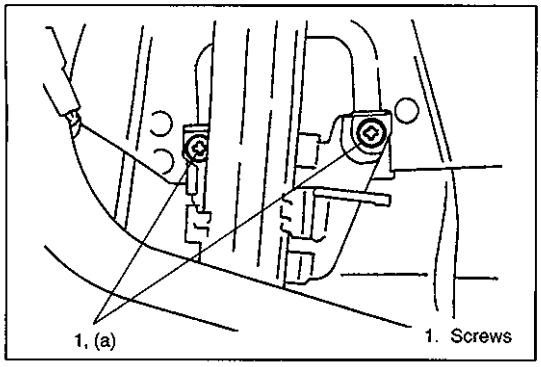
7) Remove door outside weatherstrip.
   Lower window all the way down. Then, use a tape-wrapped putty knife (or screwdriver) to pry off weatherstrip.

CAUTION:
Use a tape-wrapped putty knife (or screwdriver) to pry off weatherstrip. Use of an unwrapped tool will cause damage to painting.



1. Screws

8) Remove glass attaching screws.
9) Take out door glass.



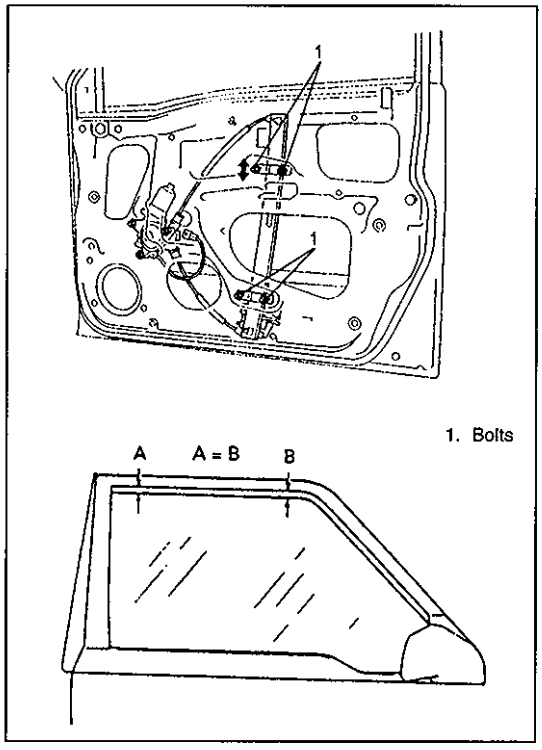
INSTALLATION

Reverse removal procedure to install door glass noting following points:

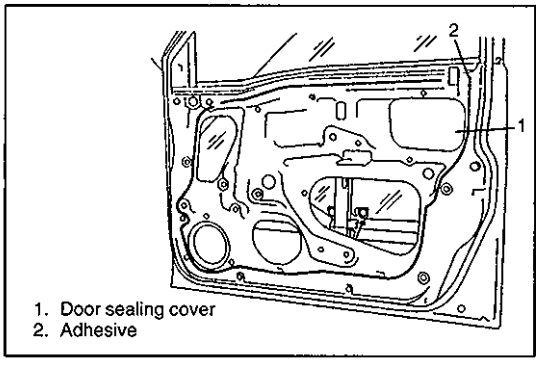
- Tighten glass attaching screws to specified torque. Tighten front screw first, then rear screw.

  Tightening Torque
  (a): 2.5 N·m (0.25 kg-m, 1.8 lb-ft)

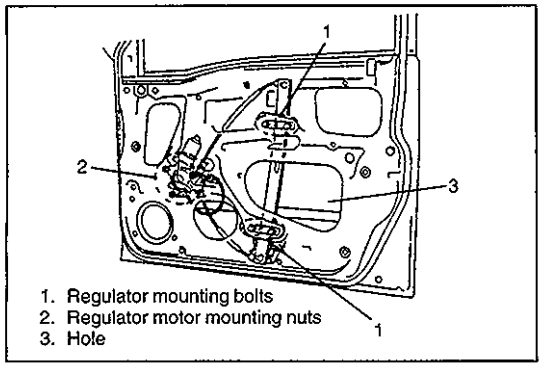
- When window becomes hard to raise and lower, adjust screws to correct tilted glass as shown in figure.



- Adjust equalizer of window regulator so that measurement A and B are equal.



- Secure door sealing cover with adhesive.

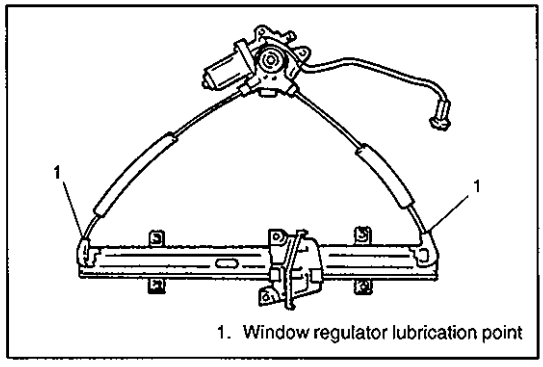


1. Regulator mounting bolts
2. Regulator motor mounting nuts
3. Hole

FRONT DOOR WINDOW REGULATOR

REMOVAL

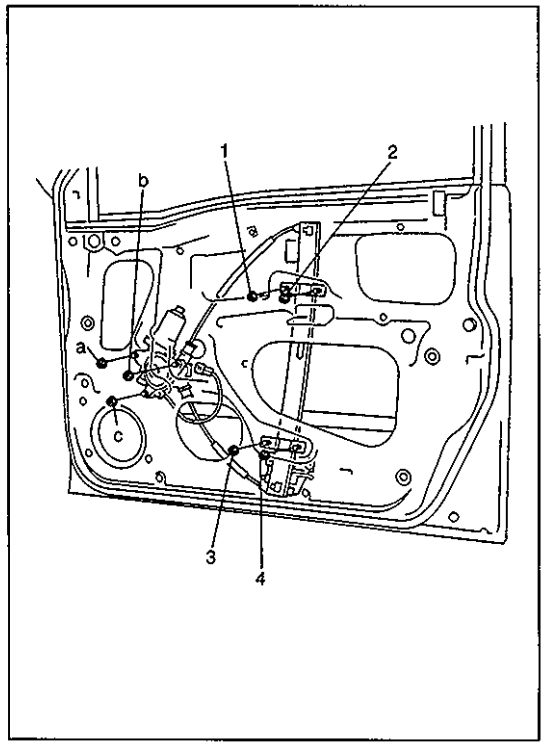
1) Remove door glass, referring to steps 1) to 10) of FRONT DOOR GLASS REMOVAL in this section.
2) Disconnect power window motor lead wire at coupler and loosen clamp.
3) Loosen regulator mounting bolts, nuts and take out regulator through hole as shown in left figure.



1. Window regulator lubrication point

INSPECTION

1) Check regulator sliding and rotating parts for greasing.
2) Check rollers for wear and damage.
3) Check wire for damage.



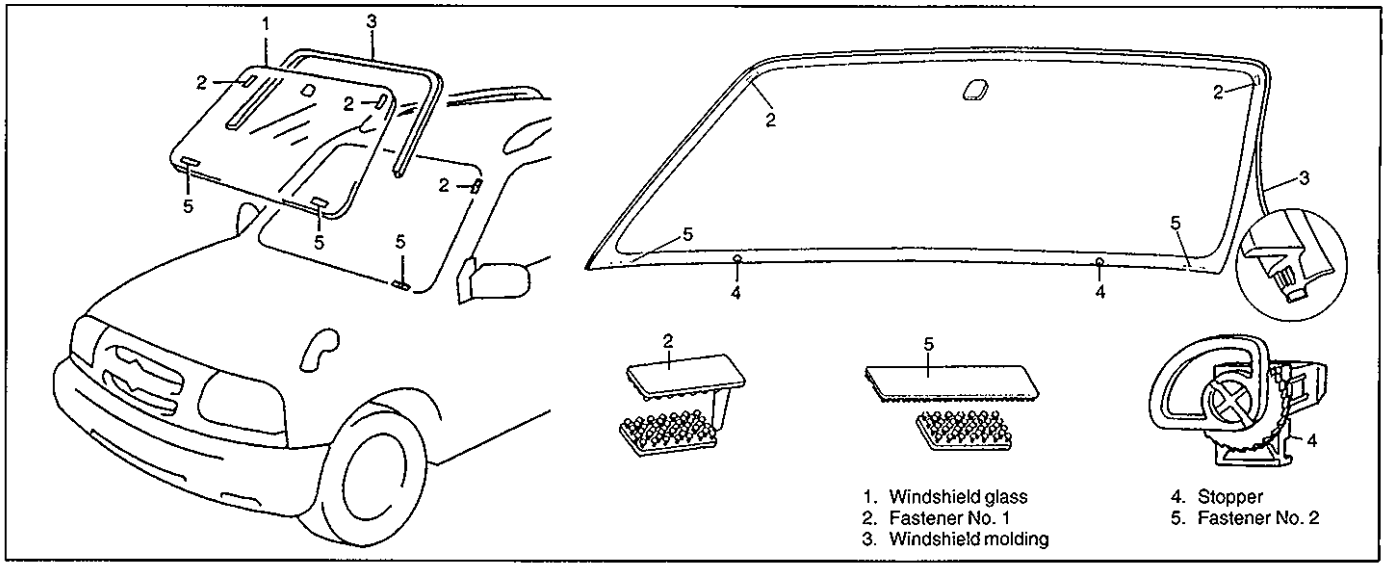
INSTALLATION

Reverse removal procedure to install window regulator noting following point.

- Tighten bolts and nuts according to the order (a, b, c/1, 2, 3, 4) shwon in left figure.
- When installing glass, check that the top part of the glass contacts the glass run evenly and that the glass moves up and down smoothly.
  If the glass is tilted with respect to the glass run, make a fine adjustment with the screws.

WINDSHIELD

The front windshield is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For the Windshield replacement, it is important to use an adhesive which provides sufficient adhesion strength and the follow the proper procedure.



CAUTION:

- **Described in this section is the glass replacement by using 3 types of primers and 1 type of adhesive made by YOKOHAMA (one component urethane adhesive to be used with primer in combination). When using primer and adhesive made by other manufacturers, be sure to refer to handling instructions supplied with them. 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 following property.

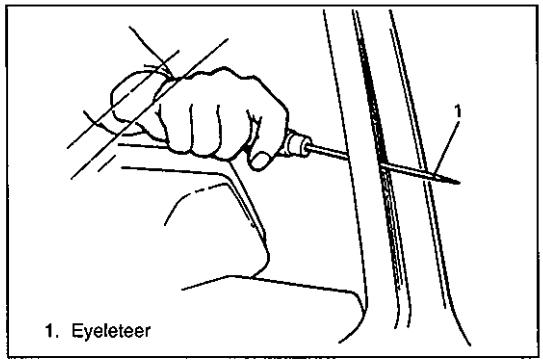
Shearing strength: 40 kg/cm^2 (569 lb/in^2) or more

Adhesive materials and tools required for removal and installation.

- One component urethane adhesive and primers used in combination (For one sheet of windshield).
  Adhesive (470 g (15.7 oz.))
  Primer for glass (30 g (1.0 oz.))
  Primer for body (30 g (1.0 oz.))
  Primer for molding (30 g (1.0 oz.))
- Eyeleteer
- Piano string
- Windshield knife
- Brush for primer application (2 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

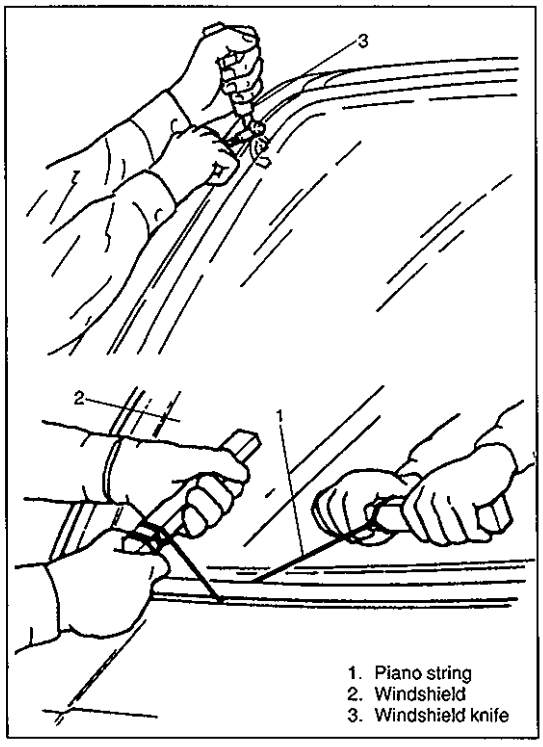
REMOVAL

1) Clean both inside and outside of glass and around it.
2) Remove wiper arms and garnish.
3) Using tape, cover body surface around glass to prevent any damage.
4) Remove rear view mirror, sunvisor, and front pillar trims (right & left).
5) If necessary, remove instrument panel. Refer to "INSTRUMENT PANEL" in this section.
6) If necessary, remove head lining. Refer to "HEAD LINING" in this section.
7) Remove (or cut) windshield molding all around until windshield edge comes out.



1. Eyeleteer

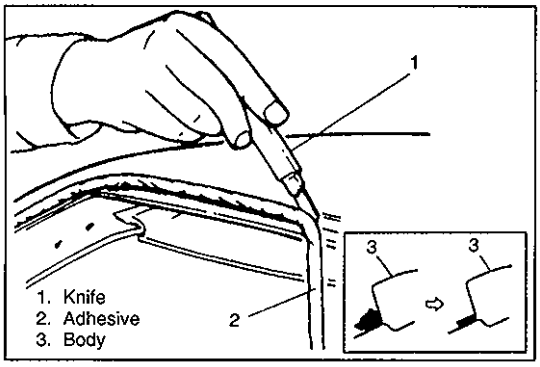
8) Drill hole with eyeletter through adhesive and let piano string through it.



1. Piano string
2. Windshield
3. Windshield knife

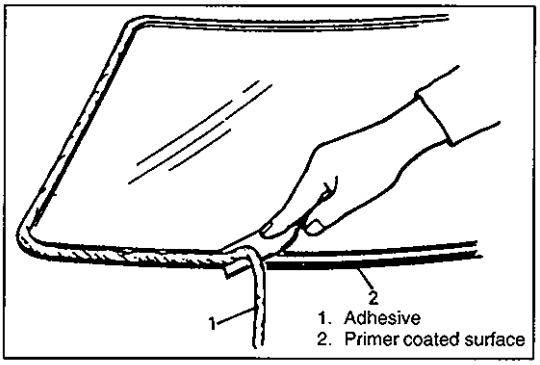
9) Cut adhesive all around windshield with piano string.
When using tool to cut adhesive, be careful not to cause damage to windshield. Use wire to cut adhesive along lower part of windshield.

NOTE:
Use piano string as close to glass as possible so as to prevent damage to body and instrument panel.

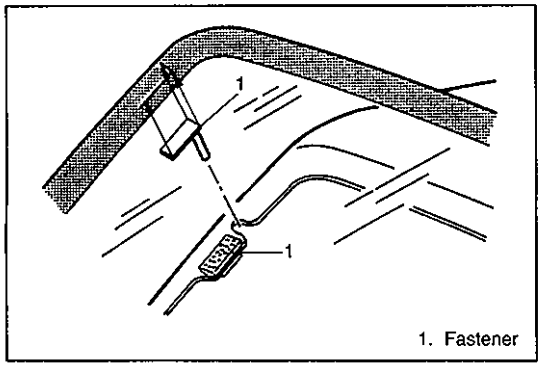


10) Using knife, smoothen adhesive remaining on body side so that it is 1 to 2 mm thick all around.

NOTE:
Before using knife, clean it with alcohol or the like to remove oil from it.



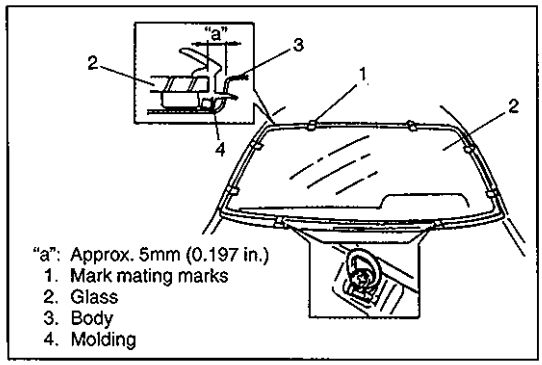
11) When reusing windshield, remove the adhesive from it, using care not to damage primer coated surface.



1. Fastener

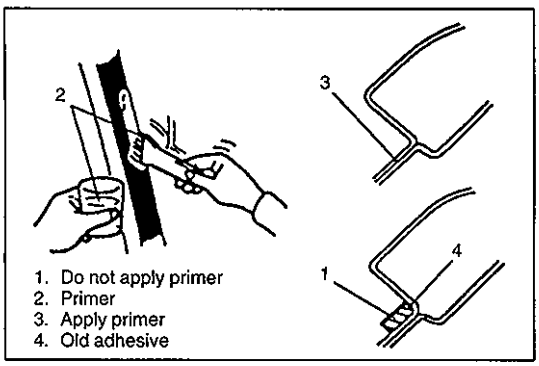
INSTALLATION

1) Using cleaning solvent, clean windshield edge where windshield glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Install new glass stoppers (2pcs) to lower side of windshield and new fastener to body.
   When reusing wind shield, install new fastener to wind shield.



"a": Approx. 5mm (0.197 in.)
1. Mark mating marks
2. Glass
3. Body
4. Molding

3) To determine installing position of glass to body, position glass against body so that clearance between upper end of glass and body is about 5 mm (0.197 in.) and clearances between each side end (right & left) of glass and body are even. Place glass so that lug of fastener is matched with cut in body and fit fastener. Then mark mating marks on glass and body as shown.
   Upper clearance can be adjusted by moving stoppers position.



1. Do not apply primer
2. Primer
3. Apply primer
4. Old adhesive

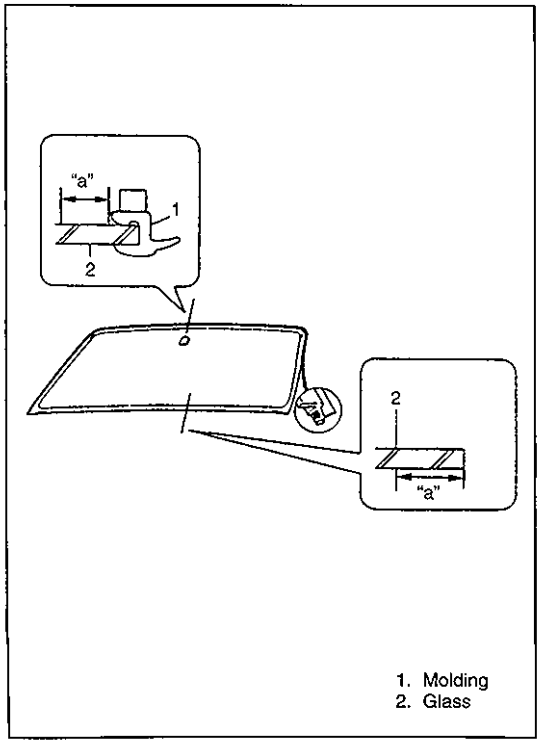
4) Clean contact surfaces of old adhesive, paint or bare metal thoroughly.
   If surfaces of paint or bare metal come out, apply primer for body with caution not to apply primer to surface of adhesive remaining on body.

   NOTE:
   - **Be sure to refer to primer maker's instruction for proper handling and drying time.**
   - **Do not touch body and old adhesive surfaces where glass is to be adhered.**

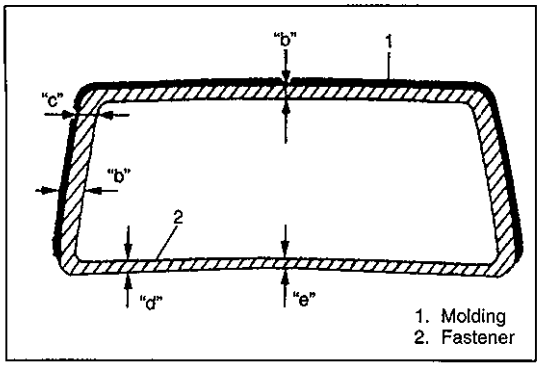
5) Install new molding to glass.
6) Clean glass surface to be adhered to body with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.

   Cleaning Area

   Distance from the edge of glass or molding
   "a": 30 – 50 mm (1.18 – 1.97 in.)



1. Molding
2. Glass



1. Molding
2. Fastener

7) 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 apply primer on outside of ceramic coated surface.**
- **Do not touch primer coated surface.**

Width "b": 18 – 19 mm (0.71 – 0.75 in.)
"c": 16 – 17 mm (0.63 – 0.67 in.)
"d": 24 mm (0.94 in.)
"e": 27 mm (1.06 in.)

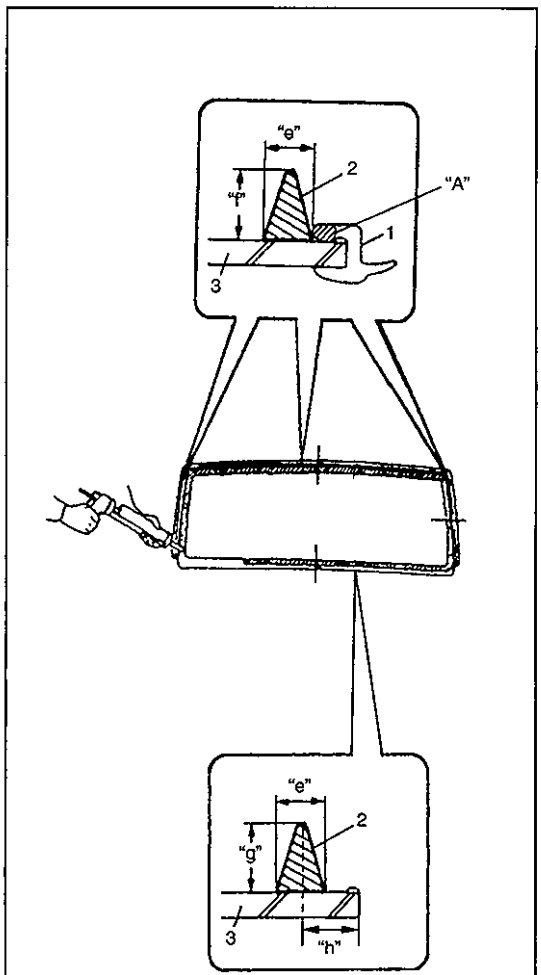
8) Apply primer for molding along molding surface all around as shown in figure.

9) Apply adhesive referring to figure at the left.

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.**

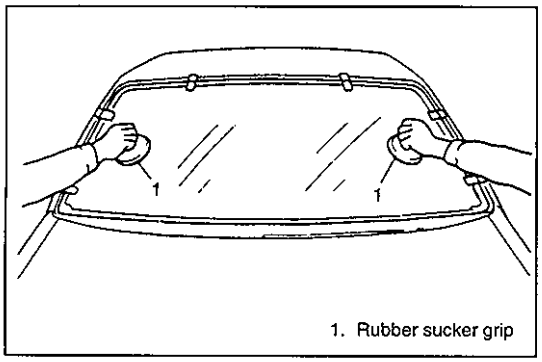
Upper, right and left sides
Width "e" : Approx. 11 mm (0.43 in.)
Height "f" : Approx. 17 mm (0.67 in.)
"g" : Approx. 25 mm (0.98 in.)
Distance "h" : Approx. 16 mm (0.63 in.)

- **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.**
- **Perform steps 9) to 10) within 10 min. to ensure sufficient adhesion.**
- **Be sure to refer to adhesive maker's instruction for proper handling and drying time.**

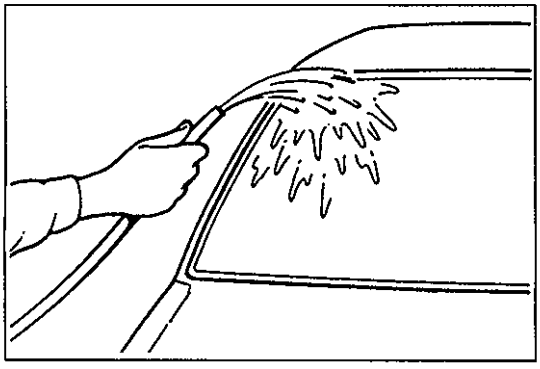


1. Molding
2. Adhesive
3. Glass
"A": Apply primer for molding

10) Holding rubber sucker grips, place glass onto body by aligning mating marks marked in step 3) and press it.



1. Rubber sucker grip



11) Check for water leakage by pouring water over windshield through hose. If leakage is found, dry windshield and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

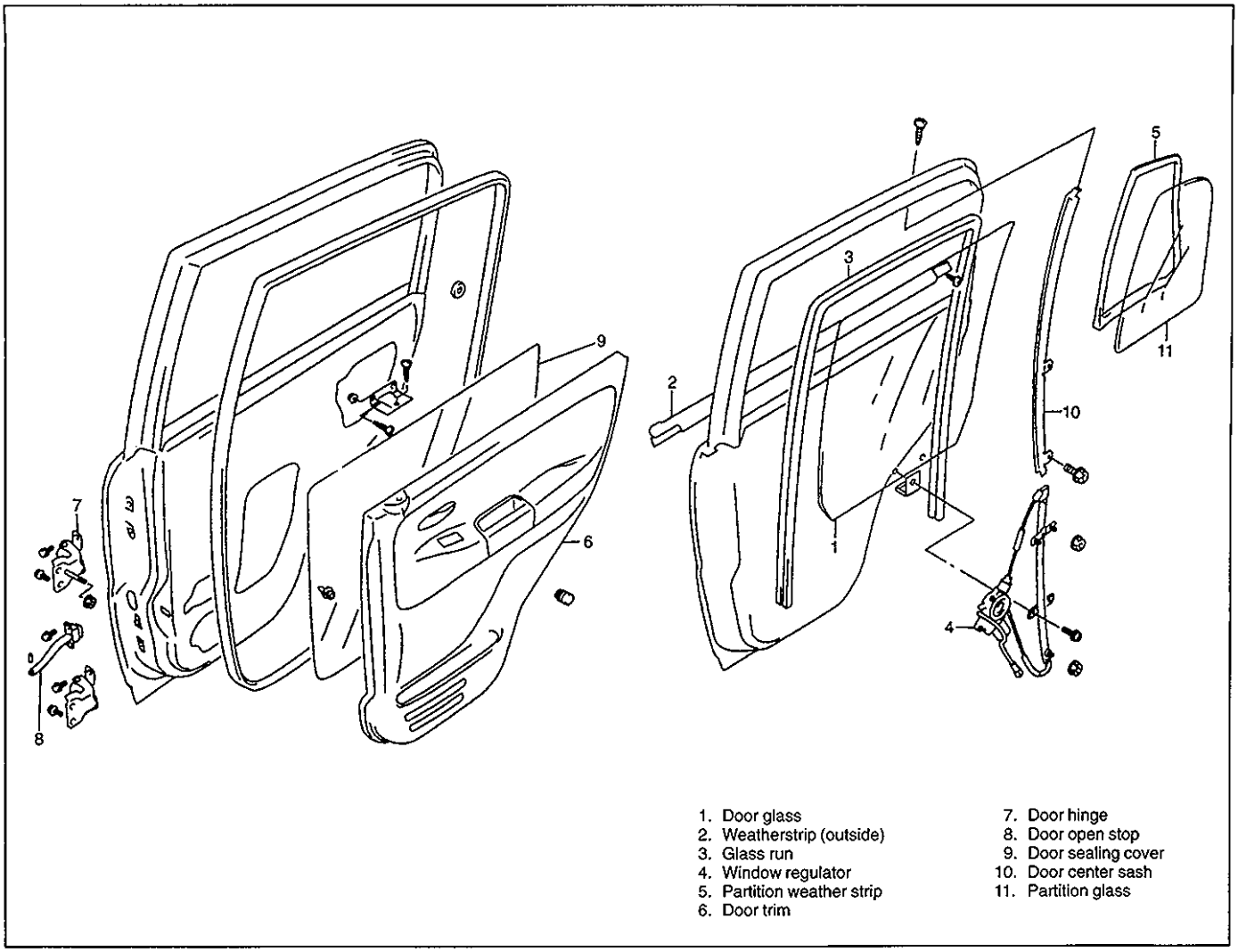
NOTE:

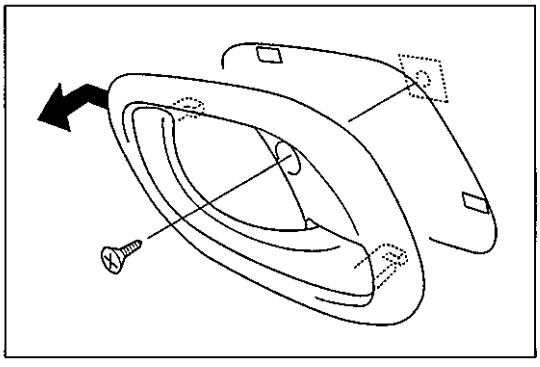
- **Do not use high pressure water.**
- **Do not blow compressed air directly at adhesive applied part when drying.**
- **Do not use infrared lamp or like for drying.**

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 its 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.**

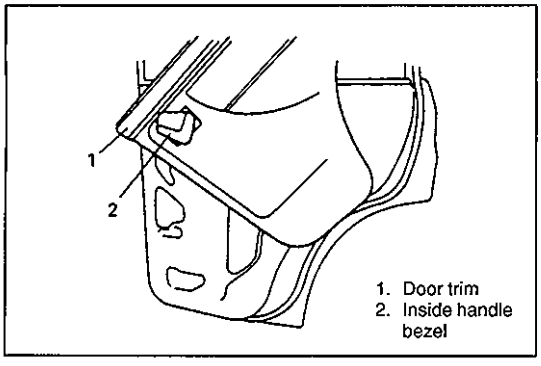
REAR DOOR GLASS



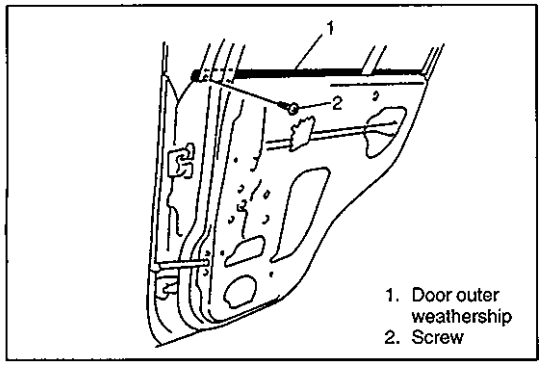


REMOVAL

1) Remove inside handle bezel.
2) Remove inside lock knob and door inside pull handle case fitting screw.

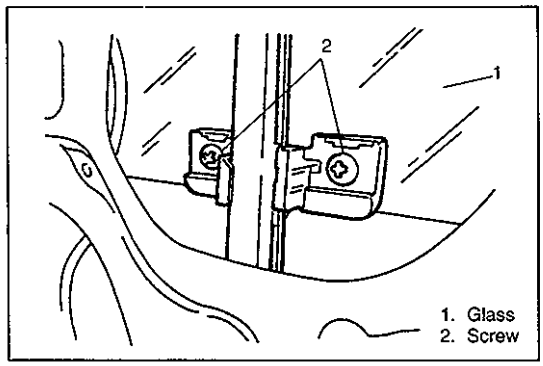


3) Remove door trim with inside weatherstrip.
   With inside handle bezel tilted as shown in figure, turn door trim 90° counterclockwise to remove it. And disconnect power window switch lead wire.
4) Remove door sealing cover.

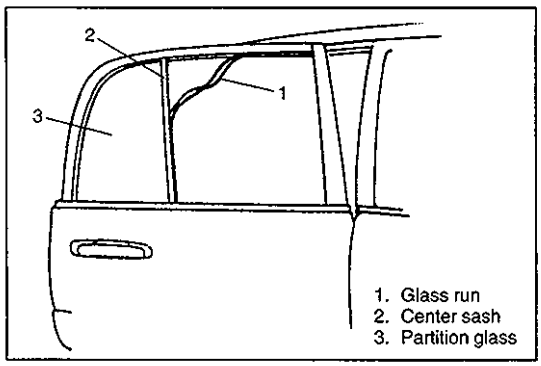


5) Remove outer weatherstrip.

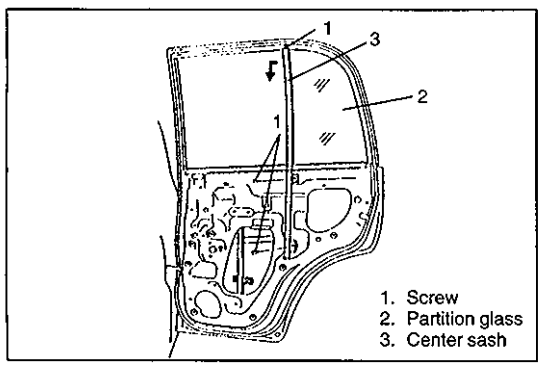
CAUTION:
Using a tape-wrapped putty knife (or tape-wrapped screwdriver), pry off weatherstrip. Use of an unwrapped tool will cause damage to painting.



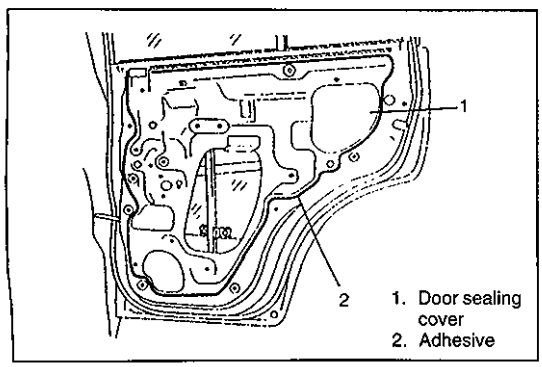
6) Remove glass fitting screws. Then down door glass.



7) Detach rear part of glass run from center sash.



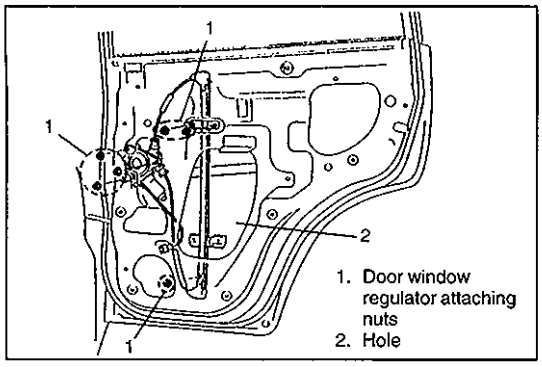
8) Remove door center sash (by removing two screws with door glass lowered all the way down).
9) When remove partition glass, slide to front to remove it.
10) Take out glass.



INSTALLATION

Reverse removal sequence to install door glass.
However, be careful of following points.

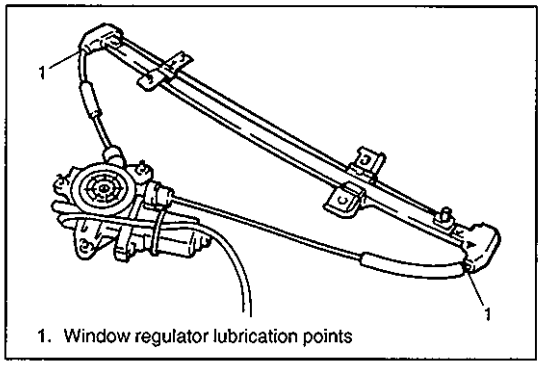
- Securely seal door sealing cover with adhesive.
- When weatherstrip is hardened, water leak may develop. In such case, replace it with new one.



REAR DOOR WINDOW REGULATOR

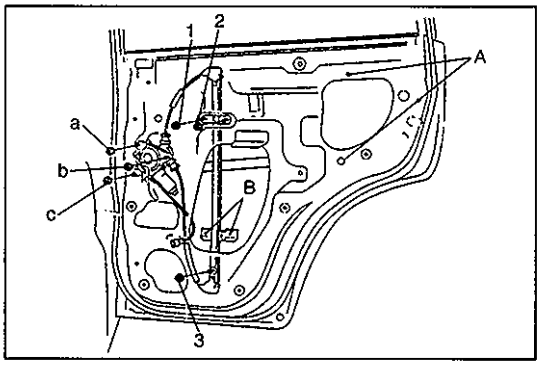
REMOVAL

1) Remove door glass, refer to steps 1) to 10) of REAR DOOR GLASS REMOVAL in this section.
2) Disconnect power window motor lead wire at coupler and clamp.
3) Remove door window regulator attaching nuts (6 pcs), and take out regulator through hole as shown in left figure.



INSPECTION

1) Check regulator sliding and rotating parts for greasing.
2) Check rollers for wear and damage.
3) Check wire for damage.



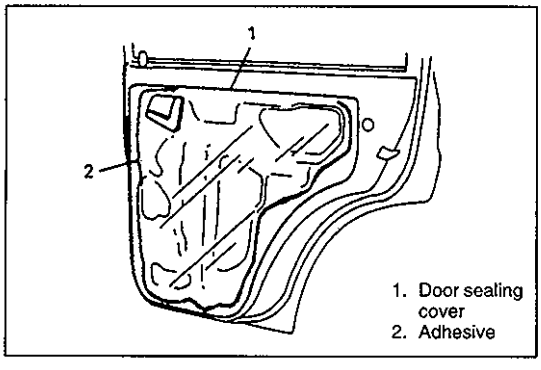
INSTALLATION

Reverse removal sequence to install door window regulator noting following points.

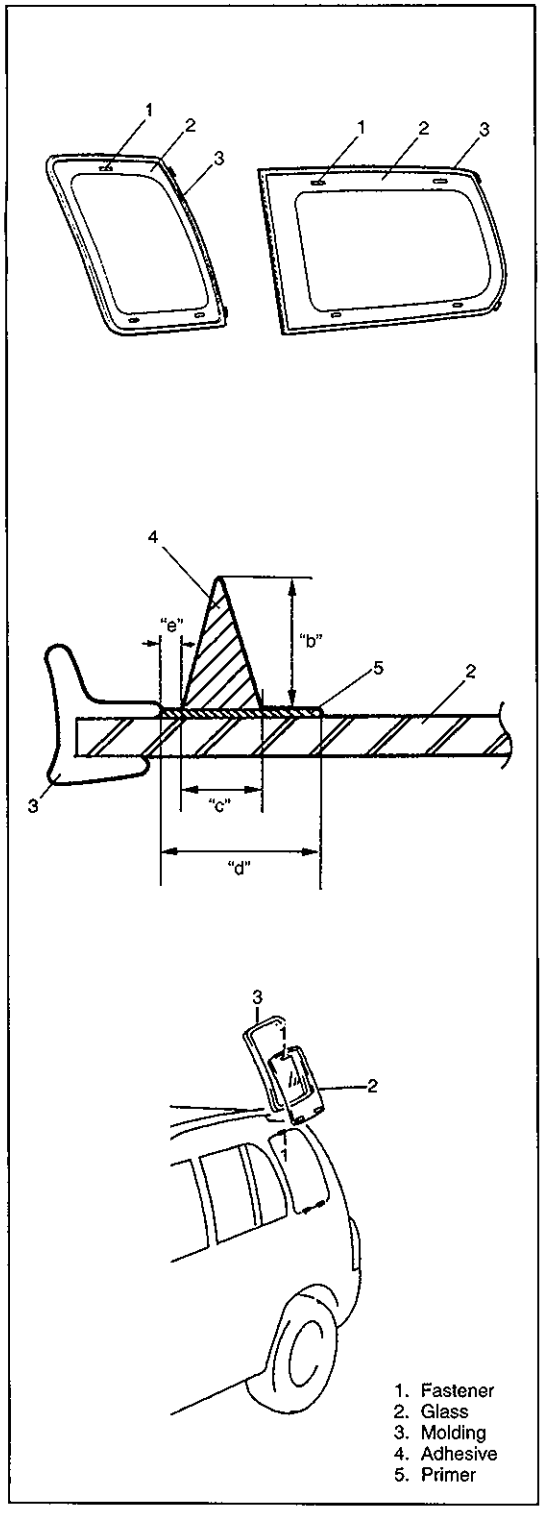
- Tighten regulator base nuts according to the order (a, b, c) shown in figure.
- Adjust door window regulator according to following procedure.
  a. Loosen three nuts, two screws and two bolts.
  b. Raise window fully.
  c. Tighten three regulator rail nuts according to the order (1, 2, 3) shown in figure and two center sash bolts A.
  d. Lower window.
  e. Tighten two screws B to specified torque. Tighten front screw frist, then rear.

     Tightening Torque for glass attaching screws
     2.5 N·m (0.25 kg-m, 1.8 lb-ft)

  f. Check that the glass moves up and down smoothly and that the top part of the glass contacts the glass run evenly.



- Securely seal door sealing cover with adhesive.



QUARTER WINDOW

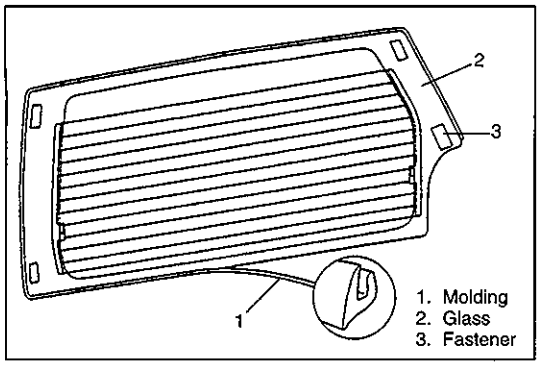
REMOVAL AND INSTALLATION

Refer to "WINDSHIELD" section as removal and installation procedures are basically the same. However, note the following.

NOTE:

- **Before applying primer to glass edge, install molding according to installing position shown in figure.**
- **Observe following precautions when applying adhesive along glass edge.**
  - **Adhesive should be applied evenly especially in height.**
  - **Be careful not to damage primer.**
  - **Press glass against body quickly after adhesive is applied.**

Height	**"b":**	**12 mm (0.47 in.)**
Width	**"d":**	**16 mm (0.63 in.)**
	"c":	**8 mm (0.31 in.)**
Clearance	**"e":**	**1 mm (0.04 in.)**



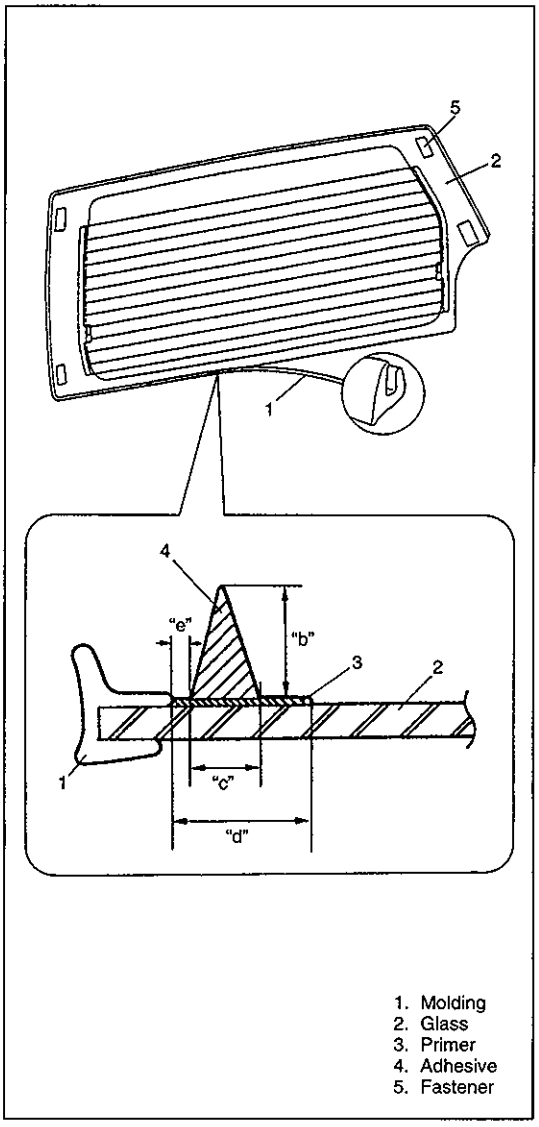
BACK DOOR GLASS

REMOVAL AND INSTALLATION

Refer to "WINDSHIELD" section as removal and installation procedures are basically the same. However, note the following.

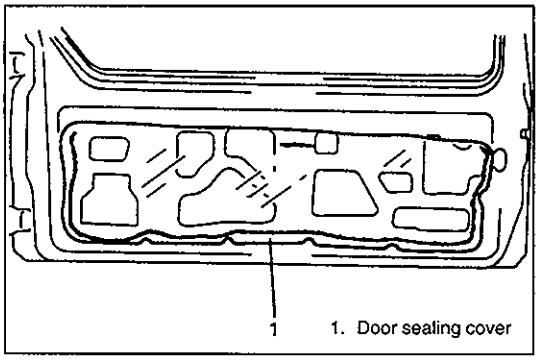
NOTE:

- **Before applying primer to glass edge, install molding according to installing position shown in figure.**

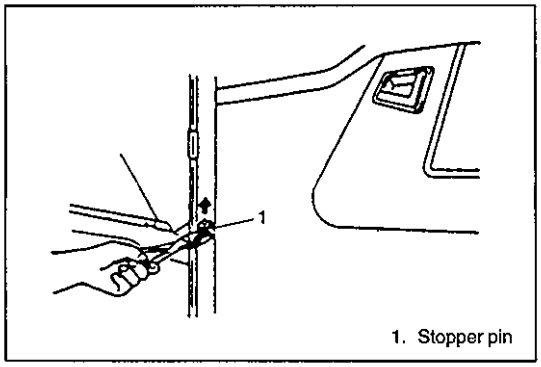


- **Observe following precautions when applying adhesive along glass edge.**
  - **Adhesive should be applied evenly especially in height.**
  - **Be careful not to damage primer.**
  - **Press glass against body quickly after adhesive is applied.**

Height "b": 15 mm (0.59 in.)
Width "c": 8 mm (0.31 in.)
Width "d": 16 mm (0.63 in.)
Clearance "e": 1 mm (0.04 in.)



- **When replacing back door, coat replacement door inside with wax for proper anticorrosive treatment. Refer to "UNDER COATING/ANTI-CORROSION COMPOUND APPLICATION AREA" in this section.**
- **Apply sealing compound to peripheral of door hem area and reinstall door sealing cover.**
- **When weatherstrip is hardened and water leaks have developed, replace it.**



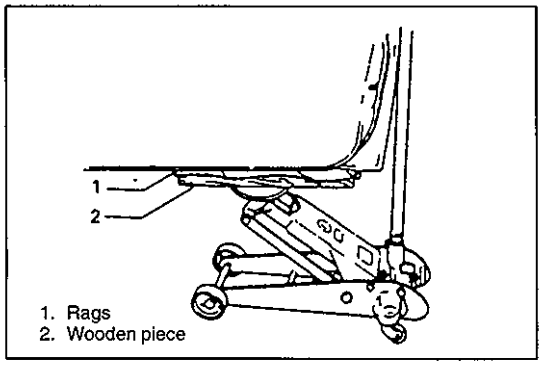
1. Stopper pin

BODY STRUCTURE

FRONT DOOR ASSEMBLY

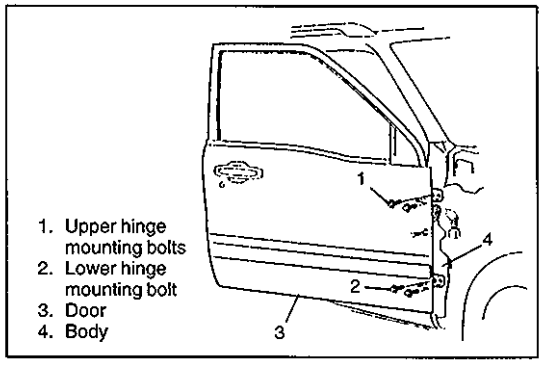
REMOVAL

1) Remove front fender. Refer to "FRONT FENDER" in this section.
2) Disconnect door harness lead wires at each coupler.
3) Remove stopper pin.



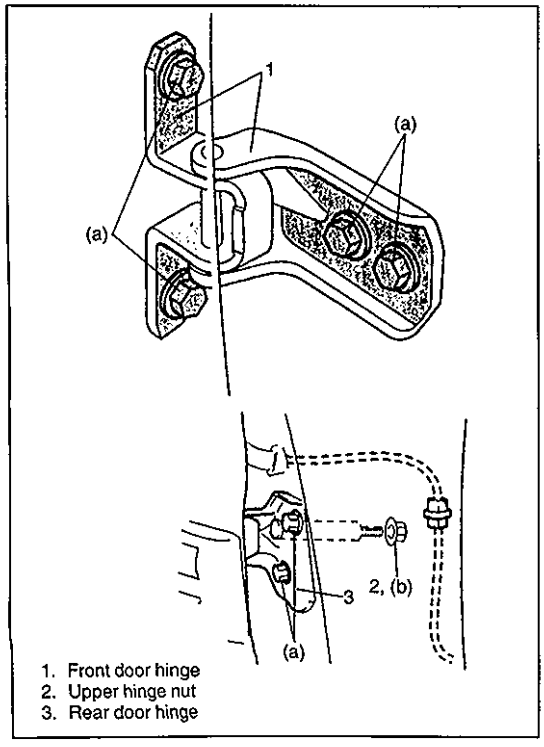
1. Rags
2. Wooden piece

4) Support door panel using a jack with a piece of wood placed between jack and panel, as shown.



1. Upper hinge mounting bolts
2. Lower hinge mounting bolt
3. Door
4. Body

5) Remove door assy by loosening hinge mounting bolts.



1. Front door hinge
2. Upper hinge nut
3. Rear door hinge

INSTALLATION

Reverse removal procedure to install door assembly, noting following point.

NOTE:

When replacing door, coat replacement door inside with wax for proper anticorrosion treatment.
Refer to "UNDERCOATING/ANTI-CORROSION COMPOUND APPLICATION AREA" in this section.

- Tighten door hinge bolts (and nut) to specified torque.

  Tightening torque
  (a): 27 N·m (2.7 kg-m, 19.5 lb-ft)
  (b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

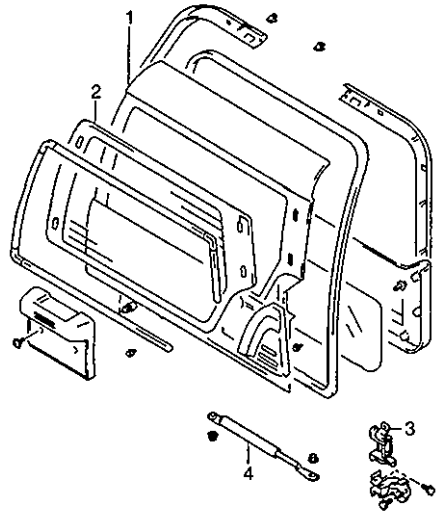
- Adjust door latch striker position by referring to "FRONT DOOR LOCK INSTALLATION" Section so that door is positioned correctly.
- Adjust front door cushion so that door contacts body when closed.
- After installation, open and close the door to check looseness. Replace door open stopper pin when there is looseness.
- When weatherstrip is hardened, water leak may develop. In such case, replace it with new one.

REAR DOOR ASSEMBLY

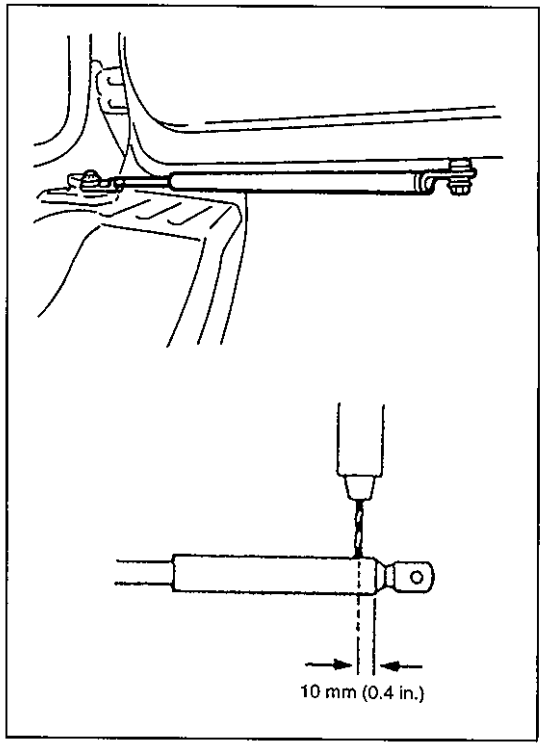
REMOVAL/INSTALLATION

Follow procedures for Front Door removal/installation in this section.

BACK DOOR ASSEMBLY



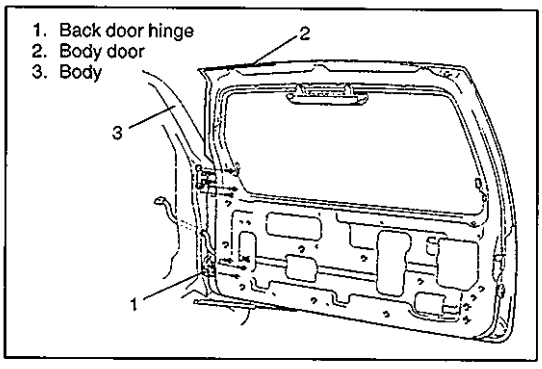
1. Back door panel assy
2. Back door window glass
3. Back door hinge
4. Back door balancer unit



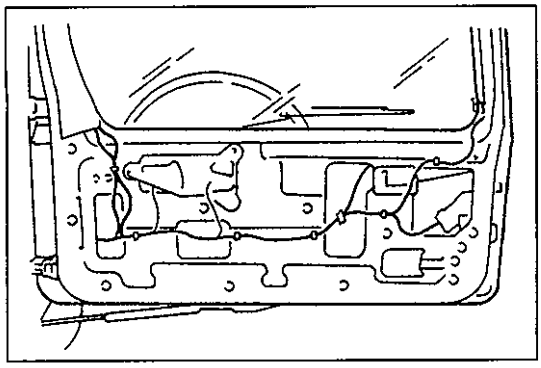
REMOVAL

1) Remove back door trim, and door sealing cover, refer to steps 1) to 4) of BACK DOOR LOCK ASSEMBLY in this section.
2) Remove wire harness connector inside the back door.
3) Remove back door balancer (first at its door-side and next at its body-side), as shown.

WARNING:
Handling of Back Door Balancer (Damper)
- **Do not disassemble balancer because its cylinder is filled with gas.**
- **The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. There fore, be sure to wear goggle.**
- **When discarding removed back door balancer (damper), use a 2 to 3 mm (0.08 to 0.12 in.) drill to make a hole as shown.**
- **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.**



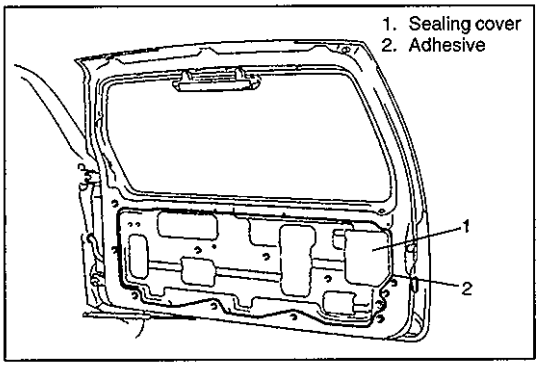
5) Remove door hinge bolts and door.



INSTALLATION

Reverse removal procedure to install back door noting following points.

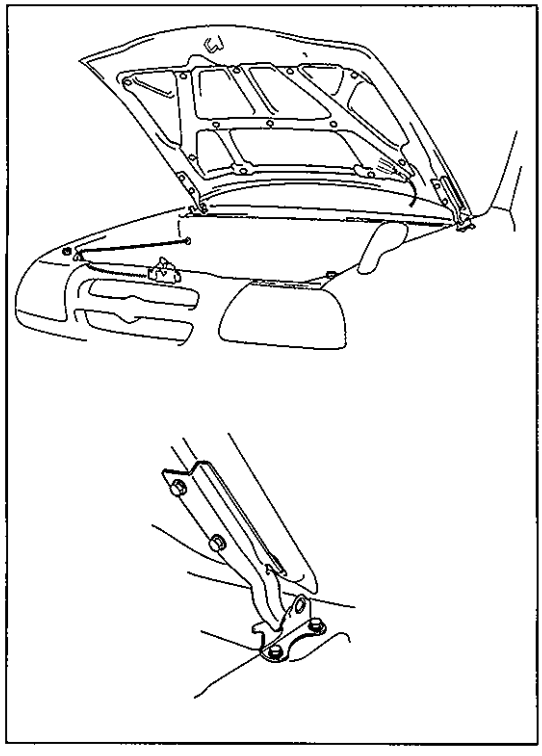
- Secure wiring harness.



- Secure door sealing cover.

NOTE:
Use adhesive to seal sealing cover to back door.

- Adjust door latch striker position by referring "BACK DOOR LOCK ASSEMBLY INSTALLATION" so that door is positioned correctly.
- Adjust door cushion so that door contacts body when closed.



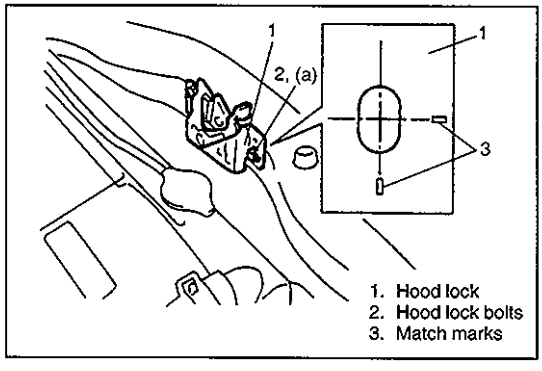
HOOD

REMOVAL

1) Remove window washer hose from hood.
2) Remove four mounting bolts to detach hood.

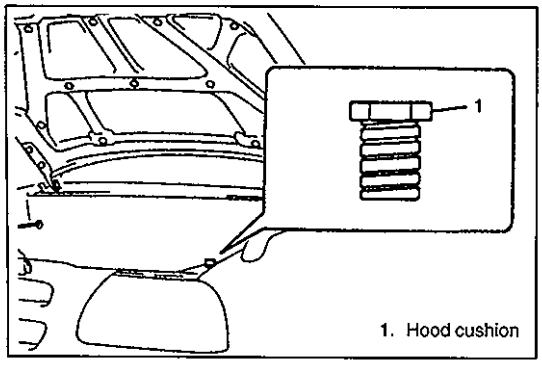
ADJUSTMENT

- Fore-and-aft and right-and-left adjustment.
  Loosen four mounting bolts for adjustment.



- Hood lock adjustment
  When installing hood lock, bring bolt at intersection point of match marks and move it in vertical direction for adjustment, if necessary.

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



- 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.

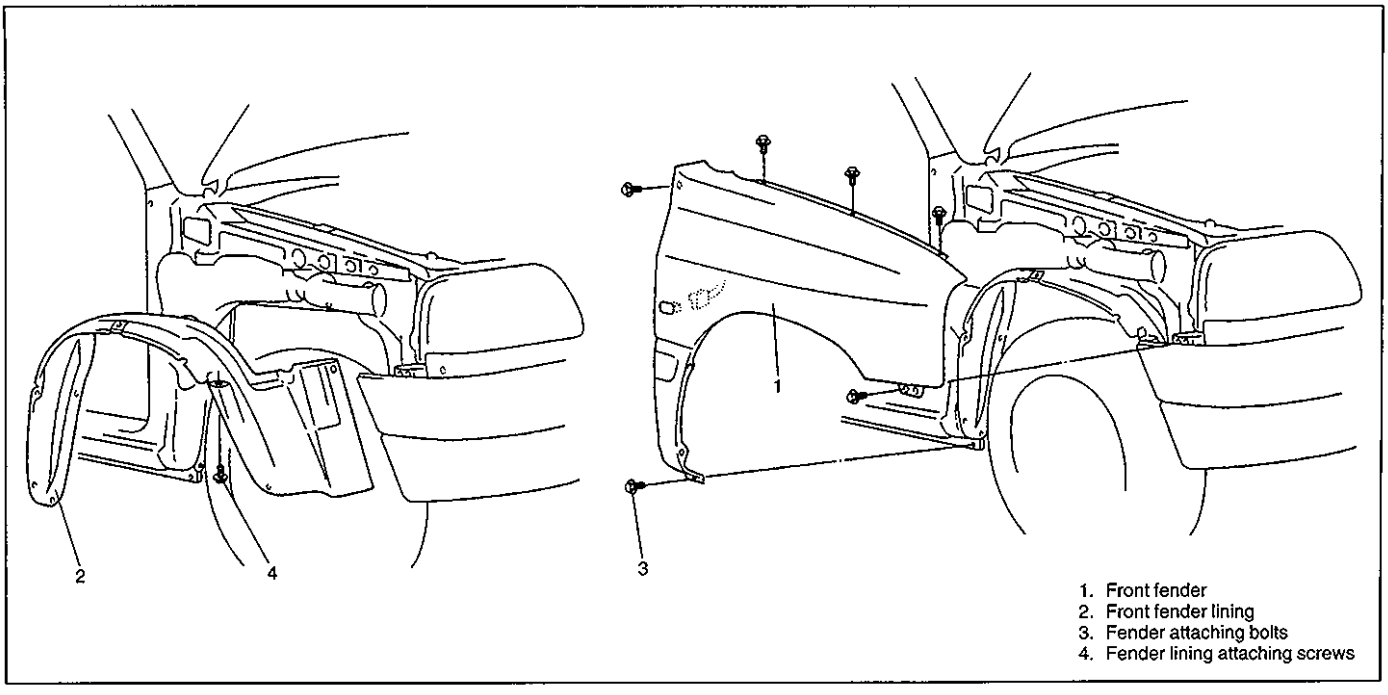
INSTALLATION

Reverse removal procedure to install hood.

INSPECTION

Check that hood opens and closes smoothly and properly. Lubricate if necessary. Also check that secondary latch operates properly (check that secondary latch keeps hood from opening all the way) and hood locks securely when closed.

FRONT FENDER



1. Front fender
2. Front fender lining
3. Fender attaching bolts
4. Fender lining attaching screws

REMOVAL

1) Remove front bumper.
2) Disconnect connector of side turn signal (or side marker) lamp.
3) Remove front fender lining.
4) Remove front fender.

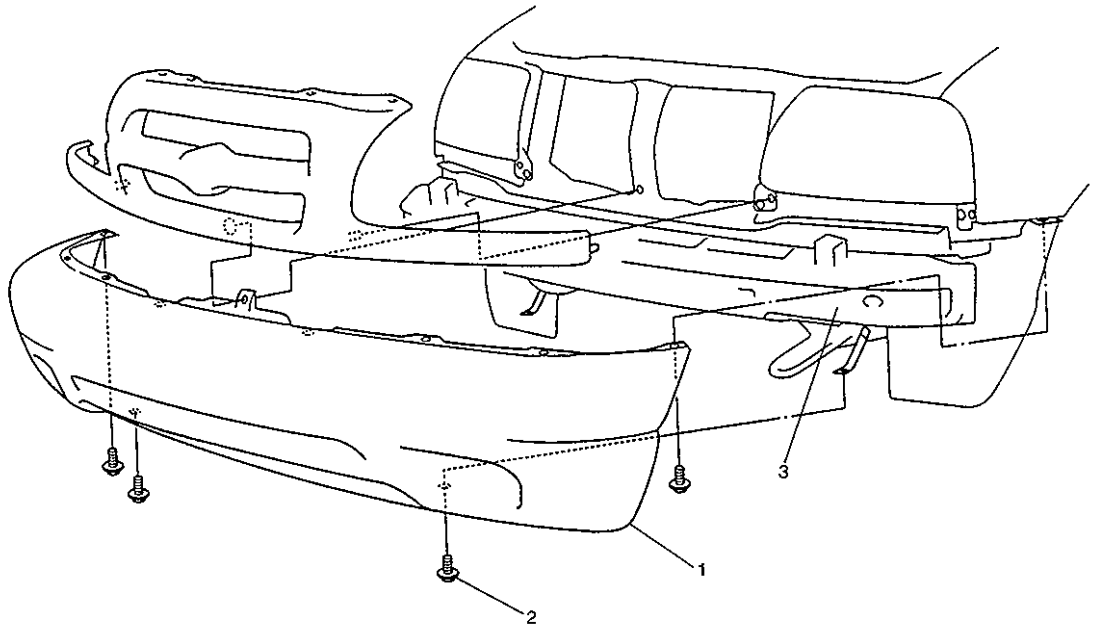
INSTALLATION

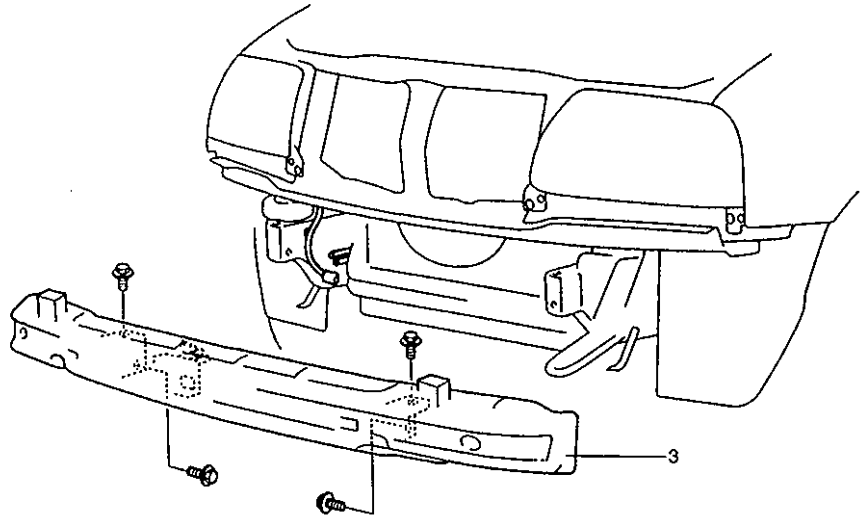
Reverse removal procedure for installation.

NOTE:
If paint on fender bolt is peeled off, be sure to apply paint again.

FRONT BUMPER

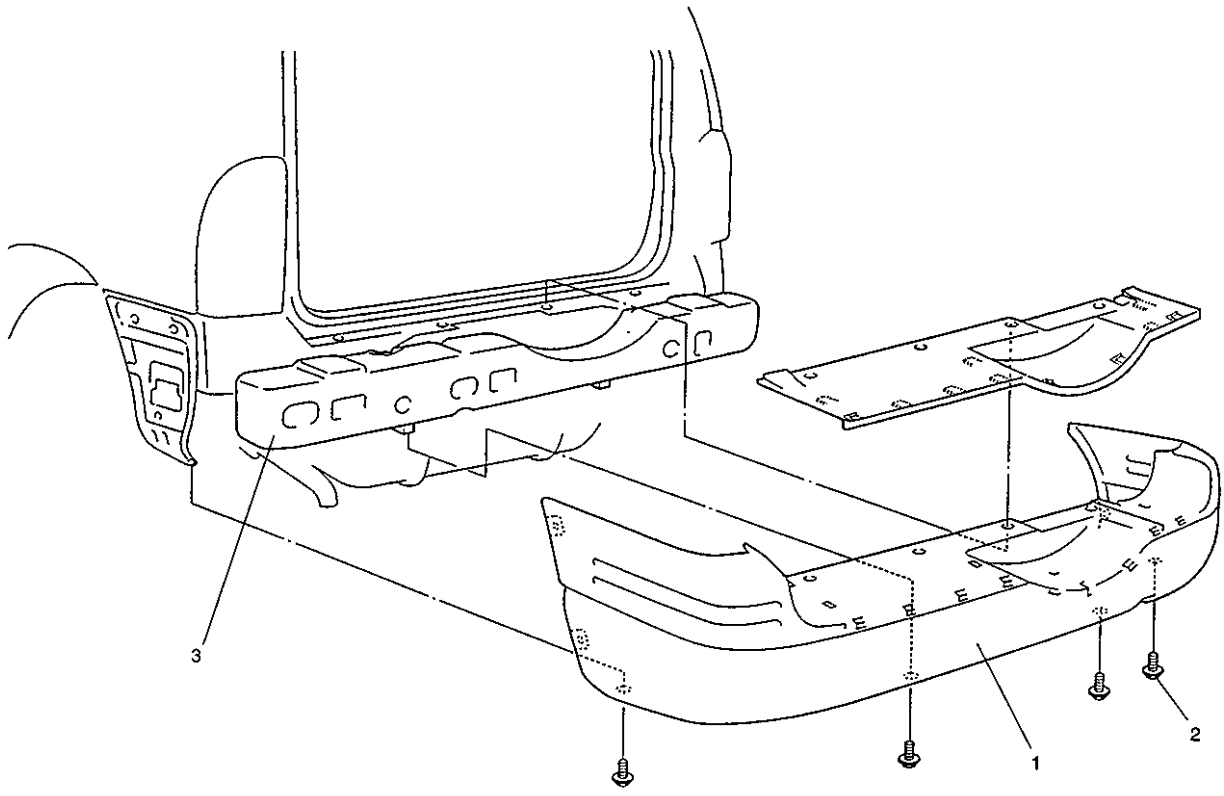
NOTE:
Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.
Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

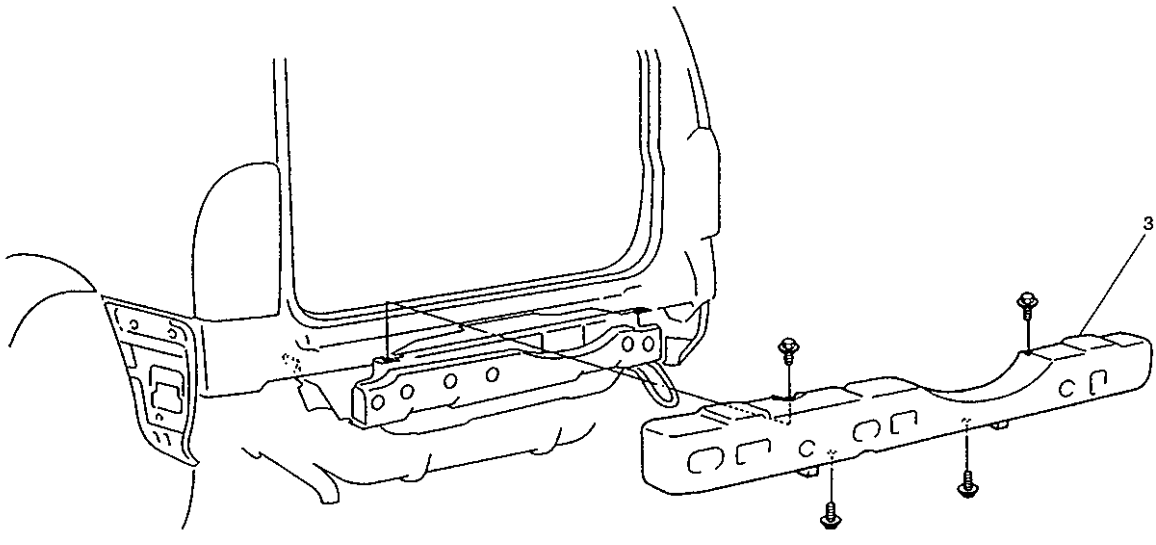




1. Front bumper
2. Screws
3. Front bumper member

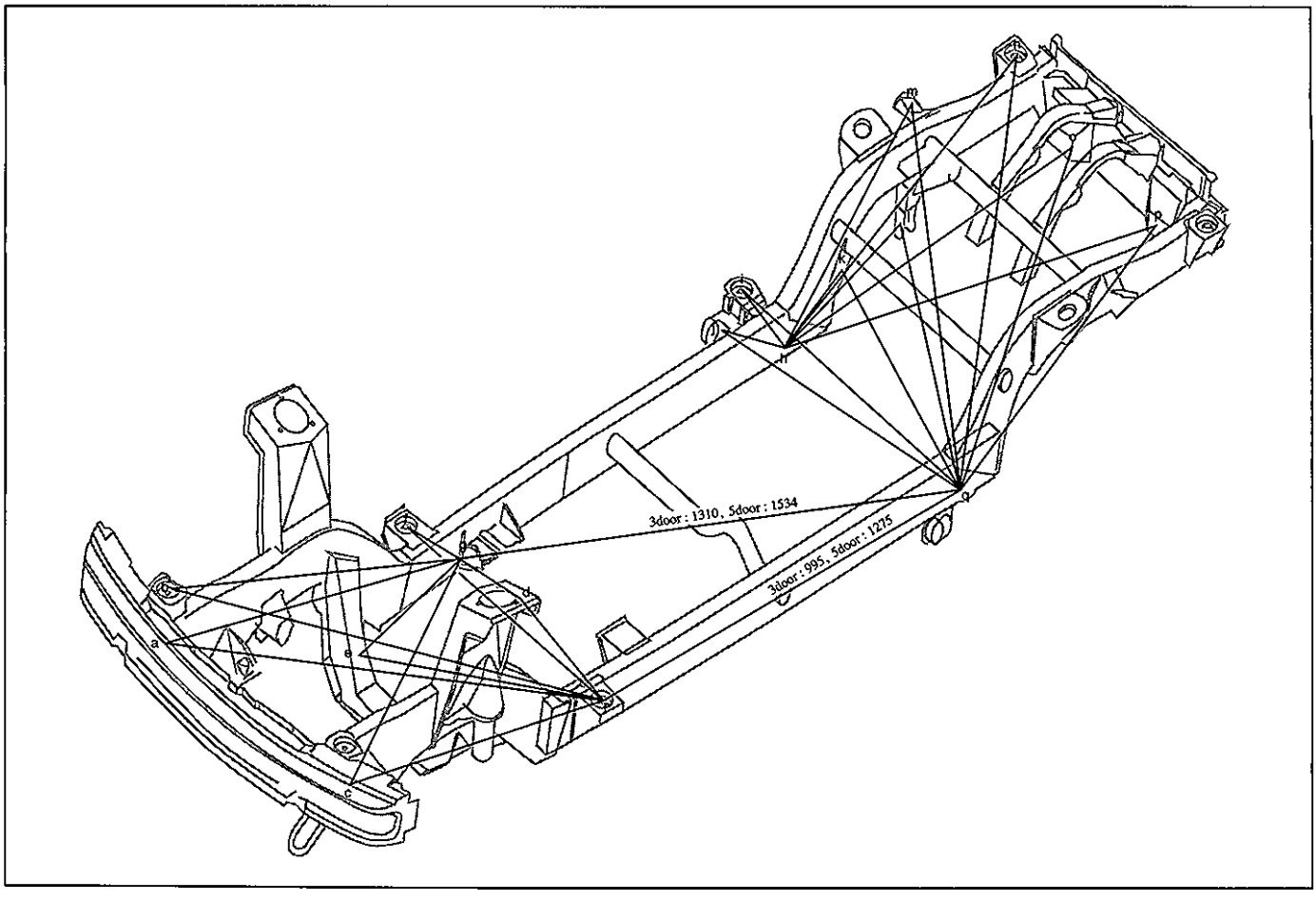
REAR BUMPER





1. Rear bumper
2. Rear bumper screws
3. Rear bumper member

UNDER BODY DIMENSIONS



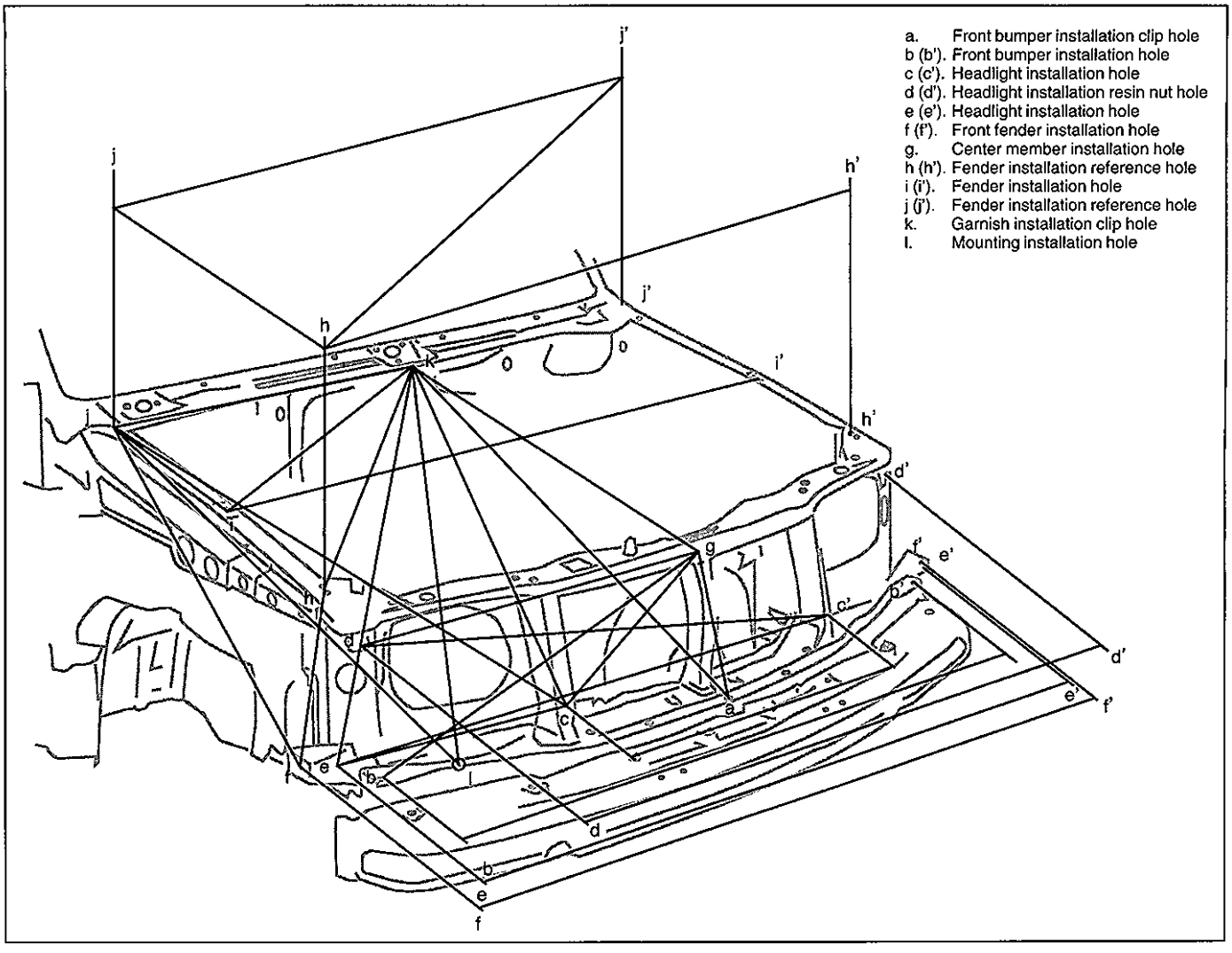
a. Front bumper
b. 1st mounting
c. Suspension Frame
d. Front strut
e. Suspension arm
f. 2nd mounting
g. ø20 zig hole
h. Zig hole
i. 3rd mounting
j. Lower rod
k. Upper rod
l. Lateral rod
m. Rear shock absorber
n. 4th mounting
o. Fuel tank
p. Fuel tank
q. Lower rod

a – g : 1315 mm (51.77 in.)
a – f' : 1534 mm (60.39 in.)
b – g : 1243 mm (48.94 in.)
b – f' : 1518 mm (59.76 in.)
c – g : 1377 mm (54.21 in.)
c – f' : 1105 mm (43.50 in.)
d – f' : 1319 mm (51.93 in.)
d – f : 874 mm (34.41 in.)
e – g : 525 mm (20.67 in.)
e – f' : 857 mm (33.74 in.)
f – f' : 927 mm (36.50 in.)
f' – q : 1275 mm (50.20 in.)
g – q : 1534 mm (60.39 in.)
h – i : 178 mm (7.01 in.)
h – j : 133 mm (5.24 in.)
h – k : 325 mm (12.80 in.)
h – l : 674 mm (26.54 in.)

h – m : 803 mm (31.61 in.)
h – n : 1161 mm (45.71 in.)
h – o : 1184 mm (46.61 in.)
h – p : 1190 mm (46.85 in.)
i – q : 999 mm (39.33 in.)
j – q : 997 mm (39.25 in.)
k – q : 824 mm (32.44 in.)
l – q : 1130 mm (44.49 in.)
m – q : 1258 mm (49.53 in.)
n – q : 1483 mm (58.39 in.)
o – q : 1349 mm (53.11 in.)
p – q : 1334 mm (52.52 in.)

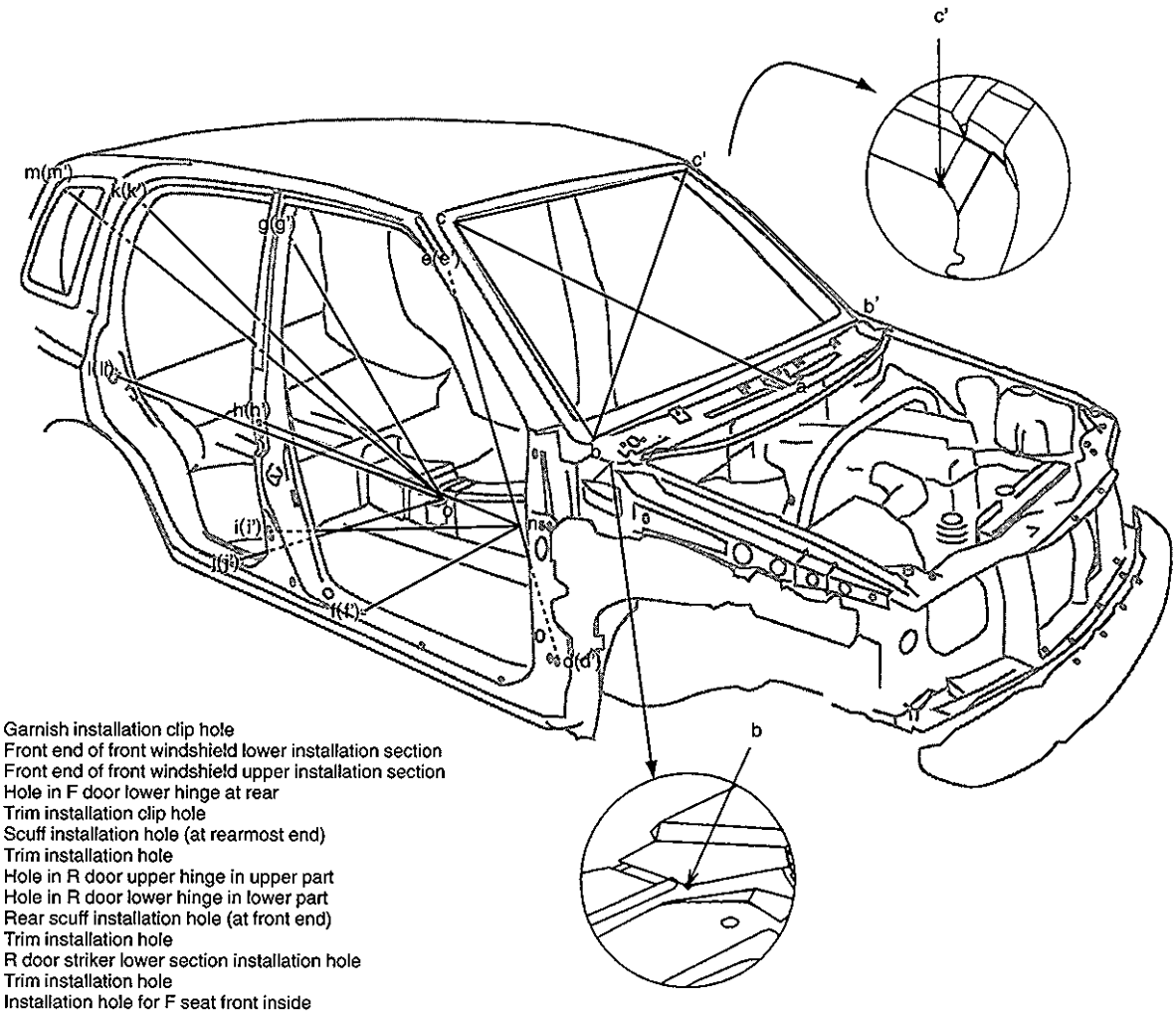
For 3 door model
g – h : 995 mm (39.17 in.)
g – q : 1310 mm (51.57 in.)

BODY DIMENSIONS



Hole to hole distance

"a – g" : 276 mm (10.87 in.)
"a – k" : 1000 mm (39.37 in.)
"b – b'": 1302 mm (51.26 in.)
"b – g" : 730 mm (28.74 in.)
"c – c'": 668 mm (26.30 in.)
"c – e" : 414 mm (16.30 in.)
"c – g" : 406 mm (15.98 in.)
"c – j" : 1029 mm (40.51 in.)
"c – k" : 1000 mm (39.37 in.)
"d – d'": 1302 mm (51.26 in.)
"d – e" : 189 mm (7.44 in.)
"d – c'": 1016 mm (40.00 in.)
"d – g" : 672 mm (26.46 in.)
"d – k" : 968 mm (38.11 in.)
"e – e'": 1456 mm (57.32 in.)
"f – f'" : 1550 mm (61.02 in.)
"f – h" : 299 mm (11.77 in.)
"f – j" : 811 mm (31.93 in.)
"g – k" : 854 mm (33.62 in.)
"h – h'": 1339 mm (52.72 in.)
"h – j'" : 1504 mm (59.21 in.)
"h – j" : 677 mm (26.65 in.)
"h – k" : 927 mm (36.50 in.)
"i – i'" : 1344 mm (52.91 in.)
"i – j" : 391 mm (15.39 in.)
"i – k" : 760 mm (29.92 in.)
"j – j'" : 1348 mm (53.07 in.)
"j – k" : 676 mm (26.61 in.)
"l – j" : 961 mm (37.83 in.)
"l – k" : 1018 mm (40.08 in.)



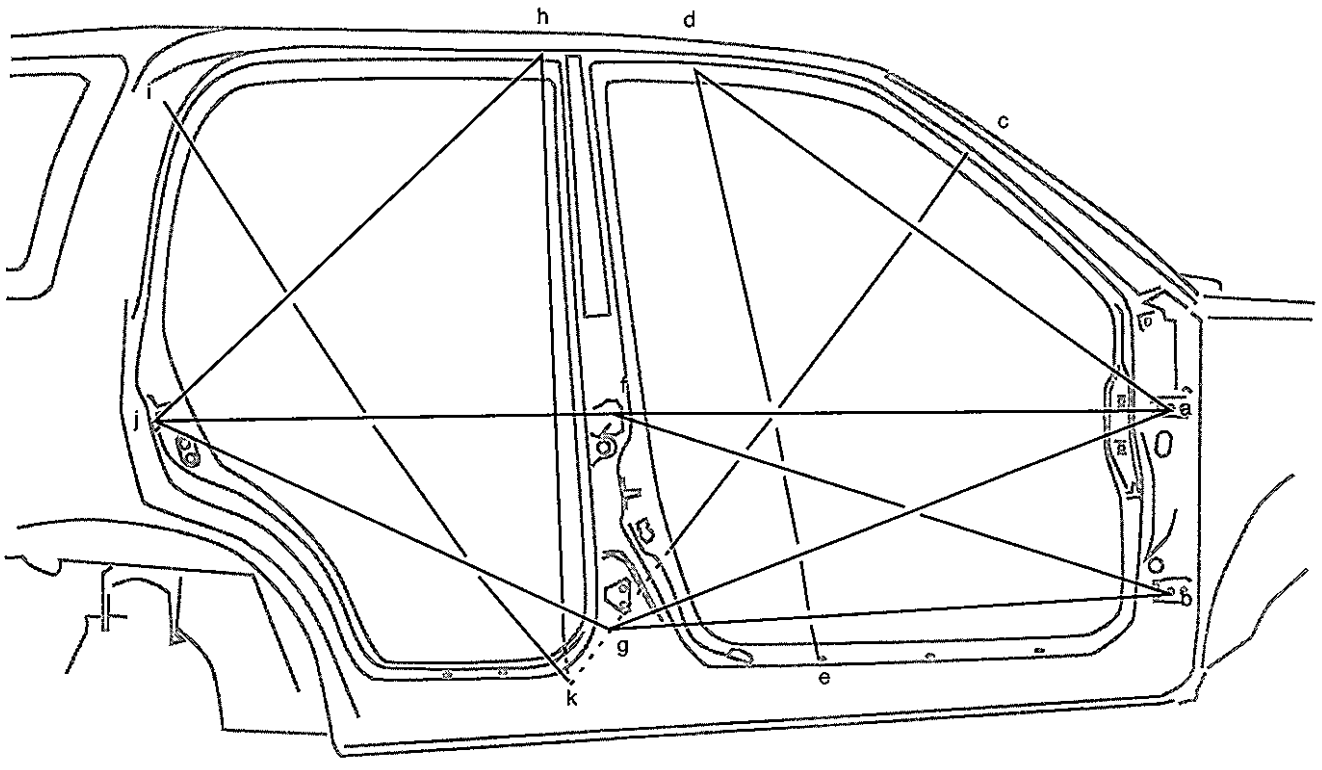
a. Garnish installation clip hole
b (b'). Front end of front windshield lower installation section
c (c'). Front end of front windshield upper installation section
d. Hole in F door lower hinge at rear
e. Trim installation clip hole
f (f'). Scuff installation hole (at rearmost end)
g (g'). Trim installation hole
h (h'). Hole in R door upper hinge in upper part
i (i'). Hole in R door lower hinge in lower part
j (j'). Rear scuff installation hole (at front end)
k (k'). Trim installation hole
l (l'). R door striker lower section installation hole
m (m'). Trim installation hole
n. Installation hole for F seat front inside
o. Installation hole for F seat rear inside

Hole to hole distance

"a – c" : 982 mm (38.66 in.)
"b – b'" : 1390 mm (54.72 in.)
"b – c'" : 1406 mm (55.35 in.)
"b – c" : 755 mm (29.72 in.)
"c – c'" : 1012 mm (39.84 in.)
"d – d'" : 1545 mm (60.83 in.)
"d – n" : 800 mm (31.50 in.)
"e – e'" : 1110 mm (43.70 in.)
"e – n" : 1036 mm (40.79 in.)
"f – f'" : 1511 mm (59.49 in.)
"f – n" : 620 mm (34.41 in.)
"g – g'" : 1085 mm (42.72 in.)
"g – o" : 1099 mm (43.27 in.)
"h – h'" : 1521 mm (59.88 in.)
"h – o" : 901 mm (35.47 in.)
"i – i'" : 1547 mm (60.91 in.)
"j – n" : 806 mm (31.73 in.)
"j – j'" : 1511 mm (59.49 in.)
"j – o" : 649 mm (25.55 in.)
"k – k'" : 1126 mm (44.33 in.)
"k – o" : 1350 mm (53.15 in.)
"l – l'" : 1491 mm (58.70 in.)
"l – o" : 1130 mm (44.49 in.)
"m – m'" : 939 mm (36.97 in.)
"m – o" : 1725 mm (67.91 in.)

For 3 door model

"f – n'" : 688 mm (27.09 in.)
"f – f'" : 1514 mm (59.61 in.)
"l – o" : 888 mm (34.96 in.)
"m – o" : 1514 mm (59.61 in.)
"k – n" : 1265 mm (49.80 in.)
"k – k'" : 1084 mm (42.68 in.)



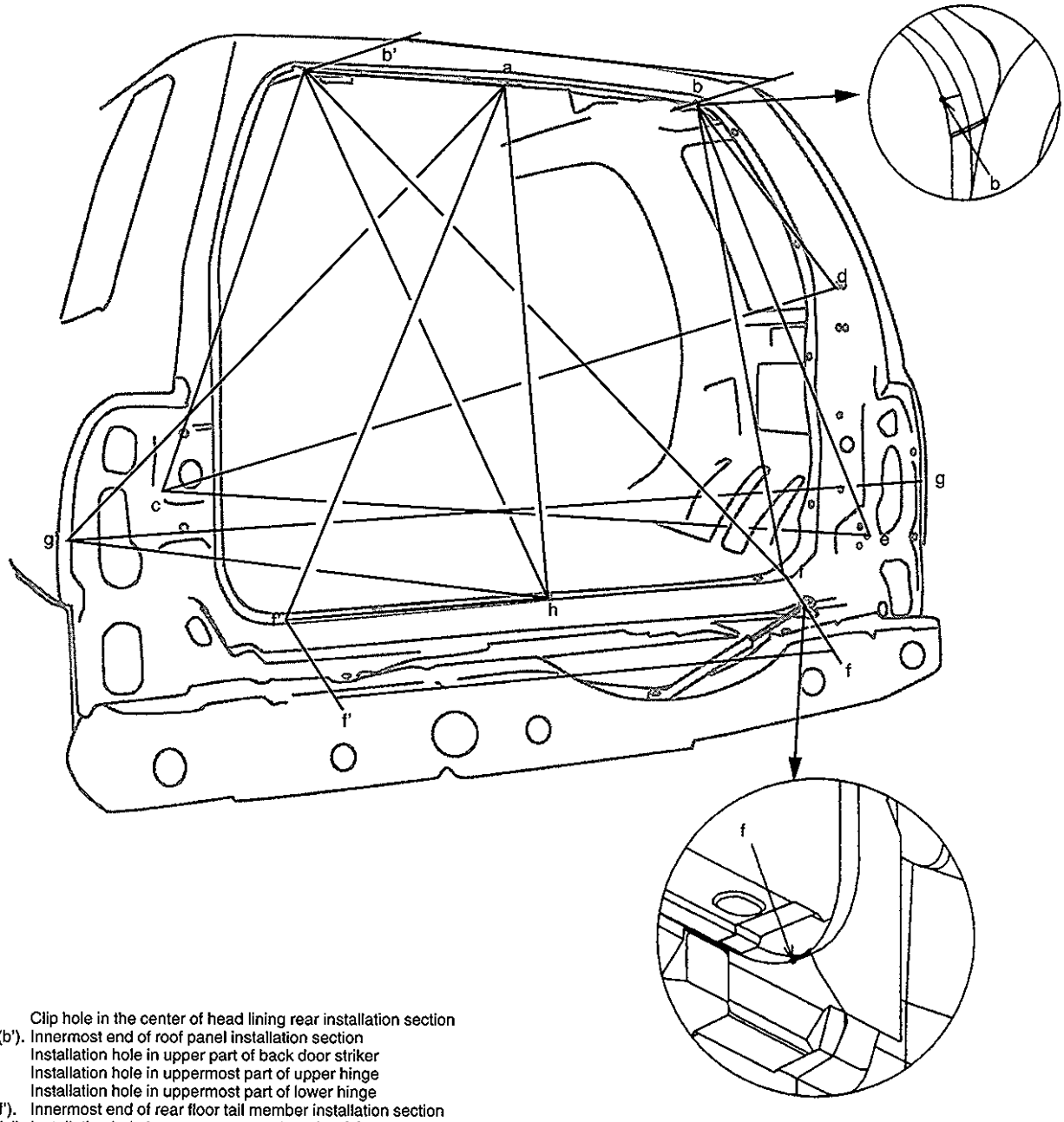
a. Hole in F door upper hinge at rear
b. Hole in F door lower hinge at rear
c. Trim installation clip hole
d. ø7 jig hole
e. Scuff installation hole (rearmost end)
f. Hole n R door upper hinge in upper part
g. Hole in R door lower hinge in lower part
h. Assistant grip installation hole
i. Trim installation hole
j. Door striker lower section installation hole
k. F seat belt installation hole

Hole to hole distance

"a – d" : 1155 mm (45.47 in.)
"a – g" : 1090 mm (42.91 in.)
"a – f" : 1046 mm (41.18 in.)
"b – f" : 1120 mm (44.09 in.)
"b – g" : 1140 mm (44.88 in.)
"c – k" : 1245 mm (49.02 in.)
"d – e" : 1174 mm (46.22 in.)
"f – j" : 839 mm (33.03 in.)
"g – j" : 918 mm (36.14 in.)
"h – j" : 941 mm (37.04 in.)
"h – k" : 1189 mm (46.81 in.)
"i – k" : 1309 mm (51.53 in.)

For 3 Door model

"a – j" : 1150 mm (45.28 in.)
"b – f" : 1165 mm (45.87 in.)
"b – j" : 1165 mm (45.87 in.)
"c – e" : 1142 mm (44.96 in.)
"c – k" : 1246 mm (49.06 in.)
"d – e" : 1146 mm (45.12 in.)

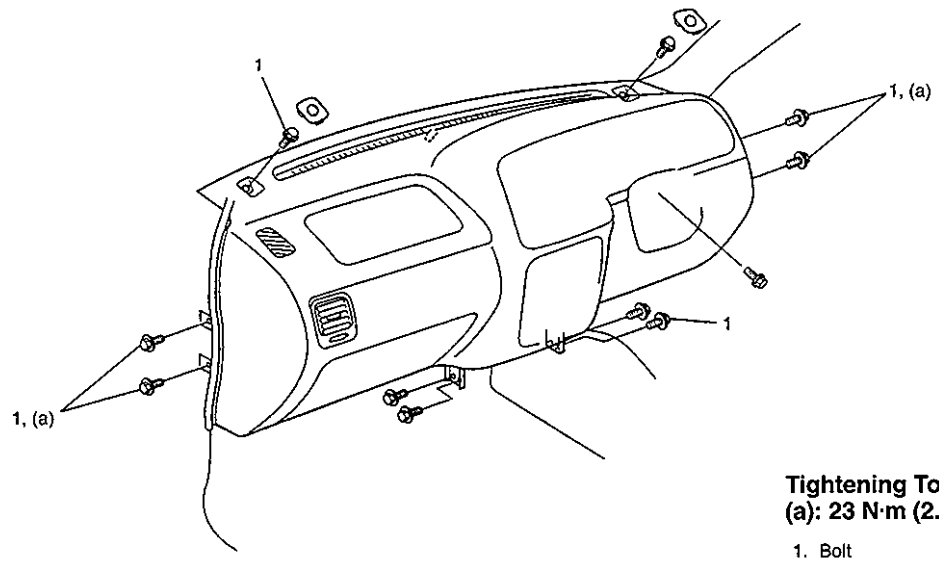


a. Clip hole in the center of head lining rear installation section
b (b'). Innermost end of roof panel installation section
c. Installation hole in upper part of back door striker
d. Installation hole in uppermost part of upper hinge
e. Installation hole in uppermost part of lower hinge
f (f'). Innermost end of rear floor tail member installation section
g (g'). Installation hole in outer upper section of R-COMB R lamp
h. Nut hole

"a – b'" : 448 mm (17.64 in.)	"b' – c" : 650 mm (25.59 in.)
"a – f'" : 1054 mm (41.50 in.)	"b' – g" : 996 mm (39.21 in.)
"a – h" : 921 mm (36.26 in.)	"b' – f" : 1314 mm (51.73 in.)
"a – g" : 1050 mm (41.34 in.)	"c – d" : 1245 mm (49.02 in.)
"b – b'" : 888 mm (34.96 in.)	"c – e" : 1293 mm (50.90 in.)
"b – d" : 400 mm (15.75 in.)	"f – f'" : 1030 mm (40.55 in.)
"b' – f" : 1314 mm (51.73 in.)	"f' – g" : 512 mm (20.16 in.)
"b – e" : 837 mm (32.95 in.)	"g – h" : 806 mm (31.73 in.)
"b – f" : 892 mm (35.12 in.)	"g – g'" : 1544 mm (60.79 in.)

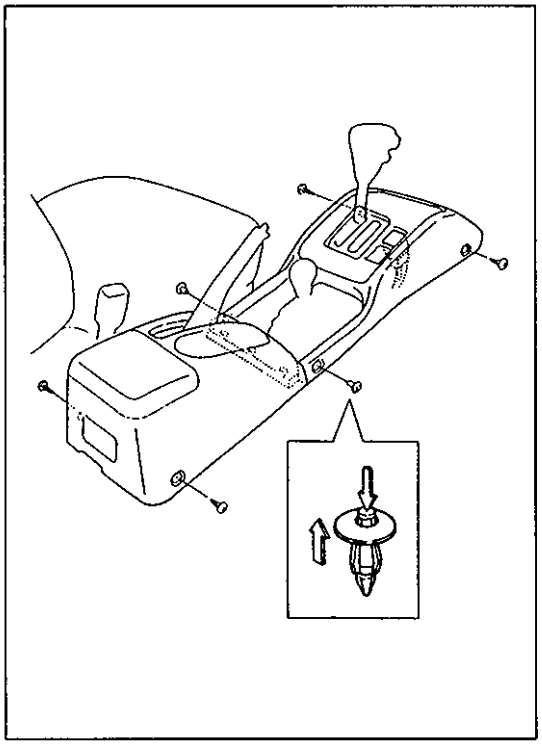
INSTRUMENTATION AND DRIVER INFORMATION

INSTRUMENT PANEL



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

1. Bolt



WARNING:
See WARNING at the beginning of this section.

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disable air bag system, if equipped. Refer to "Disabling Air Bag System" in Section 10B.
3) Remove console box.
4) Remove glove box and column hole cover.
5) Disconnect wires and cables from heater unit and blower motor assembly.
6) Remove steering column assembly. Refer to Section 3C or 3C1.
7) Disconnect speedometer connector and remove speedometer assembly.
8) Remove engine hood opener.
9) Disconnect couplers which need to be disconnected for removal for instrument panel.
10) Remove instrument panel mounting screws.
11) Remove instrument panel mounting bolt.
12) Remove instrument panel.

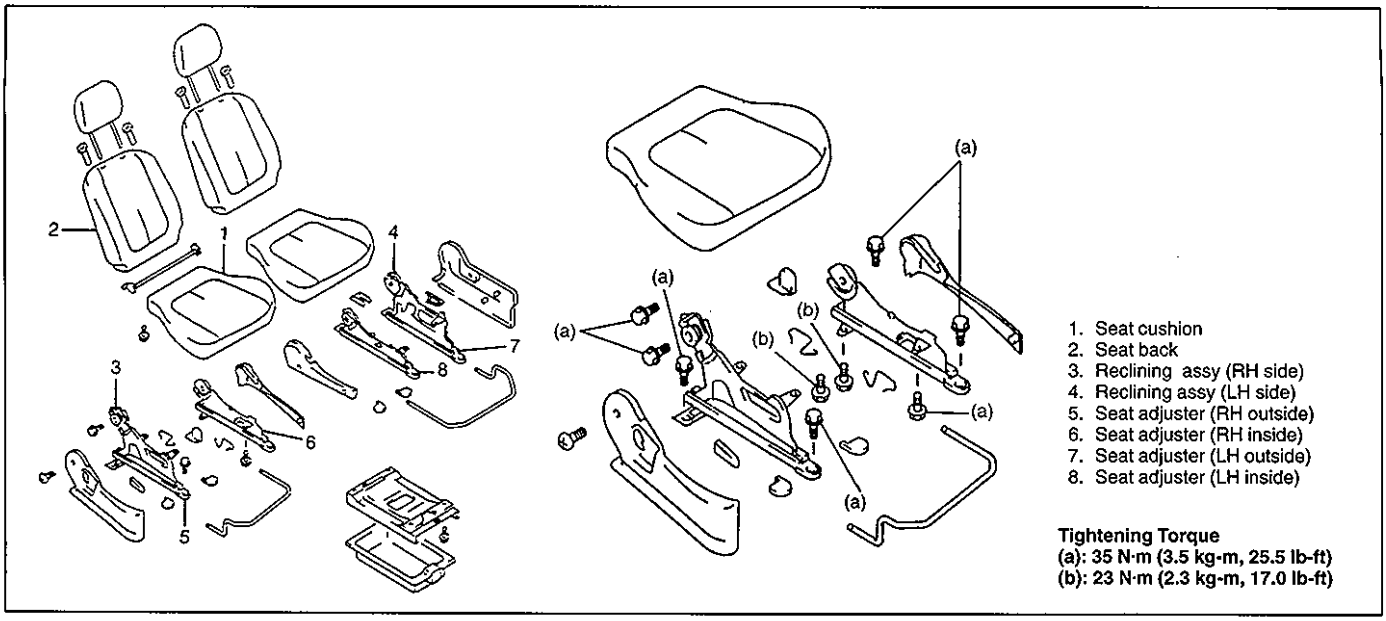
CAUTION:
For vehicle with Air Bag, instrument panel could not be removed with SDM coupler connected.
Use are not to damage Air Bag harness.

INSTALLATION

1) Install instrument panel by reversing removal procedure, noting the following items.
   - When installing each part, be careful not to catch any cable or wiring harness.
   - When installing steering column assembly, refer to Section 3C or 3C1 "STEERING COLUMN INSTALLATION".
2) Adjust control cables. (Refer to Section 1A "HEATER CONTROL CABLES".)
3) Enable air bag system if equipped. Refer to "Enabling Air Bag System" in Section 10B.

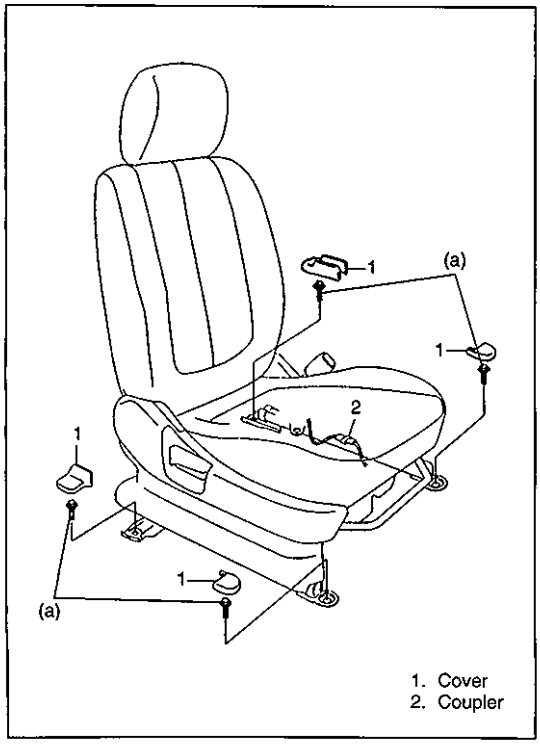
SEAT

FRONT SEAT



REMOVAL

1) Disconnect lead wire(s) at coupler (if equipped). Remove four mounting bolts fixing front seat to seat rail to remove front seat.
2) Disassemble and repair seat as necessary.

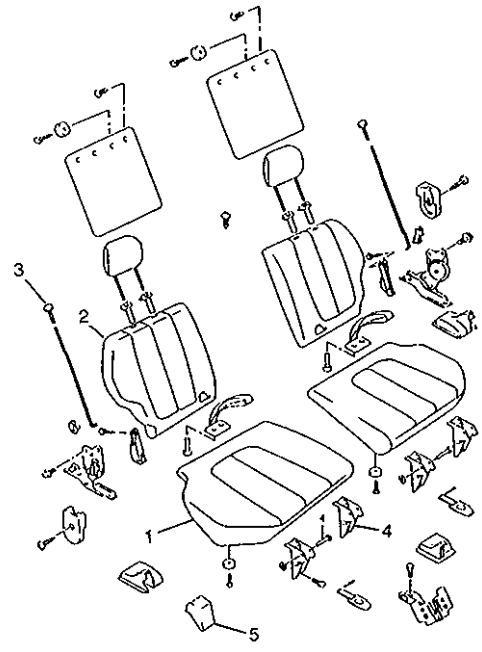


INSTALLATION

Reverse removal procedure to install front seat.
Torque to specifications, as shown.

Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

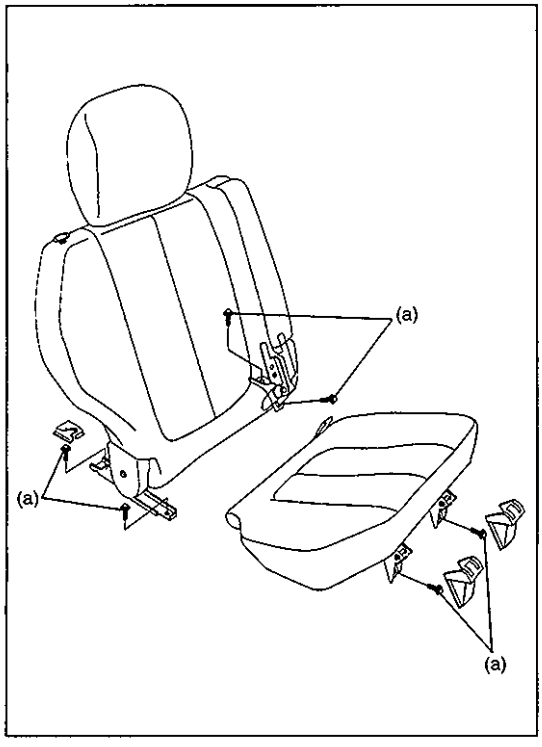
REAR SEAT



1. Seat cushion
2. Seat back
3. Seat auto lock release handle
4. Seat hinge male
5. Hinge male cover

REMOVAL

1) Remove four mounting bolt to remove seat cushion.
2) Remove four mounting bolts to remove seat back.
3) Disassemble and repair seat as necessary.



INSTALLATION

Reverse removal procedure to install rear seat.
Torque to specifications, as shown.

Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

PAINT AND COATINGS

ANTI-CORROSION TREATMENT

WARNING:
Standard shop practices, particularly eye protection, should be followed during the performance of the below-itemized operations to avoid personal injury.

As rust proof treatment, steel sheets are given corrosion resistance on the interior and/or exterior.
These corrosion resistance steel sheet materials are called one of two-side galvanized steel sheets.
It is for the sake of rust protection that these materials are selected and given a variety of treatments as described blow.

1) Steel sheets are treated with cathodic electroprimer which is excellent in corrosion resistance.
2) Rust proof wax coatings are applied to door and side sill insides where moisture is liable to stay.
3) Vinyl coating is applied to body underside and wheel housing inside.
4) Sealer is applied to door hem, engine compartment steel sheet-to-steel sheet joint, and the like portions to prevent water penetration and resulting in rust occurrence.

In panel replacement or collision damage repair, leaving the relevant area untreated as it is in any operation which does disturb the above-mentioned rust proof treatment will cause corrosion to that area. Therefore, it is the essential function of any repair operation to correctly recoat the related surfaces of the relevant area.
All the metal panels are coated with metal conditioners and primer coating during vehicle production. Following the 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 the application of sealer and rust proof wax coating.

Sealer is applied to the specific joints of a vehicle during production. The sealer is intended to prevent dust from entering the vehicle and serves also as an anti-corrosion barrier. The sealer is applied to the door and hood hem areas and between panels. Correct and reseal the originally sealed joints if damaged. Reseal the attaching joints of a new replacement panel and reseal the hem area of a replacement door or hood.
Use a quality sealer to seal the flanged joints, overlap joints and seams. The sealer must have flexible characteristics and paintability after it's applied to repair areas.
For the sealer to fill open joints, use caulking material. Select a sealer in conformance with the place and purpose of a specific use. Observe the manufacturer's label-stand instructions when using the sealer.
In many cases, repaired places require color painting. When this is required, follow the ordinary techniques specified for the finish preparation, color painting and undercoating build-up.
Rust proof wax, a penetrative compound, is applied to the metal-to-metal surfaces (door and side sill insides) where it is difficult to use ordinary undercoating material for coating. Therefore, when selecting the rust proof wax, it may be the penetrative type.
During the undercoating (vinyl coating) application, care should be taken that sealer is not applied to the engine-related parts and shock absorber mounting or rotating parts. Following the under coating, make sure that body drain holes are kept open.
he sequence of the application steps of the anti-corrosion materials are as follows:

1) Clean and prepare the metal surface.
2) Apply primer.
3) Apply sealer (all joints sealed originally).
4) Apply color in areas where color is required such as hem flanges, exposed joints and under body components.
5) Apply anticorrosion compound (penetrative wax).
6) Apply undercoating (rust proof material).

When the welding or heating operation causes the original galvanization or other anticorrosive materials to be burnt, the interior and under-body panel surfaces must be cleaned.
Removal of residues of the burning should be carried out carefully when the relevant place has boxtype construction or has shape which limits the access to the interior surfaces. In general, the following method can be used satisfactorily for the removal of those residues.
Scrape the accessible places. If a standard putty knife or scraper does not fit to the elevant place, consider to use a more flexible scraper to a place narrowly enclosed by sheet metals.
A jet of compressed air can remove most residues, and is effective to limited areas.
However, this type of operation absolutely requires eye protection.

METAL REPLACEMENT PARTS FINISHING

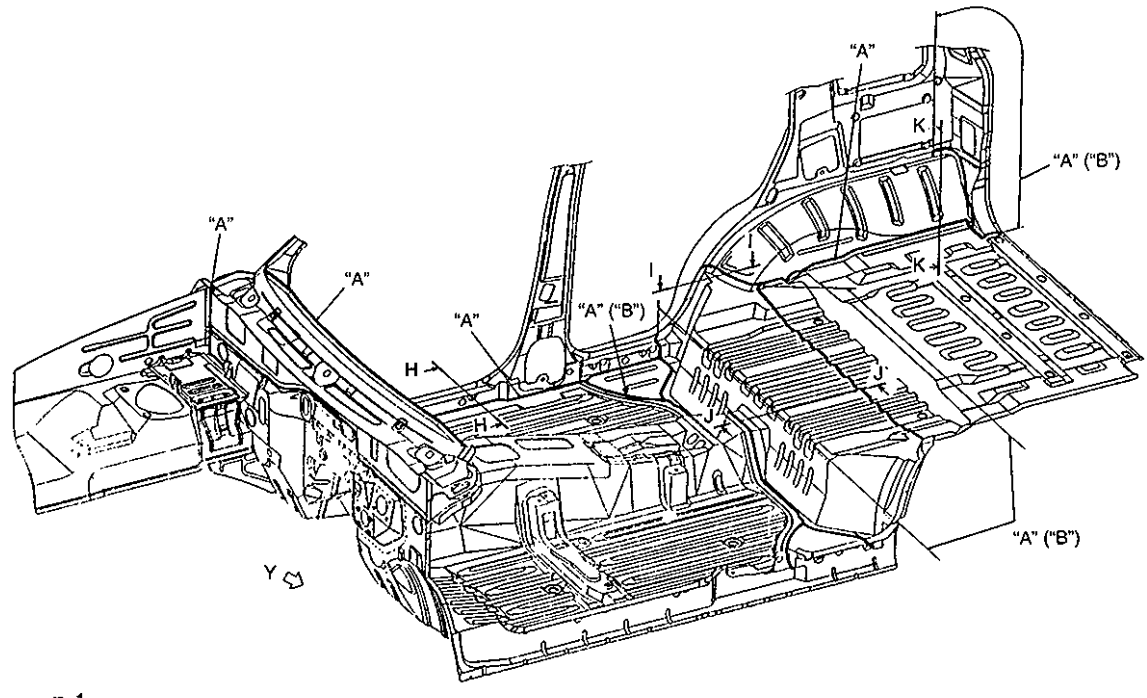
The metal service replacement parts (or assemblies) are coated with electro-deposition primer.
For the proper adhesion of a paint, the following finish process (refinish steps) becomes necessary.

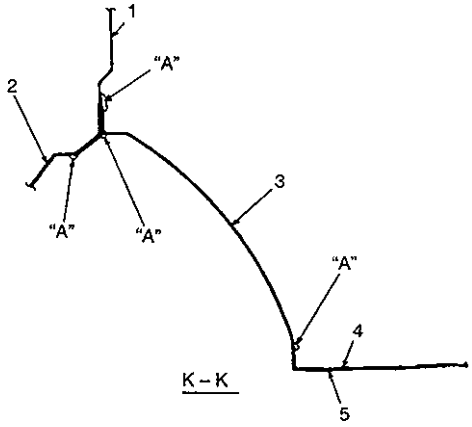
1) Use wax or grease-removing solvent to clean the part.
2) Use a wet or dry sand-paper (No. 400) to polish the panel lightly. DO not polish it forcibly to produce any scratch. Clean the part again.
3) If factory-applied primer coating is cut through to the bare metal, apply metal conditioner to the bare metal exposed to open air. As for method of use of the metal conditioner, follow directions on the container.
4) Apply primer-surfacer to the part completely dry before starting sand-paper polishing. As for drying time, follow directions advised on the primer-surfacer container.
5) Use a wet or dry sand-paper (No. 400) and water to polish the panel lightly.
6) Wash the part again.
7) Apply color, coating to the part.
8) Different paints demand different drying methods. Hence, follow directions advised on the 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 the melamine or acrylic coating, compound polishing can be omitted after drying.
10) If the case of lacquer coating, wax should not be applied to coated surface until the surface has dried completely (for approx. two months).

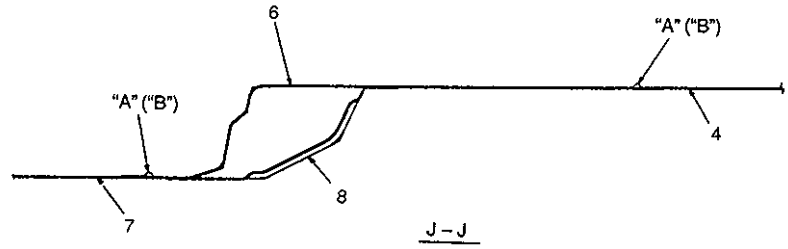
Before replacing exterior parts or assemblies, check paint conditions of all the covered or hidden interior surfaces. If any rust scale is found at these places, proceed as follows:

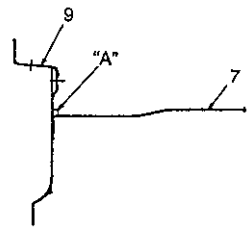
1) Use a proper wire brush, adhesive or liquid rust removing agent to remove rust. As for the method of use, follow directions advised for respecitve materials.
2) If necessary, wash parts with detergent, rinse, and dry them.
3) Before installing exterior body parts, apply anticorrosive compound to all cleaner surfaces of exterior body parts. Also, apply anticorrosive compound to inner surfaces of exterior body parts to be installed.

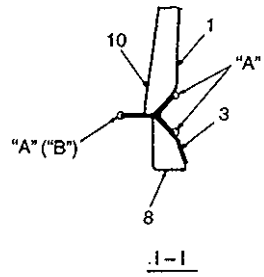
SEALANT APPLICATION AREA

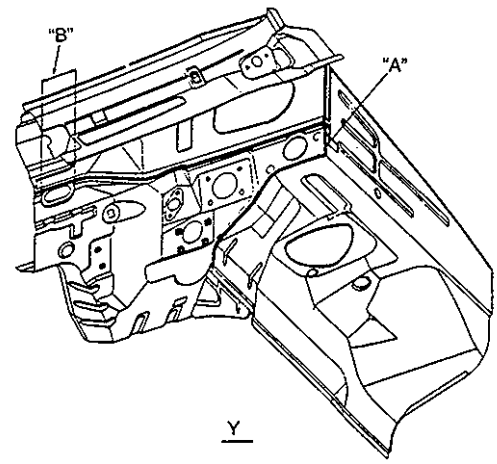






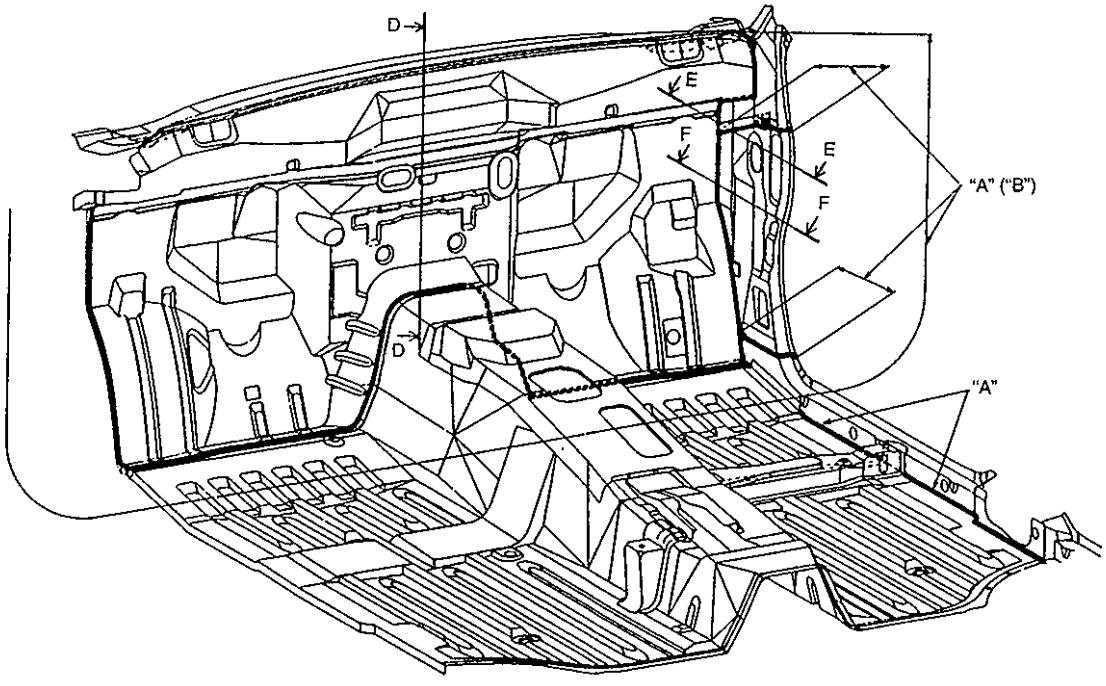




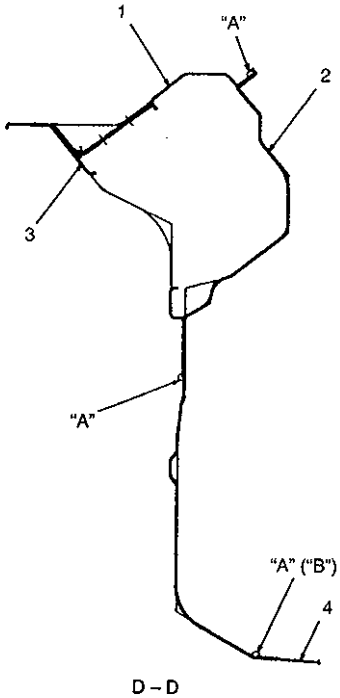


1. Side body inner panel
2. Rear wheel housing outer rear panel
3. Rear wheel housing panel
4. Rear floor panel
5. Tail lower member
6. Center floor panel
7. Front floor panel
8. Center floor member
9. Side sill inner panel
10. Side outer panel

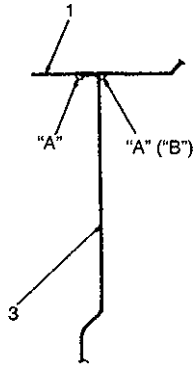
"A": Apply sealant
"B": Brush treatment



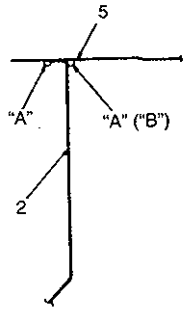
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D – D



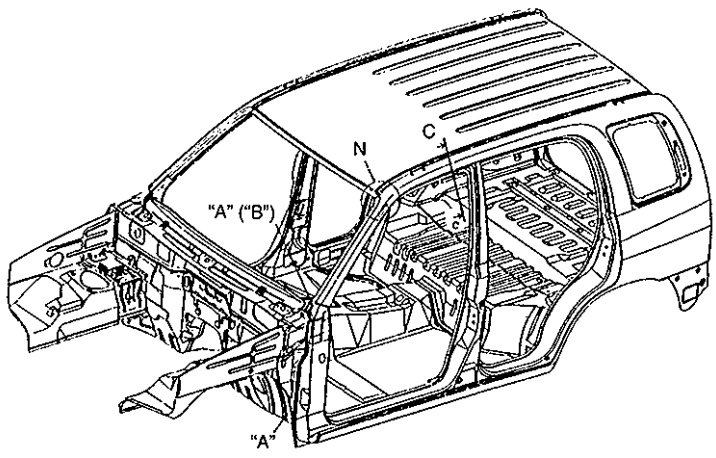
E – E

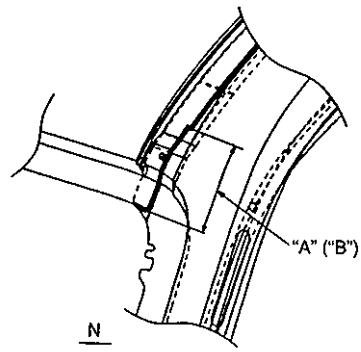


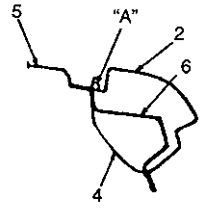
F – F

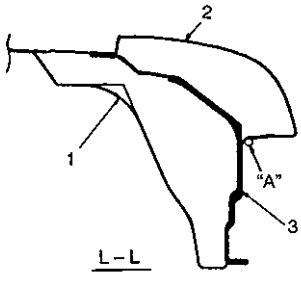
1. Cowl top panel
2. Dash panel
3. Cowl front panel
4. Front floor panel
5. Front pillar inner lower panel

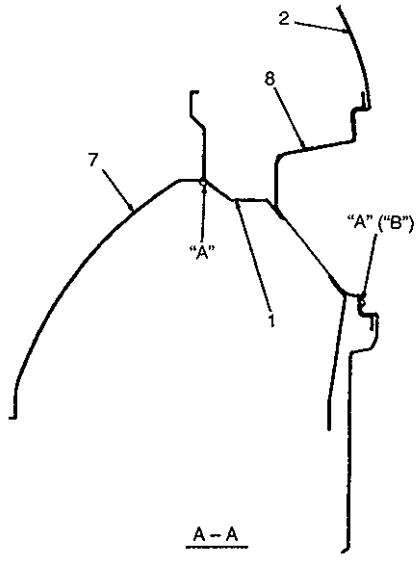
"A": Apply sealant
"B": Brush treatment

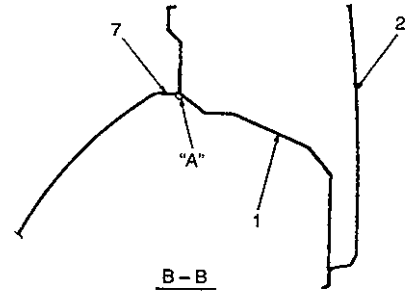


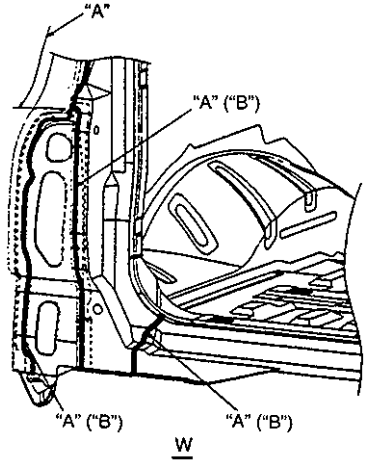


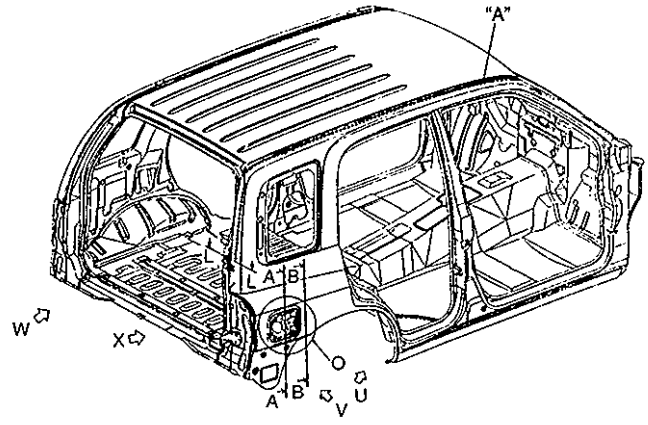






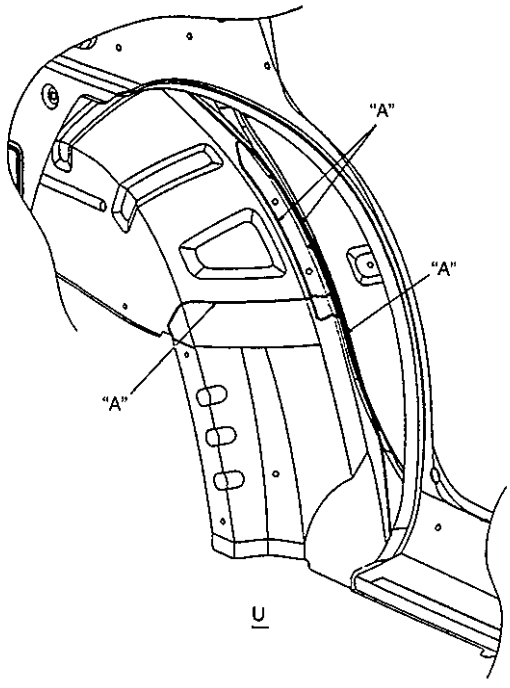




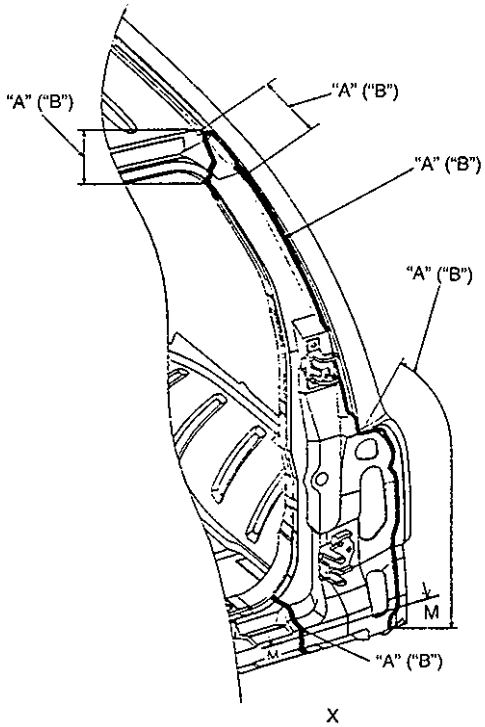


1. Side body inner panel
2. Side body outer panel
3. Back pillar outer panel
4. Front pillar inner panel
5. Roof panel
6. Front pillar upper reinforcement
7. Rear wheel housing panel
8. Fuel inlet box

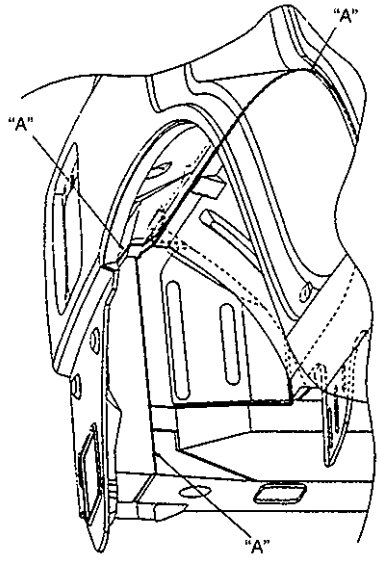
"A": Apply sealant
"B": Brush treatment



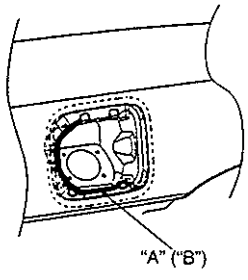
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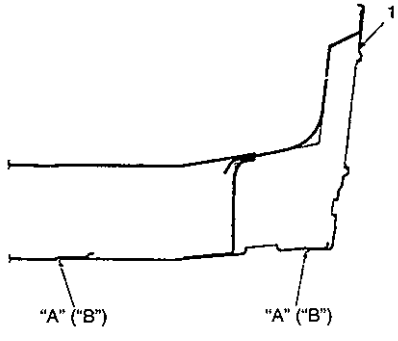
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V



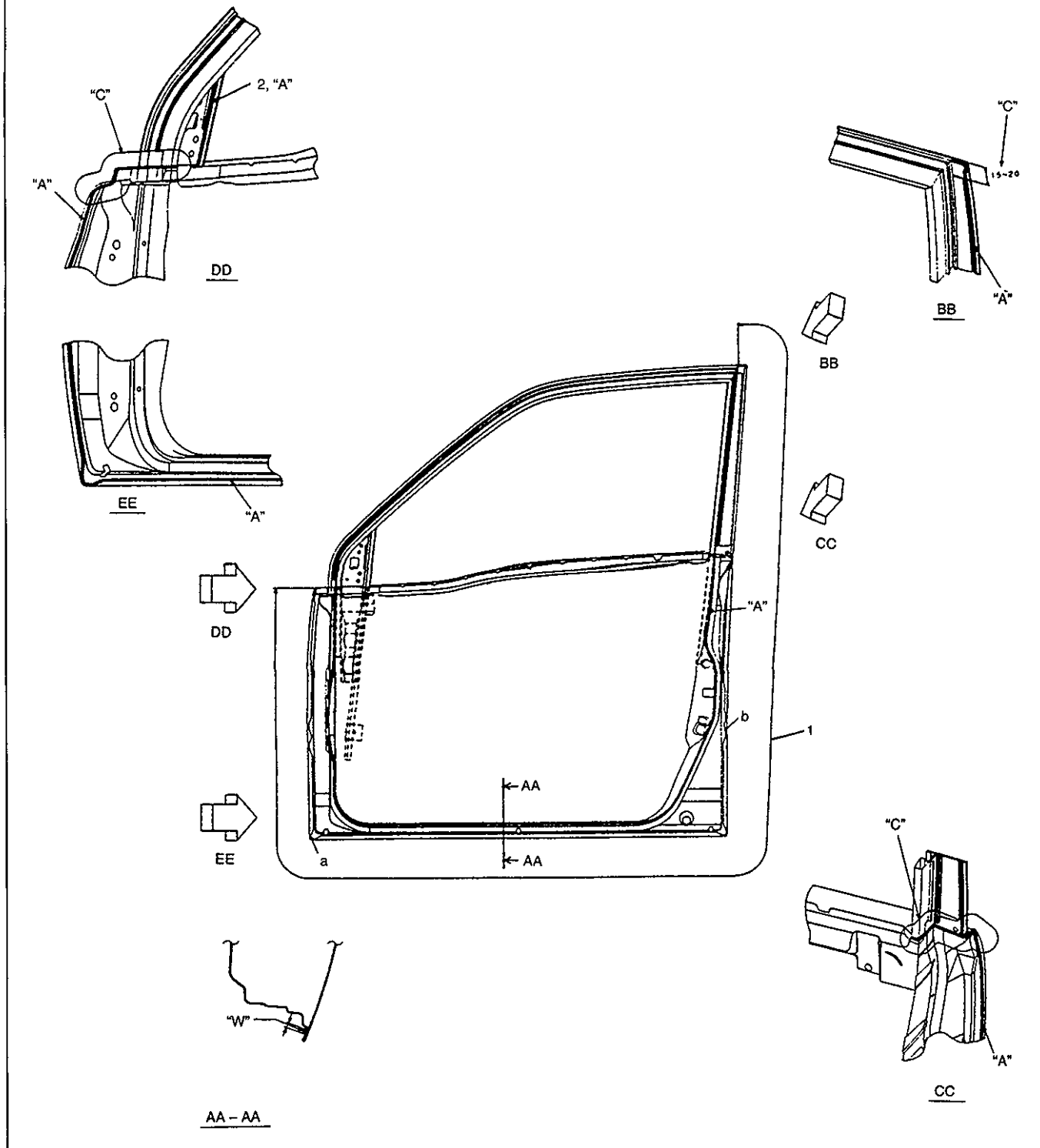
O



M – M

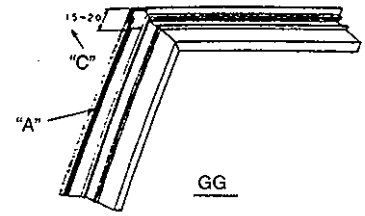
1. Side body outer panel

"A": Apply sealant
"B": Brush treatment

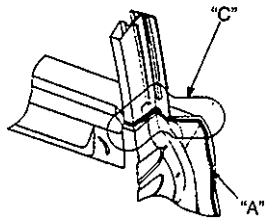


Sealant width "W": more than 5 mm between a and b

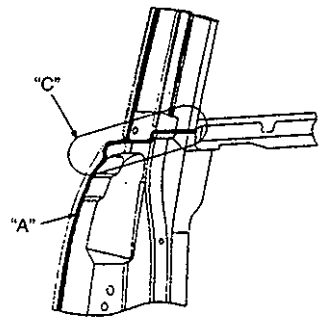
"A": Apply sealant
"B": Brush treatment
"C": Wipe sealant away
1. Sealant application area
2. Outside of body



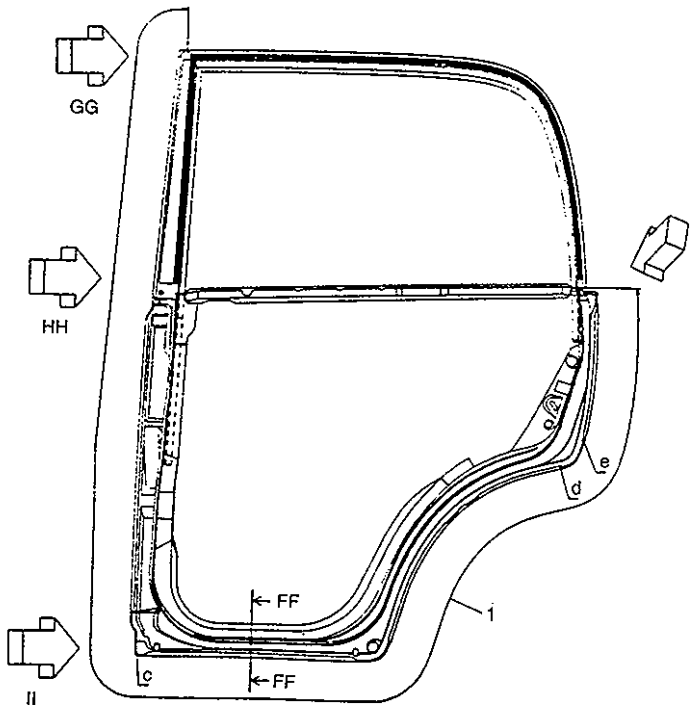
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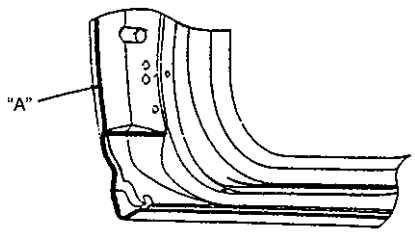


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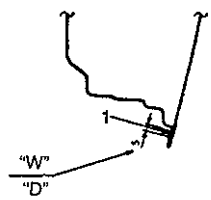


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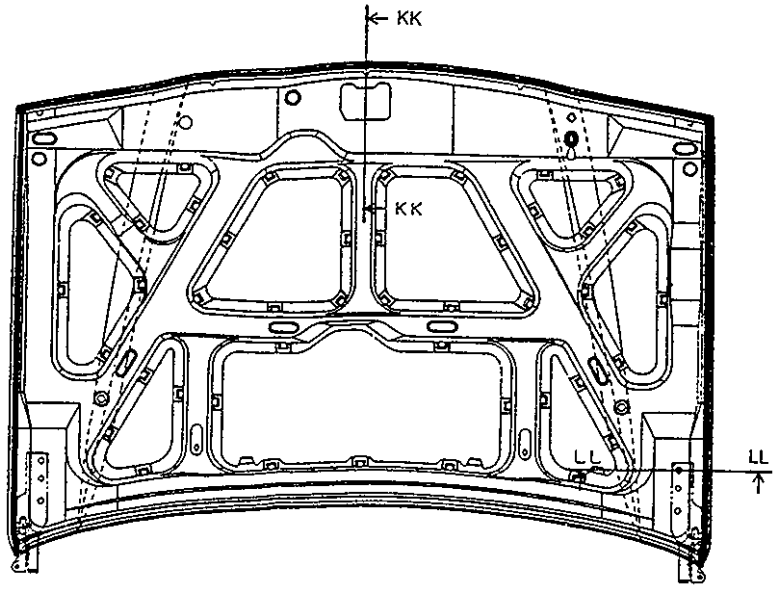
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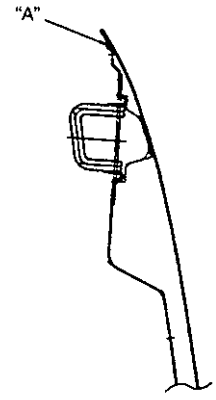


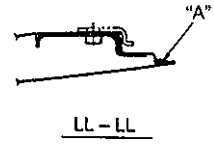
FF – FF

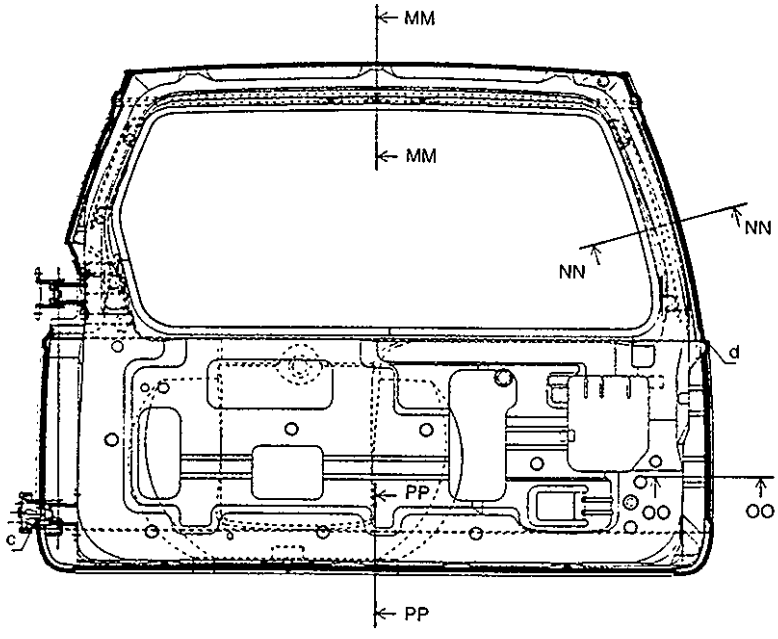
"A": Apply sealant
"B": Brush treatment
"C": Wipe sealant away
"D": Role sealant between d and e

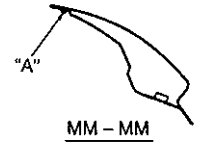
Sealant width "W": more than 5 mm between c and d
1. Sealant application area

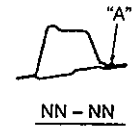


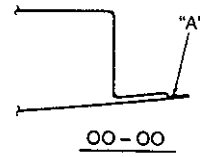


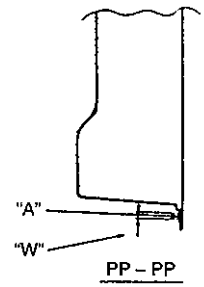








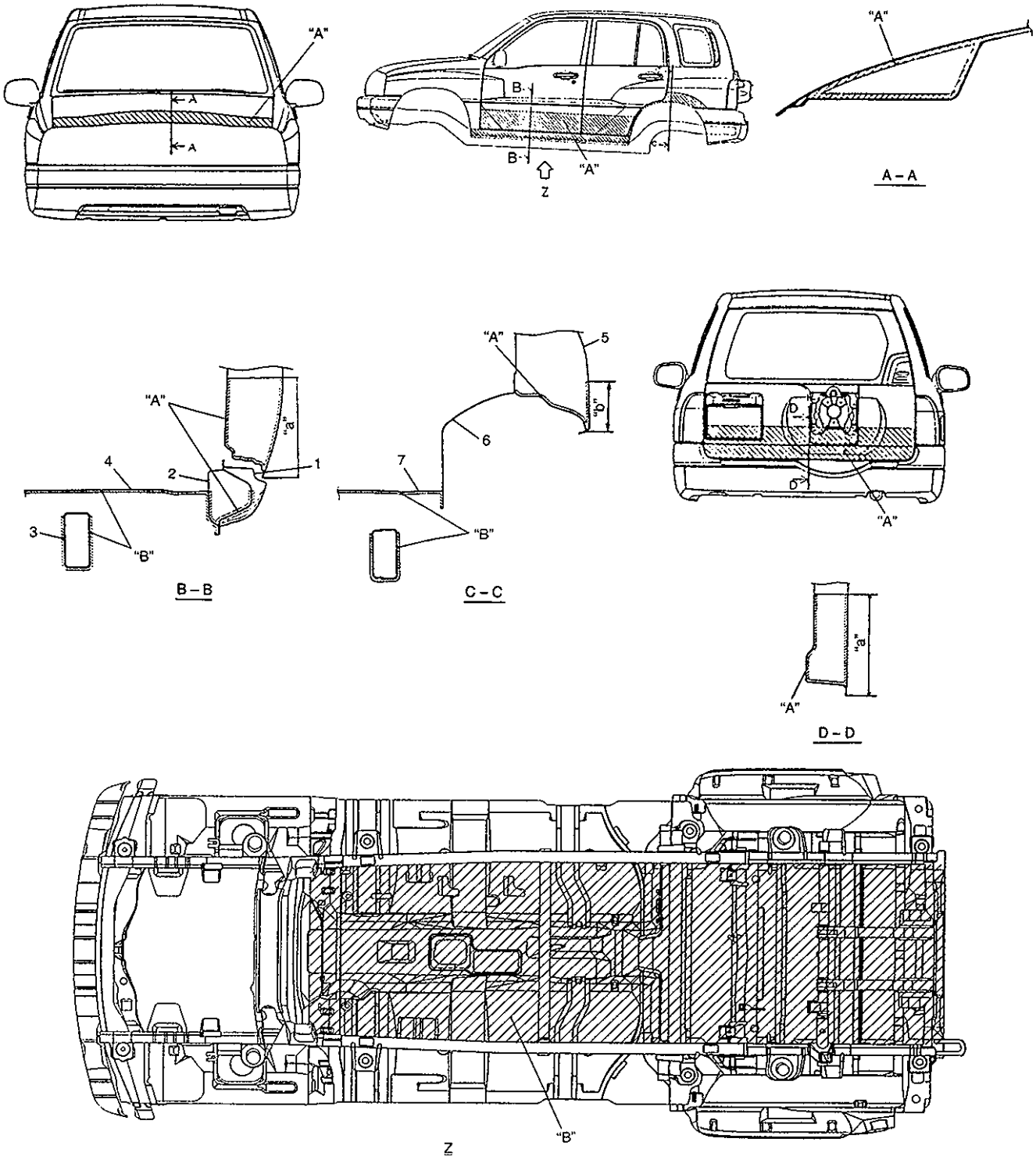




"A": Apply sealant

Sealant width "W": more than 5 mm between c and d

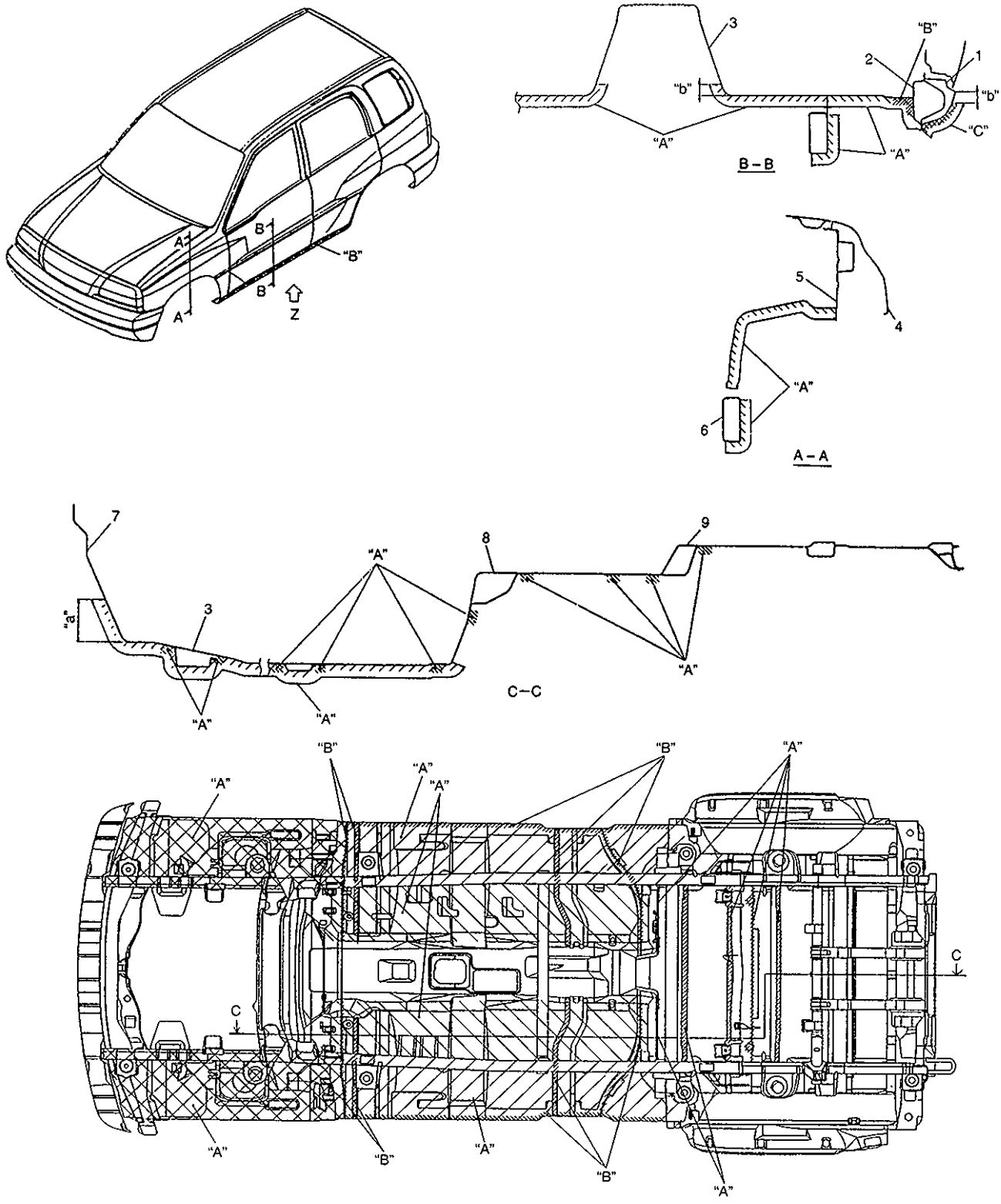
UNDERCOATING/ANTI-CORROSION COMPOUND APPLICATION AREA



"a": 200 mm (7.87 in.)
"b": 100 mm (3.94 in.)

"A": Apply rust proof wax (hot wax 50 µm or more)
"B": Apply rust proof wax (high viscosity wax 50 µm or more)

1. Side body outer
2. Side sill inner
3. Frame
4. Main floor
5. Rear fender
6. Rear wheel housing
7. Center floor



"a": 100 mm (3.94 in.)
"b": 30 mm (1.18 in.)

"A": Apply undercoating (PVC, 400 µm or more)
"B": Additional applying of under coating
(for 5 door vehicle without splush guard)
"C": Apply PVC chip resistant material (200 µm or more)

1. Side body outer
2. Side sill inner
3. Main floor
4. Front fender
5. Front wheel housing
6. Frame
7. Dash panel
8. Center floor
9. Rear floor

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 to 70°C).

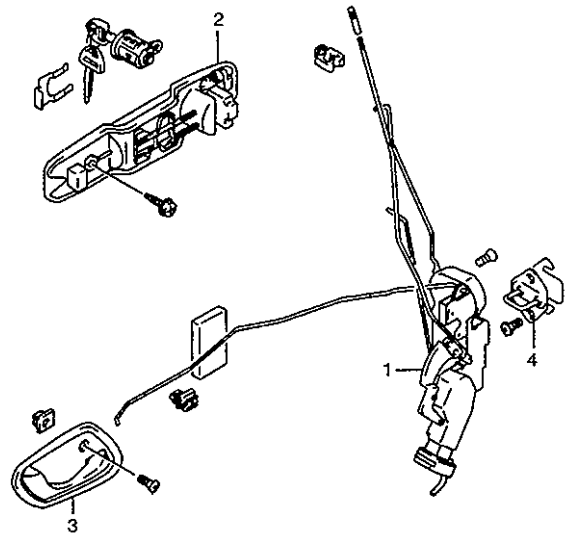
Reference

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 back smoke while burning with its residue suspended in air temporarily.
5) Polypropylene must raise no readily distinguishable smoke while burning.

SECURITY AND LOCKS

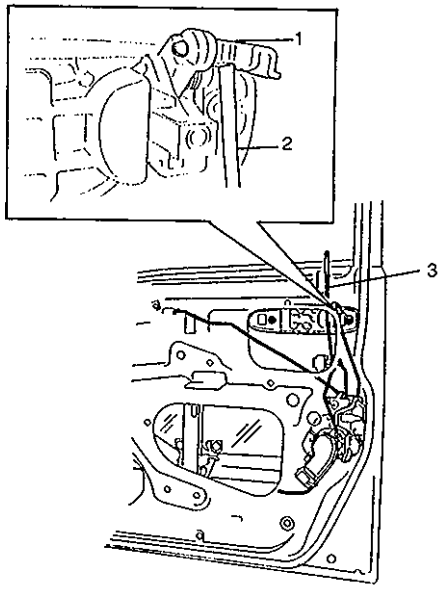
FRONT DOOR LOCK ASSEMBLY



1. Door latch
2. Outside handle
3. Inside handle bezel
4. Latch striker

REMOVAL

1) Raise window all the way up.
2) Remove door trim and door sealing cover, refer to steps 1) to 6) of FRONT DOOR GLASS REMOVAL in this section.

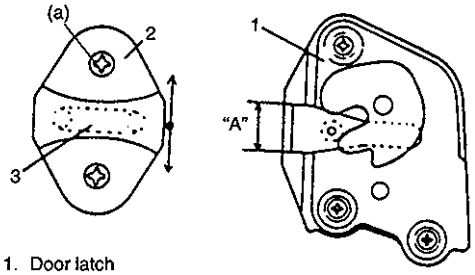


1. Door opening control rod pin retainer
2. Door opening control rod
3. Door lock control rod

3) Remove door opening control rods.
   Unlock door lock rod pin retainer and disconnect control rod.
4) Remove door lock control rod.
5) Disconnect door lock motor lead wire.
6) Remove lock assembly.

INSTALLATION

To install front door lock, reverse removal procedure, noting following.

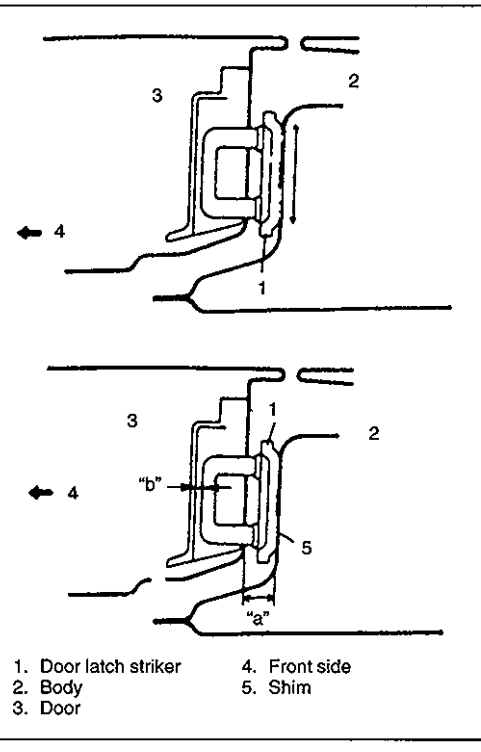


1. Door latch
2. Door latch striker
3. Shaft

- Door latch striker.
  Move door latch striker up or down so its center aligns with the center of groove "A" on the door, as shown.

NOTE:
Striker should be moved vertically and placed level. Do not adjust door lock.

Tightening Torque
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)



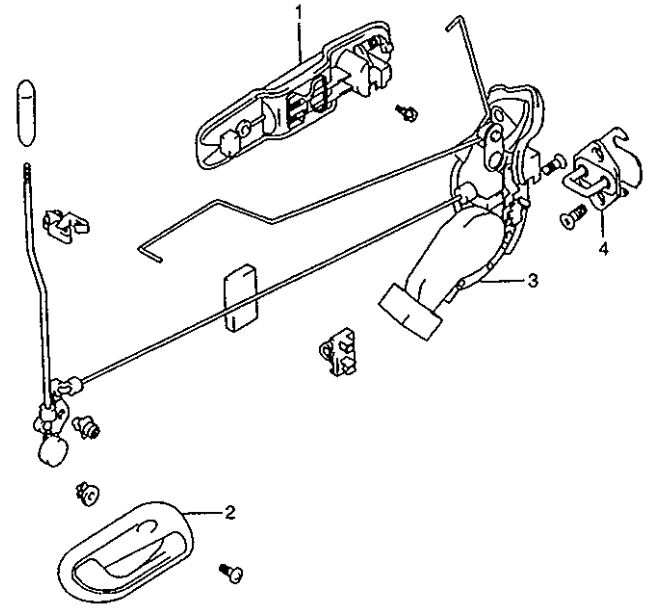
1. Door latch striker
2. Body
3. Door
4. Front side
5. Shim

- Move door latch striker sideways to adjust door surface flush with body surface, as shown.
  In order to correctly obtain door latch striker position in the fore-and-aft direction, increase or decrease number of shims inserted between body and striker to adjust it.

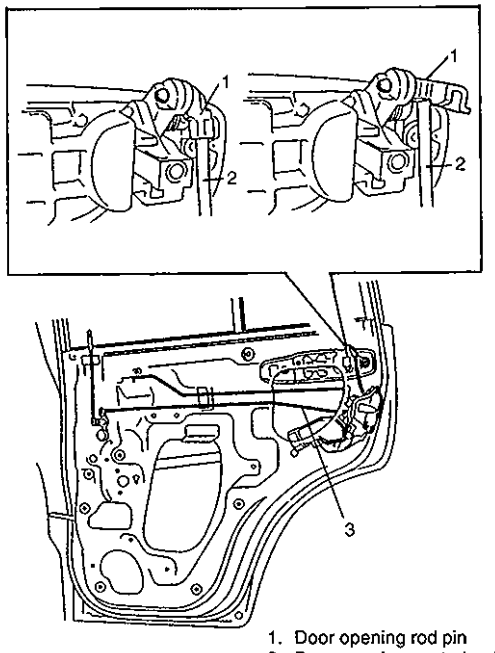
Dimension "a": 10.9 – 12.9 mm (0.43 – 0.5 in.)
"b": 3.4 – 5.4 mm (0.13 – 0.21 in.)

NOTE:
Apply oil or grease to striker joints periodically.

REAR DOOR LOCK ASSEMBLY



1. Outside handle
2. Inside handle bezel
3. Latch assembly
4. Latch striker



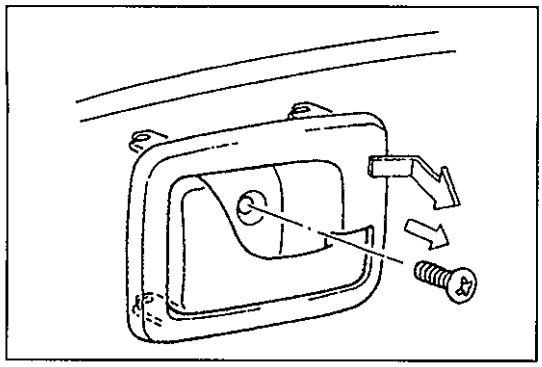
1. Door opening rod pin
2. Door opening control rod
3. Door lock control rod

REMOVAL

1) Remove door trim and door sealing cover, refer to steps 1) to 4) of REAR DOOR GLASS REMOVAL in this section.
2) Remove door opening control rod and door lock control rod.
3) Remove lock assembly.

INSTALLATION

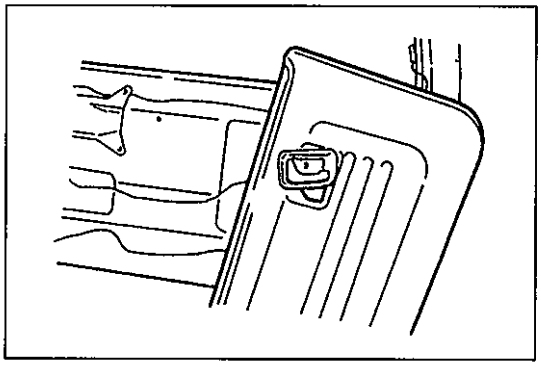
Reverse removal sequence to install rear door lock, noting points mentioned in "FRONT DOOR LOCK ASSEMBLY".



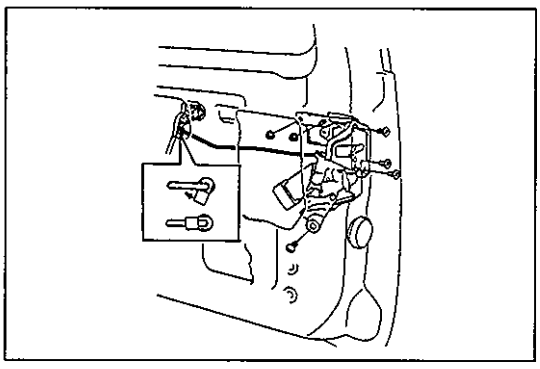
BACK DOOR LOCK ASSEMBLY

REMOVAL

1) Remove inside handle bezel (if equipped).
2) Remove inside lock knob.



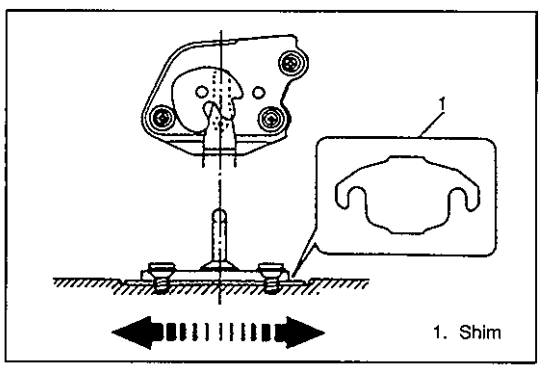
3) Remove door trim.
   With inside handle bezel tilted as shown in figure, turn door trim 90° counterclockwise to remove it (if equipped with inside handle).
4) Remove door sealing cover.



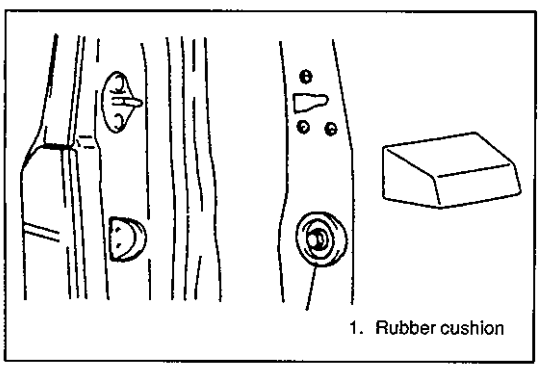
5) Remove door lock control rod.
   Unlock door lock rod pin retainer and disconnect control rod.
6) Disconnect door lock motor lead wire.
7) Remove lock assembly.

INSTALLATION

Reverse removal procedure to install back door lock assembly noting following points.



- Door latch striker.
  Adjust door latch striker so that its center aligns with the center of groove in door latch base.
  To adjust door latch and striker with each other, insert proper number of shims below the bottom of striker, as shown.



- Door rubber cushion.
  Move rubber cushion installed at the left side of back door to align it with its guide.

KEY CODING

KEY USAGE AND IDENTIFICATION

Key is used for ignition and door lock cylinder. Keys are cut on both edges to make them reversible.

Key identification is obtained from five 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

See Section 3C or 3C1, "STEERING WHEEL AND COLUMN" or "AIR BAG STEERING WHEEL AND COLUMN".

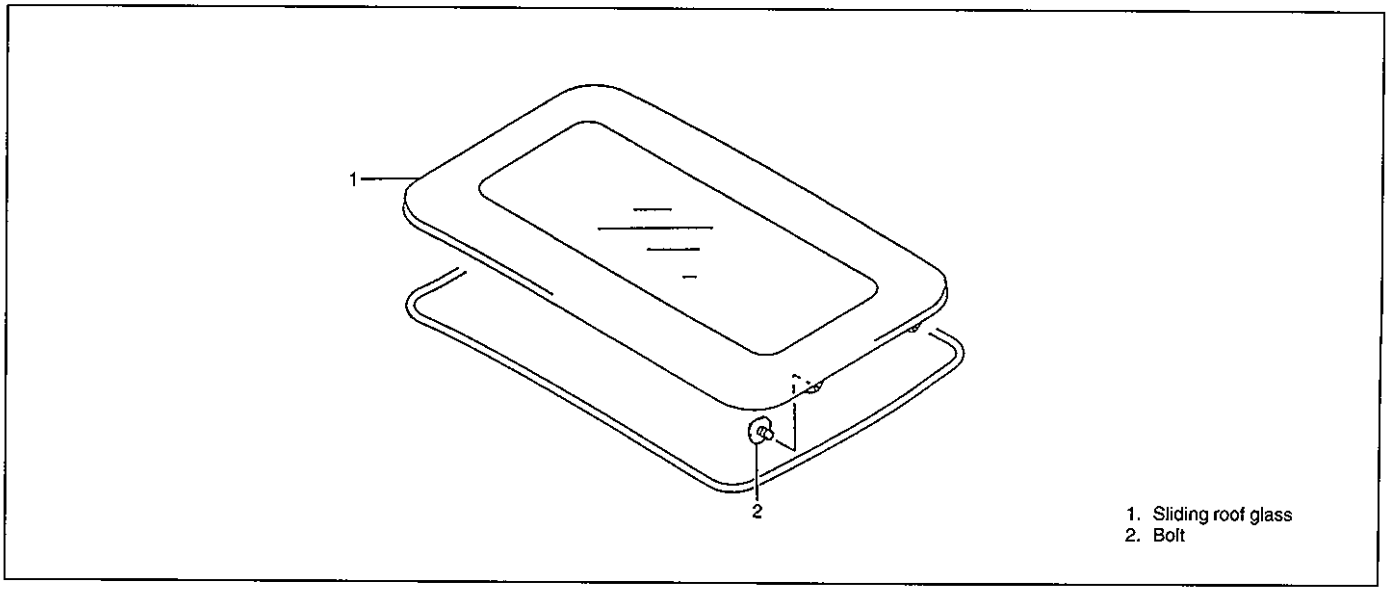
ELECTRICAL DIAGNOSIS

For ignition switch electrical troubleshooting, see Section 8, "BODY ELECTRICAL SYSTEM".

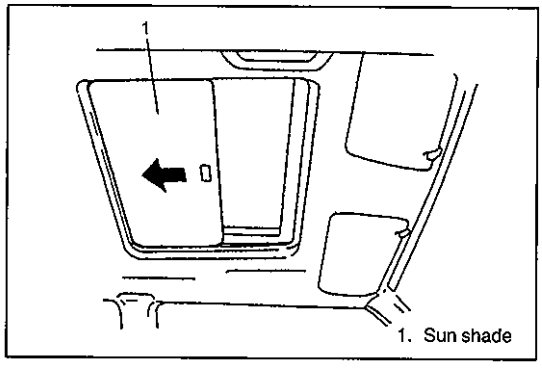
SUNROOF/CONVERTIBLE TOP

SLIDING ROOF (IF EQUIPPED)

SLIDING ROOF GLASS



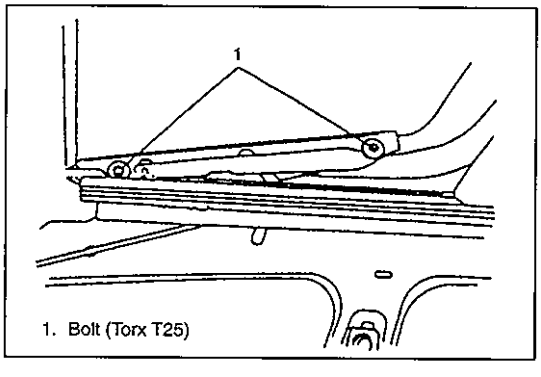
1. Sliding roof glass
2. Bolt



1. Sun shade

REMOVAL

1) Open sunshade fully and tilt up sliding roof.
2) Disconnect battery negative cable at battery.



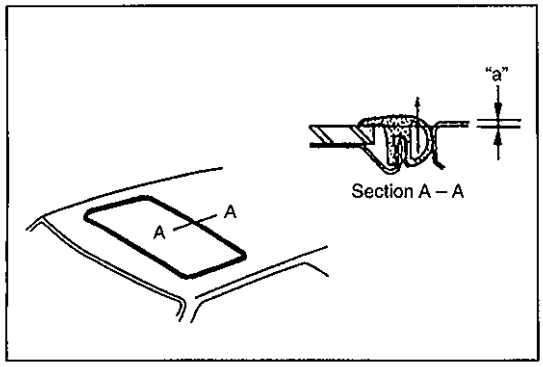
1. Bolt (Torx T25)

3) Remove sliding roof glass by removing bolts (torx).

INSTALLATION

For installation, reverse removal procedure, noting following points.

1) Tighten glass fixing bolts temporarily.
2) Position sliding roof glass by closing sliding roof glass completely.
3) Tighten glass fixing bolts.

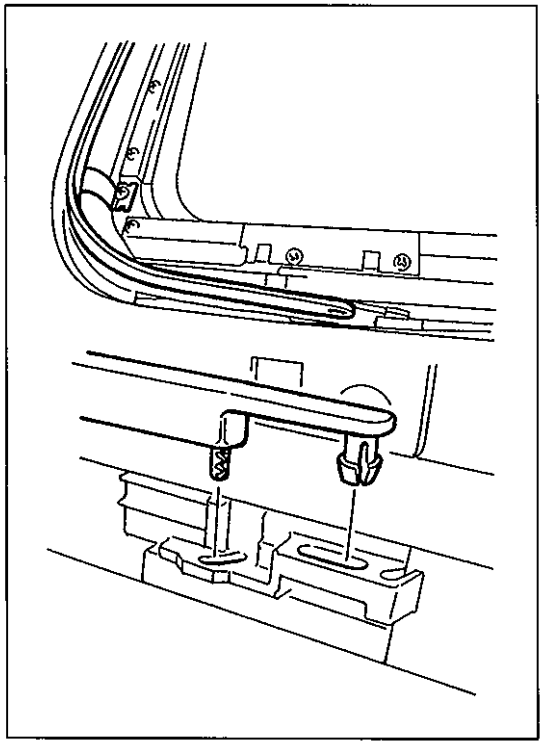


ADJUSTMENT

1) Loosen sunroof glass fixing screws (at 4 locations) and move sunroof glass up and down 2 to 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 mm (0.0 in.)

3) After installing all parts and adjusting properly, check sunroof for proper operation (open, close and up).



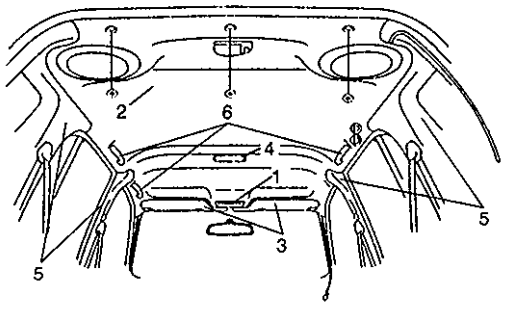
SLIDING ROOF DEFLECTOR

REMOVAL

1) Open sliding roof.
2) Disconnect negative cable at battery.
3) Remove screws and disconnect deflector from deflector link.

INSTALLATION

Reverse removal procedure to install deflector.

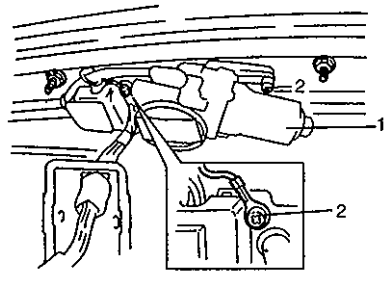


1. Spot light
2. Head lining
3. Sunvisor assemblies
4. Room light
5. Trim
6. Assist grips

SLIDING ROOF MOTOR/RELAY

REMOVAL

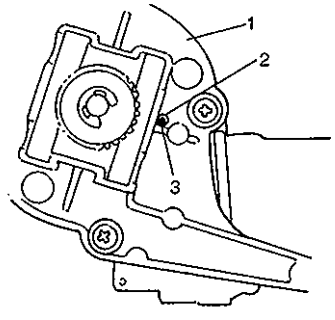
1) Remove head lining, refer to HEAD LINING REMOVAL in this section.



1. Sliding roof motor
2. Mounting screw

2) Disconnect coupler and remove sliding roof motor assembly by removing 3 screws.

CAUTION:
After removing sliding motor assembly, do not move guide and link.



1. Motor assy
2. Hole (body)
3. Hole (cam)

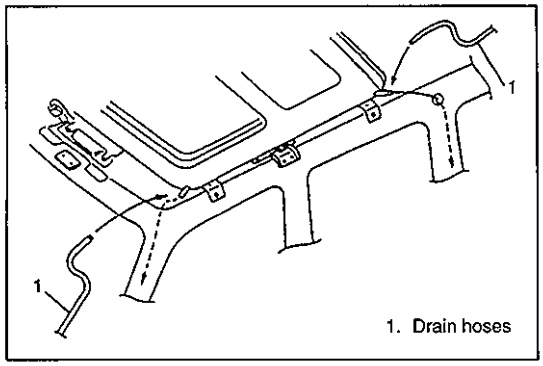
INSTALLATION

For installation, reverse removal procedure, noting following point.
Before installing, connect coupler and push the CLOSE side of the slide switch.

SLIDING ROOF ASSEMBLY

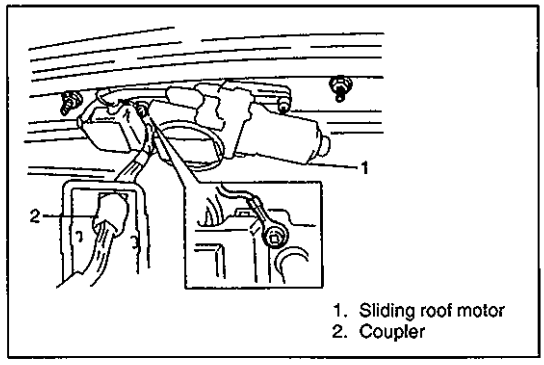
REMOVAL

1) Remove roof lining. Refer to HEAD LINING REMOVAL in this section.
2) Remove sliding roof glass. Refer to SLIDING ROOF GLASS REMOVAL.



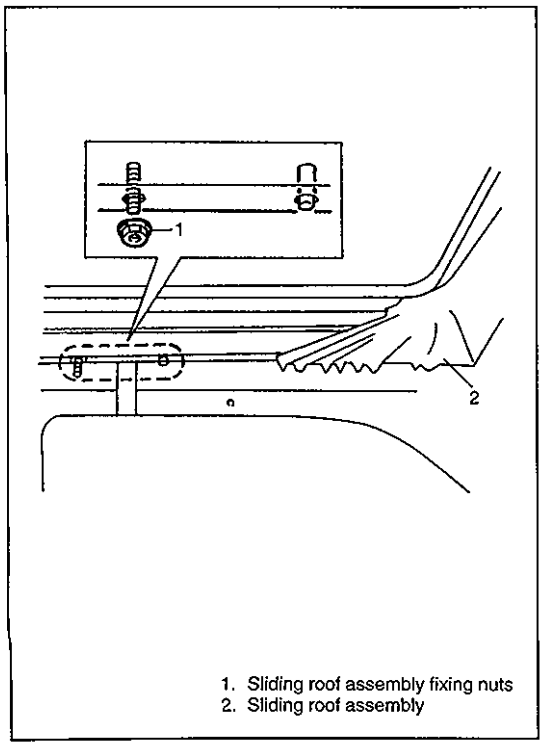
1. Drain hoses

3) Disconnect drain hoses connected to sliding roof assembly at 4 locations.



1. Sliding roof motor
2. Coupler

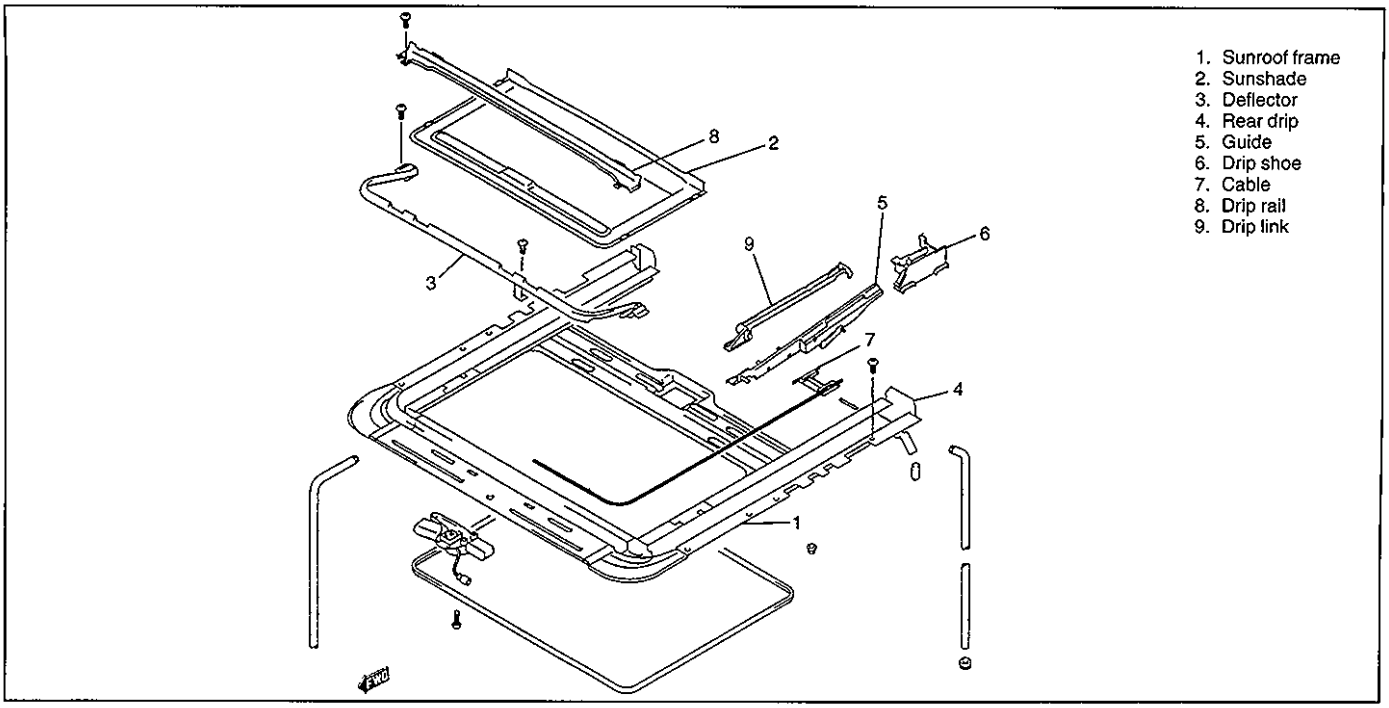
4) Disconnect sliding roof motor at coupler.

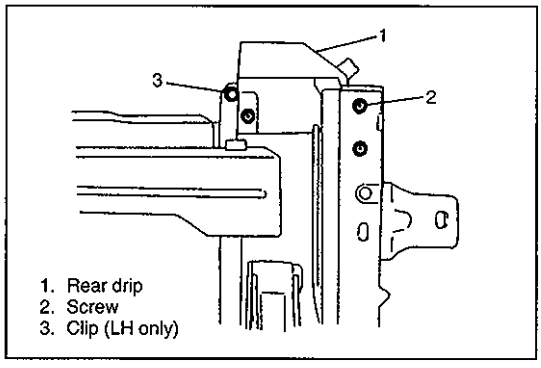


1. Sliding roof assembly fixing nuts
2. Sliding roof assembly

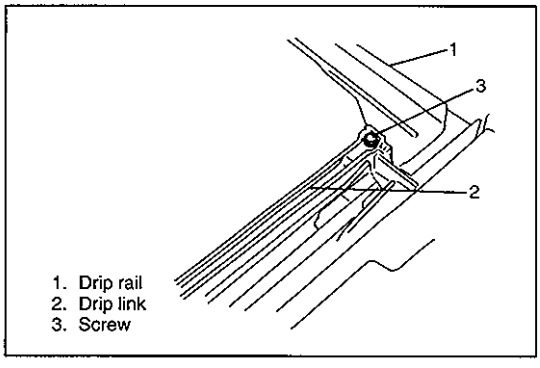
5) Remove 6 nuts and then remove sliding roof assembly.

DISASSEMBLY

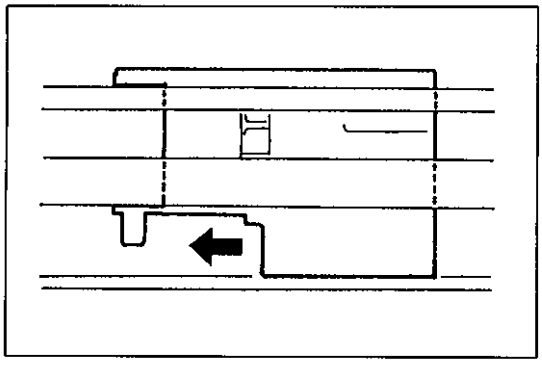




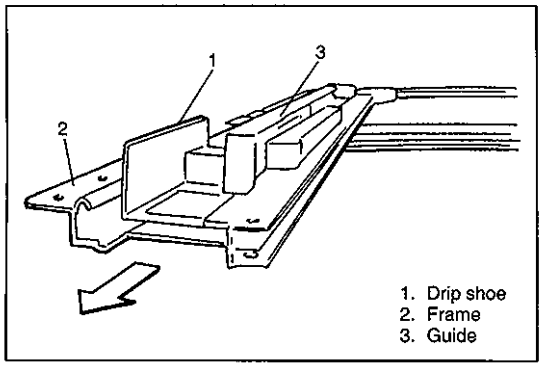
Before disassembling, be sure that sliding roof is "CLOSE" state.
1) Remove rear drip.



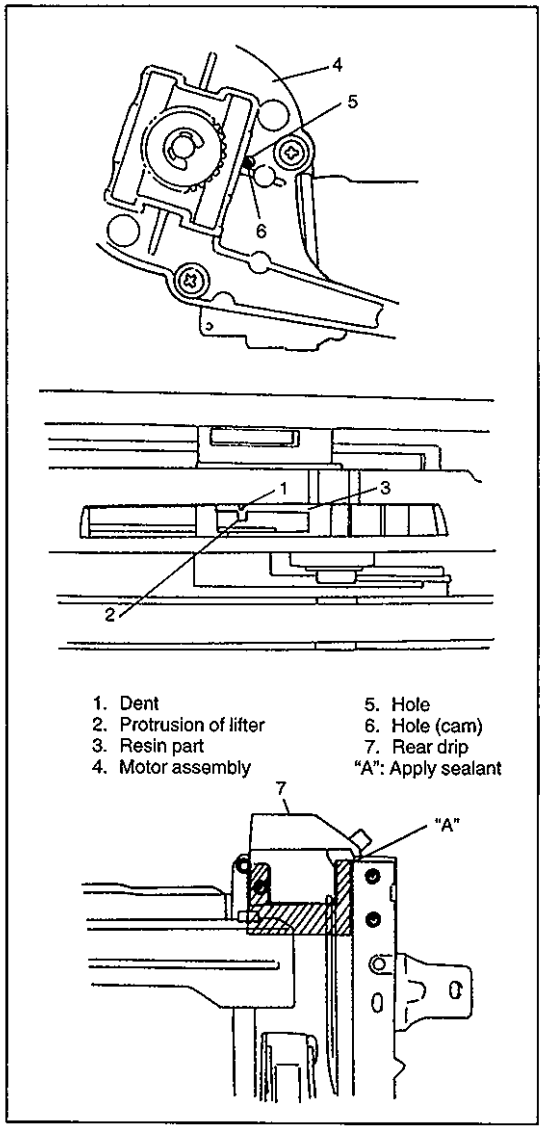
2) Pull out sunshade by sliding it.
3) Remove drip rail.



4) Remove sliding motor assy.
5) Move cable fully to the direction shown in figure.



6) Remove sliding roof deflector.
7) Pull out drip shoe, guide and cable assy as a set.

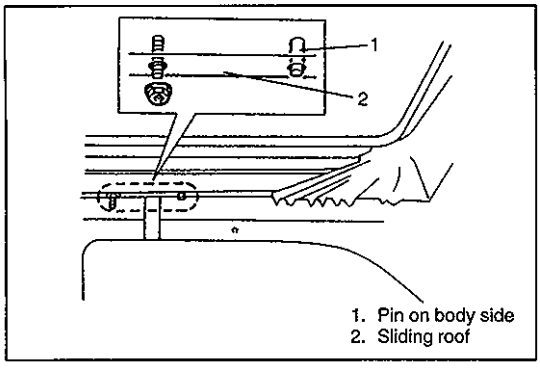


ASSEMBLY

Reverse disassembly procedure for assembly, observing following instructions.

CAUTION:
Match protrusion of guide and dent in cable for completely closed position of sliding roof drive cable and match marks (holes) for completely closed position of sliding roof motor assembly and then install sliding roof motor assembly.

- Press the CLOSE side switch to match marks of sliding roof motor assembly.
- Apply butyl rubber sealant to contact surface of the rear drip.

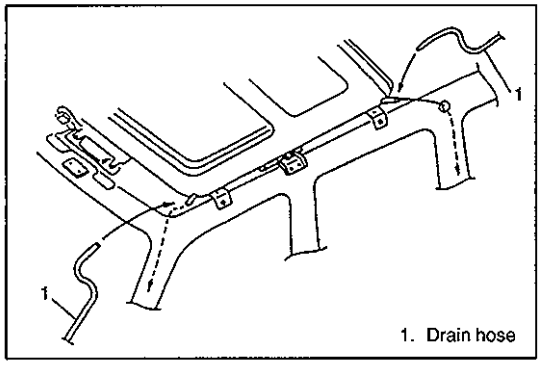


1. Pin on body side
2. Sliding roof

INSTALLATION

For installation, reverse removal procedure, noting following points.

- Align positioning holes in sliding roof assembly at right and left and pins on body side for installation.



1. Drain hose

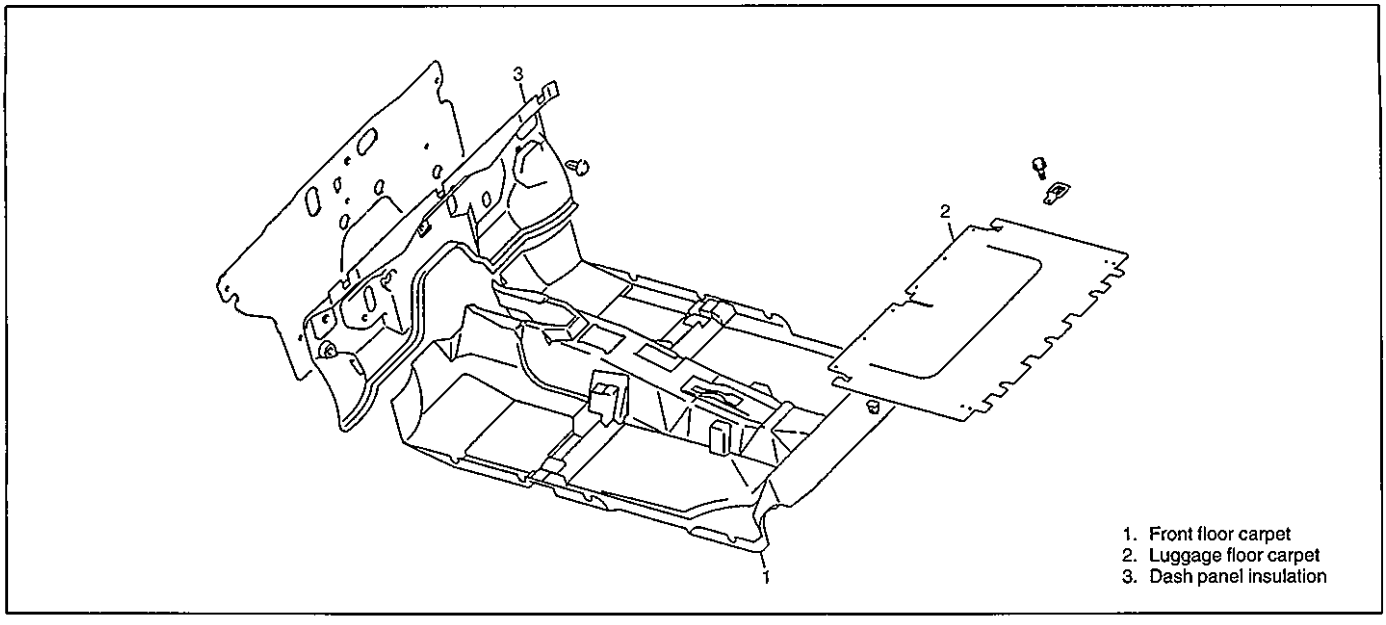
- Connect drain hoses to sliding roof assembly at 4 locations. Pass front drain hose between roof panel and inner panel and through front pillar down to sill side. Pass rear drain hose into baring hole in rear quarter inner panel and through C pillar down to jig hole in rear side bumper.

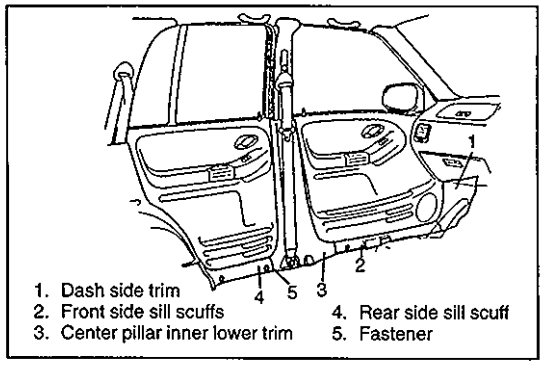
NOTE:

After reinstalling sliding roof assembly, be sure to make glass adjustment. (Refer to SLIDING ROOF GLASS ADJUSTMENT described previously.)

EXTERIOR AND INTERIOR TRIM

FLOOR CARPET





FRONT FLOOR CARPET

REMOVAL

1) Remove front seats and rear seat cushions.
2) Remove seat belt lower anchor bolt.
3) Remove dash side trims, front side sill scuffs, center pillar inner lower rims and rear side sill scuffs.
4) Remove parking brake lever cover, console box and console box front extention.
5) Remove front floor carpet.

INSTALLATION

Reverse removal sequence to install front floor carpet, noting following point.

- When tightening seat belt anchor bolt, refer to Section 10A "FRONT SEAT BELT WITHOUT PRITENTIONER" for tightening torque.

LUGGAGE FLOOR CARPET

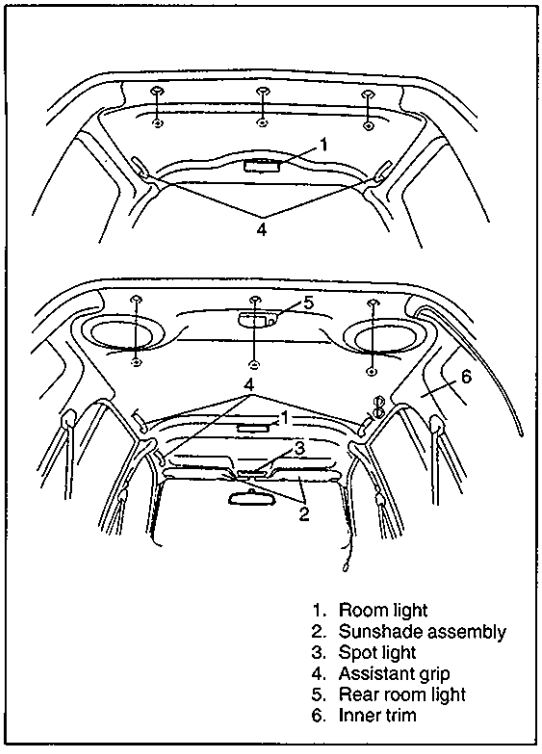
Luggage floor carpet is fixed to floor with clips.

REMOVAL

Detach clips, using care not to pull up carpet with force and break clips. And remove inner trim.

INSTALLATION

Reverse removal sequence to install luggage floor carpet.



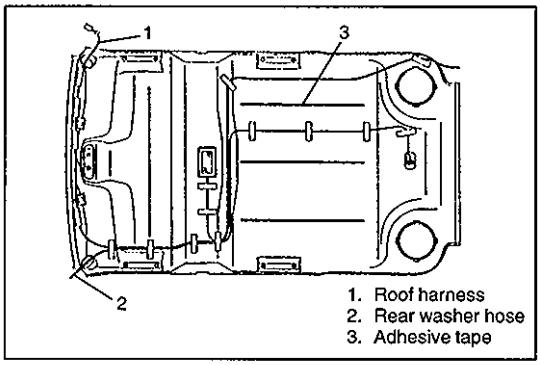
1. Room light
2. Sunshade assembly
3. Spot light
4. Assistant grip
5. Rear room light
6. Inner trim

HEAD LINING

REMOVAL

1) Remove spot light and sliding roof switch (if equipped.)
2) Remove sunchade assembly.
3) Remove room light and spacer.
4) Remove assistant grips.
5) Remove inner trims covering head lining and door opening trim.
6) Remove rear speaker cover.
7) Disconnect rear washer hose and roof harness from body.
8) Remove head lining.

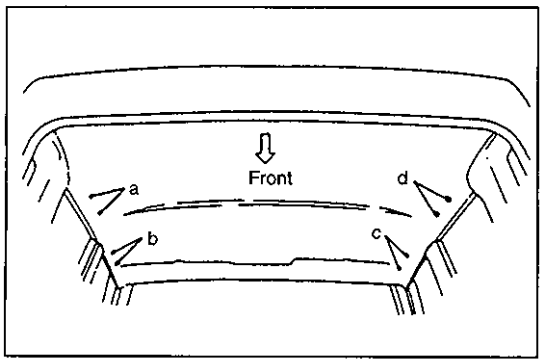
NOTE:
Adhesive double coated tape is used to attach rear part of head lining. Detach head lining from roof after removing all above parts.



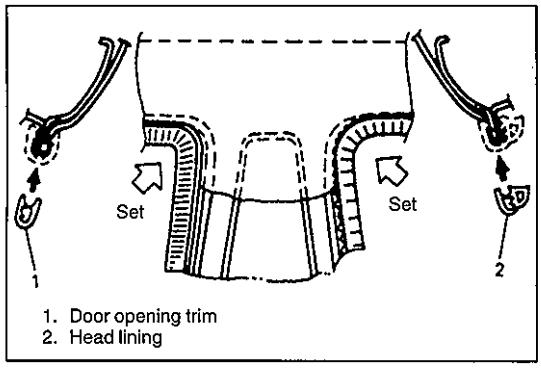
1. Roof harness
2. Rear washer hose
3. Adhesive tape

INSTALLATION

1) Set roof harness and washer hose to head lining with tape.
2) Clean roof where adhesive tape of head lining will be attached.
3) Peel off release liner of adhesive tape on head lining and install it to body.

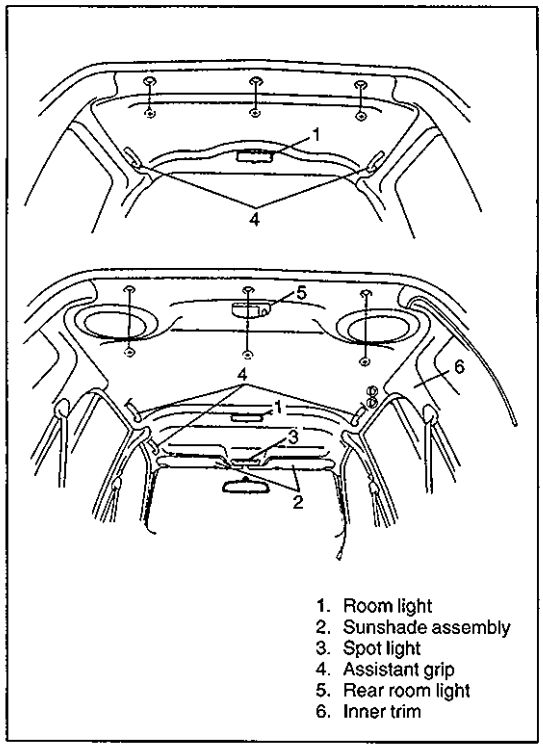


4) Install assistant grips and clips a, b, c and d in that order.



1. Door opening trim
2. Head lining

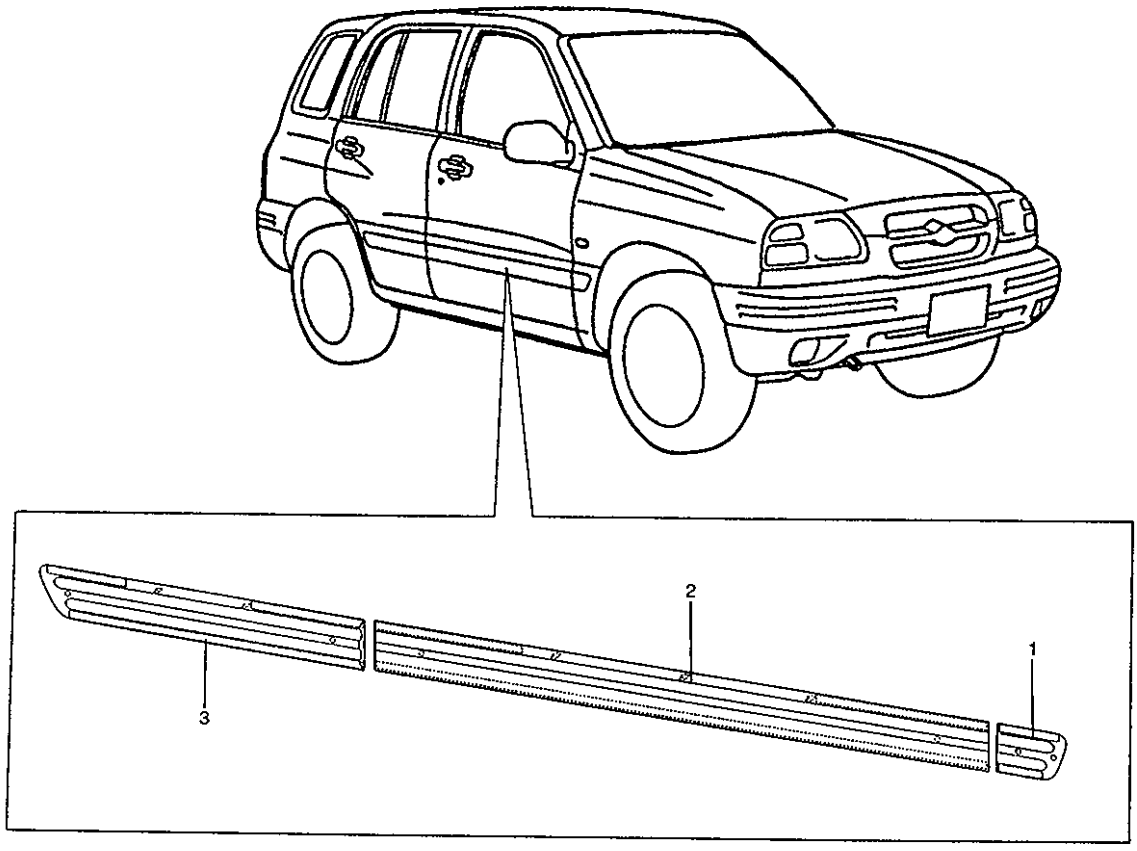
5) Install door opening trim.



1. Room light
2. Sunshade assembly
3. Spot light
4. Assistant grip
5. Rear room light
6. Inner trim

6) Install spot light, sunshade assembly, speaker cover, room light and inner trims covering head lining.

SIDE MOLDINGS (IF EQUIPPED)

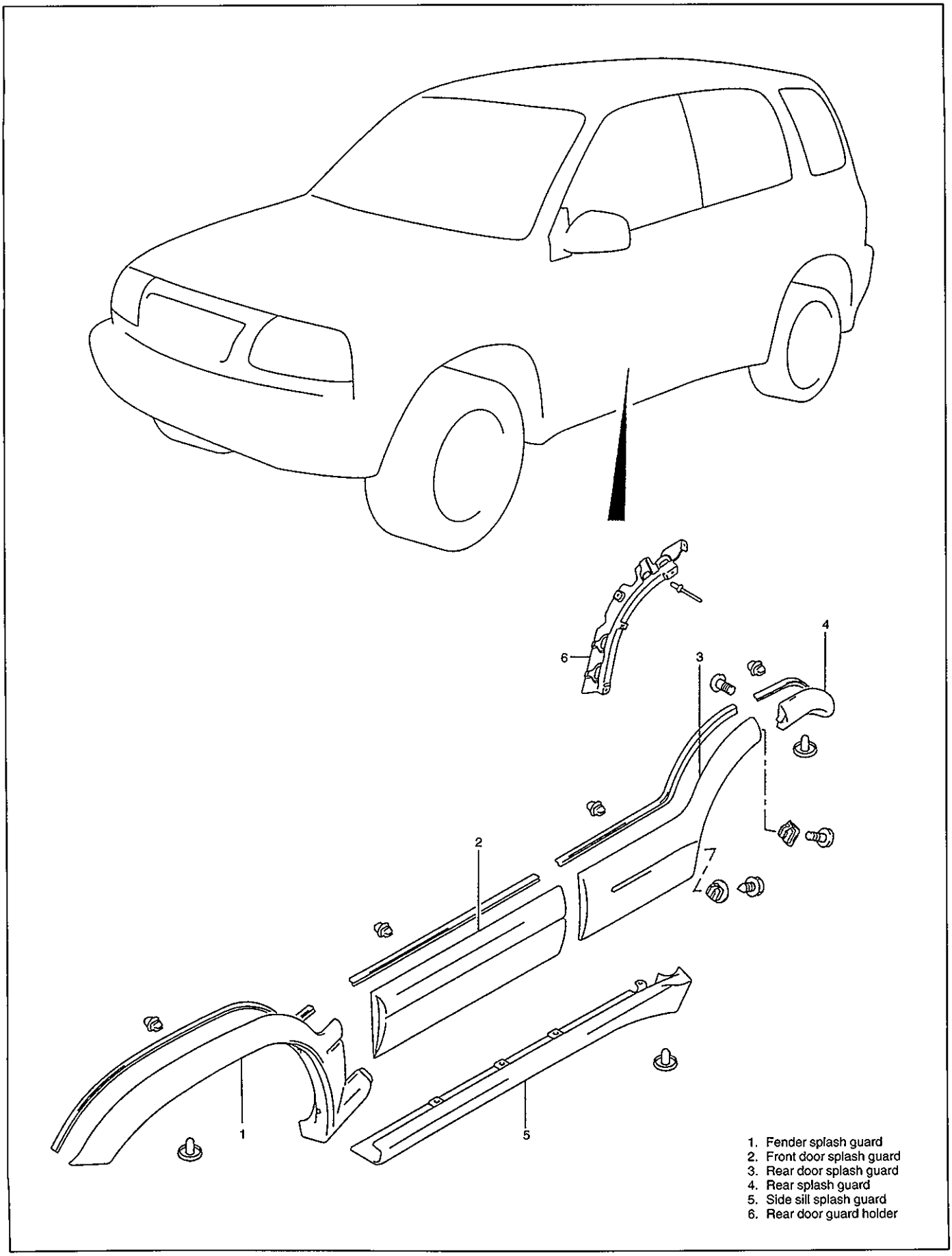


1. Front door molding
2. Rear door molding
3. Front fender molding

INSTALLATION

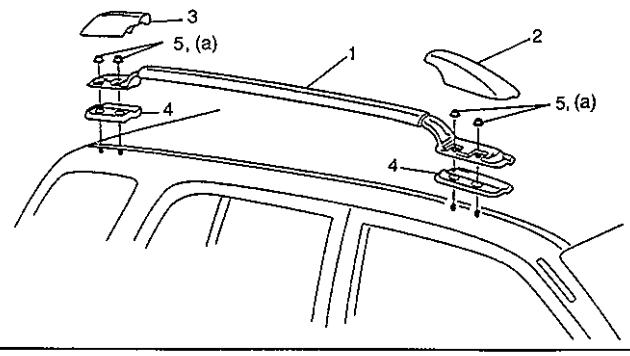
1) Bonding surfaces should be cleaned throughly.
2) Install molding by aligning it to clip holes and pulling it to the rear so that fender or door will not interfere with it when door is opened.
3) If adequate adhesive force is not available, use urethane adhesive.

SPLASH GUARD (IF EQUIPPED)

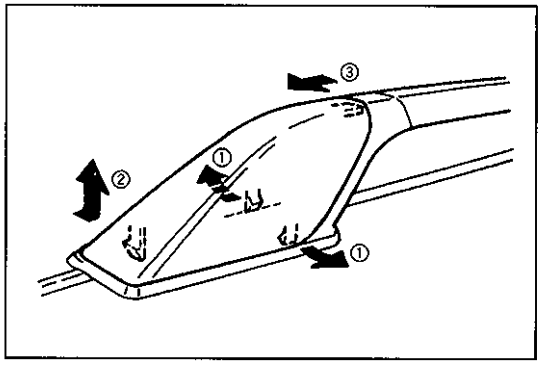


1. Fender splash guard
2. Front door splash guard
3. Rear door splash guard
4. Rear splash guard
5. Side sill splash guard
6. Rear door guard holder

ROOF RAIL (IF EQUIPPED)



1. Roof rail assembly
2. Front cap
3. Rear cap
4. Base seal
5. Nut



Removal

1) Remove roof rail front and rear caps as shown in figure.
2) Remove nuts.
3) Remove roof rail assembly.

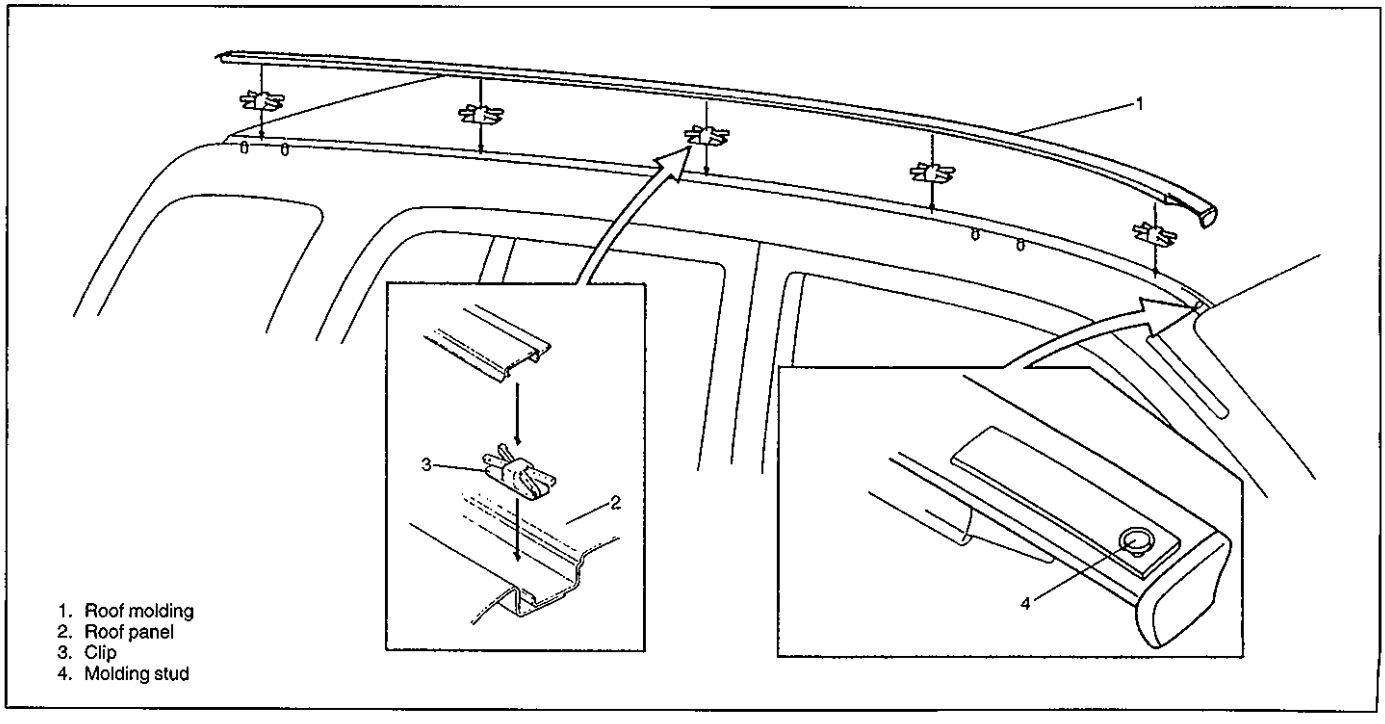
Installation

Reverse removal procedure for installation.
Confirm that each roof rail fixing nut is tightened securely.

ROOF MOLDING

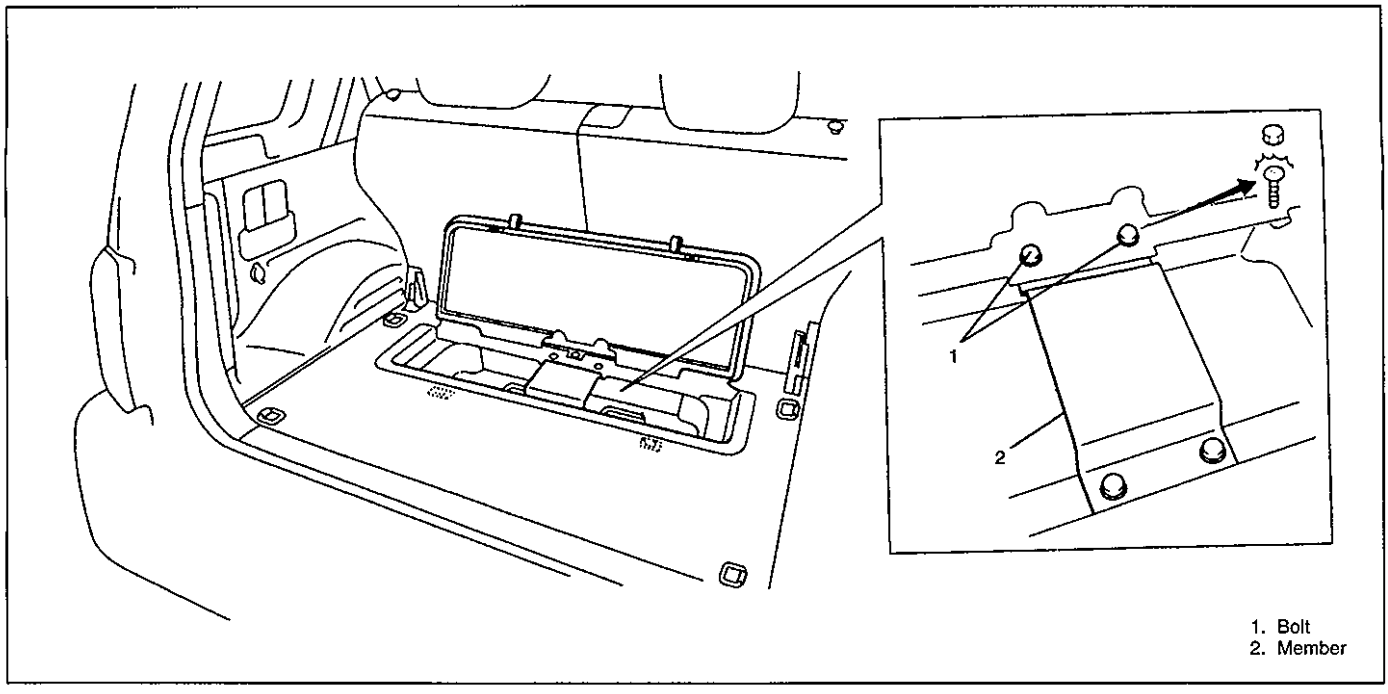
REMOVAL AND INSTALLATION

- If roof rail is equipped, remove it in advance (refer to "ROOF RAIL" section).
- When reusing roof molding, be careful not to make roof molding warped.



1. Roof molding
2. Roof panel
3. Clip
4. Molding stud

LUGGAGE UNDER BOX



1. Bolt
2. Member

WARNING:
Do not remove member in the center of luggage under box.

If member had to be removed temporarily for repair or for some other reason, be sure to reinstall it by using specified new bolts until head of bolt is broken off.

SECTION 10

RESTRAINT 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).**

SEAT BELT ..... SECTION 10A
AIR BAG SYSTEM ..... SECTION 10B

CONTENTS

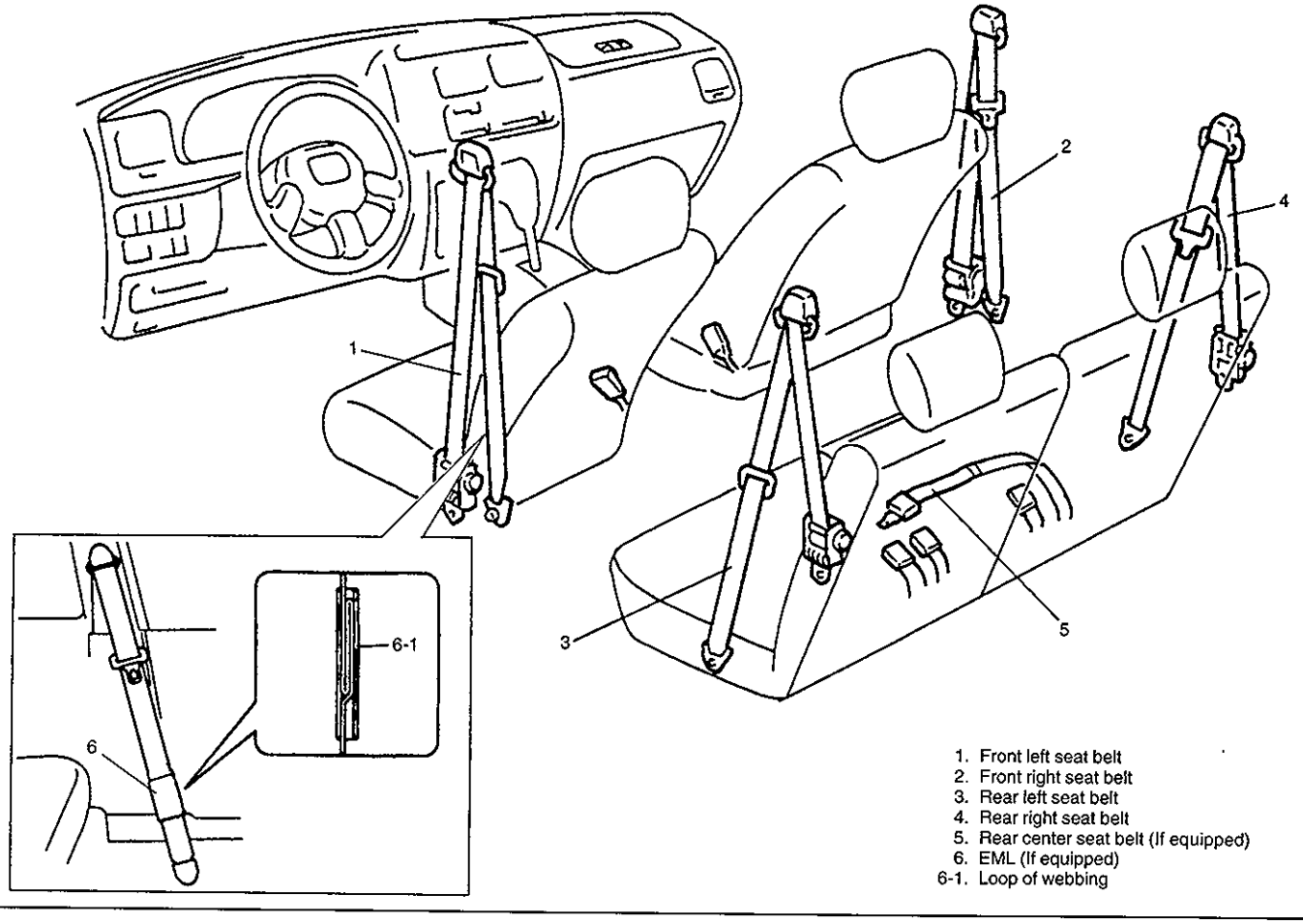
GENERAL DESCRIPTION 10-2
DIAGNOSIS ..... Refer to "Diagnosis" in SECTION 10A and 10B.

GENERAL DESCRIPTION

There are two types of restraint system used for this vehicle.

TYPE A (NOT EQUIPPED WITH AIR BAG SYSTEM)

Front Seat Belts:	**Seat belt with ELR and EML (if equipped)**
Rear Left And Right Seat Belts:	**Seat belt with A-ELR**
Rear Center Seat Belt (If Equipped):	**Seat belt without ELR and A-ELR**
Supplemental Restraint System:	**Nothing**



1. Front left seat belt
2. Front right seat belt
3. Rear left seat belt
4. Rear right seat belt
5. Rear center seat belt (If equipped)
6. EML (If equipped)

6-1. Loop of webbing

Seat belt with ELR

The seat belt with Emergency Locking Retractor (ELR) is designed so that it locks immediately (to prevent the webbing from being pulled out of the retractor any further) when any of the following items is detected as exceeding each set value; speed at which the webbing is pulled out of the retractor, acceleration or deceleration of the vehicle speed, and inclination.

Seat belt with ELR and EML

The seat belt with ELR and EML includes both an ELR mechanism described above and an Energy Management Loop (EML).

An EML is a small loop of webbing lightly stitched into the lap-shoulder belt under the plastic sleeve. When the loop is pulled by a force exceeding a specified value, the seam of the loop is torn so that the instantaneous load applied to the driver and passenger wearing that seat belt is reduced.

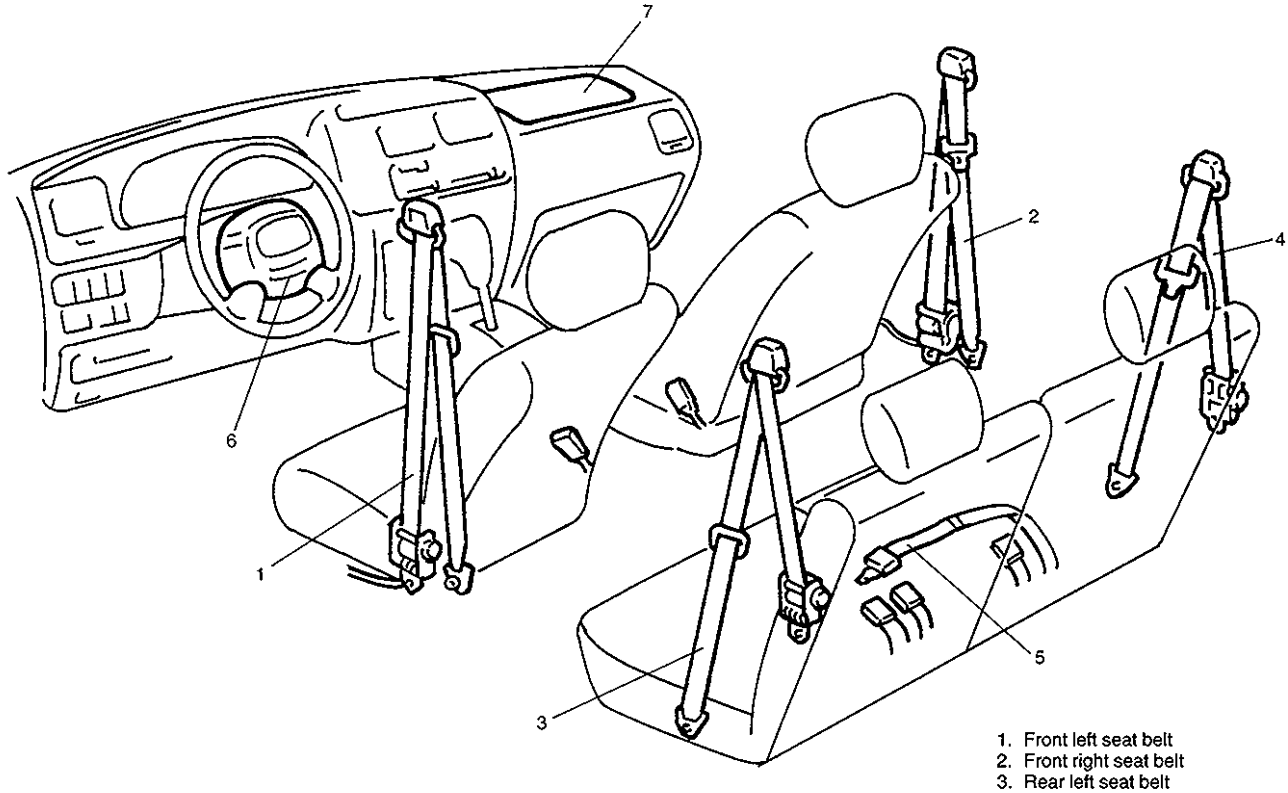
Seat belt with A-ELR

The automatic and emergency locking retractor (A-ELR) works as an Emergency Locking Retractor (ELR) till its webbing is pulled all the way out and then on as an Automatic Locking Retractor (ALR) till it is retracted fully.

ALR: Automatically locks when the webbing is pulled out from the retractor and allowed to retract even a little. Then the webbing can not be pulled out any further, unless it is wound all the way back into the retractor, which releases the lock and allows the webbing to be pulled out.

TYPE B (EQUIPPED WITH AIR BAG SYSTEM)

Front Seat Belts:	**Seat belt with ELR and pretensioner (if equipped)**
Rear Left And Right Seat Belts:	**Seat belt with A-ELR**
Rear Center Seat Belt (If Equipped):	**Seat belt without ELR and A-ELR**
Supplemental Restraint System:	**Driver and front passenger side air bags and Driver and front passenger side pretensioners (if equipped)**



1. Front left seat belt
2. Front right seat belt
3. Rear left seat belt
4. Rear right seat belt
5. Rear center seat belt (If equipped)
6. Driver side air bag
7. Passenger side air bag

Seat belt with A-ELR

Refer to previous page.

Seat belt with ELR and pretensioner

The seat belt with ELR and pretensioner includes both a pretensioner and an ELR mechanism described in the previous page in its retractor assembly. In occurrence of a front collision with an impact larger than a certain set value, the pretensioner is activated by the ignition signal from SDM and takes up the sag of the seat belt, thereby enhancing restraint performance.

Driver and front passenger side air bags and driver and front passenger side seat belt pretensioners (if equipped)

The driver and front passenger side air bags and driver and front passenger side seat belt pretensioners (if equipped) are components of the air bag system. In occurrence of a front collision with an impact larger than a certain set value, they are activated by the ignition signal from SDM to supplement protection offered by the driver and front passenger seat belts.

- the pretensioner takes up the sag of the seat belt,
- the driver air bag (inflator) module is deployed from the center of the steering column
- the passenger air bag (inflator) module from the top of the instrument panel in front of the front passenger seat.

For more information, refer to SECTION 10A "Seat Belt" and SECTION 10B "Air Bag System".

SECTION 10A

SEAT BELT

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).**
- **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.**

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.

NOTE:
To check whether the vehicle is equipped with a seat belt pretensioner or not, refer to the Owner's Manual.

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Inspection and repair required after accident 10A- 2
ON-VEHICLE SERVICE 10A- 2
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Enabling air bag system 10A- 3
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DIAGNOSIS

For diagnosis of the seat belt pretensioner, refer to SECTION 10B.

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 10B.

ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

SERVICING AND DIAGNOSIS

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.

Before servicing or replacing seat belts, refer to 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, latch plate and ELR.
- Do not bleach or dye belt webbing. (Use only mild soap and lukewarm water to clean it.)
- When installing a seat belt anchor bolt, start bolt 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.

FOR SEAT BELT WITH PRETENSIONER

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.**

- WARNING/CAUTION labels are attached on each part of air bag system components. Be sure to follow the instructions.
- Many of the service procedures require disconnection of the "AIR BAG" fuse and air bag (inflator) modules (driver and passenger) from the 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.
- Never use air bag component parts from another vehicle.
- 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.
- When servicing, if shocks may be applied 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 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 activation, personal injury or unneeded air bag system repairs.

DISABLING AIR BAG SYSTEM

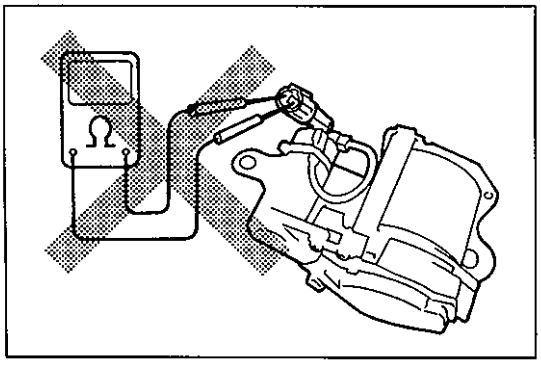
For disabling air bag system, referring to "Disabling Air Bag System" under "Service Precautions" in SECTION 10B.

ENABLING AIR BAG SYSTEM

For enabling air bag system, referring to "Enabling Air Bag System" under "Service Precautions" in SECTION 10B.

HANDLING AND STORAGE

NOTE:
Once pretensioner operates, it will not be possible to pull out webbing or to retract it into retractor. To check whether pretensioner has operated or not, try to pull out and retract webbing.

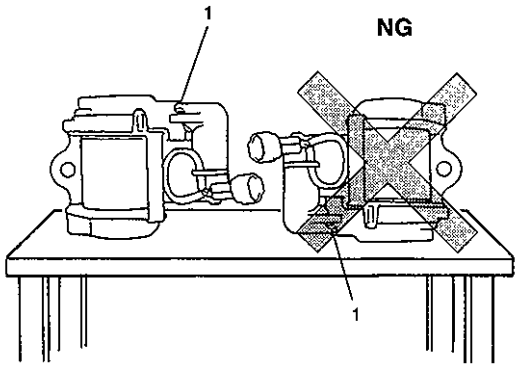


LIVE (INACTIVATED) SEAT BELT PRETENSIONER

WARNING:
Never attempt to measure the resistance of the pretensioner. It is very dangerous as the electric current from the tester may activate the pretensioner.

Special care is necessary when handling and storing a live (inactivated) pretensioner.
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.

- Never attempt disassembly of the seat belt pretensioner (retractor assembly).



1. Exhaust hole

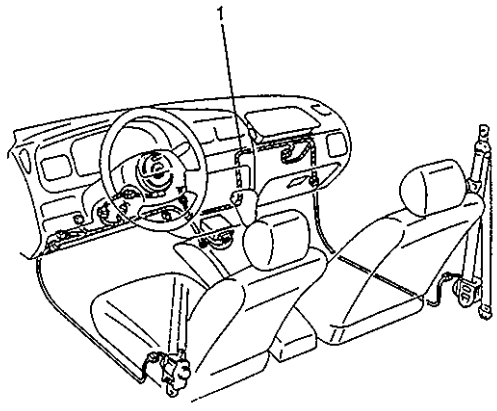
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (inactivated) seat belt pretensioner, be sure to activate it before discarding it. (Refer to "Seat Belt Pretensioners Disposal" in SECTION 10B.)
- When grease, cleaning agent, oil water, etc., got on the seat belt pretensioner (retractor assembly), wipe it off immediately with a dry cloth.
- If seat belt pretensioner (retractor assembly) was dropped from a height of 30 cm (1 ft) or more, it should be replaced.

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 the workbench or some place like that, be sure not to lay it with its exhaust hole provided side facing down. It is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another. Otherwise, personal injury may result.**

ACTIVATED SEAT BELT PRETENSIONER

WARNING:
- **Immediately after activation, the seat belt pretensioner is very hot. Wait for at least 30 minutes to cool it off before starting servicing (handling) it.**
- **Do not apply water, 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 SECTION 10B, for details.



1. Air bag wire harness

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

Do not dispose of retractor assembly with live (inactivated) seat belt pretensioner. When disposal is necessary, be sure to activate it first according to the procedure described in SECTION 10B and then dispose it. Refer to SECTION 10B for disposal procedure.

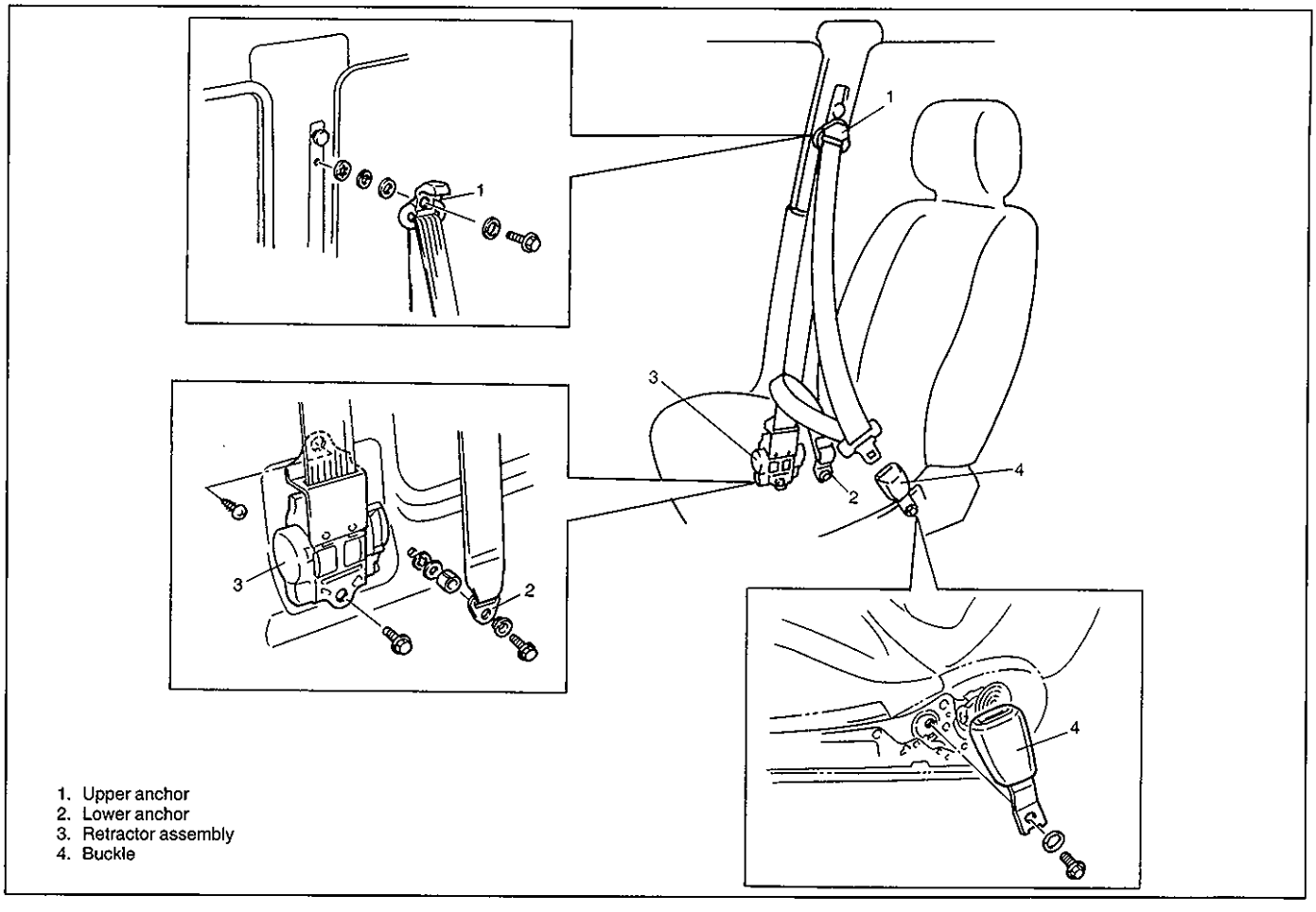
WARNING:
Failure to follow proper retractor assembly with seat belt pretensioner disposal procedures can result in seat belt pretensioner activation which could cause personal injury. Seat belt pretensioner that has not been activated must not be disposed of through normal refuse channels. The seat belt pretensioner that has not been activated contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

FRONT SEAT BELT WITHOUT PRETENSIONER

WARNING:
Be sure to read "Service Precautions" before starting to work and observe every precaution during work.

REMOVAL

Refer to the figure below to remove front seat belts.



1. Upper anchor
2. Lower anchor
3. Retractor assembly
4. Buckle

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.

Seat belt

Its webbing or strap should be free from damage.

Retractor assembly

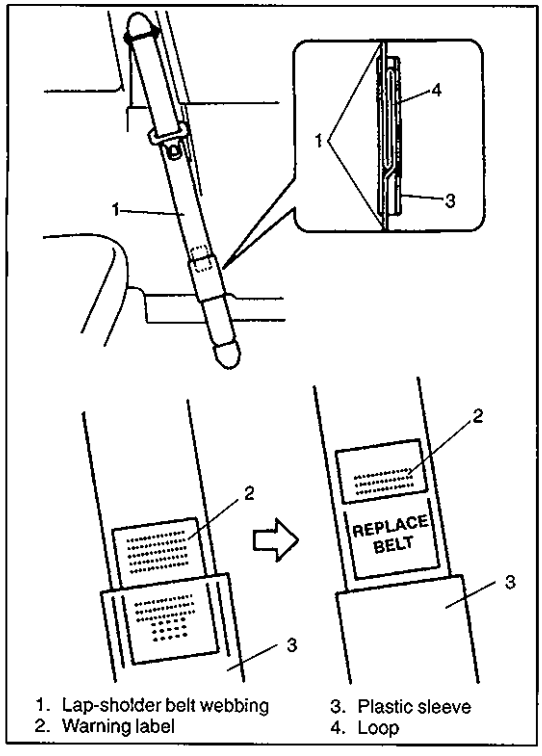
It should lock webbing when pulled quickly. The front seat belt retractor assembly should pass the above inspection and should lock webbing even when tilted (approx. 15°) toward the fore and aft or right and left directions.

Anchor bolt

Anchor bolts should be torqued to specification.

Belt latch

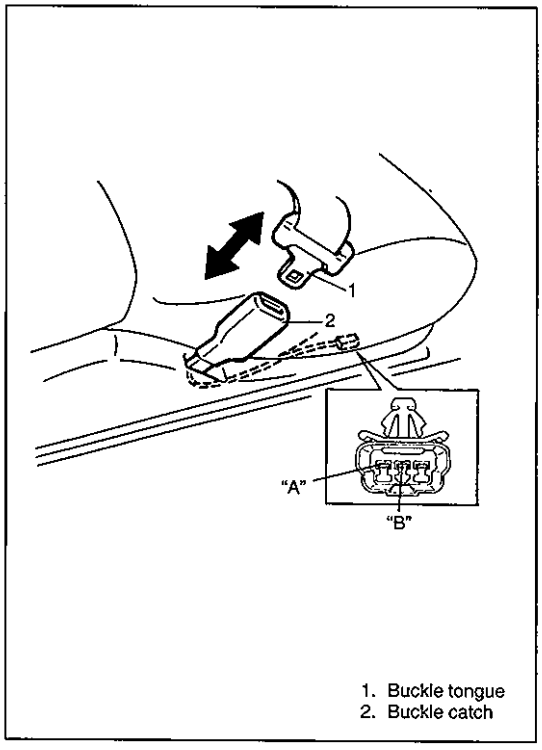
It should be secure when latched.



1. Lap-sholder belt webbing
2. Warning label
3. Plastic sleeve
4. Loop

Energy Management Loop (EML) (if equipped)

Check the lap-sholder belt to see if the loop has been pulled out (making the "REPLACE BELT" label visible).
If the "REPLACE BELT" label is visible, replace the belt.



1. Buckle tongue
2. Buckle catch

Warning system (if equipped)

Check driver's seat belt strap switch for continuity by using ohmmeter.

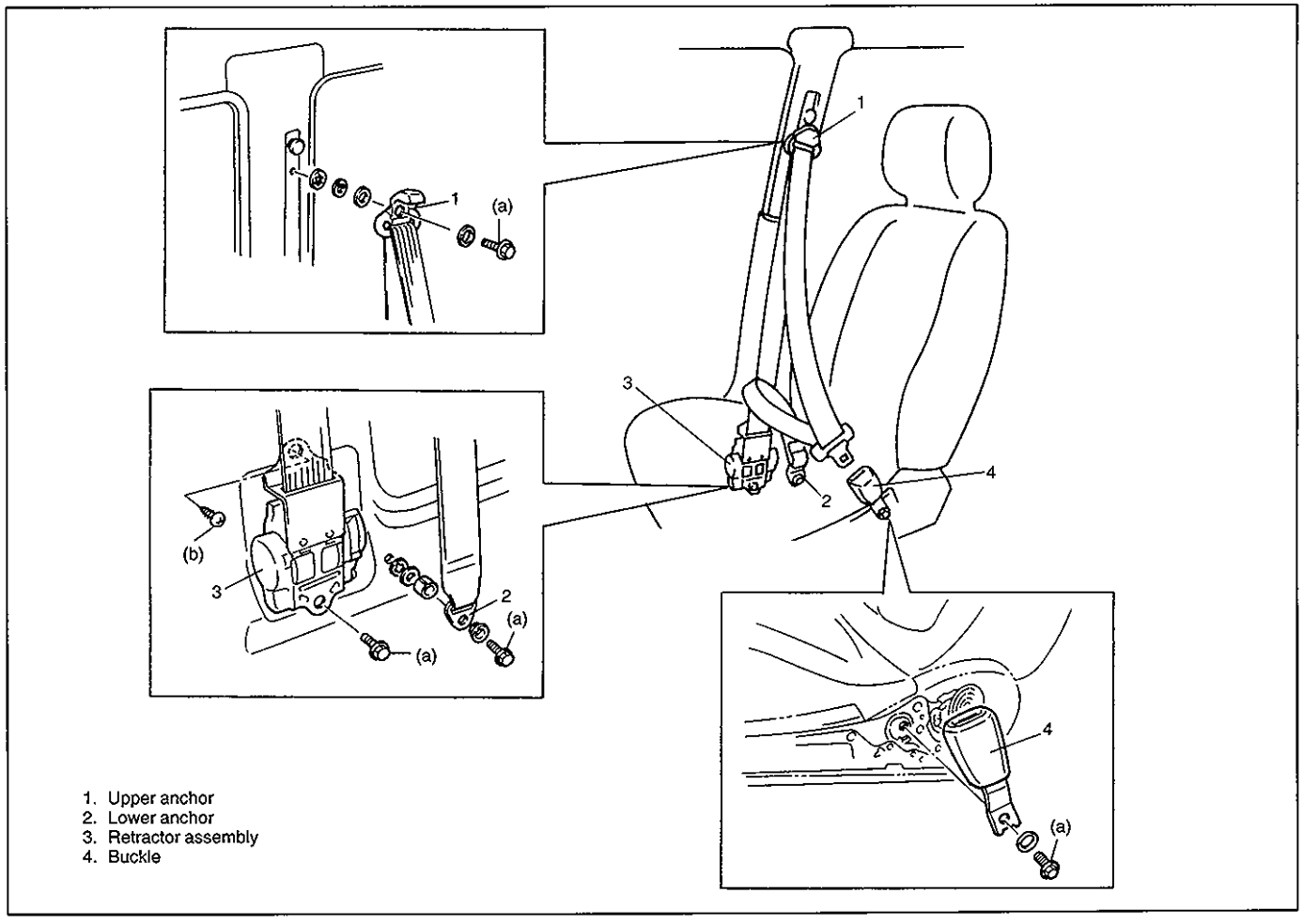
Without inserted buckle tongue to buckle catch:
Terminal "A" and "B": Continuity
With inserted buckle tongue to buckle catch:
Terminal "A" and "B": No continuity (∞Ω)

INSTALLATION

Install in reverse order of removal, noting the following.

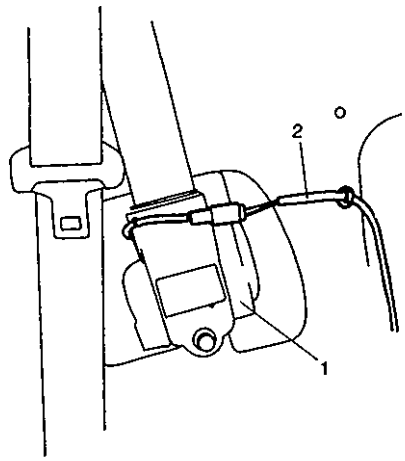
- Seat belt anchor bolts should have an unified fine thread (7/16-20 UNF). Under no circumstances should any different sized or metric screw threads be used.
- Be sure to tighten seat belt anchor bolts to specified torque.

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)

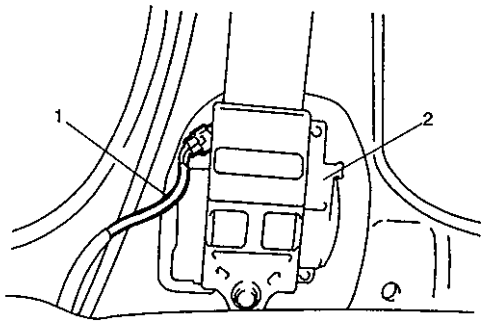


1. Upper anchor
2. Lower anchor
3. Retractor assembly
4. Buckle

TYPE A



TYPE B



1. Pretensioner harness
2. Retractor assembly

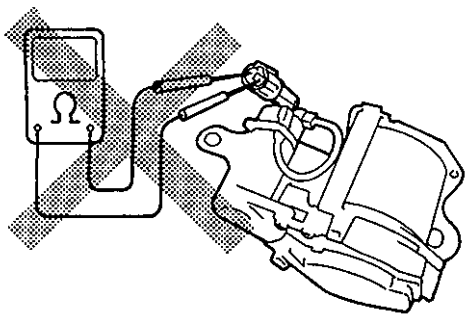
FRONT SEAT BELT WITH PRETENSIONER

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 "Service Precautions" earlier in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or inactivation of the seat belt pretensioner when necessary.**

REMOVAL

1) Disconnect negative battery cable from battery.
2) Disable air bag system. Refer to "Disabling Air Bag System" under "On-Vehicle Service" in SECTION 10B.
3) **For TYPE A**
   i) Disconnect pretensioner harness from seat belt pretensioner.
   ii) Remove front seat belts from the vehicle in the same way as when removing them without pretensioner described on page 10A-6.

   For TYPE B
   i) Remove front seat belts from the vehicle in the same way as when removing them without pretensioner described on page 10A-6.
   ii) Disconnect pretensioner harness from seat belt pretensioner.



INSPECTION

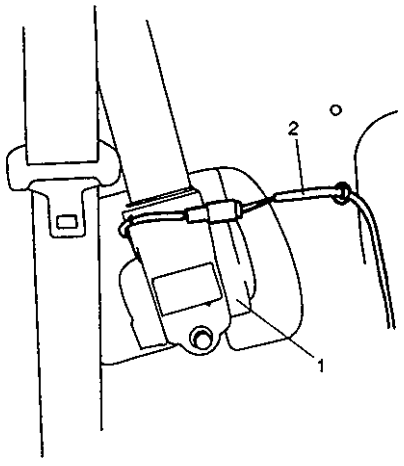
When checking seat belt with pretensioner, use following check items in addition to those specified for seat belt without pretensioner described in pages 10A-6 and 10A-7.

WARNING:
Never measure resistance of pretensioner or disassemble it. Otherwise, personal injury may result.

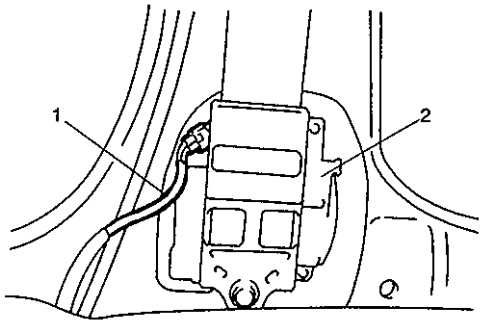
CAUTION:
If seat belt pretensioner (retractor assembly) was dropped from a height of 30 cm (1 ft) or more, it should be replaced.

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.

TYPE A



TYPE B



1. Pretensioner harness
2. Retractor assembly

INSTALLATION

1) **For TYPE A**
   i) Install front seat belts to the vehicle in the same way as when installing them without pretensioner described on page 10A-8.
   ii) Connect pretensioner harness to seat belt pretensioner securely and fit pretensioner harness onto body.

   For TYPE B
   i) Connect pretensioner harness to seat belt pretensioner and fit seat belt pretensioner harness onto body.
   ii) Install front seat belts to the vehicle in the same way as when installing them without pretensioner described on page 10A-8.
3) Connect negative battery cable to battery.
4) Enable air bag system. Refer to "Enabling Air Bag System" under "On-Vehicle Service" in SECTION 10B.

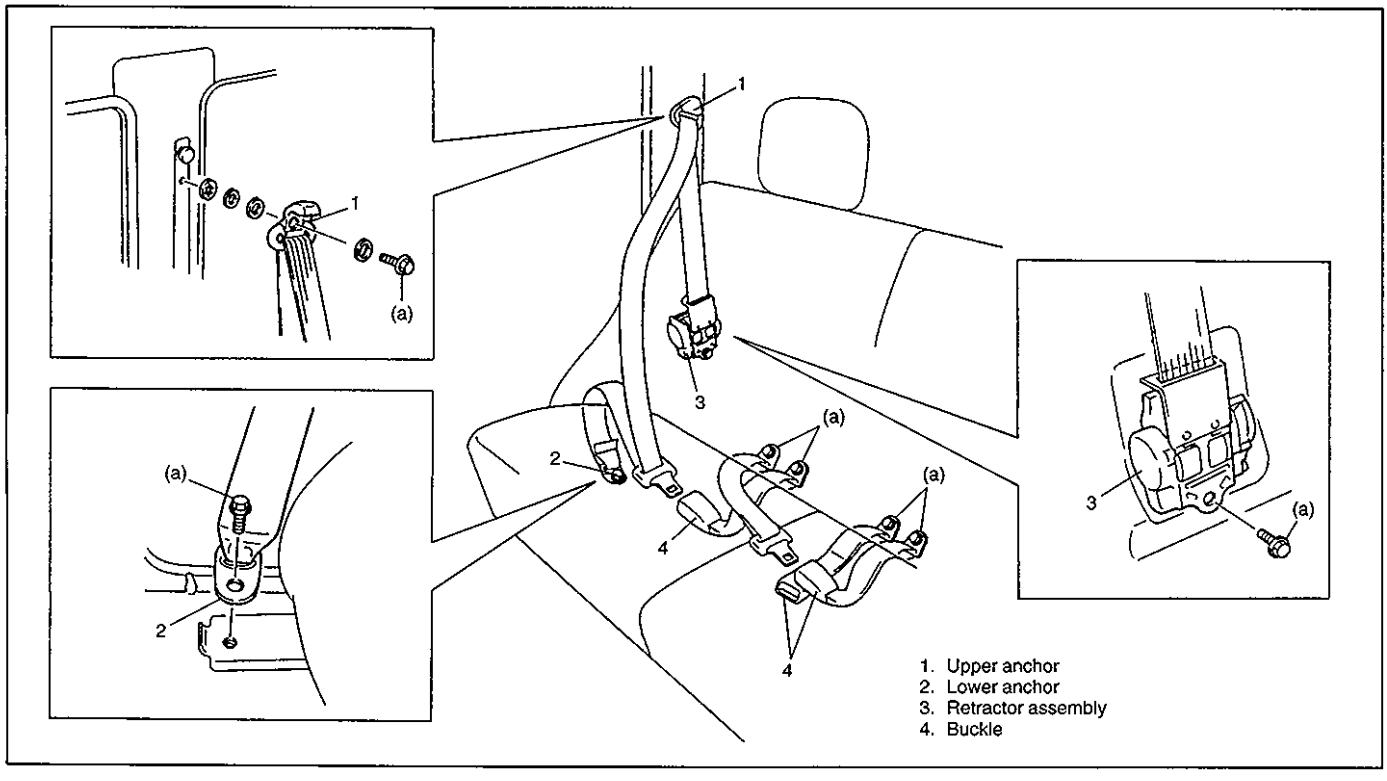
REAR SEAT BELT

WARNING:
Be sure to read "Service Precautions" before starting to work and observe every precaution during work.

REMOVAL

Refer to the figure below to remove rear seat belts.

Tightening Torque
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)



INSPECTION

Check the rear seat belt in the same way as when inspecting front seat belt without pretensioner. (Refer to pages 10A-6.)

INSTALLATION

Install the rear seat belt observing the same precautions as when installing front seat belt without pretensioner. (Refer to page 10A-8.)

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Upper and lower anchor bolt	35	3.5	25.5
Retractor assembly bolt	35	3.5	25.5
Retractor assembly screw	5.5	0.55	4.0
Buckle bolt	35	3.5	25.5

SECTION 10B

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 "Service Precautions" under "On-Vehicle Service" 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.**
- **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.**

CAUTION:

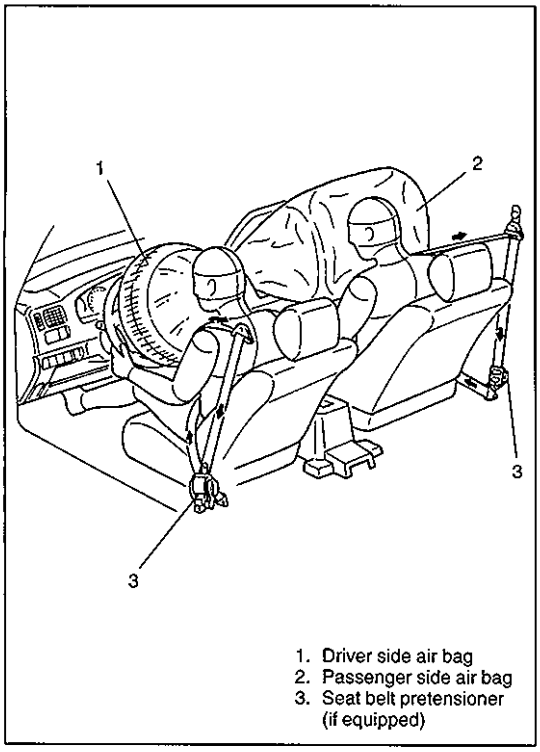
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) 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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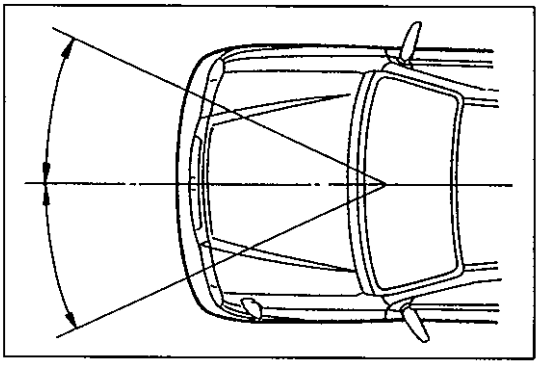
Code 46 - Passenger pretensioner initiator circuit resistance low 10B-46
Code 43 - Driver pretensioner initiator circuit short to ground 10B-48
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GENERAL DESCRIPTION

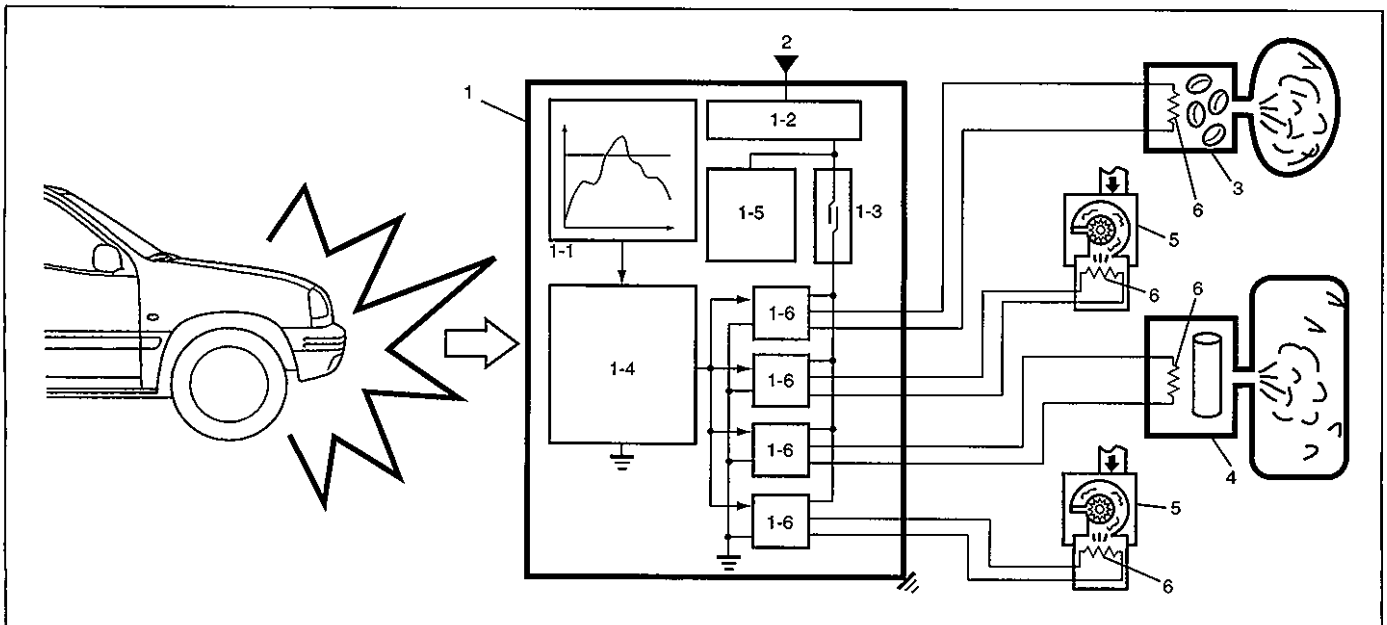


1. Driver side air bag
2. Passenger side air bag
3. Seat belt pretensioner (if equipped)

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.

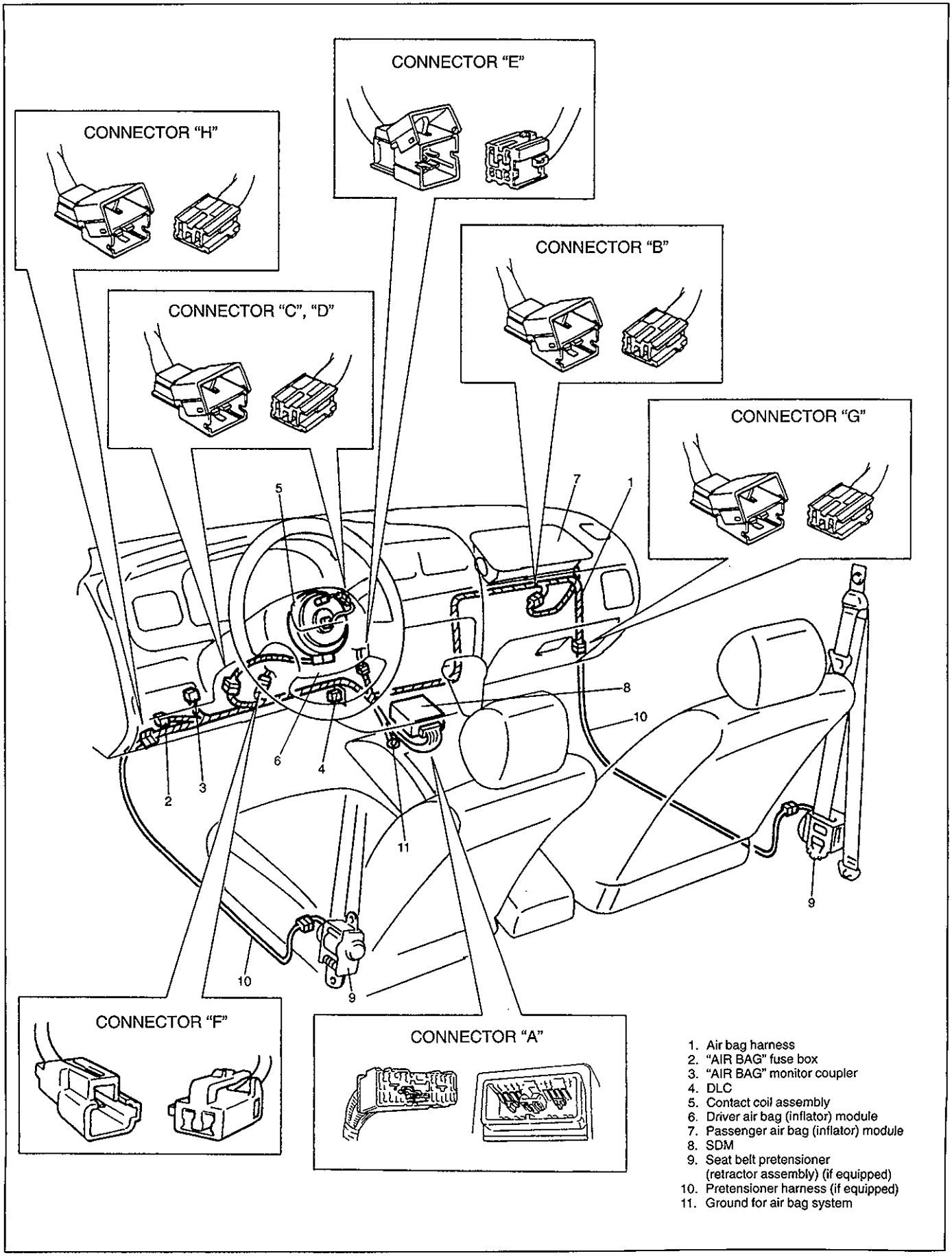


The air bag system is designed to activate only in severe frontal collisions. It is not designed to activate in rear impacts, side impacts, rollovers, or minor frontal collisions, since it would offer no protection in those types of accidents.



1. SDM
1-1. Sensor
1-2. Voltage converter
1-3. Safing sensor
1-4. Micro-controller
1-5. Energy reserve circuit
1-6. Ignition driver circuit
2. Power source
3. Driver air bag
4. Passenger air bag
5. Seat belt pretensioner (if equipped)
6. Squib circuit

SYSTEM COMPONENTS AND WIRING LOCATION VIEW AND CONNECTORS

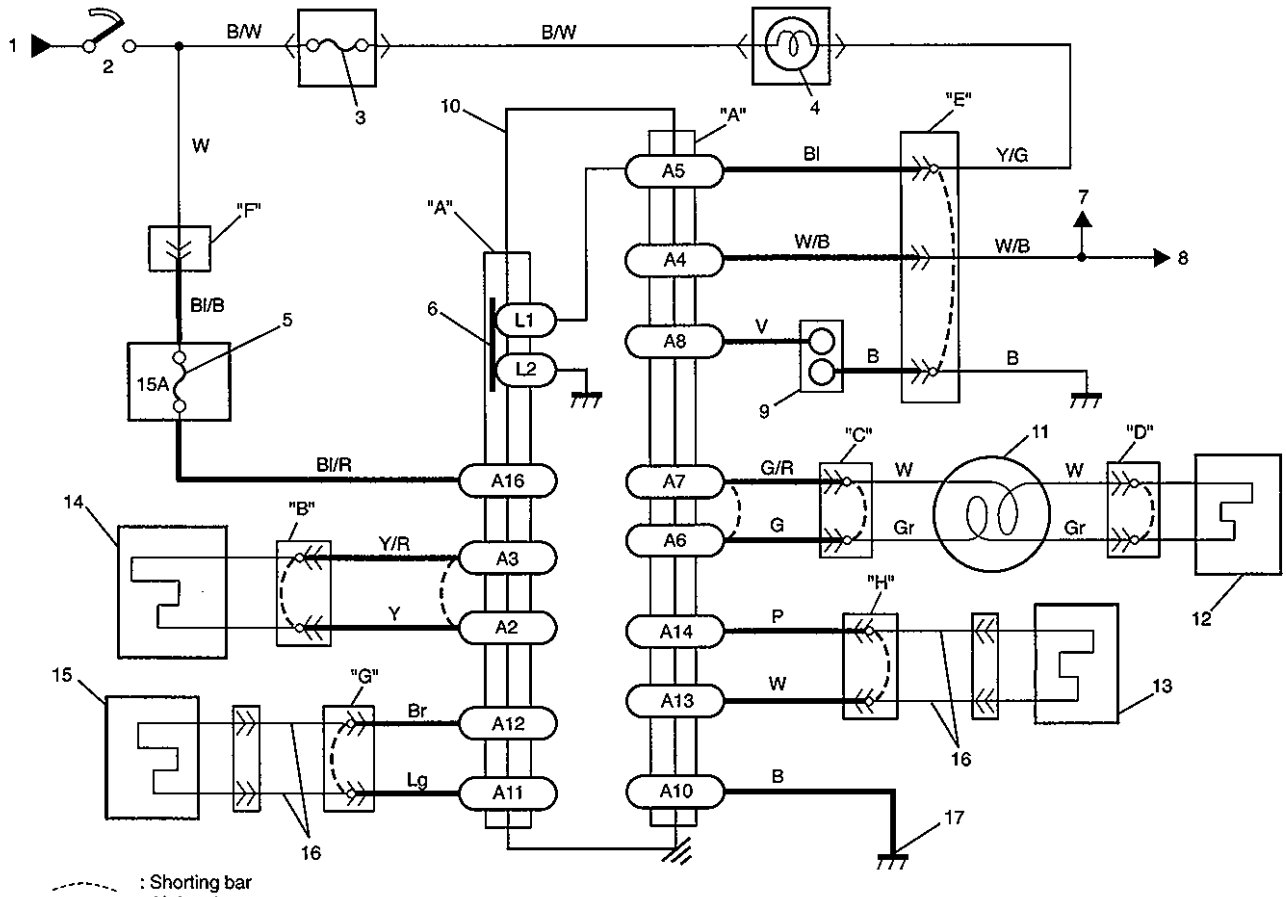


1. Air bag harness
2. "AIR BAG" fuse box
3. "AIR BAG" monitor coupler
4. DLC
5. Contact coil assembly
6. Driver air bag (inflator) module
7. Passenger air bag (inflator) module
8. SDM
9. Seat belt pretensioner (retractor assembly) (if equipped)
10. Pretensioner harness (if equipped)
11. Ground for air bag system

SYSTEM WIRING DIAGRAM

WIRE HARNESS COLOR

B : Black	G : Green	Y : Yellow
B/W : Black/White	Gr : Gray	Y/G : Yellow/Green
Bl : Blue	G/R : Green/Red	Y/R : Yellow/Red
Bl/B : Blue/Black	Lg : Lightgreen	W : White
Bl/R : Blue/Red	P : Pink	W/B : White/Black
Br : Brown	V : Violet	



: Shorting bar
: Air bag harness
"A" ~ "H" : Connector

TERMINAL ARRANGEMENT OF SDM
(VIEWED FROM HARNESS SIDE)

A8	A7	A6	A5	L1	L2	A4	A3	A2	A1
A16	A15	A14	A13			A12	A11	A10	A9

1. From main fuse
2. Ignition switch
3. "IG·COIL METER" fuse in J/B
4. "AIR BAG" warning lamp in combination meter
5. "AIR BAG" fuse in "AIR BAG" fuse box
6. Connection detection pin
7. To ECM (or PCM), 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. Pretensioner harness (if equipped)
17. Ground for air bag system

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	Low
A12		High
A13	Driver pretensioner	Low
A14		High
A15	———	
A16	Ignition switch (power source)	
L1	Connection detection pin	
L2		

DIAGNOSIS

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.

DIAGNOSTIC TROUBLE CODES

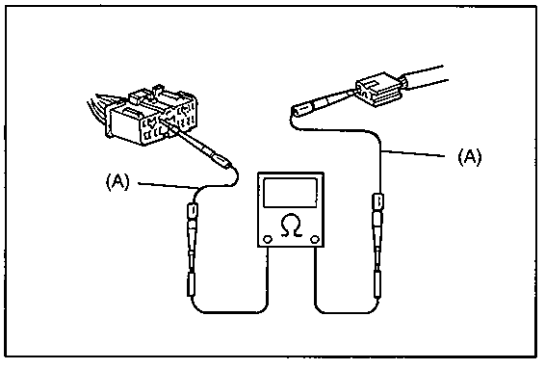
The "Air Bag Diagnostic System Check" must always be the starting point of any air bag system diagnosis. The "Air Bag Diagnostic System Check" checks for proper "AIR BAG" warning lamp operation and checks for air bag diagnostic trouble codes using the Tech-1 (scan tool) or on-board diagnosis function.

- Current diagnostic trouble code – Malfunction that are presently being detected.
- History diagnostic trouble code – All malfunction detected since the last time the history memory was cleared.

USE OF SPECIAL TOOLS

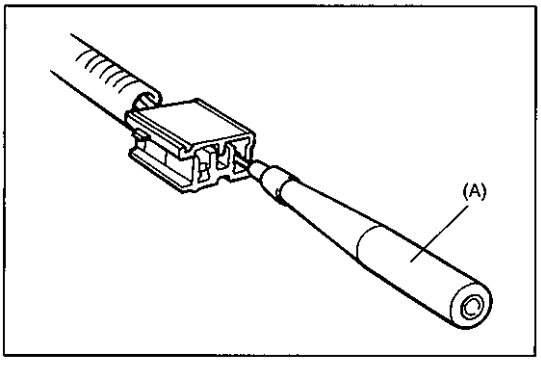
WARNING:
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester.
Instructions in this manual must be followed carefully, otherwise personal injury may result.

You should be familiar with the tools listed under "Special Tools" 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 Tech-1 Diagnostic Computer, Driver/Passenger Load Tool, Connector Test Adapter Kit and the Digital Multimeter.

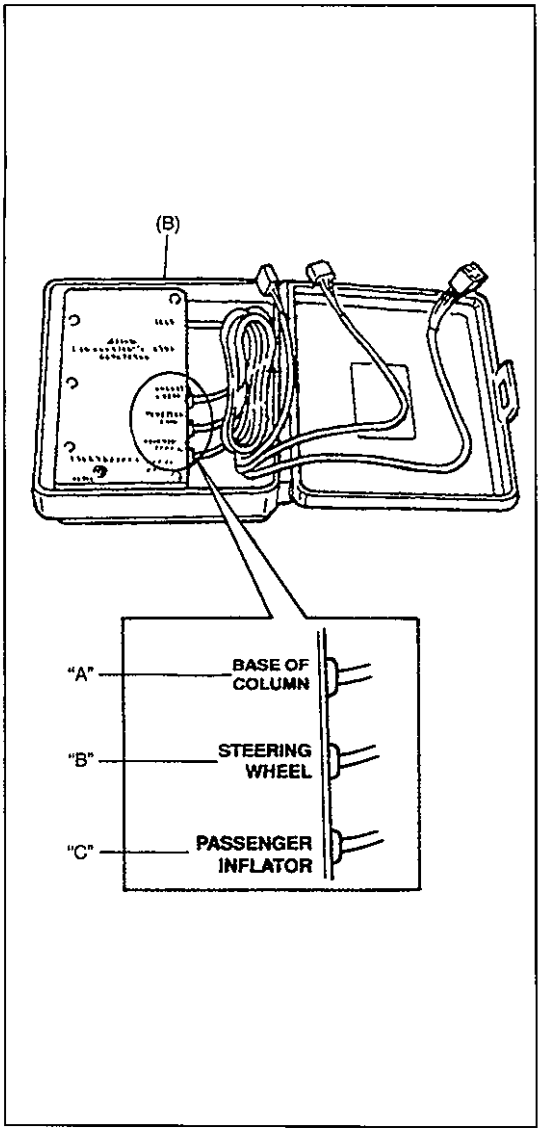


Special Tool (Connector Test Adapter Kit)
(A): 09932-76010

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.



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.



Special Tool (Air Bag Driver/Passenger Load Tool) (B): 09932-75010

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.

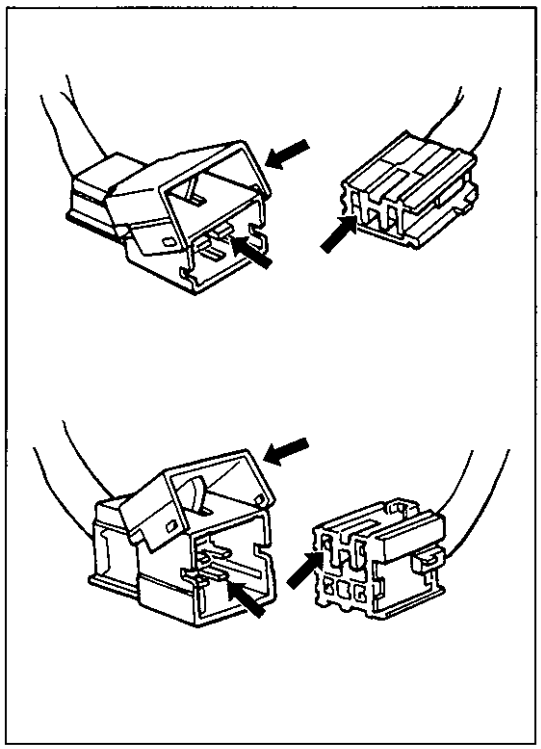
One of connectors ("A": BASE OF COLUMN) is used to substitute the load of the driver air bag (inflator) module and the contact coil assembly when it is connected at the base of the column to the air bag wire harness.
Another connector ("B": STEERING WHEEL) is used to substitute the load of followings.

- driver air bag (inflator) module when it is connected at the top of the column to the contact coil assembly.
- passenger air bag (inflator) module when it is connected to the air bag harness connector for passenger air bag (inflator) module.
- driver and passenger seat belt pretensioner when it is connected to air bag harness connector for driver and passenger seat belt pretensioner.

The third connector ("C": PASSENGER INFLATOR) is not used.
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.

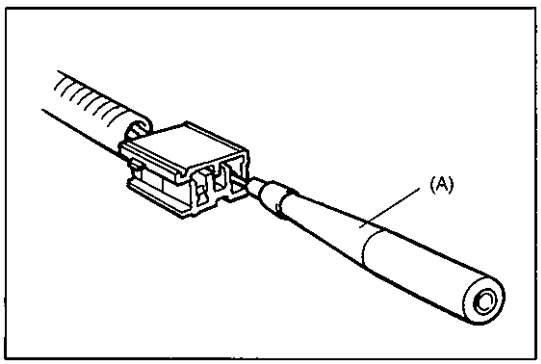
INTERMITTENT AND POOR CONNECTIONS

Most intermittent are caused by faulty electrical connections or wiring. When a check for proper connection is requested in a diagnostic flow table, perform careful check of suspect circuits for:



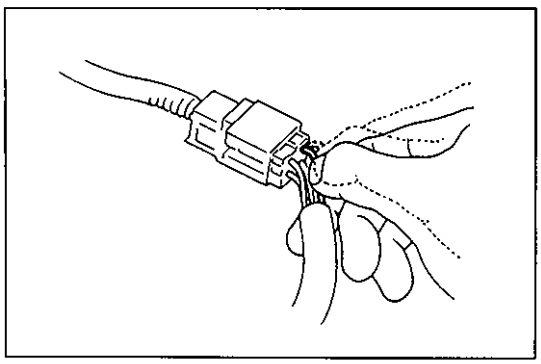
- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
  However, cleaning the terminal with a sand paper or the 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.
- Improperly formed or damaged terminals.

If any abnormality is found, repair or replace as a wire harness assembly.

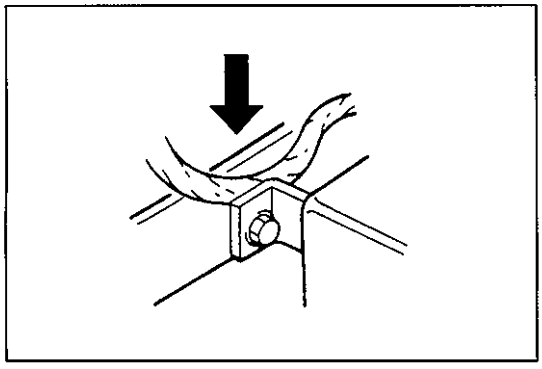


Check each connector terminal in problem circuits carefully to ensure good contact tension by using the corresponding mating terminal included in the connector test adapter kit (special tool).
If contact tension is not enough, reform it to increase contact tension or replace.

Special Tool (Connector Test Adapter Kit)
(A): 09932-76010



- 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.

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.

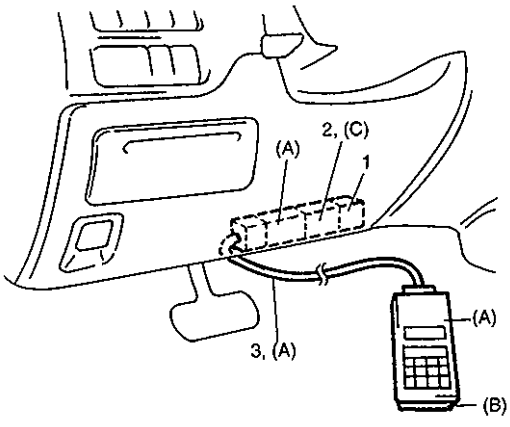
A. PERFORM THE "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE"
The "Air Bag Diagnostic System Check Flow Table" must be the starting point of any air bag system diagnostics. The "Air Bag Diagnostic System Check Flow Table" checks for proper "AIR BAG" warning lamp operation, the ability of the SDM to communicate 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 chart 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.

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. 3) Does "AIR BAG" warning lamp flash 6 times when ignition switch is tuned ON?	Go to step 2.	**"AIR BAG" warning lamp does not come "ON"** Proceed to "Table B" on p.10B-18.
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" on p.10B-20.	Go to step 3.
3	After flashing 6 times 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" on p.10B-12. 2) [Using SUZUKI scan tool (Tech 1)] Is "NO CODES" displayed ? **NOTE:** **If SDM cannot communicate through serial data circuit, proceed to "Table D" on p.10B-22.** [Not using SUZUKI scan tool (Tech 1)] 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 Connections" in this section). Then clear DTC (Refer to p.10B-13.) and repeat this table.
5	1) Check DTC, referring to "Diagnostic Trouble Code (DTC) Check" on p.10B-12. 2) [Using SUZUKI scan tool (Tech 1)] Is "NO CODES" displayed ? **NOTE:** **If SDM cannot communicate through serial data circuit, proceed to "Table D" on p.10B-22.** [Not using SUZUKI scan tool (Tech 1)] Is DTC 12 indicated ?	**"AIR BAG" warning lamp come "ON" steady** Proceed to "Table A" on p.10B-16.	**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 connector (DLC)
2. DLC cable adapter
3. DLC cable

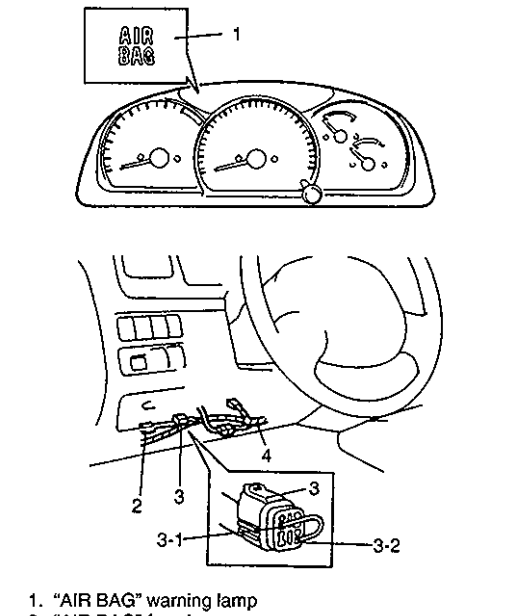
DIAGNOSTIC TROUBLE CODE (DTC) CHECK

[Using SUZUKI scan tool (Tech 1)]

1) Turn ignition switch OFF.
2) After setting cartridge to Tech 1, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special Tool
(A): 09931-76011 (Tech 1)
(B): Mass storage cartridge
(C): 09931-96020 (16/12 pin DLC adapter)

3) Turn ignition switch ON.
4) Read DTC according to instructions displayed on Tech 1 and print it or write it down. Refer to Tech 1 operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect Tech 1 from data link connector (DLC).

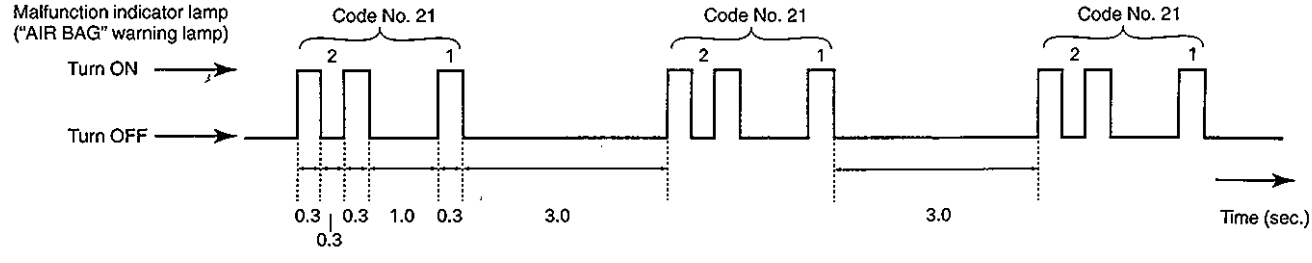


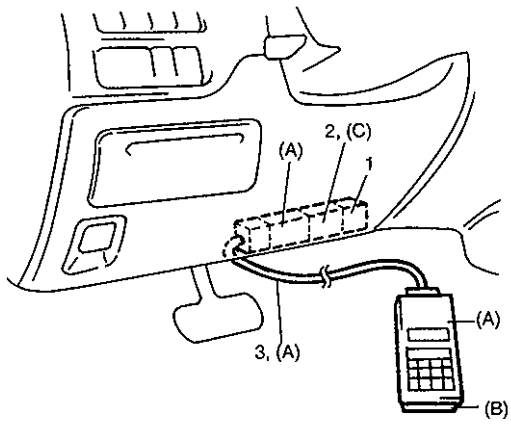
1. "AIR BAG" warning lamp
2. "AIR BAG" fuse box
3. "AIR BAG" monitor coupler
3-1. Diagnostic switch terminal
3-2. Ground terminal
4. Air bag harness (covered yellow tube)

[Not using SUZUKI scan tool (Tech 1)]

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" on p.10B-18.
2) Using service wire, ground diagnosis switch terminal in monitor coupler.
3) Read DTC from flashing pattern of malfunction indicator lamp ("AIR BAG" warning lamp). (Refer to "Diagnostic Trouble Code Table" on p.10B-14 and 10B-15.)
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
2. DLC cable adapter
3. DLC cable

DIAGNOSTIC TROUBLE CODE (DTC) CLEARANCE

[Using SUZUKI scan tool (Tech 1)]

1) Turn ignition switch OFF.
2) Connect Tech 1 to data link connector (DLC) in the same manner as when making this connection for DTC check.

   Special Tool
   (A): 09931-76011 (Tech 1)
   (B): Mass storage cartridge
   (C): 09931-96020 (16/12 pin DLC adapter)

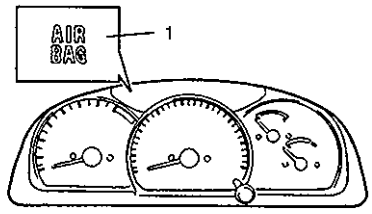
3) Turn ignition switch ON.
4) Erase DTC according to instructions displayed on Tech 1. Refer to Tech 1 operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect Tech 1 from data link connector (DLC).
6) Perform "Diagnosis Trouble Code (DTC) Check" and confirm that normal DTC (NO CODES) is displayed and not malfunction DTC.

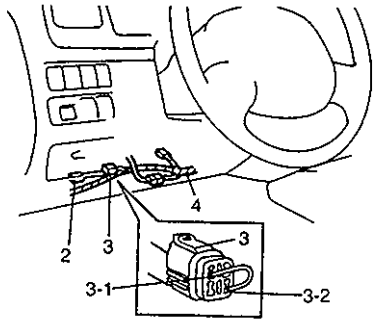
   NOTE:
   If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.

[Not using SUZUKI scan tool (Tech 1)]

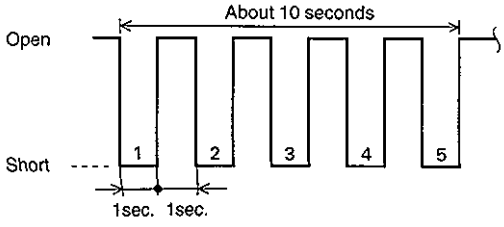
1) Turn ignition switch ON and wait about 6 seconds or more.
2) Using service wire, repeat shorting and opening between diagnosis switch terminal and ground terminal on "AIR BAG" monitor coupler 5 times at about 1 second intervals.
3) Perform "Diagnosis Trouble Code (DTC) Check" and confirm that normal 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.



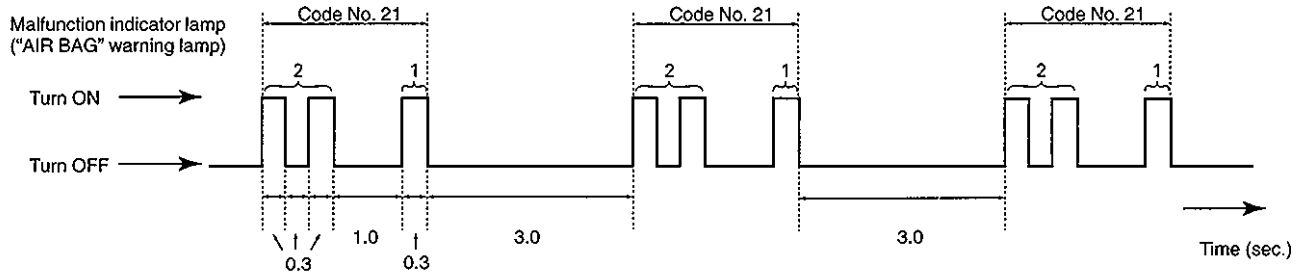


1. "AIR BAG" warning lamp
2. "AIR BAG" fuse box
3. "AIR BAG" monitor coupler
3-1. Diagnostic switch terminal
3-2. Ground terminal
4. Air bag harness (covered yellow tube)



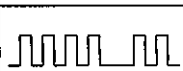
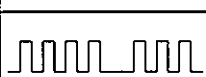
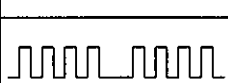
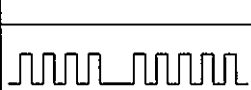
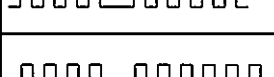
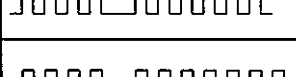
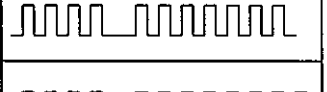
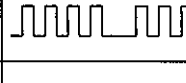
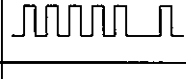
DIAGNOSTIC TROUBLE CODE TABLE (Page 1 of 2)

EXAMPLE: WHEN DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (CODE NO.21) IS SET



DIAGNOSTIC TROUBLE CODE NO.	MODE	DIAGNOSIS		
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 NO.	DIAGNOSTIC TROUBLE CODE MODE	DIAGNOSIS		
41		Driver pretensioner circuit (if equipped)	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 (if equipped)	Resistance high	
46			Resistance low	
47			Short to ground	
48			Short to power circuit	
51		SDM	Frontal crash detected	
61		"AIR BAG" warning lamp circuit		
71		SDM	Internal fault	

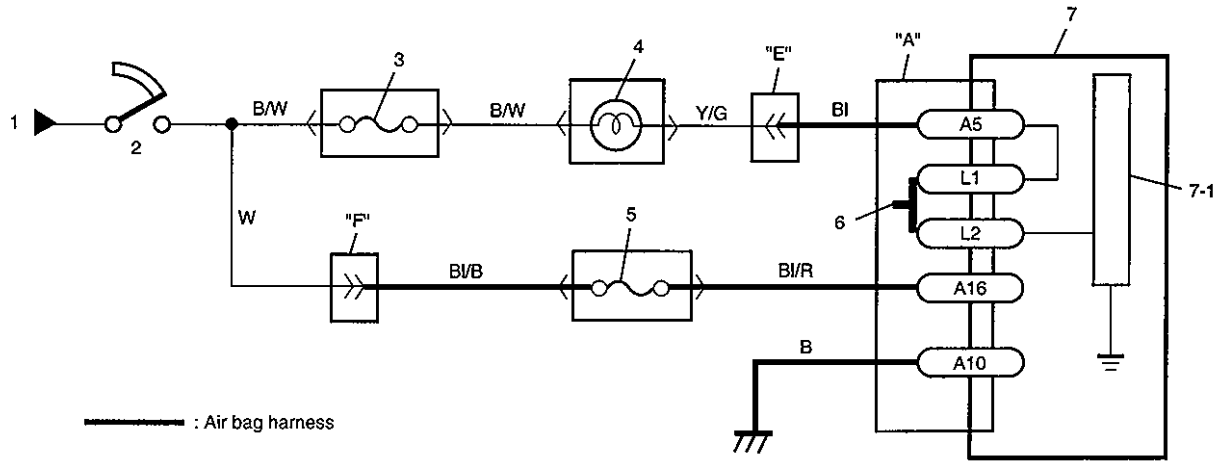
NOTE:

- **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.	Flashing 6 times 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's 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 scan tool (Tech 1) 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·COIL METER" fuse in J/B
4. "AIR BAG" warning lamp in combination meter
5. "AIR BAG" fuse in "AIR BAG" fuse box
6. Connection detection pin
7. SDM
7-1. "AIR BAG" warning lamp driver circuit

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.**

STEP	ACTION	YES	NO
1	1) Ignition switch "OFF". 2) Remove and inspect "AIR BAG" fuse. 3) 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 "A16" terminal of SDM connector and body ground with ignition switch ON. 4) Is it 8 V or more?	Go to step 3.	"Bl/R" wire (between "AIR BAG" fuse and SDM connector) open "Bl/B" wire (between ignition switch and "AIR BAG" fuse) open or short to ground.
3	1) Disconnect 16p connector from combination meter, referring to SECTION 8C. 2) Check resistance between "A5" terminal of SDM connector and body ground. 3) Is resistance 1 kΩ or more?	Substitute a known-good SDM and recheck.	"Bl" wire (between combination meter and SDM connector) short to ground.

TABLE A – "AIR BAG" WARNING LAMP COMES "ON" STEADY (Page 2 of 2)

Fig. for STEP 2

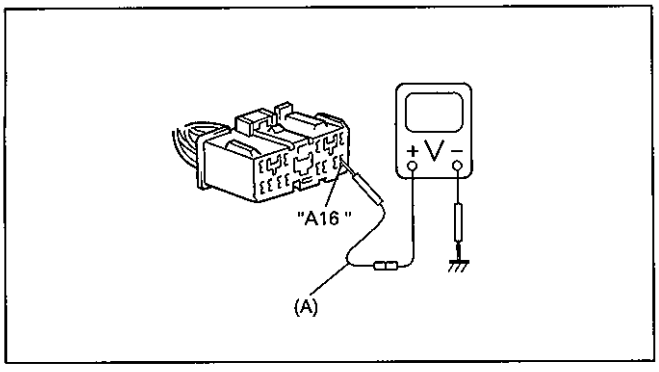
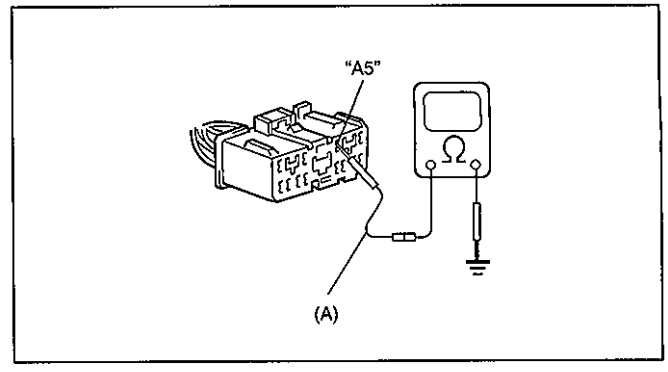


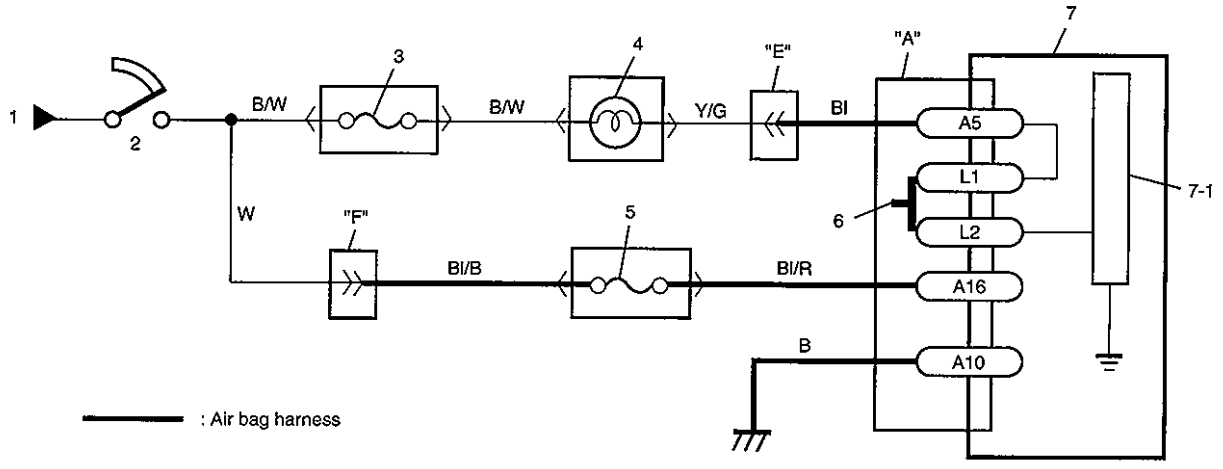
Fig. for STEP 3



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform following items.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B-11 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·COIL METER" fuse in J/B
4. "AIR BAG" warning lamp in combination meter
5. "AIR BAG" fuse in "AIR BAG" fuse box
6. Connection detection pin
7. SDM
7-1. "AIR BAG" warning lamp driver circuit

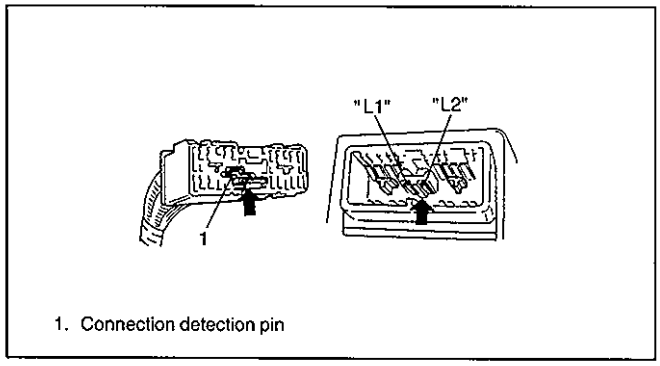
CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

STEP	ACTION	YES	NO
1	1) Set parking brake. 2) Note combination meter as ignition switch is turned ON. 3) Does the "BRAKE" indicator (warning lamp) come ON?	Go to step 2.	"B/W" wire, "IG·COIL METER" 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 (connection detection pin). 3) 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. 4) Is it 9 V or more?	Substitute a known-good SDM and recheck.	Go to step 4 on the next page.

TABLE B – "AIR BAG" WARNING LAMP DOES NOT COME "ON" (Page 2 of 2)

STEP	ACTION	YES	NO
4	1) Remove combination meter, referring to SECTION 8C. 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 "Y/G" wire terminal of combination meter connector (16p) and "A5" terminal of SDM connector. 4) Is resistance 1 Ω or less?	Go to step 5.	Repair high resistance or open in "Bl" or "Y/G" wire circuit (between combination meter and SDM).
5	1) Measure voltage from "A5" terminal of SDM connector to body ground with ignition switch ON. 2) Is it 9 V or more?	Repair short from "Bl" or "Y/G" wire circuit (between combination meter and SDM) to power circuit.	Go to step 6.
6	1) Remove and inspect "AIR BAG" bulb. 2) Is bulb good?	Substitute a known-good combination meter and recheck.	Replace bulb.

Fig. for STEP 2



1. Connection detection pin

Fig. for STEP 3 and 5

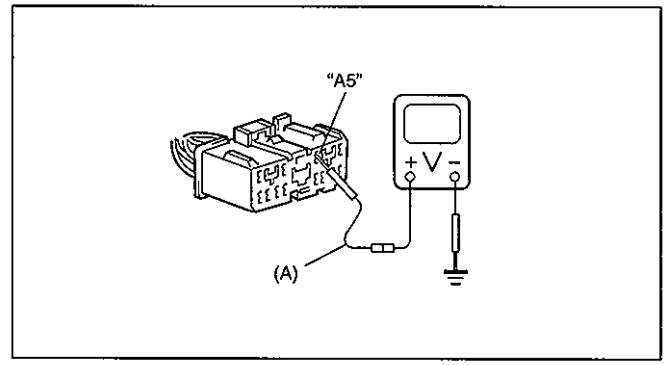
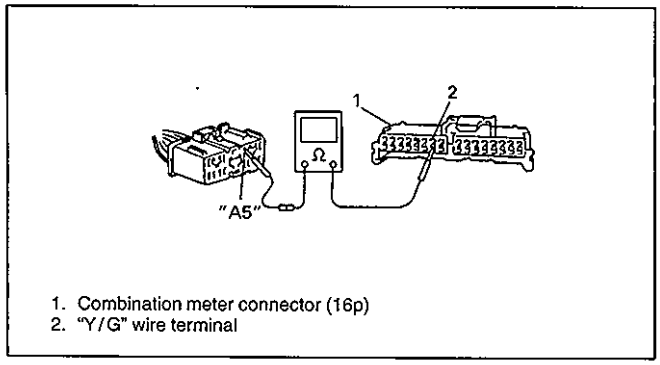


Fig. for STEP 4

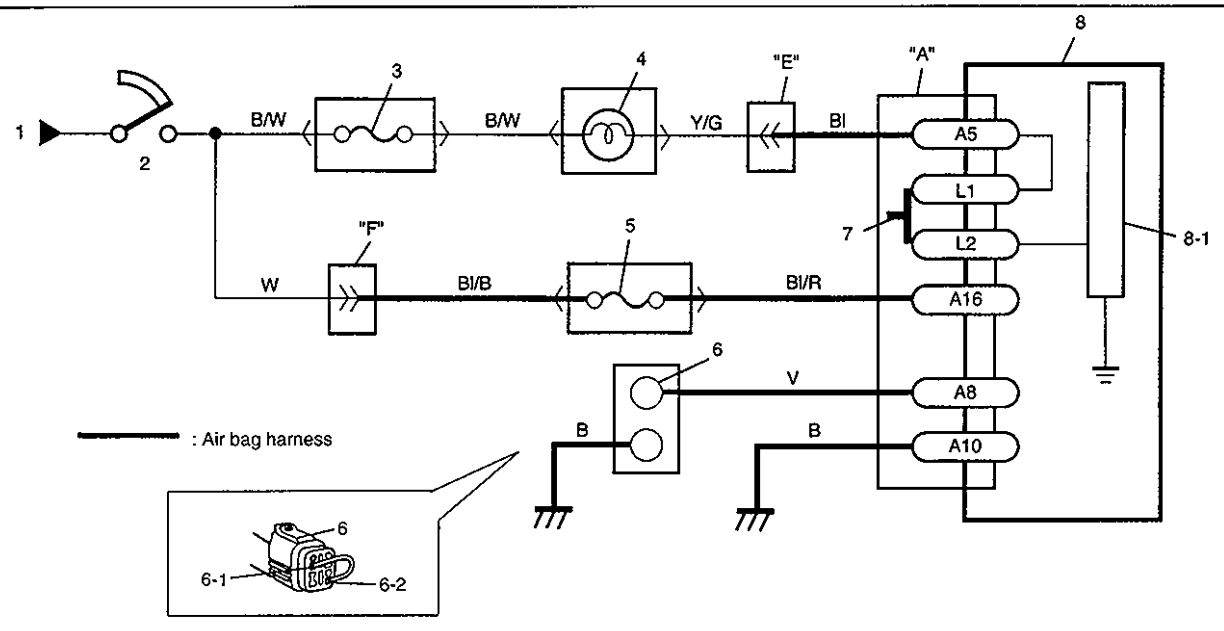


1. Combination meter connector (16p)
2. "Y/G" wire terminal

Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform following items.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B-11 to confirm that the trouble has been corrected.

TABLE C – "AIR BAG" WARNING LAMP FLASHES (Page 1 of 2)



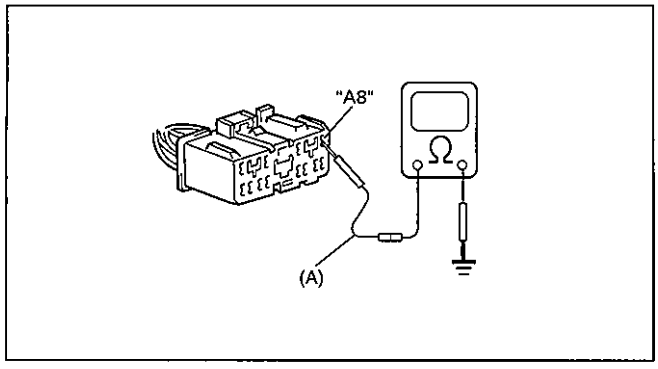
1. From main fuse
2. Ignition switch
3. "IG·COIL METER" fuse in J/B
4. "AIR BAG" warning lamp in combination meter
5. "AIR BAG" fuse in "AIR BAG" fuse box
6. "AIR BAG" monitor coupler
6-1. Diagnosis switch terminal
6-2. Ground terminal
7. Connection detection pin
8. SDM
8-1. "AIR BAG" warning lamp driver circuit

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.**

STEP	ACTION	YES	NO
1	1) Check "AIR BAG" monitor coupler. 2) Is it connected diagnosis switch terminal and ground terminal in "AIR BAG" monitor coupler by service wire?	Remove service wire.	Go to step 2.
2	1) With ignition switch OFF, disconnect SDM. 2) Measure resistance between "A8" terminal of SDM connector and body ground. 3) Is resistance 1 kΩ or more?	Substitute a known-good SDM and recheck.	Repair short from "V" wire circuit to ground.

TABLE C – "AIR BAG" WARNING LAMP FLASHES (Page 2 of 2)

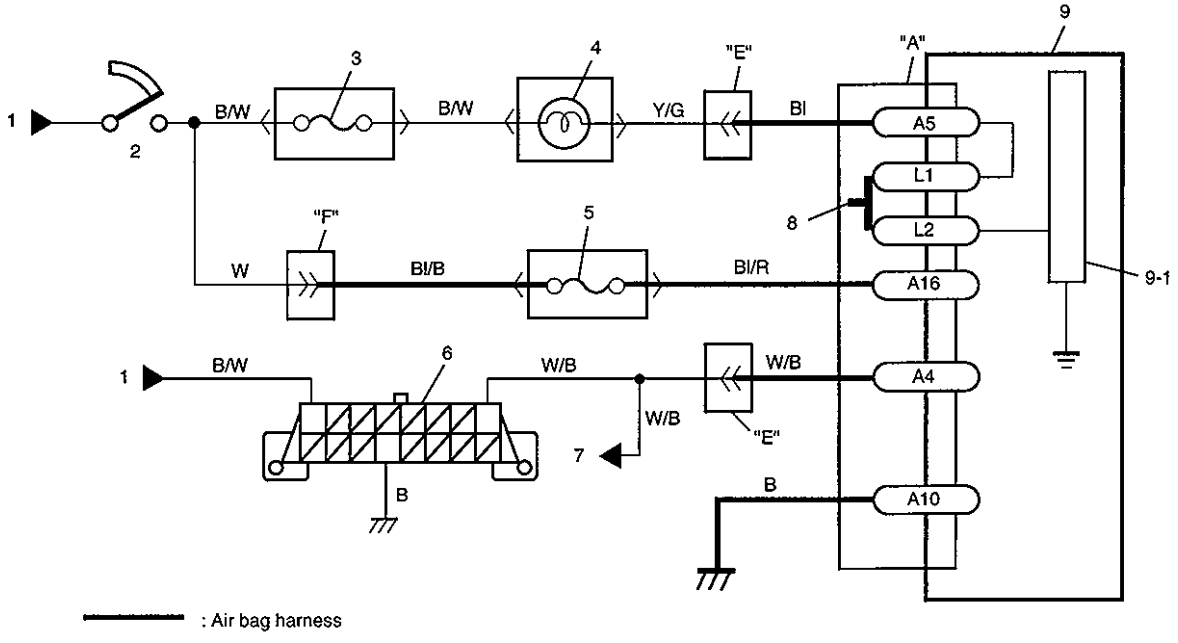
Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform following items.
1) **Reconnect all air bag system components, ensure all components are properly mounted.**
2) **Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B-11 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·COIL METER" fuse in J/B
4. "AIR BAG" warning lamp in combination lamp
5. "AIR BAG" fuse in "AIR BAG" fuse box
6. DLC
7. To ECM (or PCM), ICM (if equipped) and ABS controller (if equipped)
8. Connection detection pin
9. SDM

9-1. "AIR BAG" warning lamp driver circuit

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.**

STEP	ACTION	YES	NO
1	1) Make sure that scan tool (Tech 1) is free from malfunction and correct cartridge for air bag system is used. 2) Ignition switch OFF. 3) Check proper connection of scan tool (Tech 1) to DLC. 4) Is connection in good condition?	Go to step 2 on next page.	Properly connect scan tool to DLC.

TABLE D – SDM CANNOT COMMUNICATE THROUGH THE SERIAL DATA CIRCUIT (Page 2 of 2)

STEP	ACTION	YES	NO
2	1) Check if communication is possible by trying communication with other controller (ECM (or PCM), ICM or ABS controller). 2) Is it possible to communicate with other controller?	Go to step 3.	Repair open in common section of serial data circuit ("W/B" wire circuit) used by all controllers or short to ground or power circuit which has occurred somewhere in serial data circuit ("W/B" wire circuit).
3	1) With ignition switch OFF, disconnect SDM and "Lamp, DLC and Monitor Coupler Ground" ("E") connector. 2) Check proper connection at "W/B" wire terminal for DLC in "E" connector. 3) If OK, then check resistance between "W/B" wire terminal in "E" connector and "A4" terminal of SDM connector. 4) Is resistance 1 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "W/B" wire circuit (in air bag harness).

Fig. for STEP 1

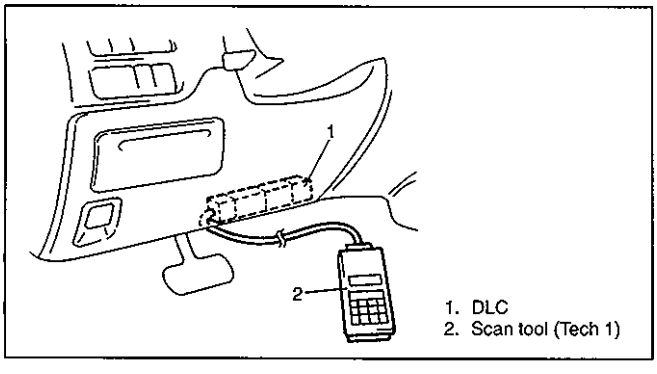
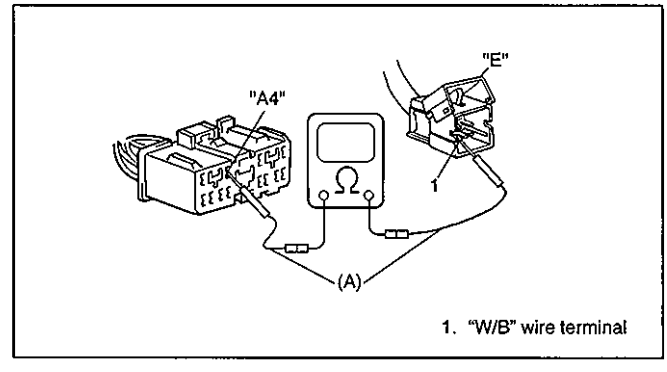


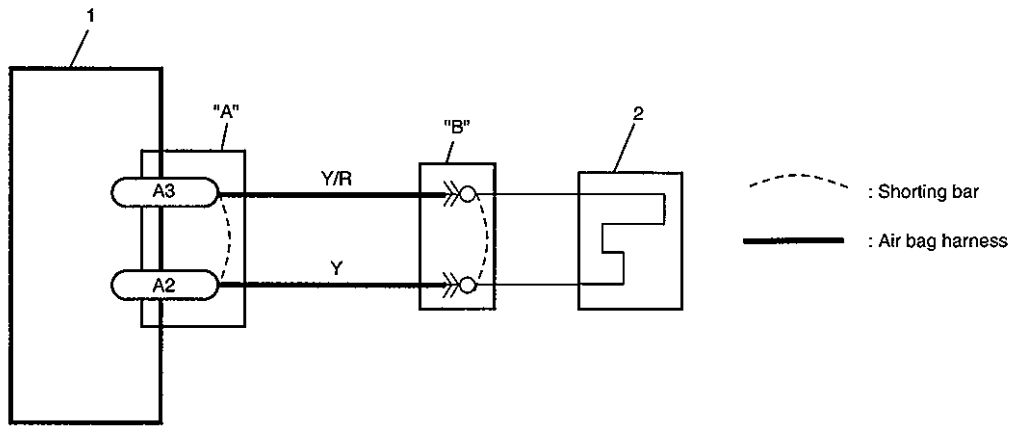
Fig. for STEP 3



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform following items.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) 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). 5) 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

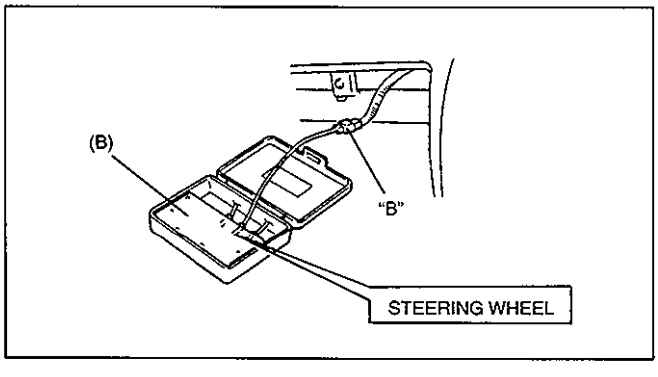
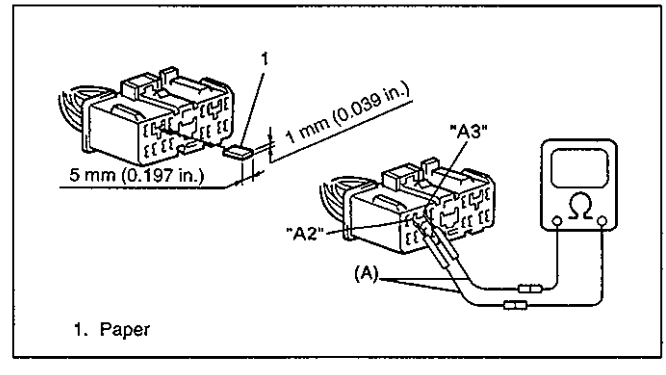


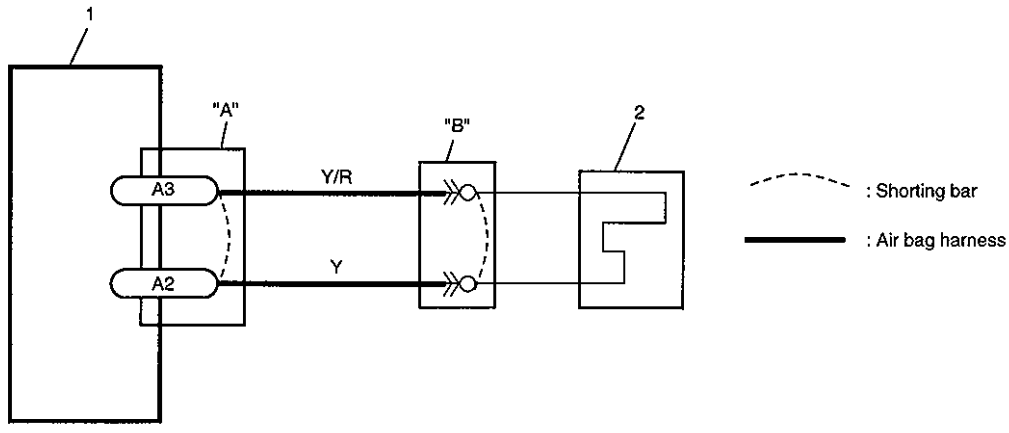
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) 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). 5) 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

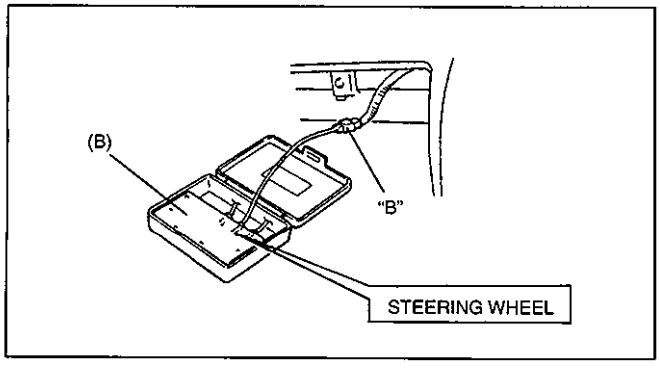
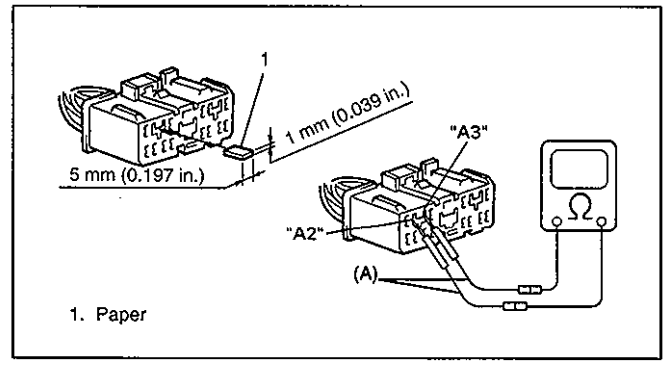


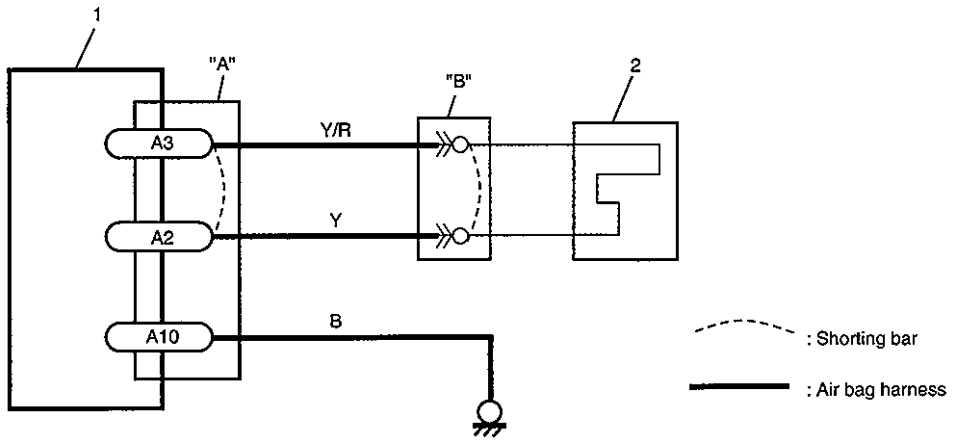
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) 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. 3) Is resistance 1 kΩ 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

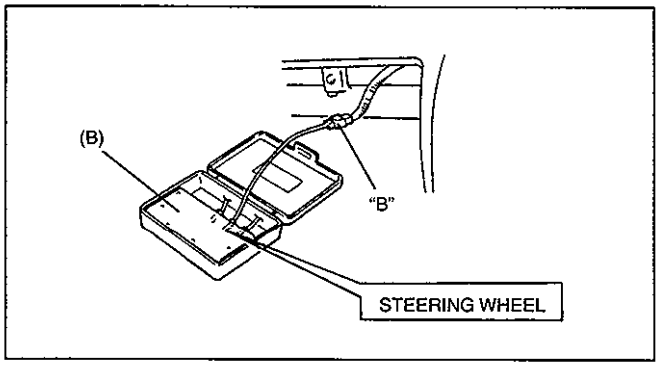
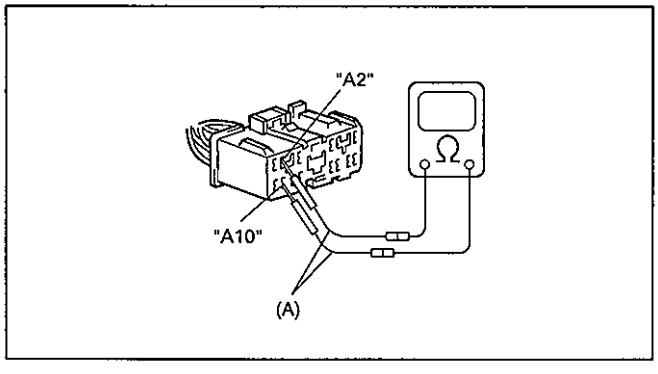


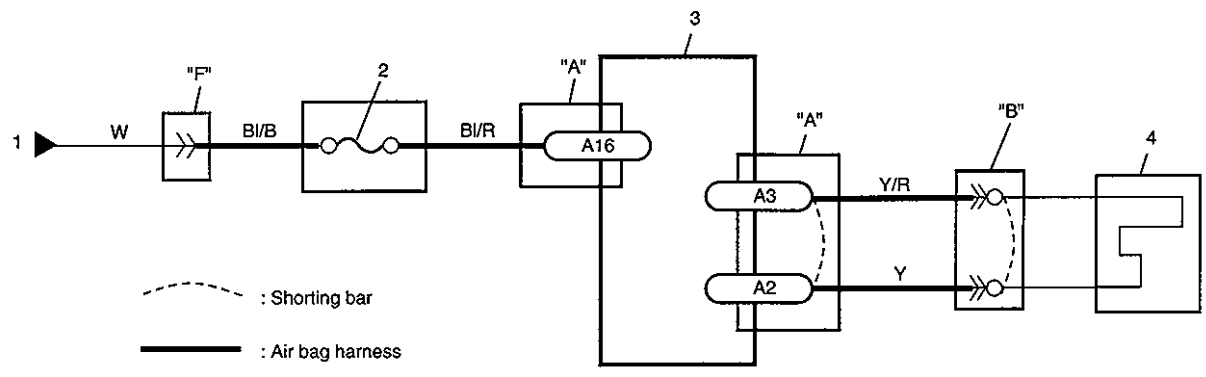
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 "AIR BAG" fuse box
3. SDM
4. Passenger air bag (inflator) module

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) 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. 3) 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

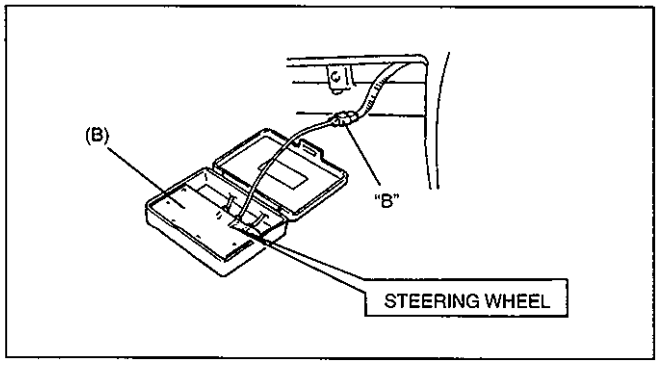
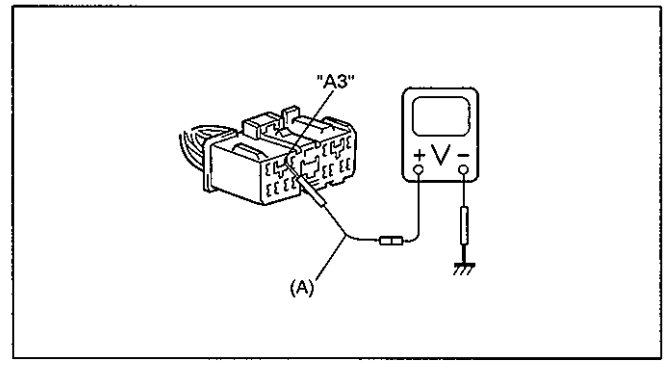


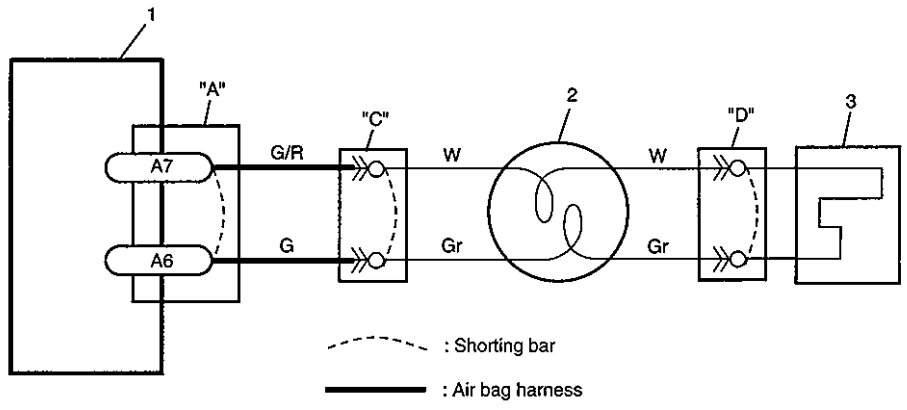
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittents and Poor Connections" in this section.**
- **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.

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). 4) With ignition switch ON, is DTC 21 current?	Go to step 2.	Go to step 3 on the next page.
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). 5) Is resistance 3.5 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "G" or "G/R" wire circuit.

CODE 21 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 2 of 2)

STEP	ACTION	YES	NO
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 2). 5) 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

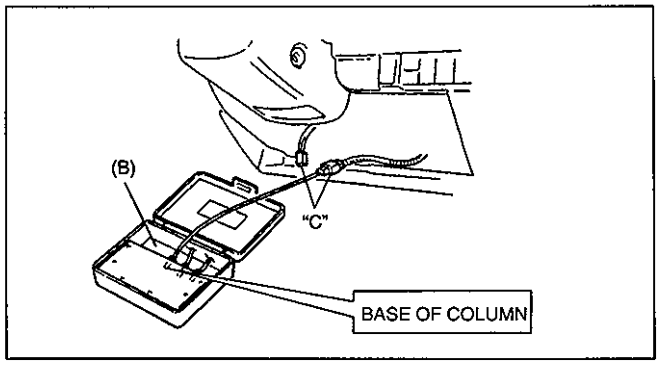


Fig. for STEP 2

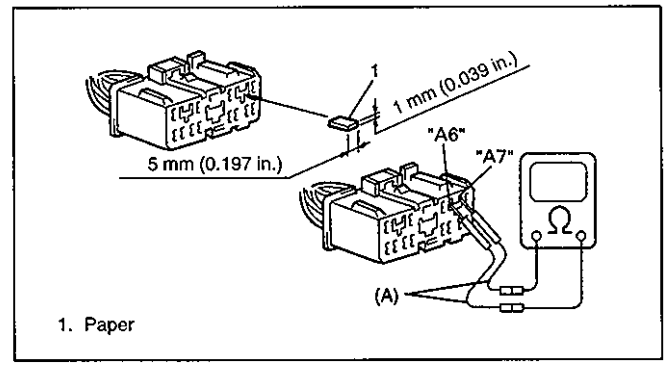
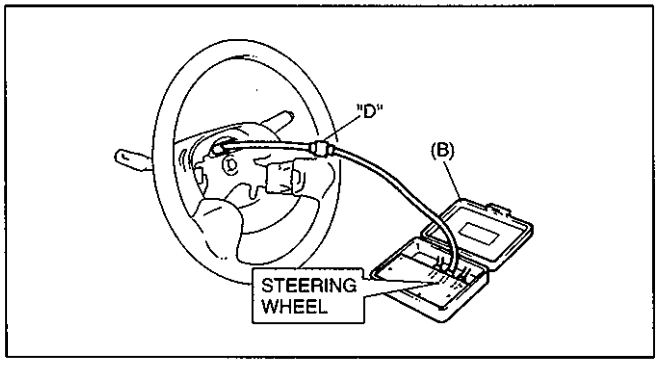


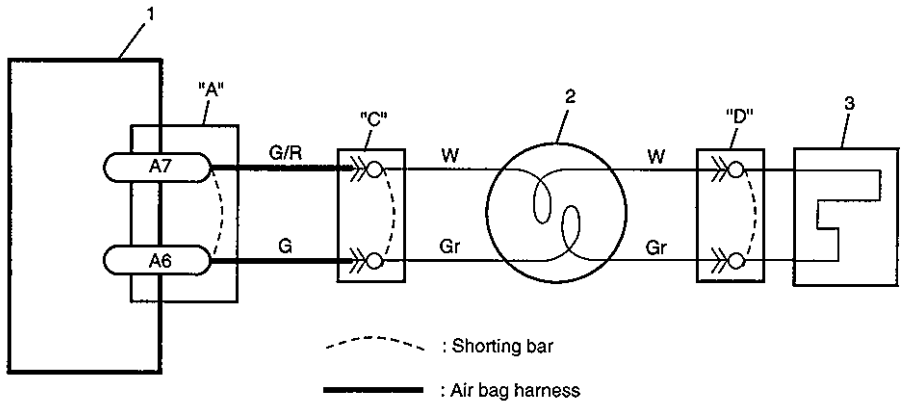
Fig. for STEP 3



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) With ignition switch ON, is DTC 22 current?	Go to step 2.	Go to step 3 on the next page.
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). 5) Is resistance 1.7 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from "G" wire circuit to "G/R" wire circuit or from "G" or "G/R" wire circuit to other wire circuit.

CODE 22 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 2 of 2)

STEP	ACTION	YES	NO
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 2). 5) 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

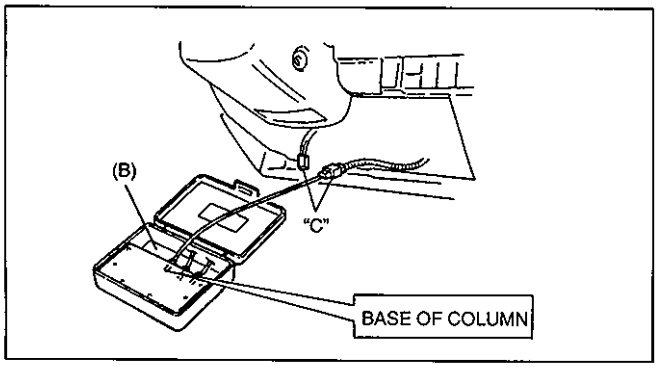


Fig. for STEP 2

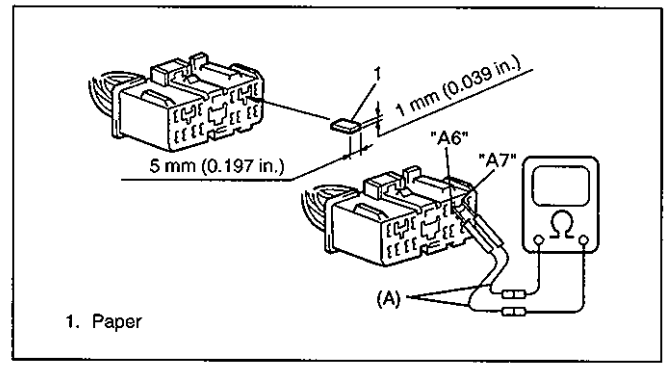
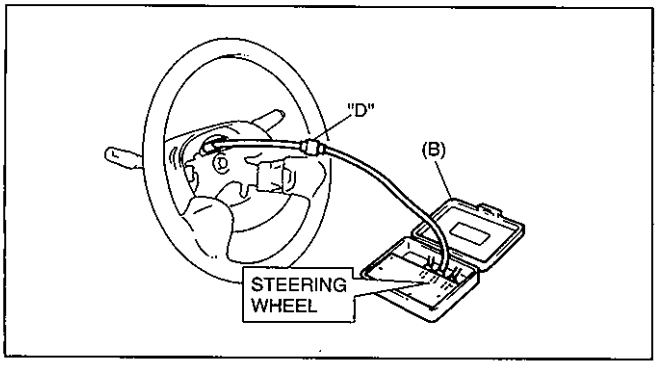


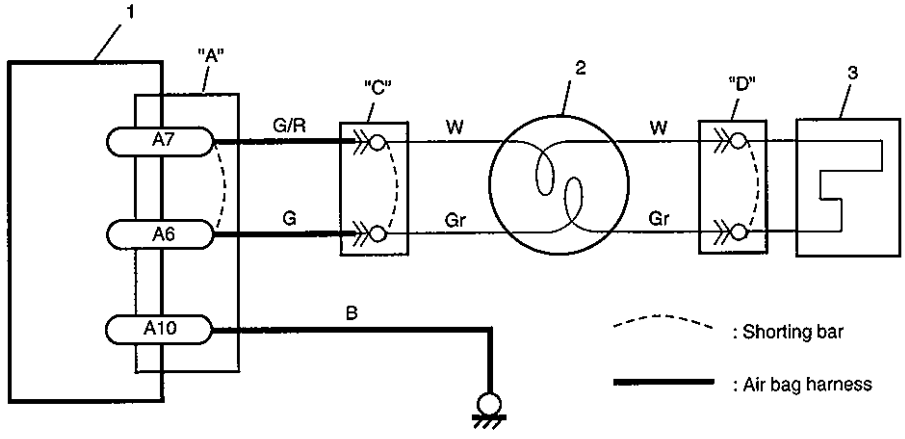
Fig. for STEP 3



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) With ignition switch ON, is DTC 24 current?	Go to step 2.	Go to step 3 on the next page.
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure resistance between "A6" and "A10" terminals. 3) Is resistance 1 kΩ or more?	Substitute a known-good SDM and recheck.	Repair short from "G" or "G/R" wire circuit to ground.

CODE 24 –DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 2 of 2)

STEP	ACTION	YES	NO
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 2). 5) 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

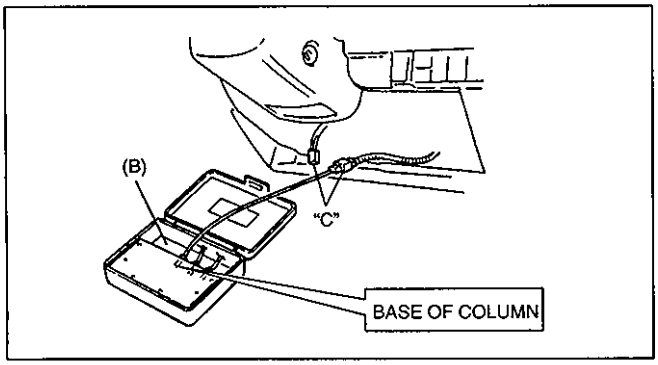


Fig. for STEP 2

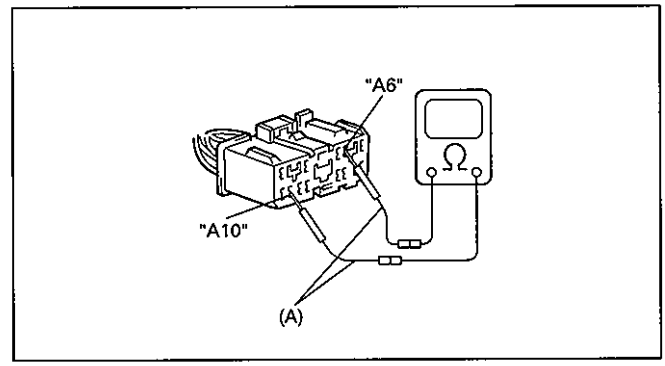
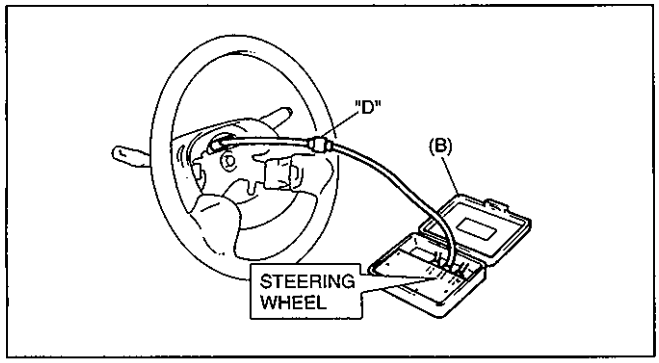


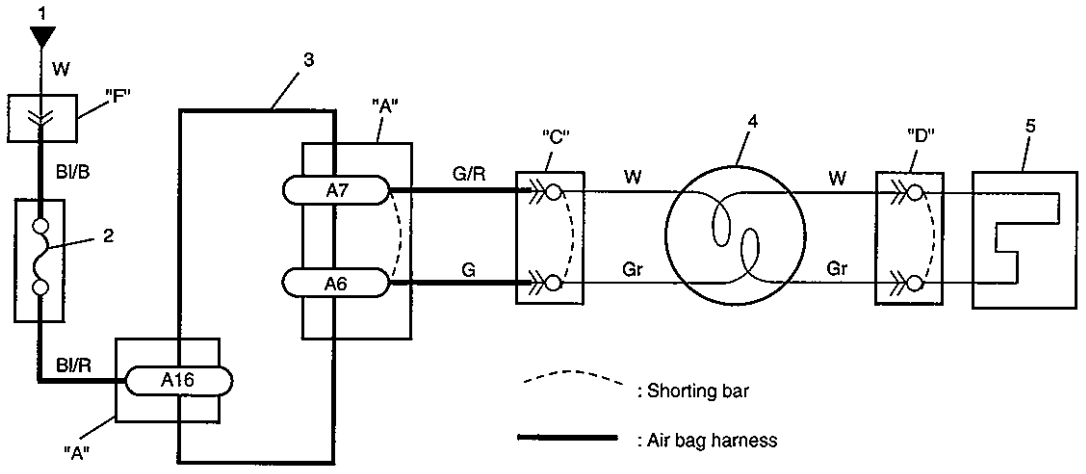
Fig. for STEP 3



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 "AIR BAG" fuse box
3. SDM
4. Contact coil assembly
5. Driver air bag (inflator) module

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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). 4) With ignition switch ON, is DTC 25 current?	Go to step 2.	Go to step 3 on the next page.
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure voltage from "A7" terminal to body ground. 3) With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	Repair short from "G" or "G/R" wire circuit to power circuit.

CODE 25 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 2 of 2)

STEP	ACTION	YES	NO
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 2). 5) 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

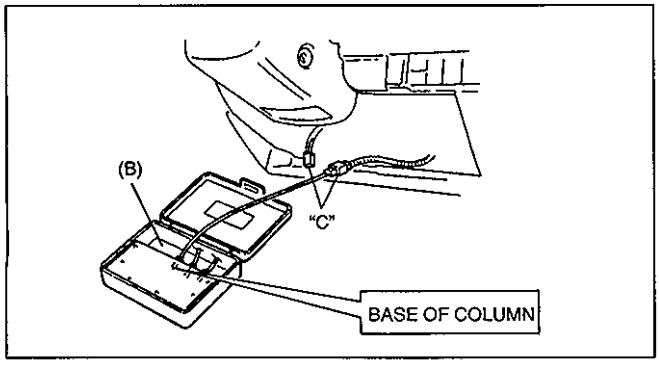


Fig. for STEP 2

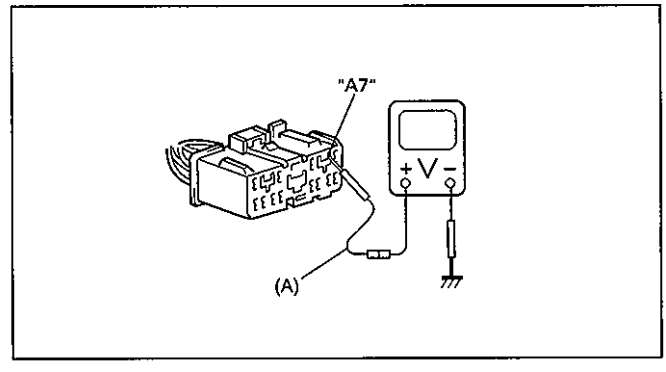
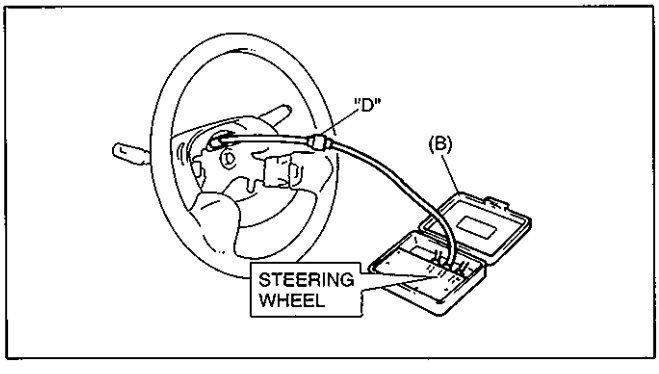


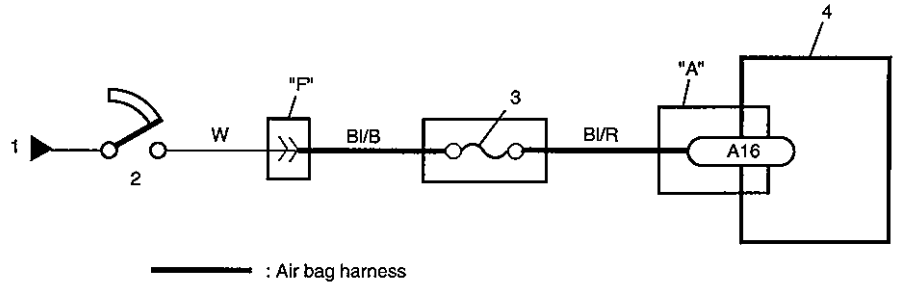
Fig. for STEP 3



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 "AIR BAG" fuse box
4. SDM

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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:

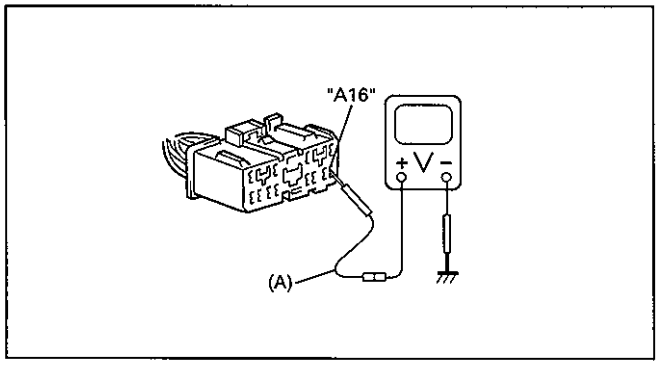
The power source voltage to SDM is above specified value for specified time.

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. 4) Is voltage 14 V or less?	Go to step 2.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Changing System")
2	1) With ignition switch OFF, reconnect SDM 2) With ignition switch ON, is DTC 31 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Changing System")

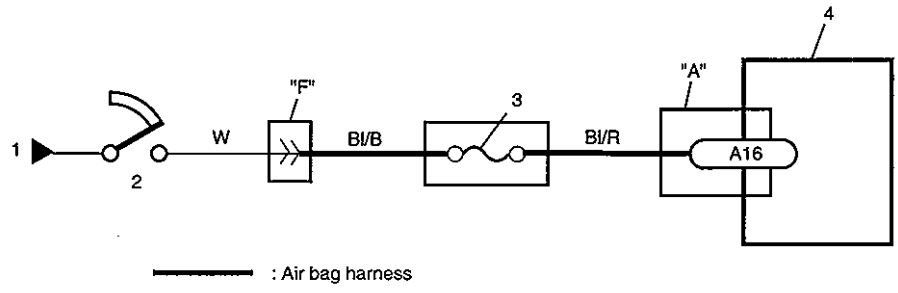
Fig. for STEP 1



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 "AIR BAG" fuse box
4. SDM

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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:

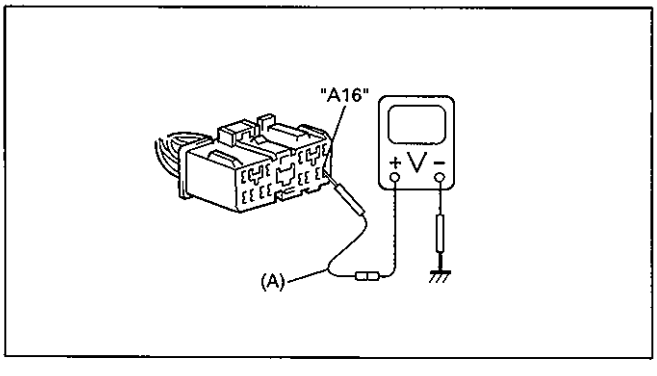
The power source voltage is below an approx. 8 V for specified time.

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	1) Measure voltage on battery. 2) Is voltage 11 V or more?	Go to step 2.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Changing System")
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. 4) 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) in air bag harness. 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 main harness to body ground. 4) Is voltage 8 V or more?	Repair poor connection, high resistance in "BI/R" or "BI/B" circuit of air bag harness or "AIR BAG" fuse.	Possibly faulty points are as follows. Check each of them and repair as necessary. ● Circuit from battery to "F" connector ● Charging System (Refer to SECTION 6H "Changing System")
4	1) With ignition switch OFF, reconnect SDM 2) With ignition switch ON, is DTC 32 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Changing System")

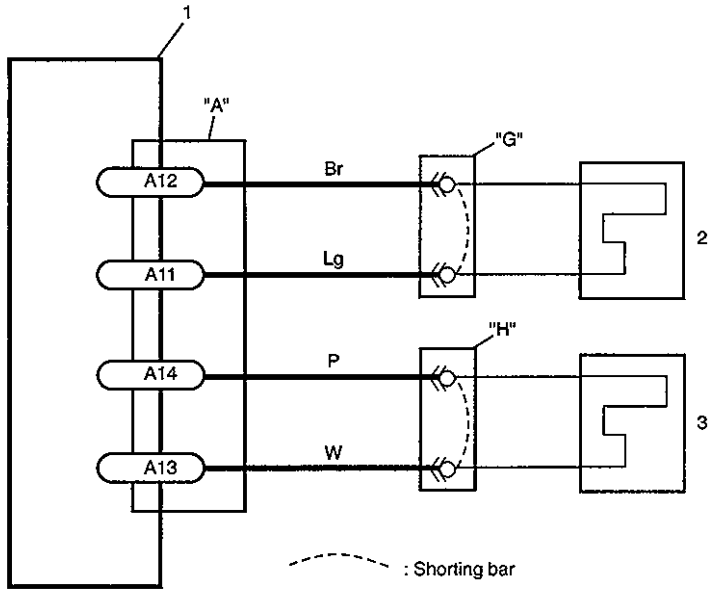
Fig. for STEP 2



Special Tool
(A): 09932-76010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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)



1. SDM
2. Passenger seat belt pretensioner
3. Driver seat belt pretensioner

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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 front pillar lower trim 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). 4) With ignition switch ON, is DTC 41 or 45 still current?	Go to step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
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). 4) Is resistance 2.9 Ω or less?	Substitute a known-good SDM and recheck.	**DTC41:** Repair high resistance or open in "P" or "W" wire circuit. **DTC45:** Repair high resistance or open in "Lg" or "Br" wire circuit.

Fig. for STEP 1 and 2

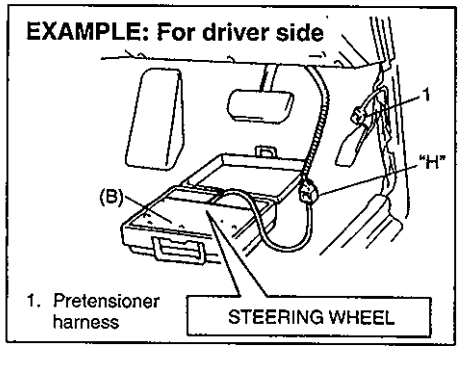
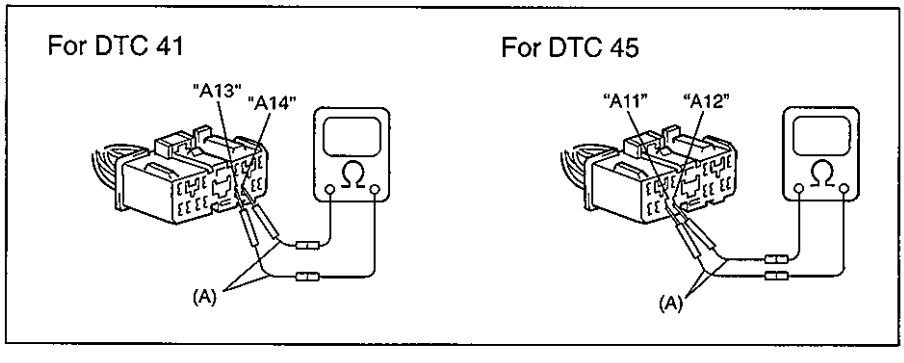


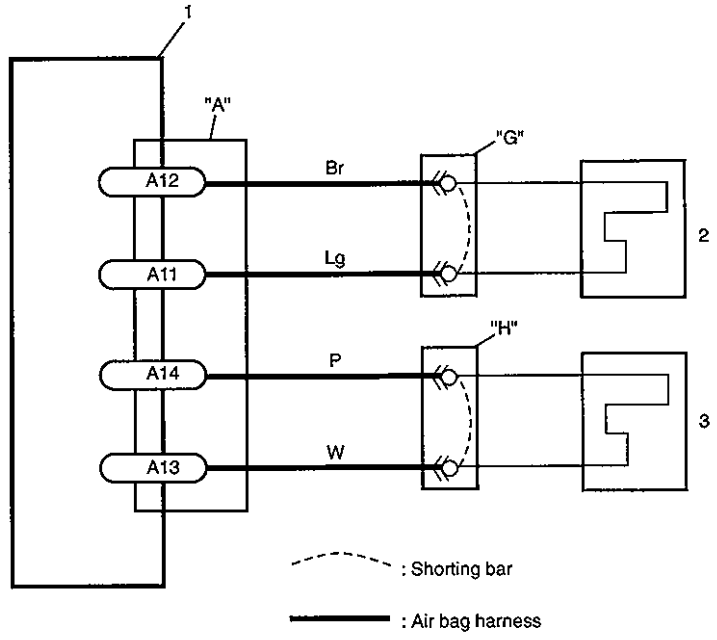
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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)



1. SDM
2. Passenger seat belt pretensioner
3. Driver seat belt pretensioner

CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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 front pillar lower trim 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). 4) With ignition switch ON, is DTC 42 or 46 still current?	Go to step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
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). 4) Is resistance 1.7 Ω or more?	Substitute a known-good SDM and recheck.	**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

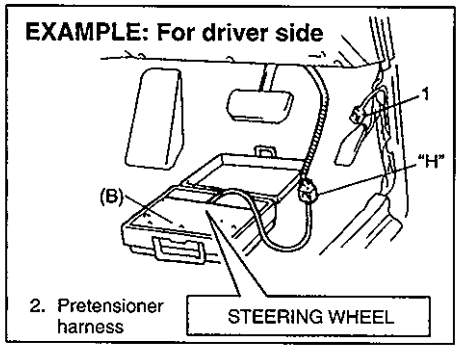
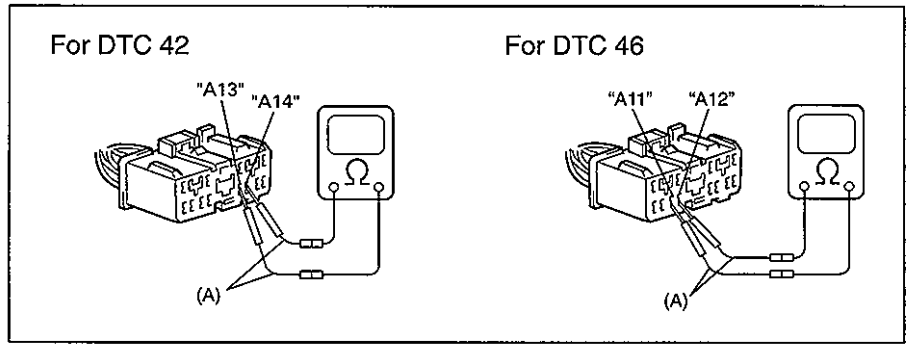


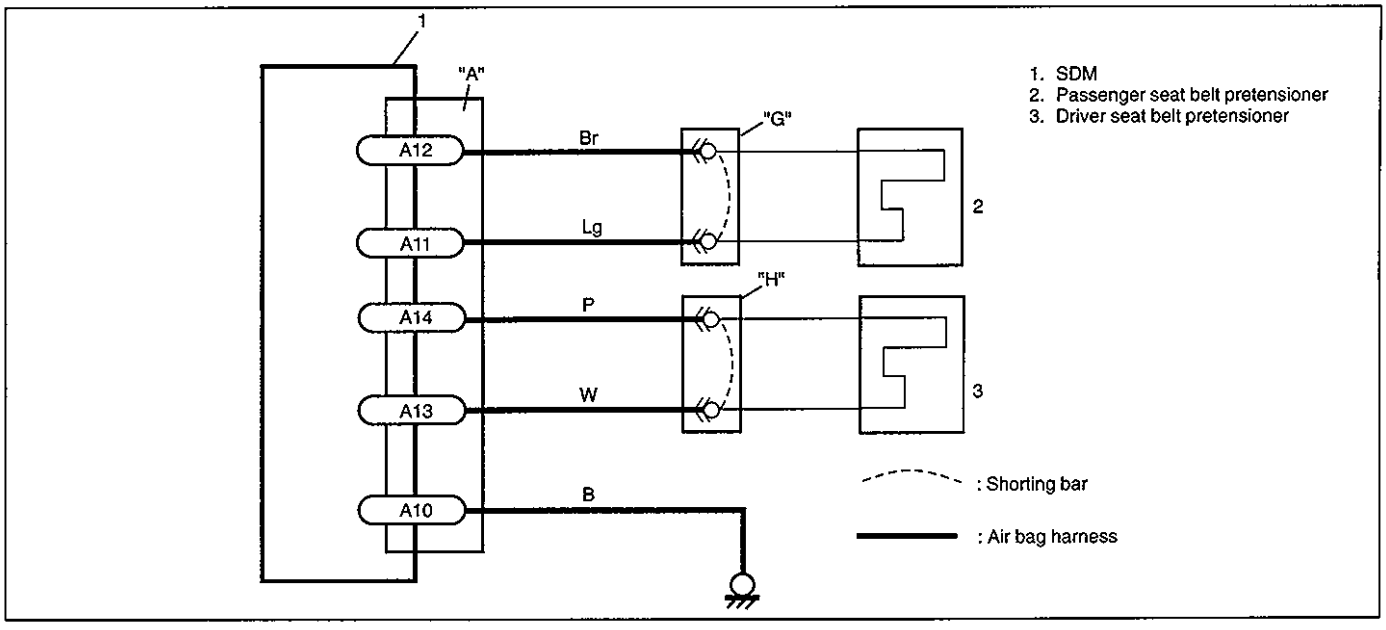
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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 front pillar lower trim 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). 4) With ignition switch ON, is DTC 43 or 47 still current?	Go to step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure resistance between "A13" or "A11" and "A10" terminals. 3) Is resistance 1 kΩ or more?	Substitute a known-good SDM and recheck.	**DTC43:** Repair short "P" or "W" wire circuit to ground. **DTC47:** Repair short from "Lg" or "Br" wire circuit to ground.

Fig. for STEP 1 and 2

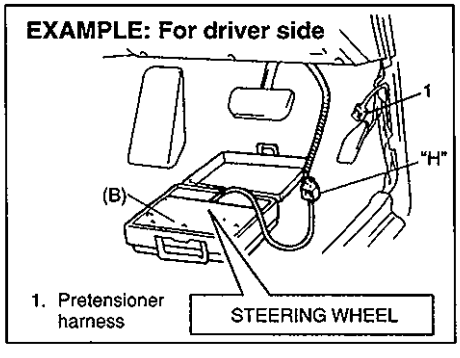
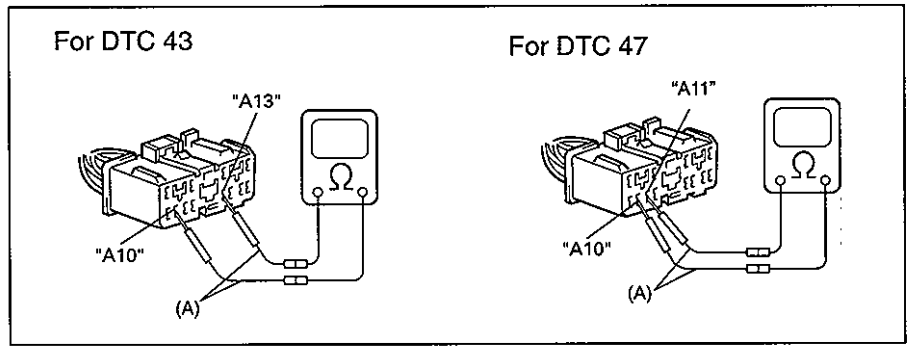


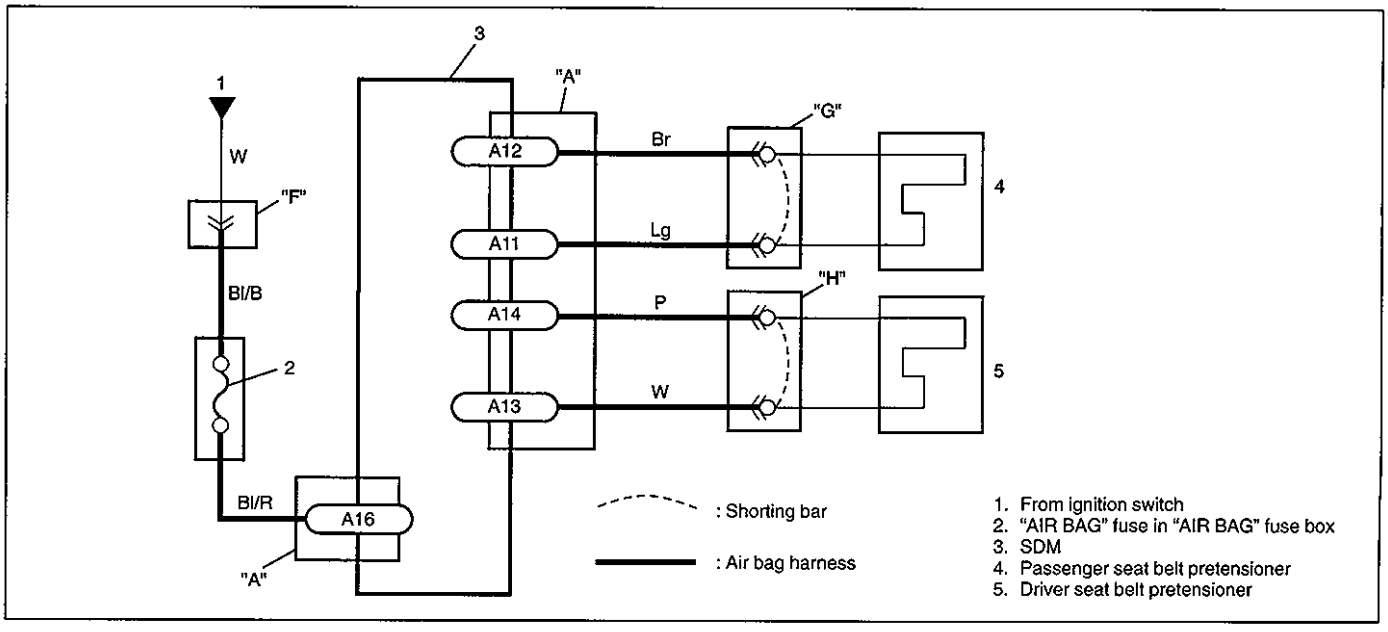
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 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)



CAUTION:
- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

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 front pillar lower trim 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). 4) With ignition switch ON, is DTC 44 or 48 still current?	Go to step 2.	1) Ignition switch OFF. 2) Replace seat belt pretensioner (Refer to SECTION 10A).
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure voltage from "A14" or "A12" terminal to body ground. 3) With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	**DTC44:** Repair short "P" or "W" wire circuit to power circuit. **DTC48:** Repair short from "Lg" or "Br" wire circuit to power circuit.

Fig. for STEP 1 and 2

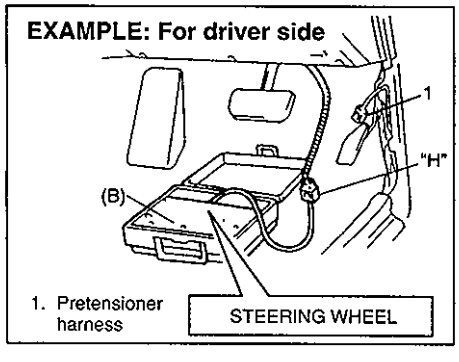
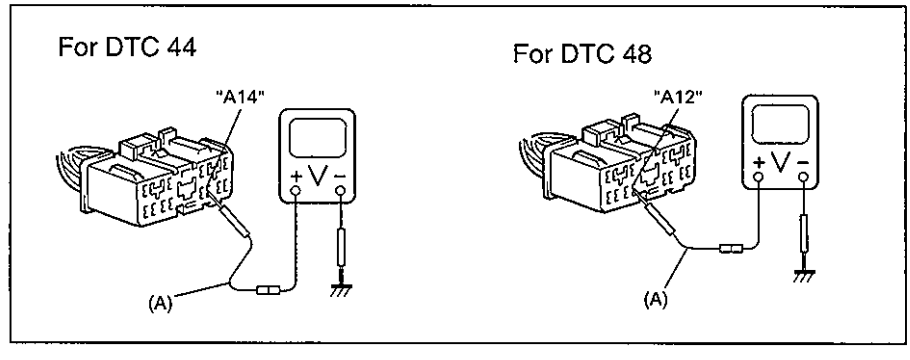


Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
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", referring to p.10B-11 to confirm that the trouble has been corrected.

CODE 51 – FRONTAL CRASH DETECTED (SYSTEM ACTIVATION COMMAND IS 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.)

NOTE:

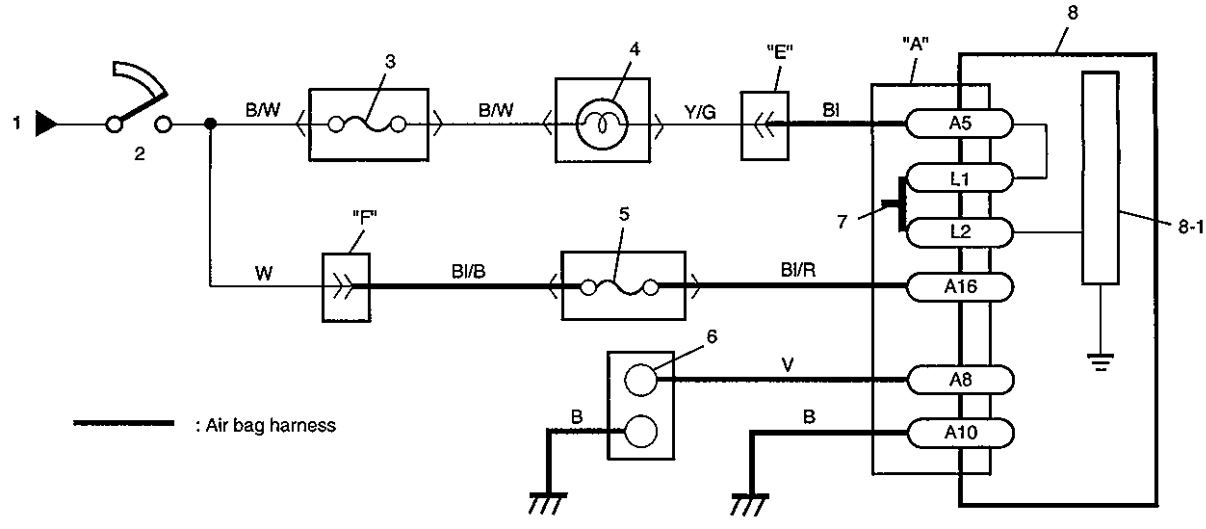
Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) Ignition switch OFF. 2) Has air bag system deployed?	Replace components and perform inspections as directed in "Repairs and Inspections Required after an Accident" in this section.	Go to step 2.
2	1) Inspect front of vehicle and undercarriage for signs of impact. 2) Are there signs of impact?	Replace components and perform inspections as directed in "Repairs and Inspections Required after an Accident" in this section.	Substitute a known-good SDM and recheck.

NOTE:

- **CODE 51 can never be cleared once it has been set.**
- **Upon completion of inspection and repair work, perform following items.**
  1) **Replace SDM.**
  2) **Reconnect all air bag system components, ensure all components are properly mounted.**
  3) **Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B-11 to confirm that the trouble has been corrected.**

CODE 61 – "AIR BAG" WARNING LAMP CIRCUIT FAILURE (Page 1 of 2)



1. From main fuse
2. Ignition switch
3. "IG·COIL METER" fuse in J/B
4. "AIR BAG" warning lamp in combination meter
5. "AIR BAG" fuse in "AIR BAG" fuse box
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 chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **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.

CODE 61 – "AIR BAG" WARNING LAMP CIRCUIT FAILURE (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "Air Bag Diagnostic System Check Flow Table".

STEP	ACTION	YES	NO
1	1) This DTC is set when there is a trouble in "AIR BAG" warning lamp circuit. Failure to properly perform "Air Bag Diagnostic System Check Flow Table" may also result in misdiagnosis. Therefore, check "AIR BAG" warning lamp circuit again according to "Air Bag Diagnostic System Check Flow Table". 2) Is "AIR BAG" warning lamp circuit in good condition?	Go to step 2.	Repair "AIR BAG" warning lamp circuit.
2	1) Clear diagnostic trouble codes. 2) 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 following items.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Repeat "Air Bag Diagnostic System Check Flow Table", referring to p. 10B-11 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:
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", referring to p.10B-11.

ON-VEHICLE SERVICE

SERVICE PRECAUTIONS

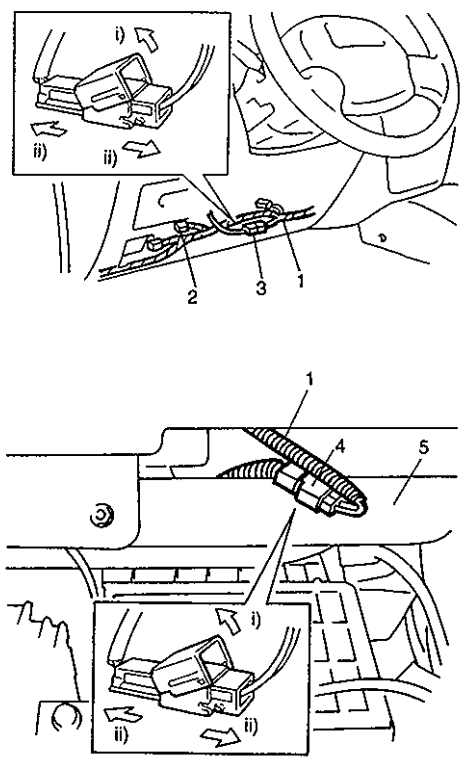
SERVICE AND DIAGNOSIS

WARNING/CAUTION labels are attached on each part of air bag system components (SDM, air bag (inflator) modules and seat belt pretensioners). 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 chart 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 (eg., dropped from a height of 90 cm (3 ft) 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.

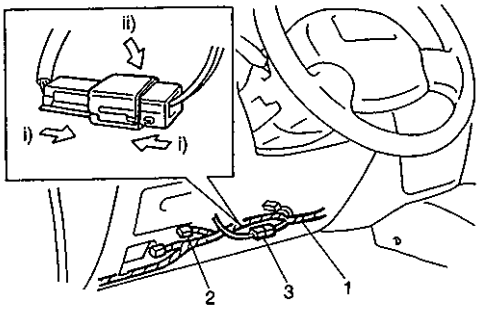


1. Air bag harness
2. "AIR BAG" monitor coupler
3. Yellow connector of contact coil and combination switch assembly
4. Yellow connector of passenger air bag (inflator) module
5. Steering support member

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 "AIR BAG" fuse box.
4) Disconnect Yellow connector of contact coil and combination switch assembly.
   i) Release locking of lock lever.
   ii) After unlocked, disconnect to connector.
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.
   i) Release locking of lock lever.
   ii) After unlocked, disconnect to connector.

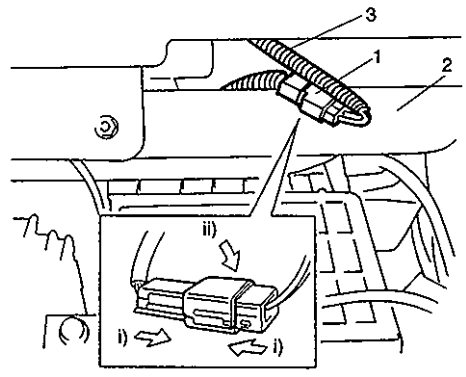
NOTE:
With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.
This is normal operation and does not indicate an air bag system malfunction.



1. Air bag harness
2. "AIR BAG" monitor coupler
3. Yellow connector of contact coil and combination switch assembly

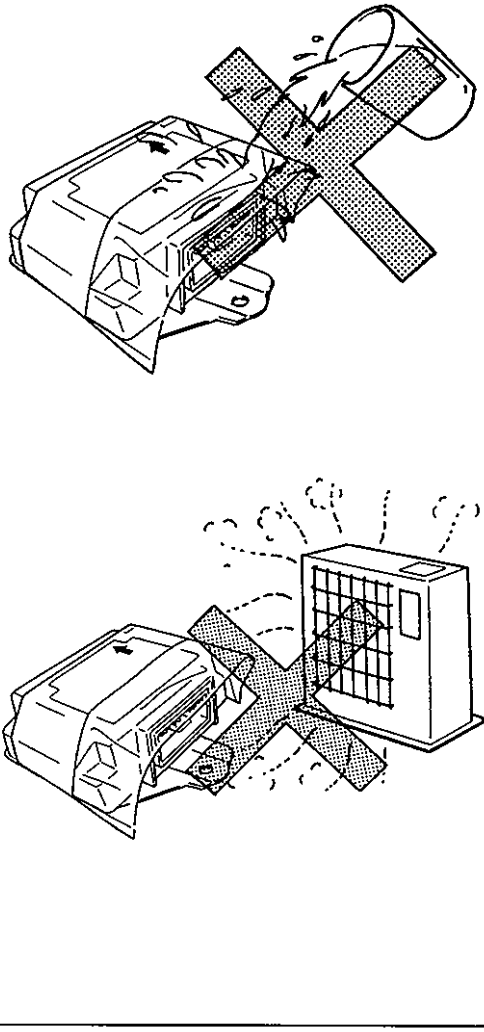
ENABLING AIR BAG SYSTEM

1) Turn ignition switch to "LOCK" and remove key.
2) Connect Yellow connector of contact coil and combination switch assembly, and be sure to lock connector with lock lever.
   i) Connect connector.
   ii) Lock connector with lock lever.



1. Yellow connector of passenger air bag (inflator) module
2. Steering support member
3. Air bag harness

3) Connect Yellow connector of passenger air bag (inflator) module, and be sure to lock connector with lock lever.
   i) Connect connector.
   ii) Lock connector with lock lever.
4) Install glove box.
5) Install "AIR BAG" fuse to "AIR BAG" fuse box.
6) 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 this section.



HANDLING AND STORAGE

SDM

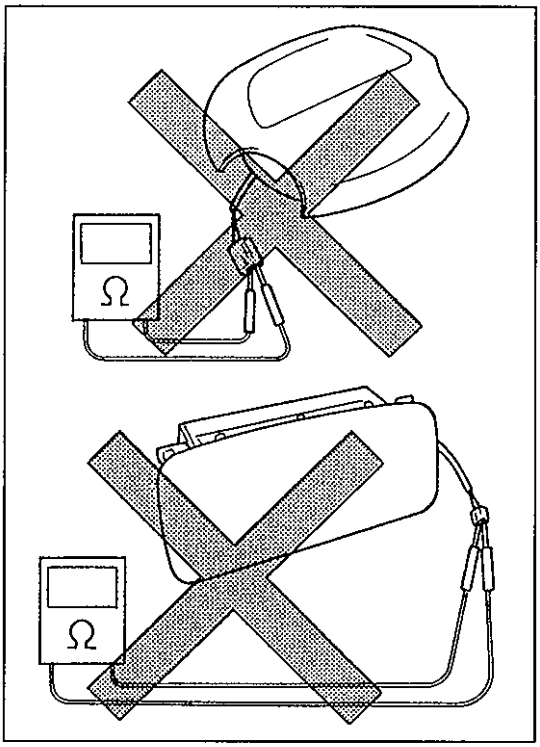
WARNING:
Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

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 disassembly of 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 90 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

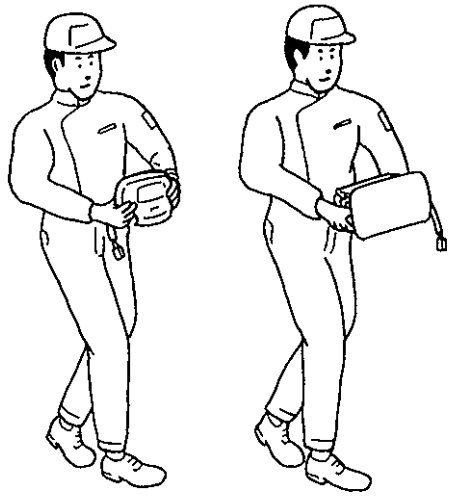
Special care is necessary when handling and storing a live (undeployed) air bag (inflator) modules.
The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the 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 disassembly of 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 90 cm (3 ft) or more, it should be replaced with a new one as an assembly.

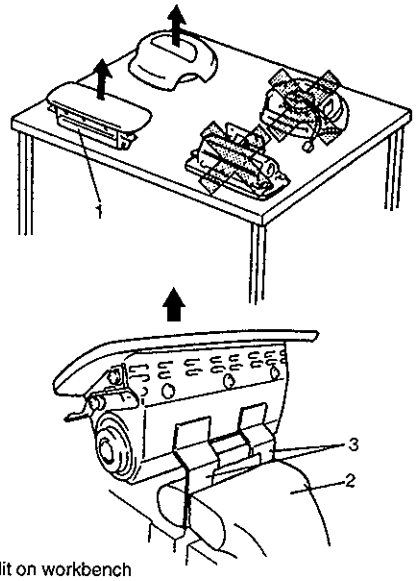
ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



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.**

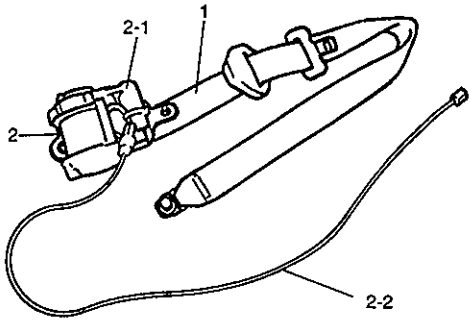
Otherwise, personal injury may result.

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

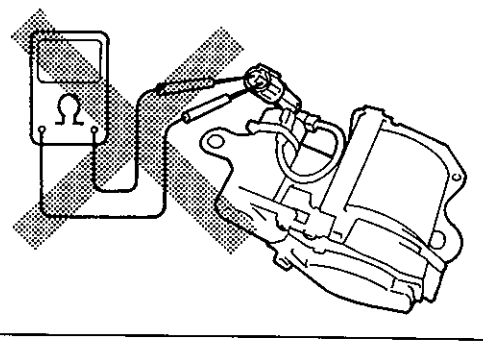
WARNING:
When placing a live air bag (inflator) module on bench or other surface, always face the bag up, away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold 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. Webbing
2. Retractor assembly
2-1. Seat belt pretensioner
2-2. Seat belt pretensioner harness

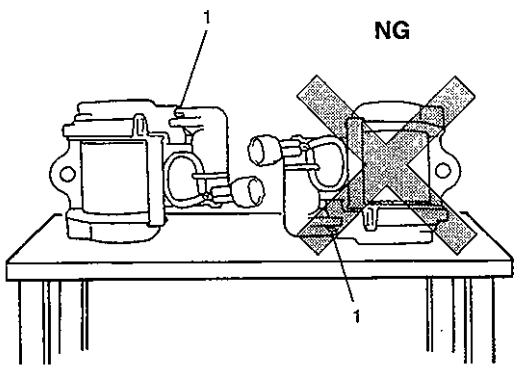
LIVE (INACTIVATED) SEAT BELT PRETENSIONERS

Special care is necessary when handling and storing a 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 30 cm (1 ft) or more, it should be replaced with a new one as an assembly.



1. Exhaust hole

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 the workbench or some place like that, be sure not to lay it with its exhaust hole provided side facing down. It is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another.**

Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULES

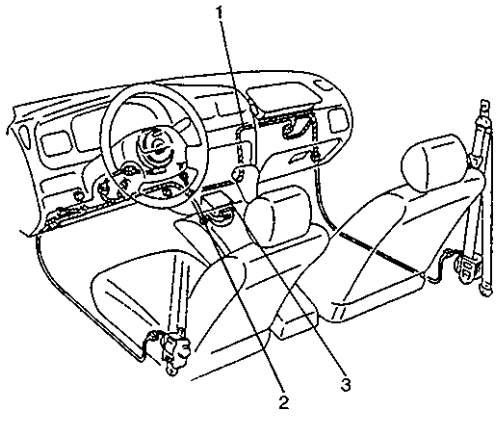
WARNING:
- **The air bag (inflator) module immediately after deployment is very hot. Wait for at least 30 minutes to cool it off before proceeding the work.**
- **Do not apply water, oil, etc. to deployed air bag (inflator) module.**
- **After an air bag (inflator) module has been deployed, the surface 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

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. 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

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".

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.

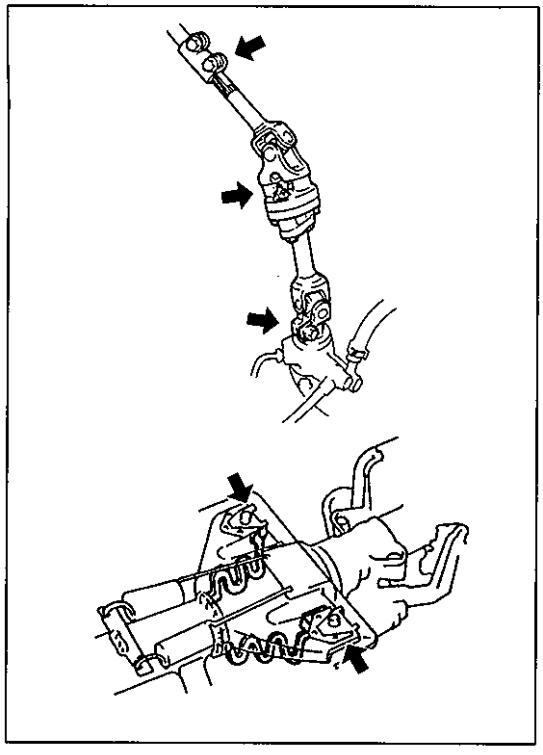
REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT

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**
  - **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
  – Replace with new one as an assembly.
- SDM after detecting such collision as to meet deployment conditions
  – Replace with new one.

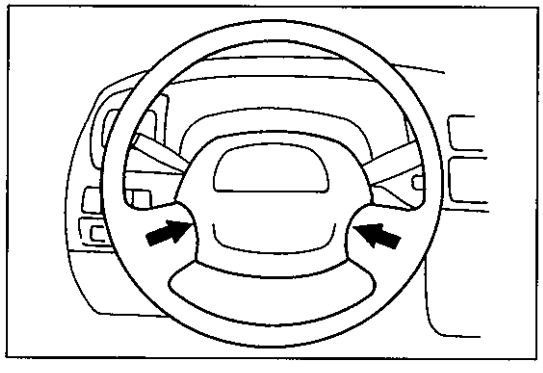


ACCIDENT WITH OR WITHOUT DEPLOYMENT – COMPONENT INSPECTIONS

Certain air bag and restraint system components must be inspected after any crash, whether the air bag deployed or not.
Those components are:

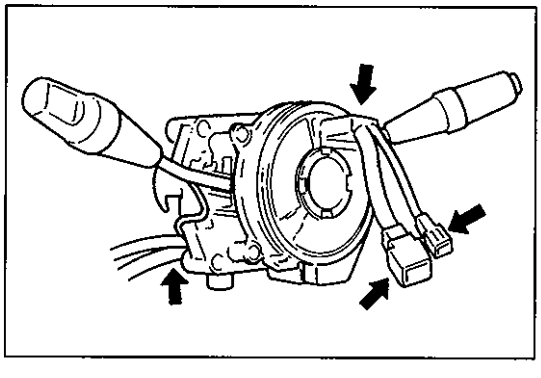
- Steering column and shaft joints
  - Check for length, damage and bend according to "Checking Steering Column for Accident Damage" in SECTION 3C1.
- Steering column bracket and capsules
  - Check for damage and bent.

  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.

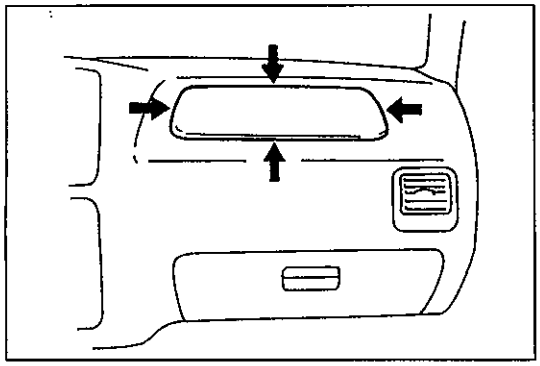


- Contact coil and combination switch assembly
  - Check wire harness and connectors for damage or tightness.
  - Check contact coil case for damage.

  If any faulty condition is found in above checks, replace.

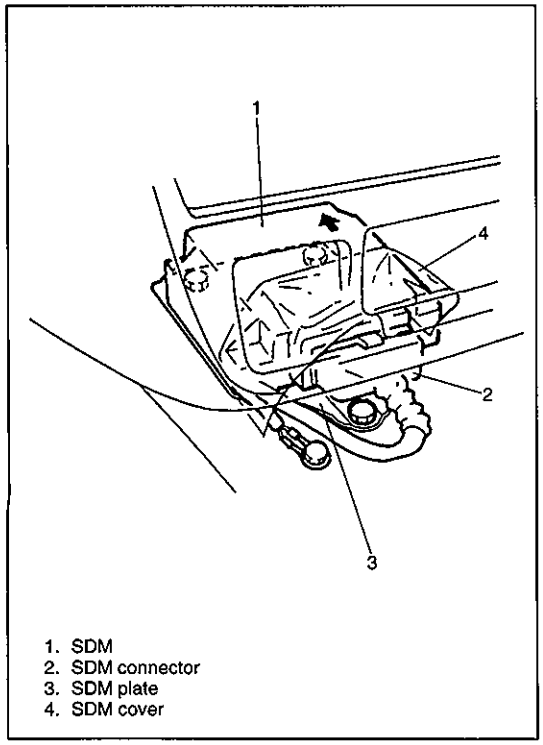
- Instrument panel member and reinforcement
  - Check for any distortion, bending, cracking or other damage.

  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.

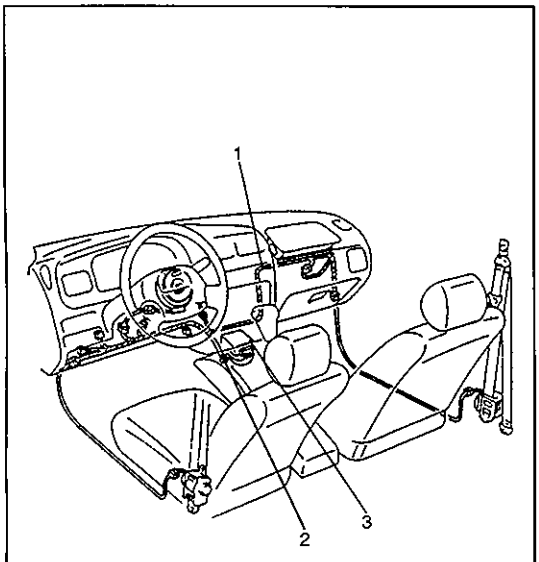
  If any faulty condition is found in above checks, replace.



1. SDM
2. SDM connector
3. SDM plate
4. SDM cover

- 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 and the diagnostic table leads to a malfunctioning SDM.

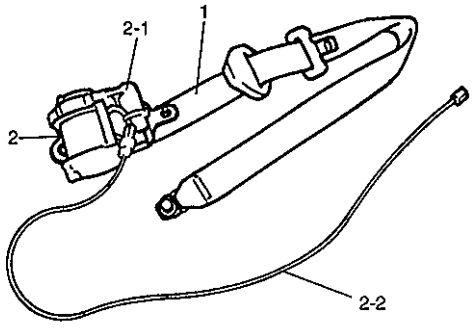
  If any faulty condition is found in above checks, replace.



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 Connections" in this section.)
  - Check wire harness clamps for tightness.

  If any faulty condition is found, correct or replace.



1. Webbing
2. Retractor assembly
2-1. Seat belt pretensioner
2-2. Seat belt pretensioner harness

- Seat belt pretensioner
  - 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 SECTION 10A.
- "AIR BAG" warning lamp (air bag system)
  - After vehicle is completely repaired, perform "Air Bag Diagnostic System Check" under "Diagnosis" in this section.

DRIVER AIR BAG (INFLATOR) MODULE

Refer to SECTION 3C1 for removal, inspection and installation.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

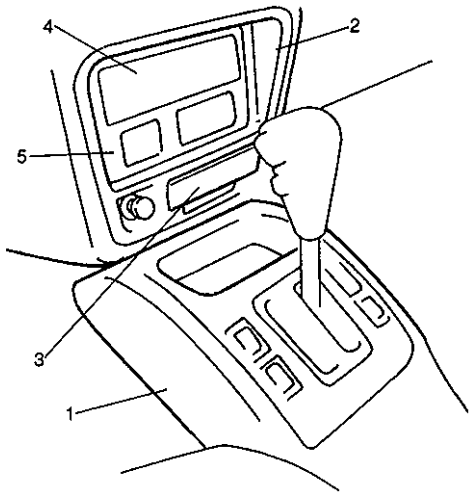
Refer to SECTION 3C1 for removal, inspection and installation.

SEAT BELT PRETENSIONER

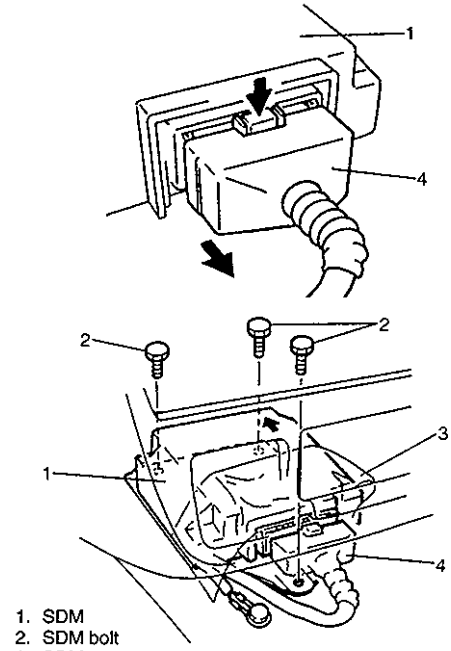
Refer to SECTION 10A for removal, inspection and installation.

"AIR BAG" WARNING LAMP

Refer to SECTION 8C for removal and installation of combination meter.



1. Front center console box
2. Center garnish panel
3. Ashtray
4. Radio hole cover
5. Clock ass'y



1. SDM
2. SDM bolt
3. SDM cover
4. SDM connector

SDM

WARNING:
During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).
Be sure to read "Service 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" earlier in this section.
3) Remove rear and front center console box by removing screw and clips.
4) Remove center garnish panel.
5) Remove ashtray and tuner ass'y, clock ass'y, tuner pocket, radio hole cover, etc.
6) Disconnect SDM connector from SDM.
7) Remove SDM (with SDM plate) as an assembly from vehicle.

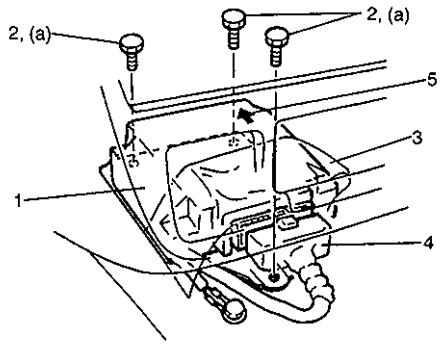
NOTE:
Do not separate SDM and SDM plate.

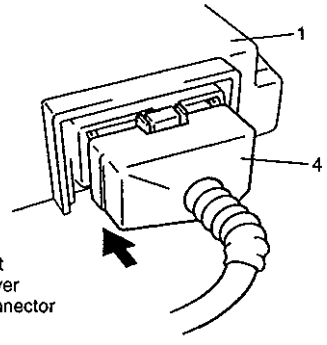
INSPECTION

CAUTION:
- **Do not connect a tester whatever type it may be.**
- **Never repair or disassemble SDM.**
- **If SDM was dropped from a height of 90 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 cover
4. SDM connector
5. Arrow

INSTALLATION

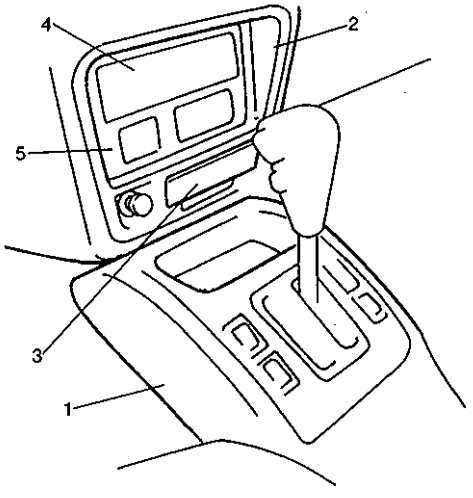
1) Check that none of following faulty conditions exists.
   - Bend, scratch, deformity in vehicle body mounted on SDM
   - Foreign matter or rust on mating surface of vehicle body mounted on SDM
2) Install SDM (with SDM plate) to vehicle.

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): 6.0 N·m (0.6 kg-m, 4.5 lb-ft)

4) Connect SDM connector to SDM securely.

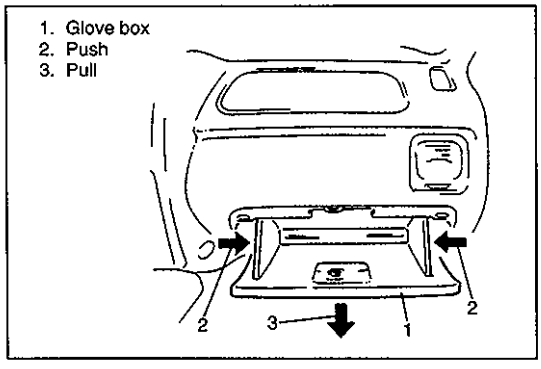


1. Front center console box
2. Center garnish panel
3. Ashtray
4. Radio hole cover
5. Clock ass'y

5) Install tuner ass'y, clock ass'y, tuner pocket, radio hole cover, etc. and ashtray.
6) Install center garnish panel.
7) Install front and rear center console box.
8) Connect negative cable to battery.
9) Enable air bag system. Refer to "Enabling Air Bag System" earlier in this section.

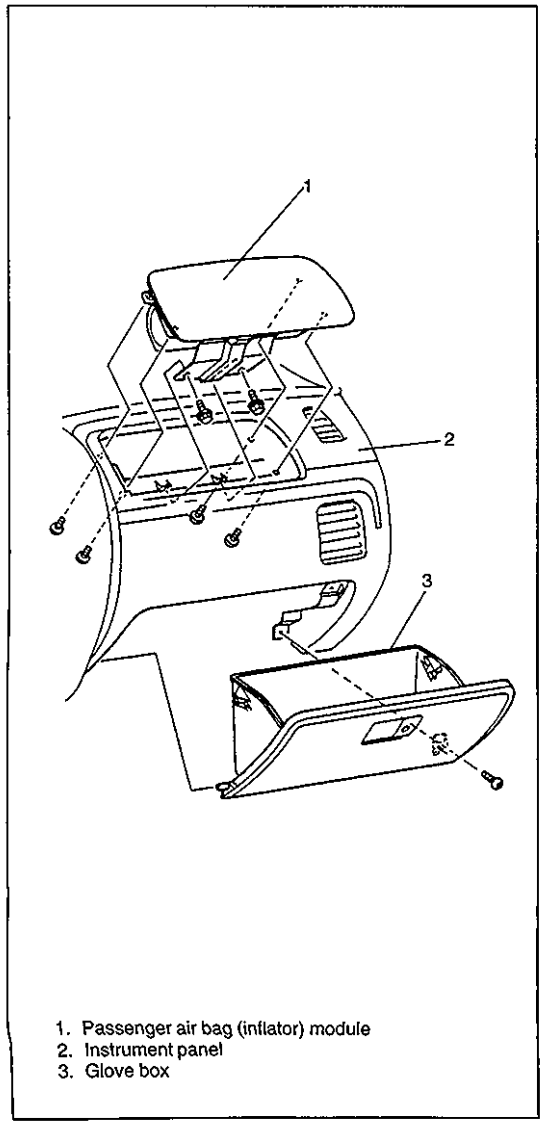
PASSENGER AIR BAG (INFLATOR) MODULE

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" 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.**



REMOVAL

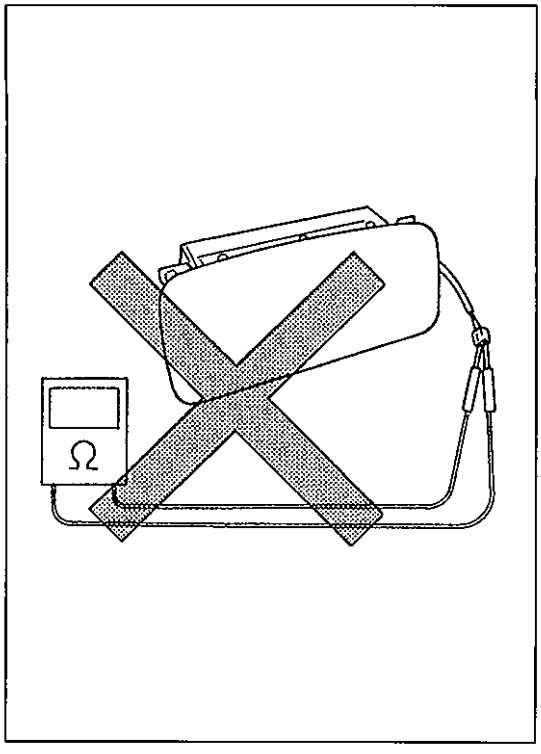
1) Disconnect negative battery cable from battery.
2) Disable air bag system. Refer to "Disabling Air Bag System" earlier in this section.
3) Open glove box, then while pressing glove box stopper, pull out glove box from instrument panel.



4) Remove glove box from instrument panel.
5) 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 "Service Precautions" earlier in this section for handling and storing it.**

Otherwise personal injury may result.



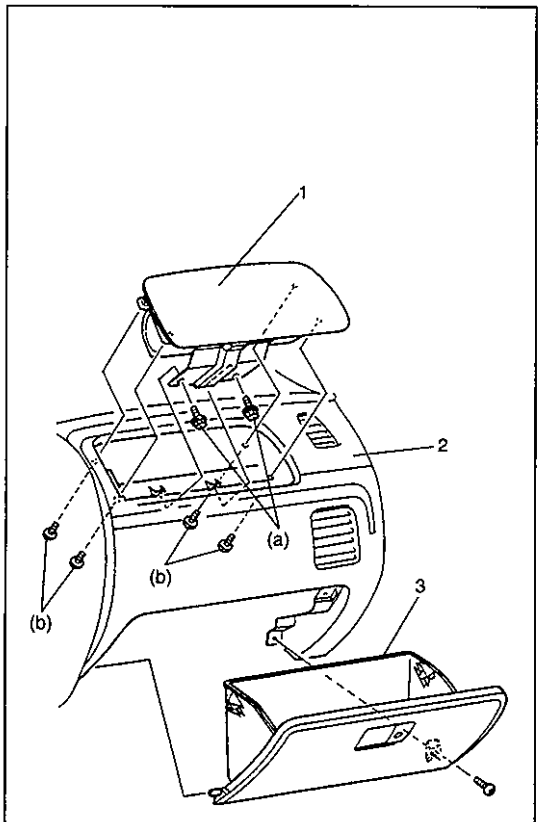
INSPECTION

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 or 90 cm (3 ft) or more, it should be replaced.

Check air bag (inflator) module appearance visually for 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
3. Glove box

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" earlier in this section.

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) module must not be disposed of through normal refuse channels.
The undeployed air bag (inflator) module contain substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

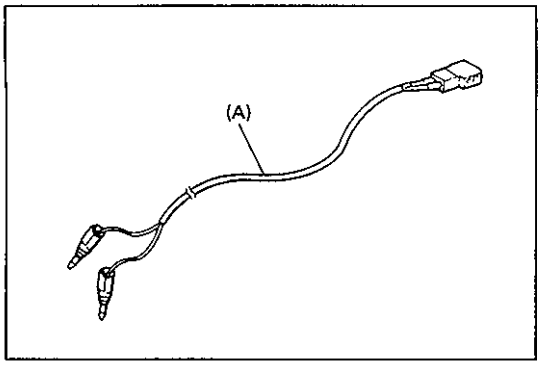
Do not dispose of the live (undeployed) air bag (inflator) modules.
The method employed depends upon the final disposition of the particular vehicle, as noted in "Deployment Outside Vehicle" and "Deployment Inside Vehicle" in this section.
Deployment Outside Vehicle ..... disposing of the air bag (inflator) 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).

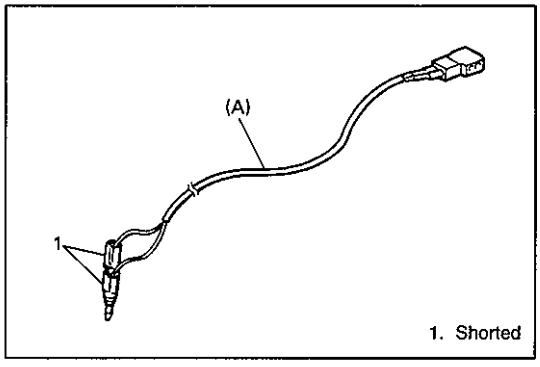
WARNING:
Following precautions must be observed for this work. Failure to observe any of them may result in personal injury.
- **To avoid an accidental deployment, this work should be performed by no more than one person.**
- **The procedure should be followed strictly as described here.**
- **Be sure to read "Service Precautions" in this section for the air bag (inflater) 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 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
(A): 09932-75030



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
(A): 09932-75030

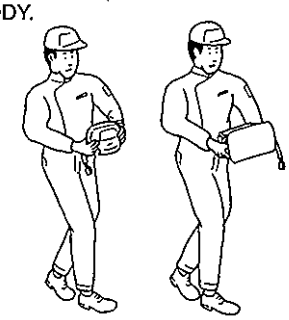
4) Remove driver or passenger air bag (inflator) module from vehicle, referring to SECTION 3C1 or 10B.

WARNING:
- **Always carry 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.

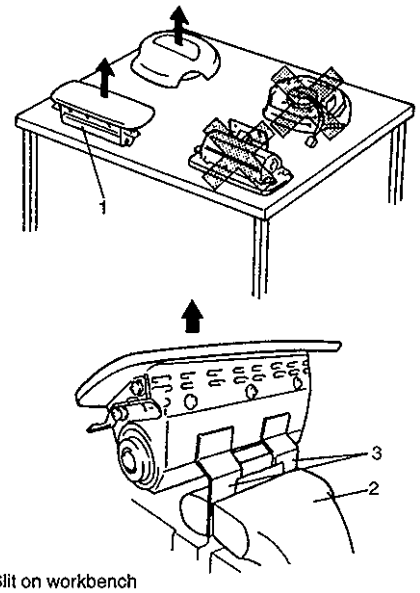
Failure to follow procedures may result in personal injury.

5) Temporarily place driver or passenger air bag (inflator) module on the workbench or the vise according to above WARNING.

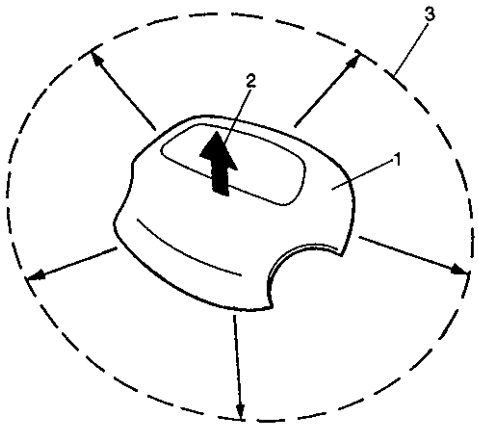
ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.

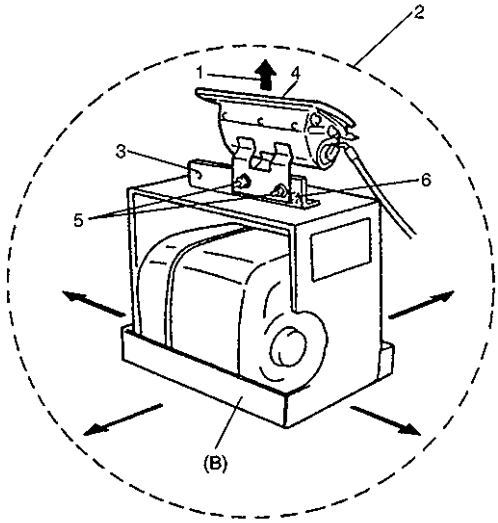


1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket



1. Driver air bag (inflator) module
2. Trim cover must face up
3. 185 cm (6 feet) of clearance

6) [In case of Driver Air Bag (Inflator) Module]
   i) 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.
   ii) 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
5. M8 bolt and nut
6. Hold-down bolt and nut

[In case of Passenger Air Bag (Inflator) Module]
   i) Clear a space on the ground about 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.
   ii) Place special tool (passenger air bag (inflator) module deployment fixture) on the ground in the space cleared in step i), if it has not already been placed there.
   Special Tool
   (B): 09932-75040

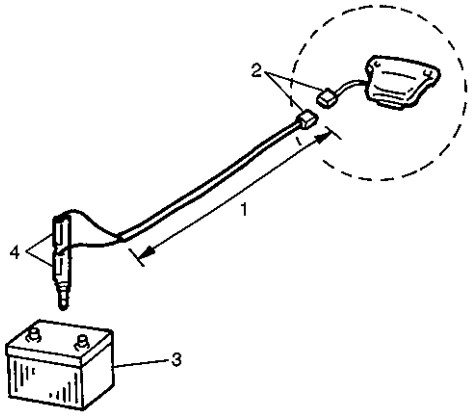
   iii) Fill plastic reservoir in fixture (special tool) with water or sand. This is necessary to provide sufficient stabilization of the fixture during deployment.
   iv) Securely attach the passenger air bag (inflator) module in the fixture (special tool) using mounting attachment, hold-down bolts and nuts and M8 bolts and nuts.

CAUTION:
Be sure to use the following bolt and nut for fixing passenger air bag (inflator) module to mounting attachment. Size: M8, Strength: 7T

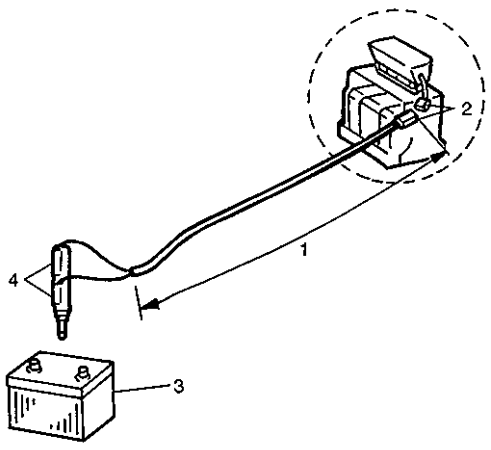
Passenger air bag (inflator) module must be mounted so that the bag will deploy upward. Securely tighten all fastener prior to deployment.

7) Stretch the deployment harness from the driver or passenger air bag (inflator) module to its full length 10 m (33 ft).
8) 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.
9) Verify that the area around the driver or passenger air bag (inflator) module is clear of all people and loose or flammable objects.
10) [In case of Driver Air Bag (Inflater) Module]
Verify that the driver air bag (inflator) module is resting with its vinyl trim cover facing up.
[In case of Passenger Air Bag (Inflator) Module]
Verify that the passenger air bag (inflator) module is firmly and properly secured in passenger air bag (inflator) module deployment fixture (special tool).

For Driver Air Bag (Inflator) Module



For Passenger Air Bag (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.

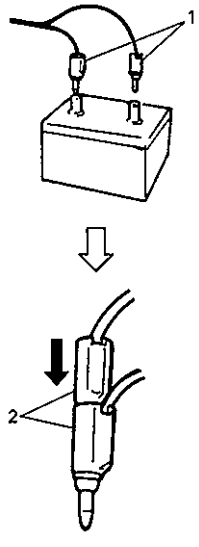
11) Connect the driver or passenger air bag (inflator) module to the deployment harness connector and lock connector with lock lever.
12) Notify all people in the immediate area that you intend to deploy the air bag (inflator) module.

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 (1 ft) 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:
- **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 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 it by using nonmetal material such as the air bag and vinyl trim.**

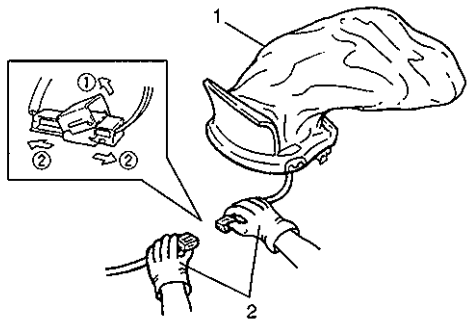
Failure to follow procedures may result in fire or personal injury.



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 to two deployment harness leads.

13) Separate the two banana plugs on the deployment harness.
14) Connect the deployment harness to the power source (12V vehicle battery) to immediately deploy the driver or passenger air bag.
15) 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.
16) In the unlikely event that the driver or passenger air bag (inflator) module did not deploy after following these procedures, proceed immediately with Steps 21) through 24). If the air bag (inflator) module did deploy, proceed with Steps 17) through 20).

For driver air bag (inflator) module

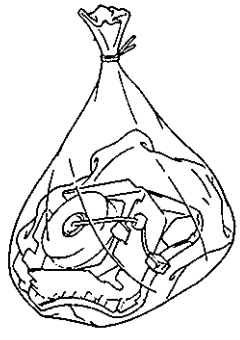


1. Deployed driver air bag (inflator) module
2. Gloves

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.

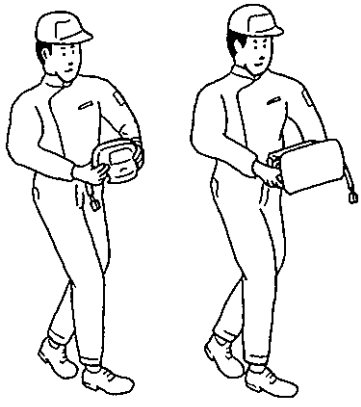


19) Dispose of the deployed air bag (inflator) module through normal refuse channels after it has cooled for at least 30 minutes and tightly seal the air bag (inflator) module in a strong vinyl bag. (Refer to "Deployed Air Bag (Inflator) Modules Disposal" in detail.)
20) Wash your hands with mild soap and water afterward.

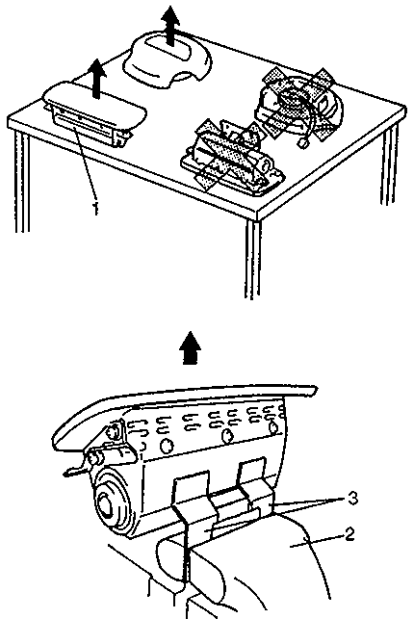
NOTE:
The remaining steps are to be followed in the unlikely event that the air bag (inflator) module did not deploy after following these procedures.

21) 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.
22) 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 or 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.

23) Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests. Refer to "Service Precautions" in this section for details.
24) Contact your local distributor for further assistance.

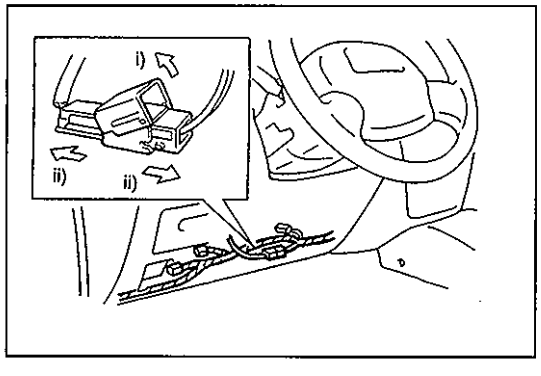
DEPLOYMENT INSIDE VEHICLE

Use this procedure when scrapping the entire vehicle including the driver and passenger air bag (inflator) modules.

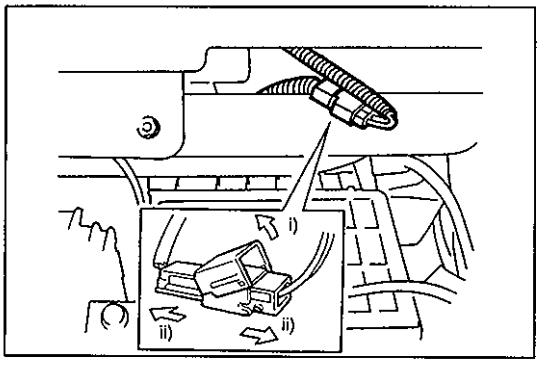
CAUTION:
When vehicle itself will be used again, deploy the air bag outside vehicle according to "Deployment Outside Vehicle", for deploying it inside will cause the instrument panel, glove box and their vicinity to be deformed.
Failure to observe this CAUTION may require unneeded vehicle inspection and repair.

WARNING:
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 "Service 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.

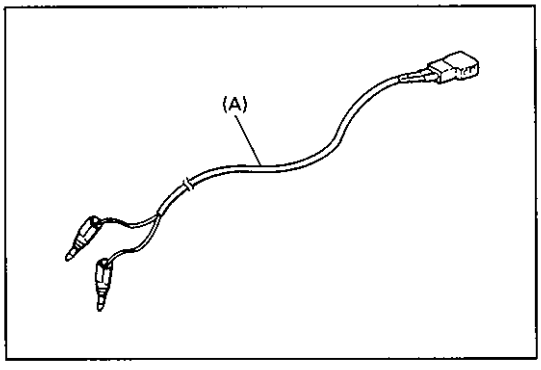


3) [For driver air bag (inflator) module]
Disconnect contact coil connector (Yellow connector) located near the base of the steering column.
i) Release locking of lock lever.
ii) After unlocked, disconnect to connector.



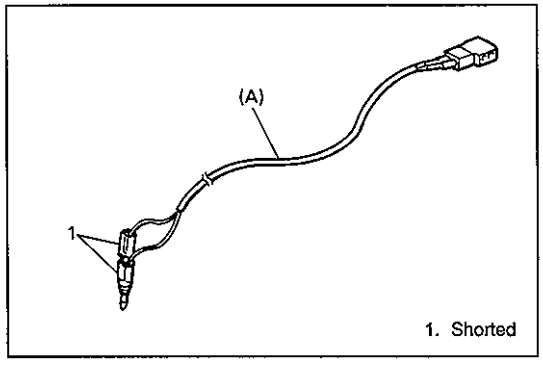
[For passenger air bag (inflator) module]
Remove glove box from instrument panel and disconnect passenger air bag (inflator) module connector (Yellow connector).
i) Release locking of lock lever.
ii) After unlocked, disconnect to connector.

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 condition is found, do not use it and be sure to use new deployment harness.

Special Tool
(A): 09932-75030



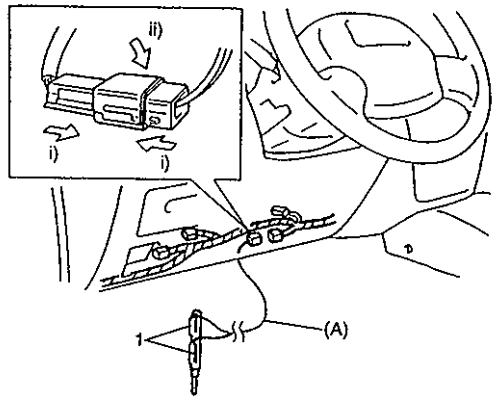
1. Shorted

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 air bag is to be deployed.

Special Tool
(A): 09932-75030

For driver air bag (inflator) module

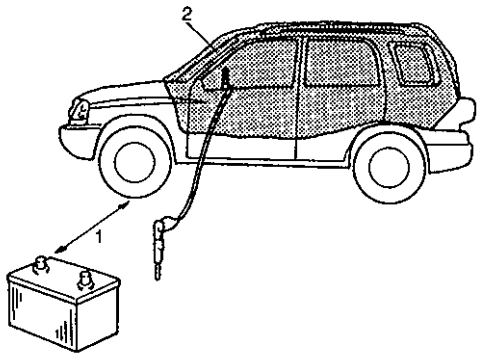


1. Short deployment harness leads.

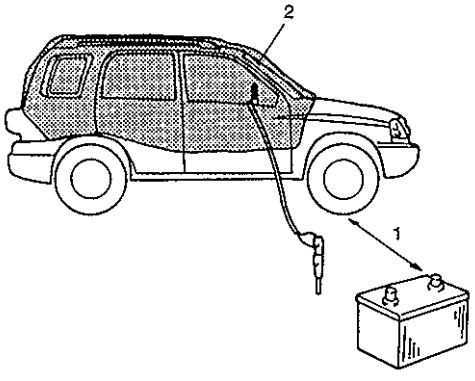
7) Connect deployment harness connector to air bag (inflator) module (driver or passenger) and lock connector with lock lever.

Special Tool
(A): 09932-75030

Driver side for left hand steering vehicle



Driver side for right hand steering vehicle



1. Stretch deployment harness to its full length 10 m (33 ft).
2. Drop cloth, 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 deploy the air bag (inflator) module.

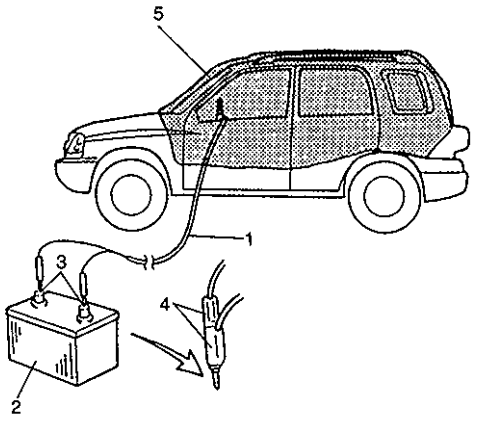
NOTE:

- **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.**
- **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 10m (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 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 deploy the driver or passenger air bag.
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.

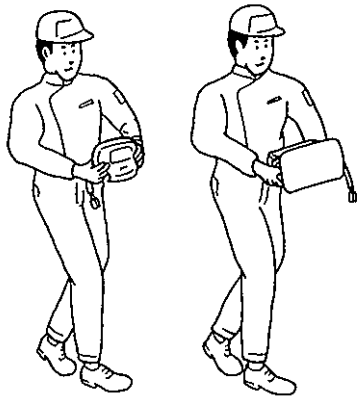
17) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module.

NOTE:
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

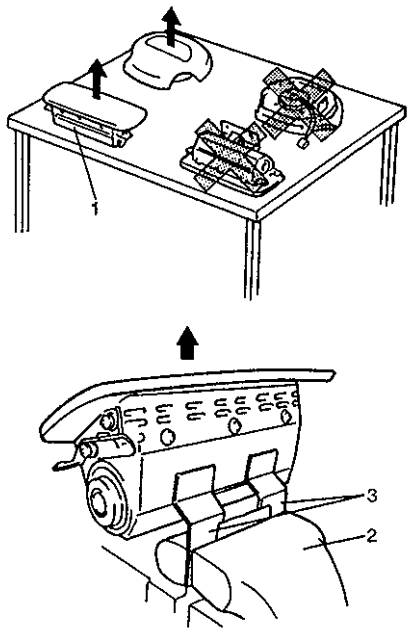
18) Disconnect the deployment harness from the air bag (inflator) module as soon after deployment as possible. This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module canister. The deployment harness are designed to be reused. They should, however, 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 which has not been deployed, if any.

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 air bags deployed the vehicle may be scrapped in the same manner as a non-air bag system equipped vehicle.

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

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 its vinyl trim cover facing up, away from the surface upon which it rests. Refer to "Service Precautions" in this section for details.
25) Contact your local distributor for further assistance.

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.

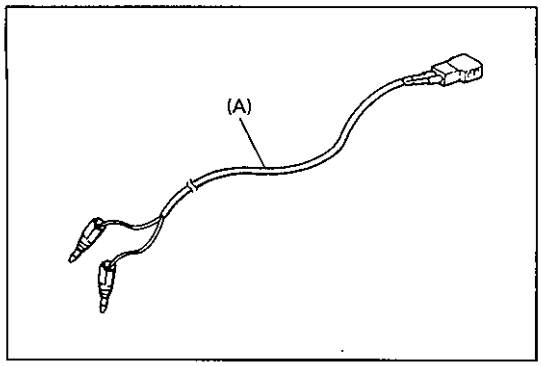
Do not dispose of the live (inactivated) seat belt pretensioners.
The method employed depends upon the final disposition of the particular vehicle, as noted in "Activation Outside Vehicle" and "Activation Inside Vehicle" in this section.
Activation Outside Vehicle ..... disposing of the seat belt pretension(s) only (i.e., the vehicle itself will be used again).
Activation Inside Vehicle ..... scrapping the entire vehicle including the seat belt pretensioners.

ACTIVATION OUTSIDE VEHICLE

Use this procedure when the vehicle itself is used again (only the seat belt pretensioner(s) are disposed of).

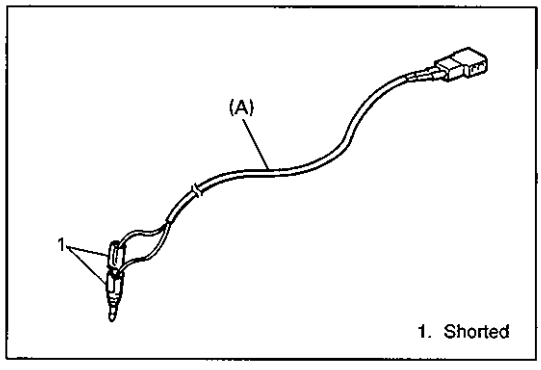
WARNING:
Following precautions must be observed for this work. Failure to observe any of them may result in personal injury.
- **To avoid an accidental activation, this work should be performed by no more than one person.**
- **The procedure should be followed strictly as described here.**
- **Be sure to read "Service 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.**
- **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). Do not attempt procedure without it.



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

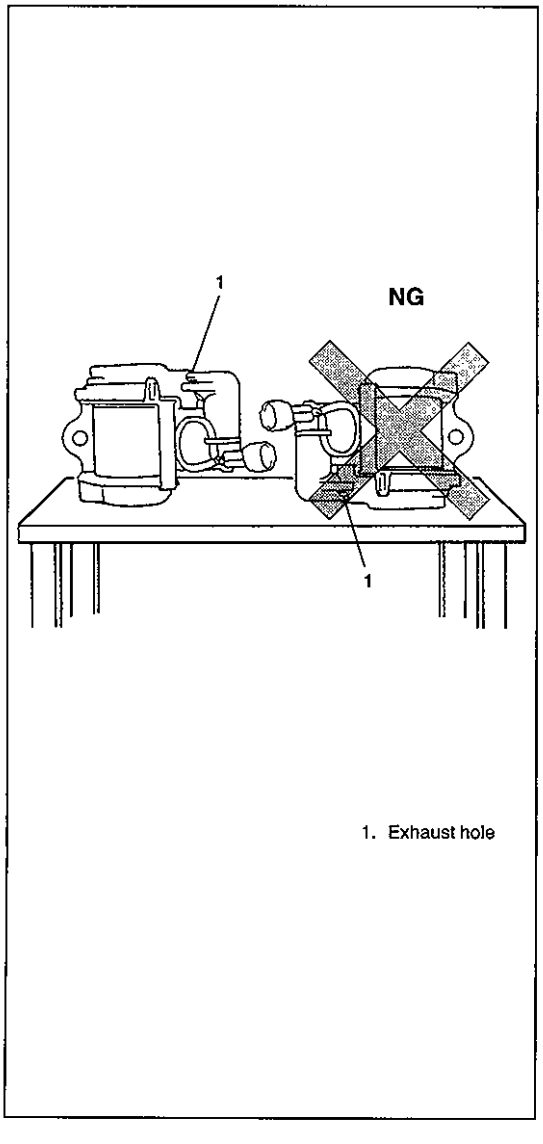


1. Shorted

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



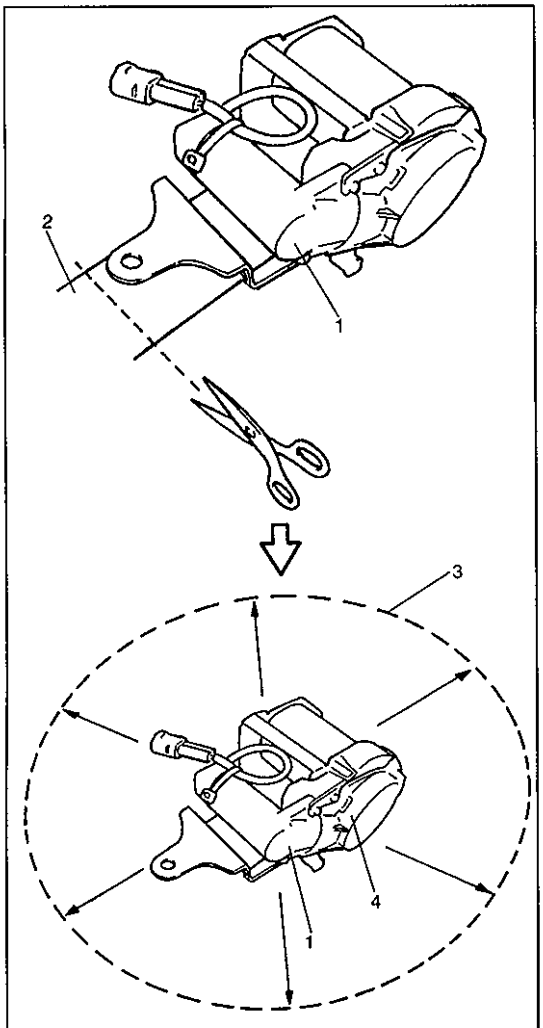
1. Exhaust hole

4) Remove driver or passenger seat belt pretensioner(s) and seat belt pretensioner harness(s) from vehicle, referring to SECTION 10A.

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 the workbench or some place like that, be sure not to lay with its exhaust hole provided side facing down. it is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another.**

Otherwise, personal injury may result.

5) Temporarily place seat belt pretensioner on the workbench according to above WARNING.

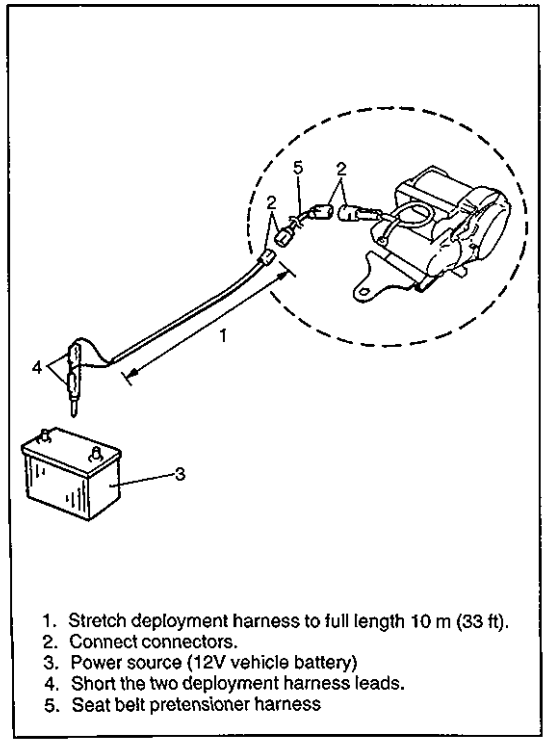


1. Seat belt pretensioner (retractor assembly)
2. Webbing
3. 185 cm (6 feet) of clearance
4. Exhaust hole

6) Pull out the webbing fully as shown at the left 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 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.
5. Seat belt pretensioner harness

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 is placed as shown in the figure on the ground in the space just cleared.
13) Connect the seat belt pretensioner harness to the deployment harness connector and lock the connector with lock lever.

Special Tool
(A): 09932-75030

14) Notify all people in the immediate area that you intend to activate the seat belt pretensioner.

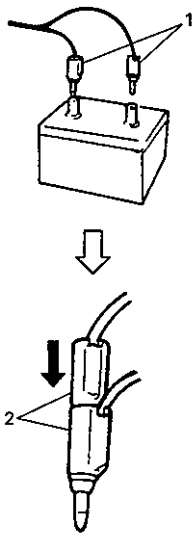
NOTE:

- **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 (1 ft) 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.**

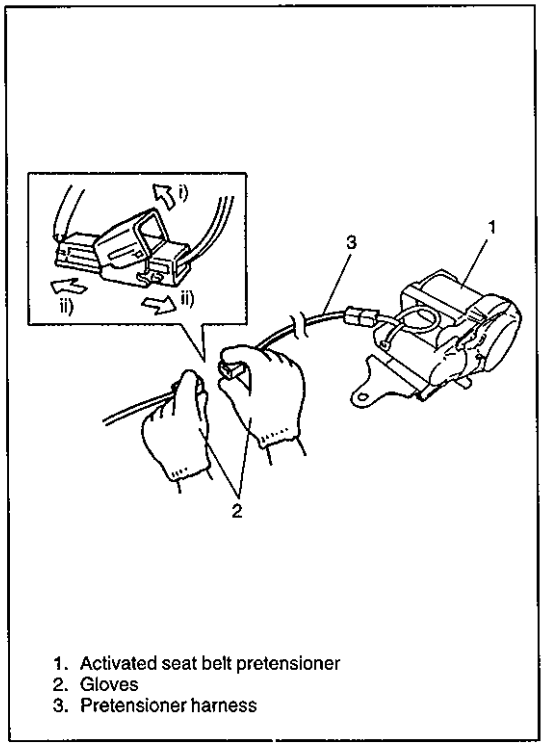
Failure to follow procedures may result in fire or personal injury.



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 following these procedures, proceed immediately with Steps 23) through 26). If the the seat belt pretensioner did activate, proceed with Steps 19) through 22).

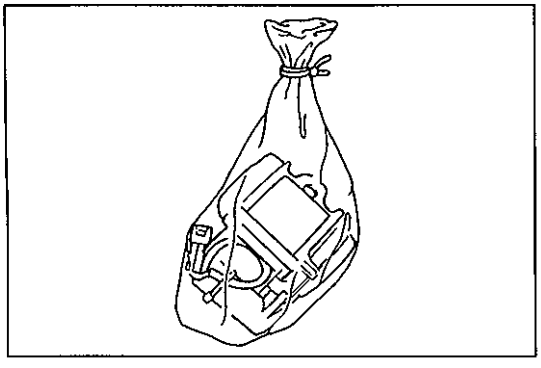


1. Activated seat belt pretensioner
2. Gloves
3. Pretensioner harness

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.

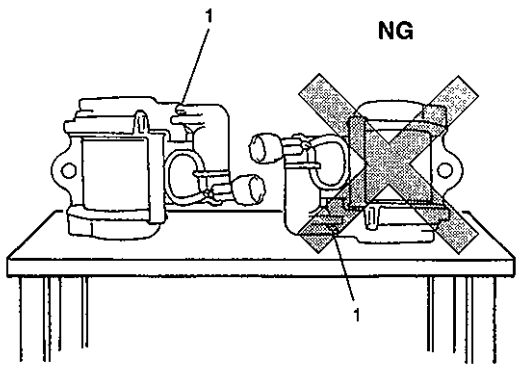


21) Dispose of the activated seat belt pretensioner through normal refuse channels after it has cooled for at least 30 minutes and tightly seal the seat belt pretensioner in a strong vinyl bag. (Refer to "Activated Seat Belt Pretensioners Disposal" in detail.)

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 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.



1. Exhaust hole

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 the workbench or some place like that, be sure not to lay it with its exhaust hole provided side facing down. It is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another.**

Otherwise, personal injury may result.

25) Temporarily store the seat belt pretensioner. At that time, be sure NOT to face its exhaust hole provided side down. It must face up. Refer to "Service Precautions" in this section for detail.
26) Contact your local distributor for further assistance.

ACTIVATION INSIDE VEHICLE

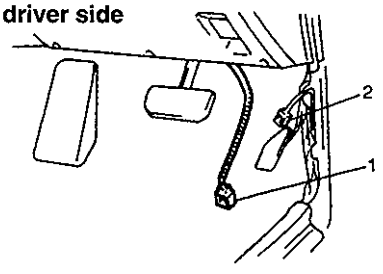
Use this procedure when scrapping the entire vehicle including the seat belt pretensioners.

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:
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 "Service 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.

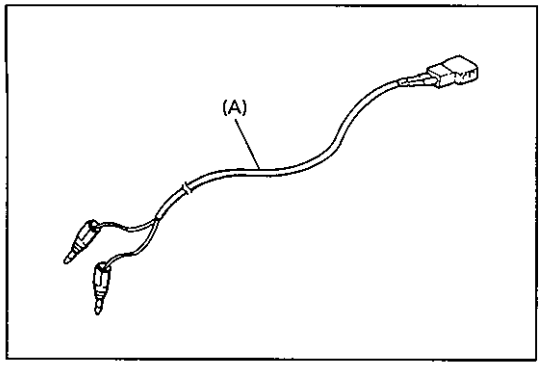
For driver side



1. Air bag harness
2. Seat belt pretensioner harness

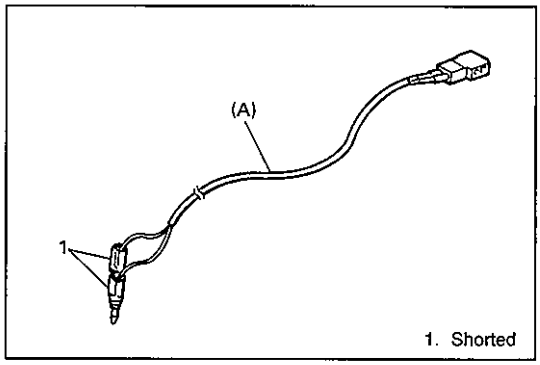
3) Remove both side (driver and passenger side) front pillar lower trims and disconnect seat belt pretensioner harnesses from air bag harness.

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



6) Short the two deployment harness leads together by fully seating one banana plug into the other.

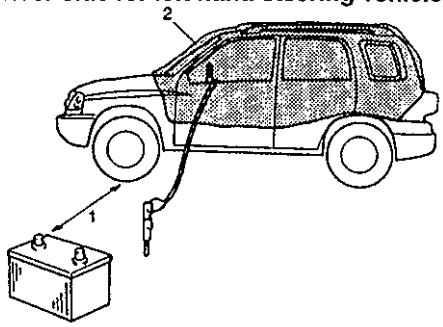
WARNING:
Deployment wires shall remain shorted and not be connected to a power source until the pretensioner is to be activated.

Special Tool
(A): 09932-75030

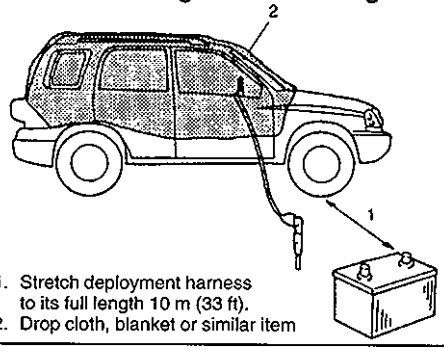
7) Connect the deployment harness connector to the seat belt pretensioner harness and lock the connector with lock lever.

Special Tool
(A): 09932-75030

Driver side for left hand steering vehicle



Driver side for right hand steering vehicle



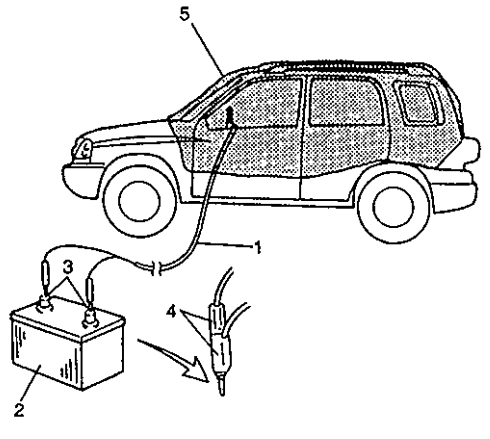
1. Stretch deployment harness to its full length 10 m (33 ft).
2. Drop cloth, blanket or similar item

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 non-metal material.**

Failure to follow procedures may result in fire or personal injury.



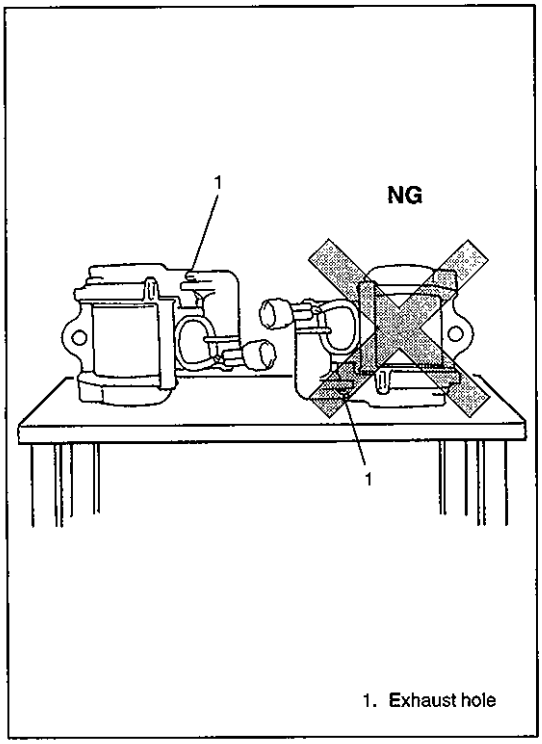
1. Stretch it to full length 10m (33 ft)
2. Power source (12V vehicle battery)
3. Connect one banana plug to positive terminal of power source (12V vehicle battery) and then the other to negative terminal to immediately activate.
4. Short harness leads after activation.
5. Drop cloth, blanket or similar 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.



1. Exhaust hole

23) Remove the inactivated seat belt pretensioner(s) from the vehicle. Refer to SECTION 10A.

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 the workbench or some place like that, be sure not to lay it with its exhaust hole provided side facing down. It is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another.**

Otherwise, personal injury may result.

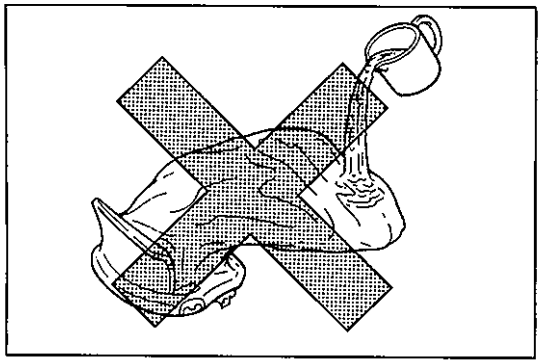
24) Temporarily store the seat belt pretensioner. At that time, be sure NOT to face its exhaust hole provided side down. It must face up. Refer to "Service Precautions" in this section for details.
25) Contact your local distributor for further assistance.

DEPLOYED AIR BAG (INFLATOR) MODULES DISPOSAL

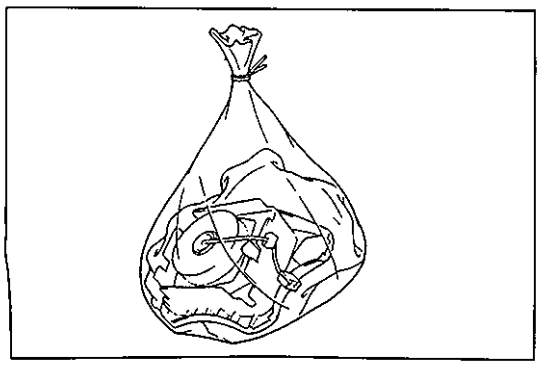
WARNING:
Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which may cause personal injury. Undeployed air bag (inflator) module must not be disposed of through normal refuse channels. The undeployed air bag (inflator) module contains substances that 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, 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.



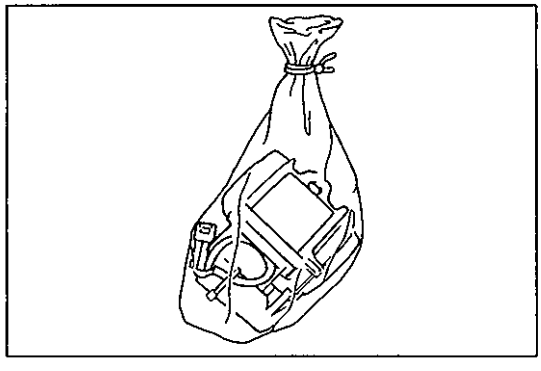
- When disposing of the deployed air bag (inflator) module, be sure to seal it in a vinyl bag.
- When air bag (inflator) module(s) have been deployed inside the vehicle which is going to be scrapped, leave them as installed to the vehicle.
- Be sure to wash your hands with mild soap and water after handling it.

ACTIVATED 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 contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

Activated seat belt pretensioners (driver/passenger) can be disposed of through normal refuse channels just like any other parts. For their disposal, however, 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.

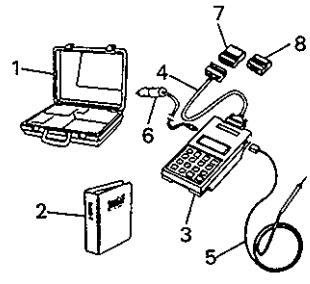


- When disposing of the activated seat belt pretensioner alone, be sure to seal it in a vinyl bag.
- When seat belt pretensioners have been activated inside the vehicle which is going to be scrapped, leave them as installed to the vehicle.
- Be sure to wash your hands with mild soap and water after handling it.

TIGHTENING TORQUE SPECIFICATIONS

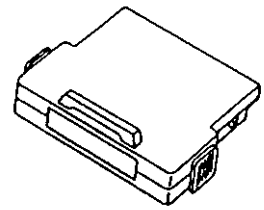
Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
SDM bolt		6	0.6	4.5
Passenger air bag (inflator) module	screw	5.5	0.55	4.0
	bolt	23	2.3	16.5
Driver air bag (inflator) module bolt		Refer to SECTION 3C1.		
Seat belt pretensioner (retractor assembly) bolt		Refer to SECTION 10A.		

SPECIAL TOOLS

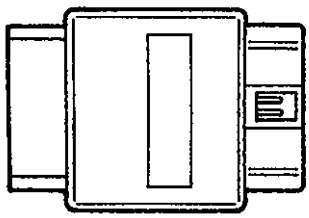


09931-76011
Tech-1 (scan tool) kit

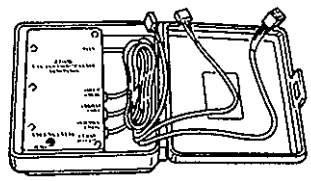
1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adapter
8. Self-test adapter



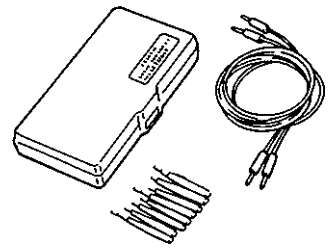
Mass storage cartridge for air bag system



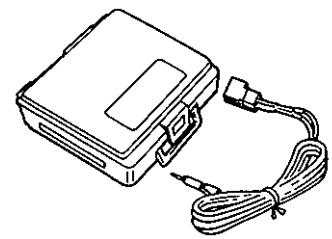
09931-96020
16/12 pin DLC adapter



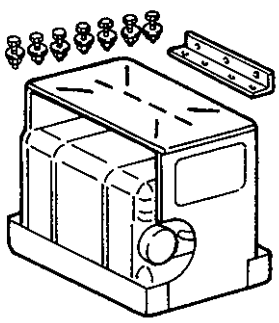
09932-75010
Air bag driver/passenger load tool



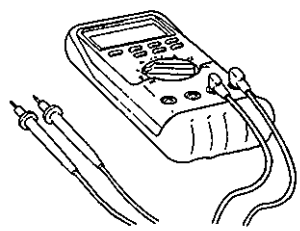
09932-76010
Connector test adapter kit



09932-75030
Air bag deployment harness



09932-75040
Passenger air bag (inflator) module deployment fixture



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.

SUZUKI MOTOR CORPORATION

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