

SUZUKI

SR410

SERVICE MANUAL

SUZUKI
Caring for Customers

99500-75F01-01E

(英)

IMPORTANT

WARNING/CAUTION/NOTE

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

WARNING:

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

CAUTION:

Indicates a potential hazard that could result in vehicle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

WARNING:

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

WARNING:

For vehicles equipped with a 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. Please observe all WARNINGS and CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag deployment.
- Do not modify the steering wheel, instrument panel or any other air bag system component (on or around air bag system components or wiring). Modifications can adversely affect air bag system performance and lead to injury.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components (air bag (inflator) modules, SDM and/or seatbelt with pretensioner) beforehand to avoid component damage or unintended deployment.

FOREWORD

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

Applicable model: SR410

The contents are classified into sections each of which is given a section number as indicated in the Table of Contents on following 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 Service Manual

Service Manual Related To This Manual	Service Manual No.
SR410 WIRING DIAGRAM MANUAL	99512-75F00

NOTE:

The screen toned Section 8A WIRING DIAGRAM in next page is not contained in this manual.

The Section 8A is contained in WIRING DIAGRAM MANUAL in above table.

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

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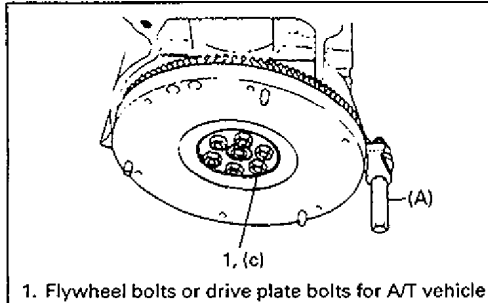
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HOW TO USE THIS MANUAL

- 1) There is a TABLE OF CONTENTS FOR THE WHOLE MANUAL on the 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.



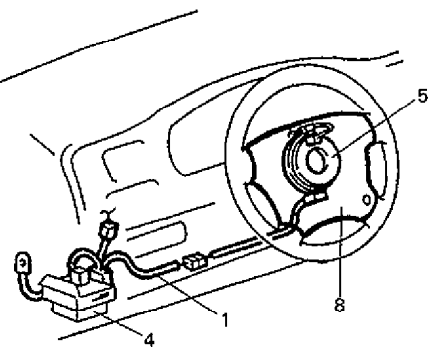
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- 6) Install oil pump. Refer to "Oil pump".
- 7) Install flywheel (for M/T vehicle) or drive plate (for A/T vehicle). Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts to specified torque.

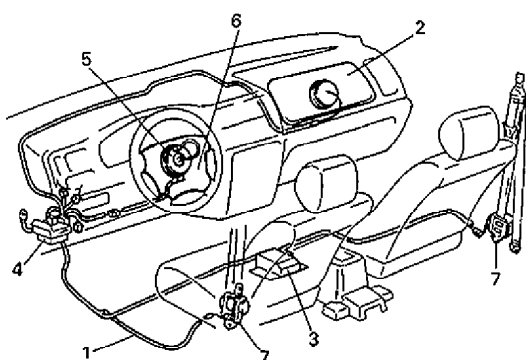
Special Tool**(A): 09924-17810****Tightening Torque****(c): 78 N·m (7.8 kg-m, 56.0 lb-ft)**

- 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.

TYPE A



TYPE B



- | | |
|--|--|
| 1. Air bag wire harness | 6. Driver air bag (inflator) module |
| 2. Passenger air bag (inflator) module | 7. Seat belt pretensioner |
| 3. SDM | 8. Driver air bag (inflator) module with SDM |
| 4. J/B | |
| 5. Contact coil | |

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PRECAUTIONS

PRECAUTION FOR VEHICLES EQUIPPED WITH A SUPPLEMENTAL RESTRAINT SYSTEM

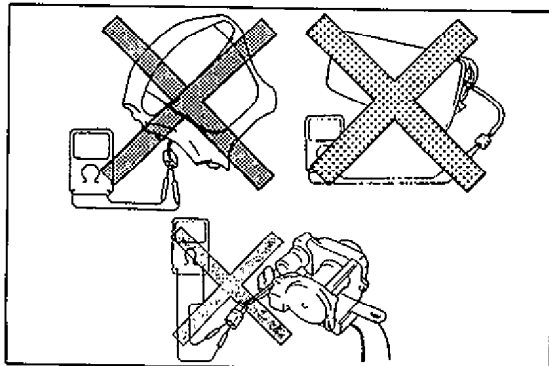
WARNING:

- 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 (for type A) or 10B1 (for type B). 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 (for type A) or 10B1 (for type B). 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.

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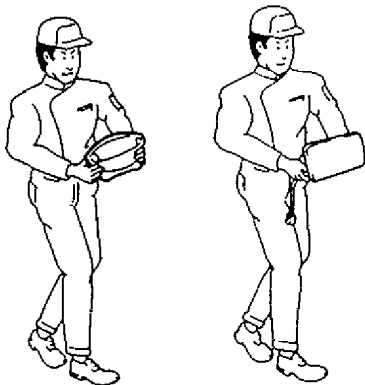


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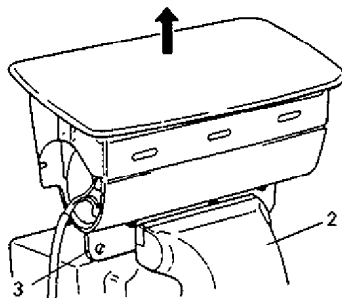
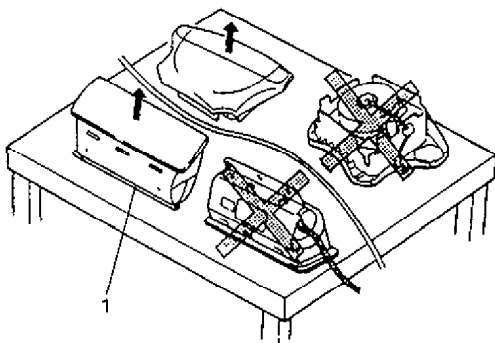
WARNING:

Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger) and seat belt pretensioners (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.

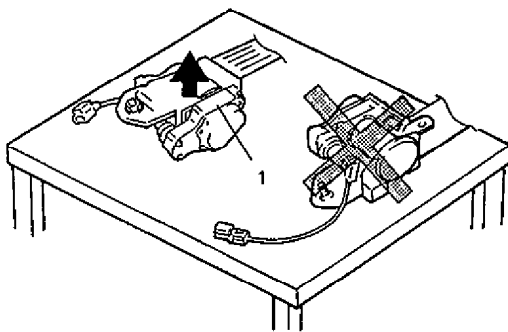
Driver and Passenger Air Bag (Inflator) Modules

- 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 (for type A) or 10B1 (for type B) 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**

- For Type A and B
During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM). Never strike or jar the SDM.
- For Type A
Never remove SDM from driver air bag (inflator) module assembly.
- For Type B
Never power up the air bag system when the SDM is not rigidly attached to the vehicle. All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointing toward the front of the vehicle to ensure proper operation of the air bag system. The SDM could be activated when powered while not rigidly attached to the vehicle which could cause deployment and result in personal injury.

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, ALWAYS FROM LOOSE OBJECTS.



1. Warning label

WARNING :**Driver and Passenger Seat Belt Pretensioners**

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner. When placing a live seat belt pretensioner on a bench or other surface, always face its warning label attached side up, away from the surface. As the live must be placed with its warning label attached side facing up, place it on the workbench. Otherwise, personal injury may result.
- Never dispose of live (inactivated) seat belt pretensioners (driver and passenger). If disposal is necessary, be sure to activate them according to activation procedures described in SECTION 10B1 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 (for type A) or 10B1 (for type B).
- 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 (driver and passenger), wipe off immediately with a dry cloth.
- Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.
- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code.
- Never use air bag system component parts from another vehicle.
- When using electric welding, be sure to temporarily disable air bag system referring to "Disabling Air Bag System" described in "Precaution" in SECTION 10B (for type A) or 10B1 (for type B).
- 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 (for type A) or 10B1 (for type B).

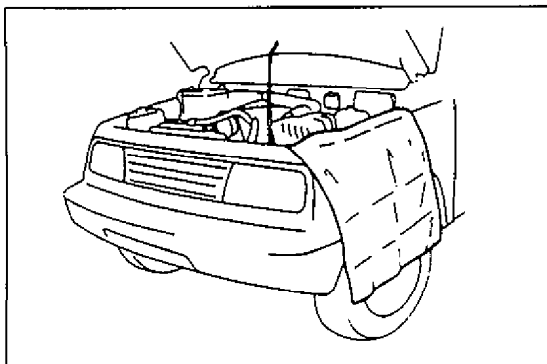
GENERAL PRECAUTIONS

The WARNING and CAUTION below describe some general precautions that you should observe when servicing a vehicle. These general precautions apply to many of the service procedures described in this manual, and they will not necessarily be repeated with each procedure to which they apply.

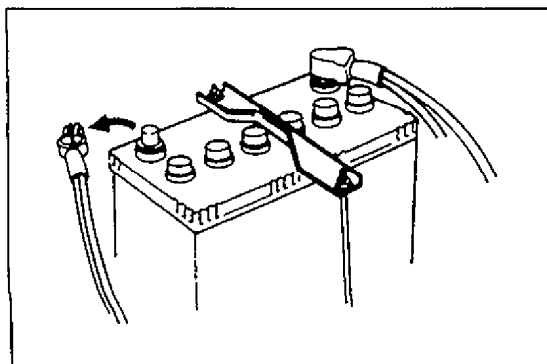
WARNING:

- Whenever raising a vehicle for service, be sure to follow the instructions under "VEHICLE LIFTING POINTS" on SECTION 0A.
- When it is necessary to do service work with the engine running, make sure that the parking brake is set fully and the transmission is in Neutral (for manual transmission vehicles) or Park (for automatic transmission vehicles). Keep hands, hair, clothing, tools, etc. away from the fan and belts when the engine is running.
- When it is necessary to run the engine indoors, make sure that the exhaust gas is forced outdoors.
- Do not perform service work in areas where combustible materials can come in contact with a hot exhaust system. When working with toxic or flammable materials (such as gasoline and refrigerant), make sure that the area you work in is well-ventilated.
- To avoid getting burned, keep away from hot metal parts such as the radiator, exhaust manifold, tailpipe, muffler, etc.
- New and used engine oil can be hazardous. Children and pets may be harmed by swallowing new or used oil. Keep new and used oil and used engine oil filters away from children and pets. Continuous contact with used engine oil has been found to cause [skin] cancer in laboratory animals. Brief contact with used oil may irritate skin. To minimize your exposure to used engine oil, wear a long-sleeve shirt and moisture-proof gloves (such as dishwashing gloves) when changing engine oil. If engine oil contacts your skin, wash thoroughly with soap and water. Launder any clothing or rags if wet with oil, recycle or properly dispose of used oil and filters.

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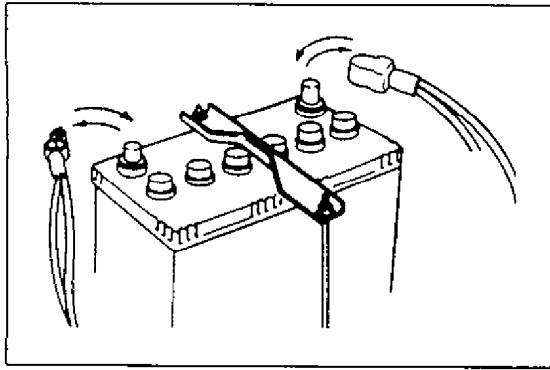
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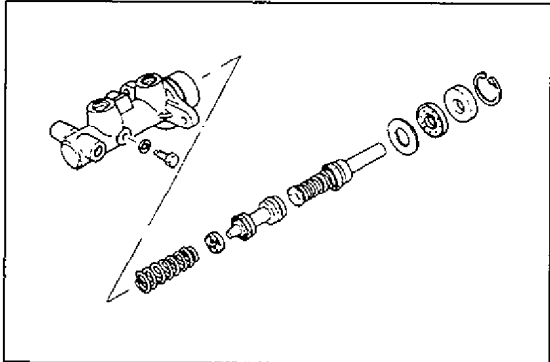
CAUTION:

- 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.



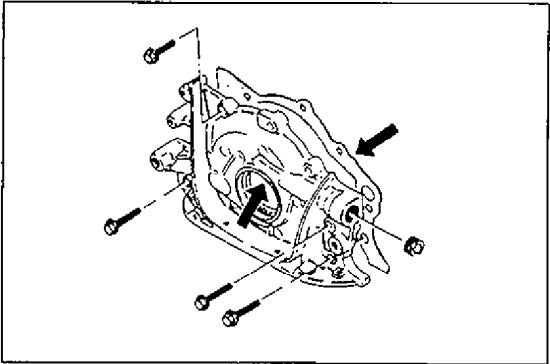
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- When removing the battery, be sure to disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover.



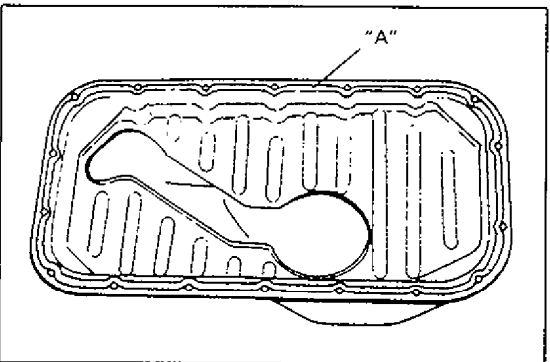
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- When removing parts that are to be reused, be sure to keep them arranged in an orderly manner so that they may be re-installed in the proper order and position.



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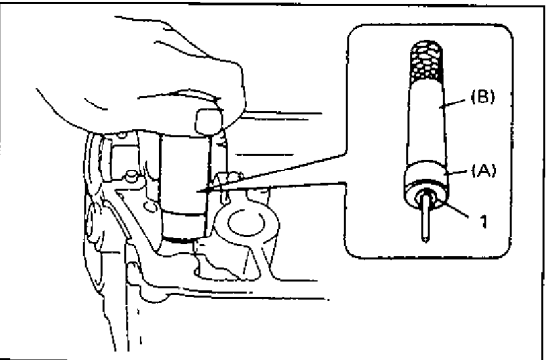
- Whenever you use oil seals, gaskets, packing, Orings, locking washers, split pins, self-locking nuts, and certain other parts as specified, be sure to use new ones. Also, before installing new gaskets, packing, etc., be sure to remove any residual material from the mating surfaces.



75F00-0A-8-4

- 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



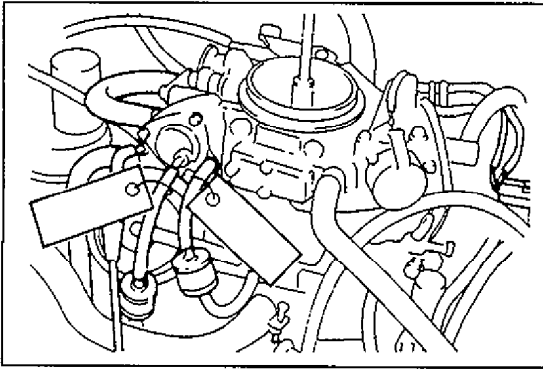
- Be sure to use special tools when instructed.

Special Tool

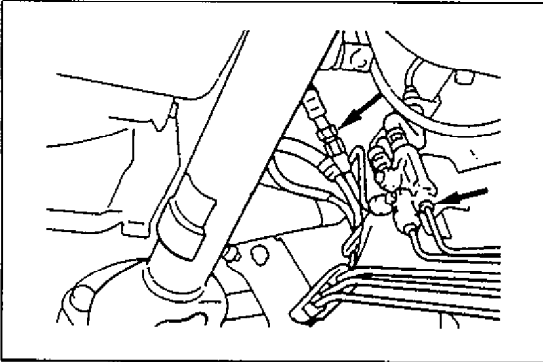
(A): 09917-98221

(B): 09916-58210

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- When disconnecting vacuum hoses, attach a tag describing the correct installation positions so that the hoses can be reinstalled correctly.
- After servicing fuel, oil, coolant, vacuum, exhaust or brake systems, check all lines related to the system for leaks.
- For vehicles equipped with fuel injection systems, never disconnect the fuel line between the fuel pump and injector without first releasing the fuel pressure, or fuel can be sprayed out under pressure.

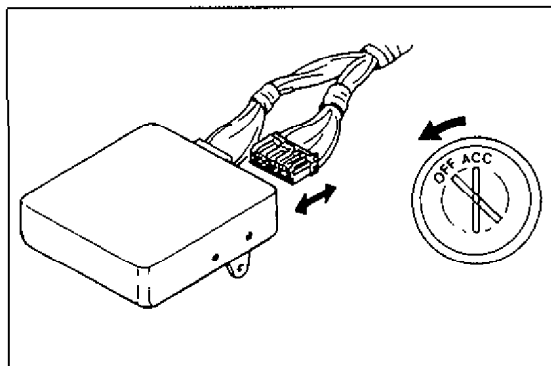
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PRECAUTIONS FOR CATALYTIC CONVERTER

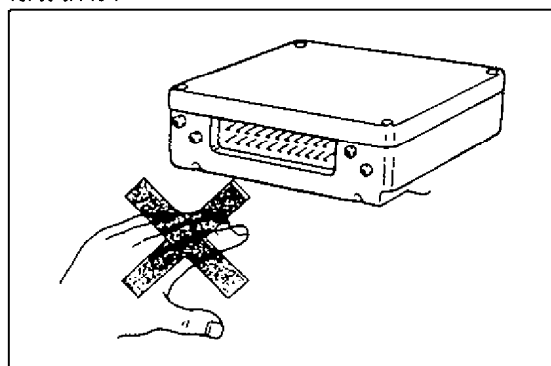
For vehicles equipped with a catalytic converter, use only unleaded gasoline and be careful not to let a large amount of unburned gasoline enter the converter or it can be damaged.

- 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.)

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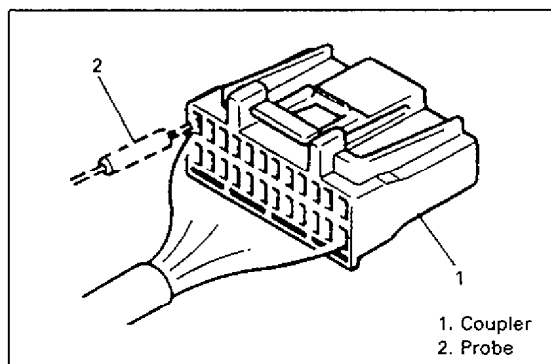
PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE

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

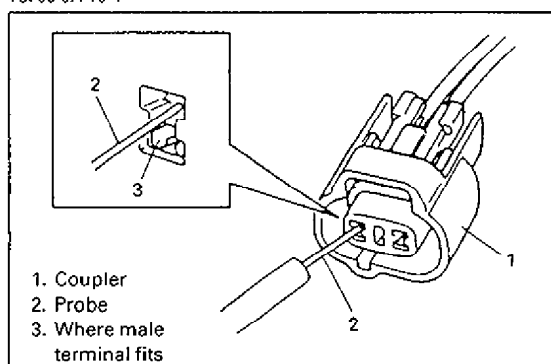
- Be careful not to touch the electrical terminals of parts which use microcomputers (e.g. electronic control unit like as ECM, PCM, P/S controller, etc). The static electricity from your body can damage these parts.

- 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.

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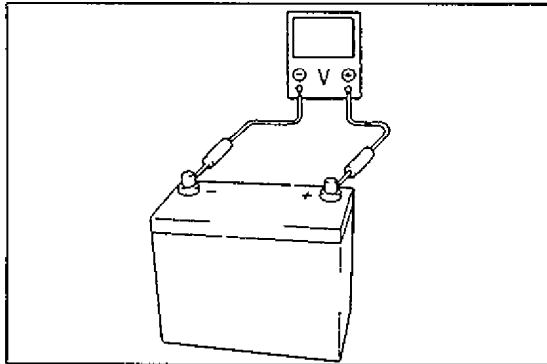
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- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector.

- 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 or 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.

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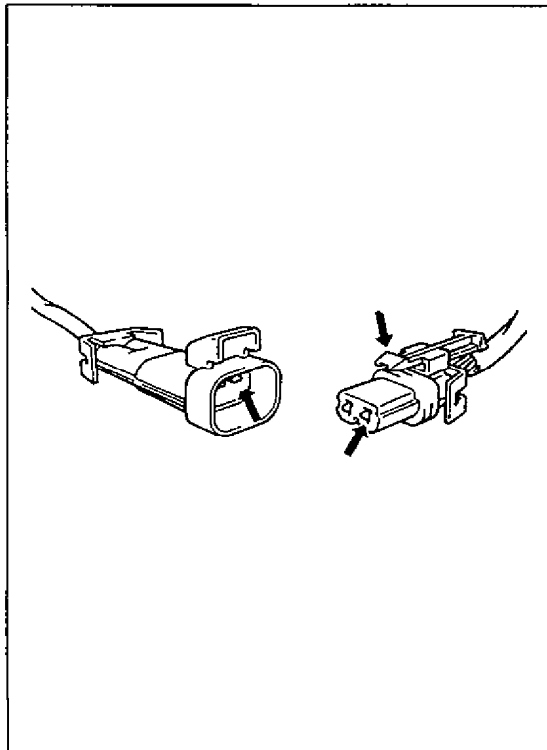
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- Before measuring voltage at each terminal, check to make sure that battery voltage is 11V or higher. Such terminal voltage check at low battery voltage will lead to erroneous diagnosis.

INTERMITTENTS AND POOR CONNECTION

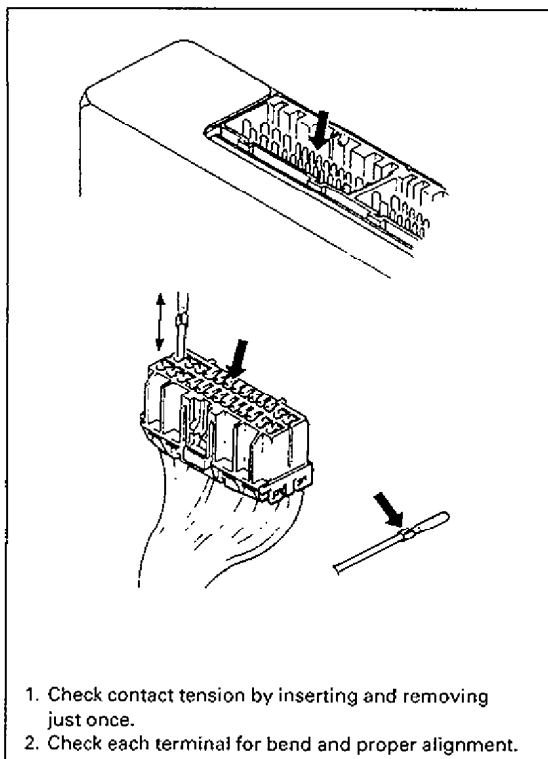
Most intermittents are caused by faulty electrical connections or wiring, although a sticking relay or solenoid can occasionally be at fault. When checking it for proper connection, perform careful check of suspect circuits for:

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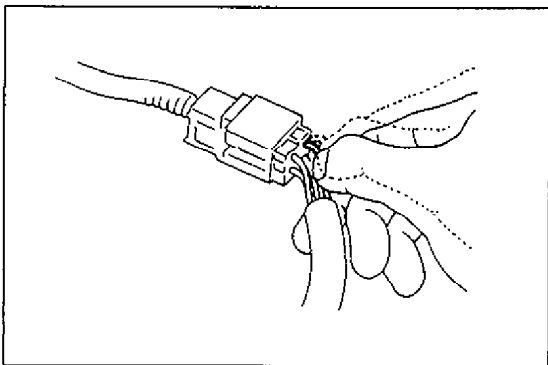


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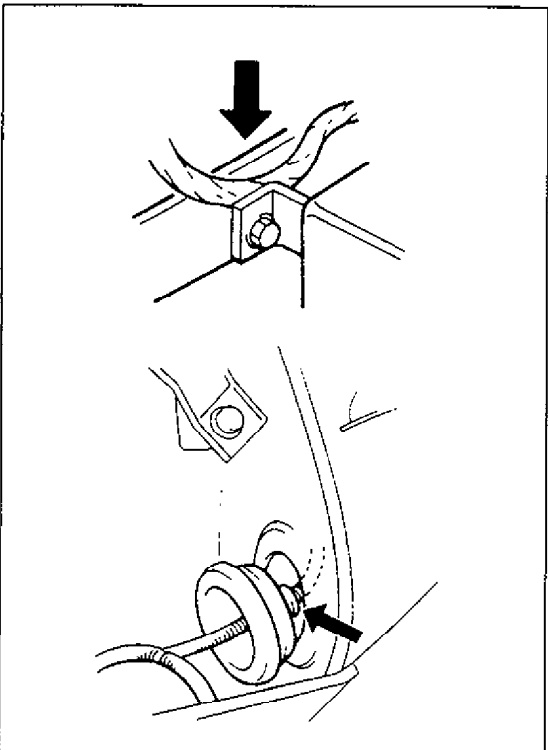
- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
However, cleaning the terminal with a sand paper or the like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



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75F00-0A-12-3

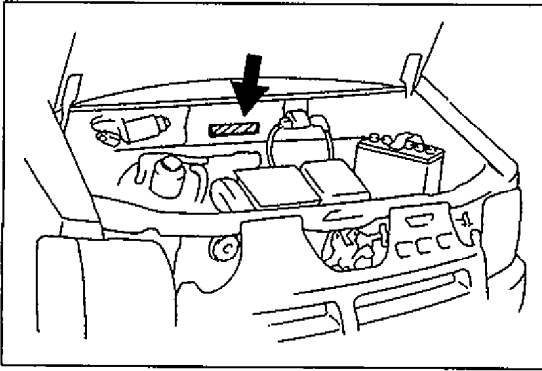


75F00-0A-12-5

- 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.

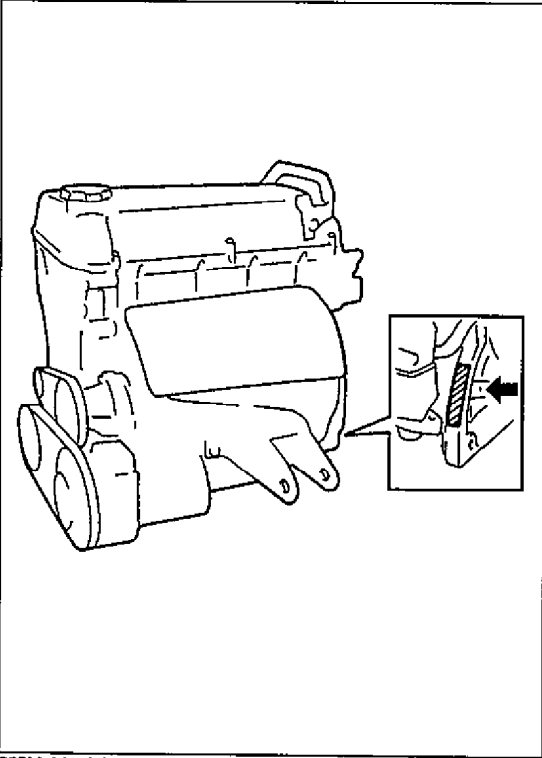


75F00-0A-13-1

IDENTIFICATION INFORMATION

BODY NUMBER

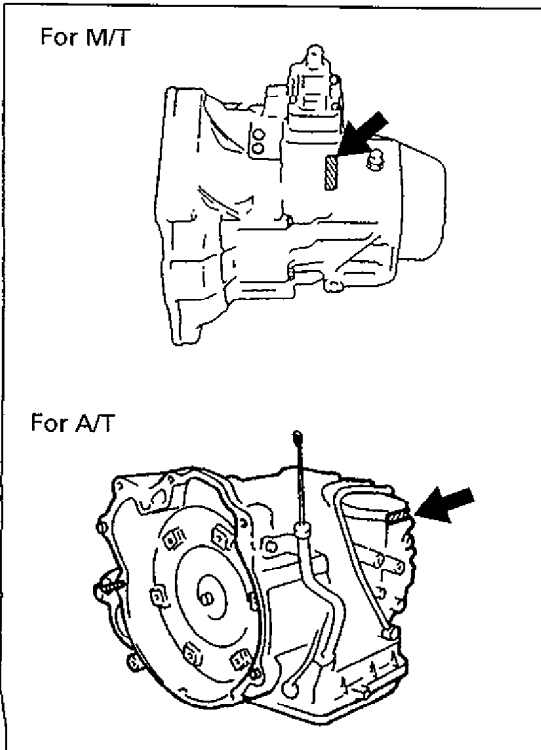
The vehicle identification number is located on the front dash panel in the engine room.



75F00-0A-13-3

ENGINE IDENTIFICATION NUMBER

The number is punched on the cylinder block.



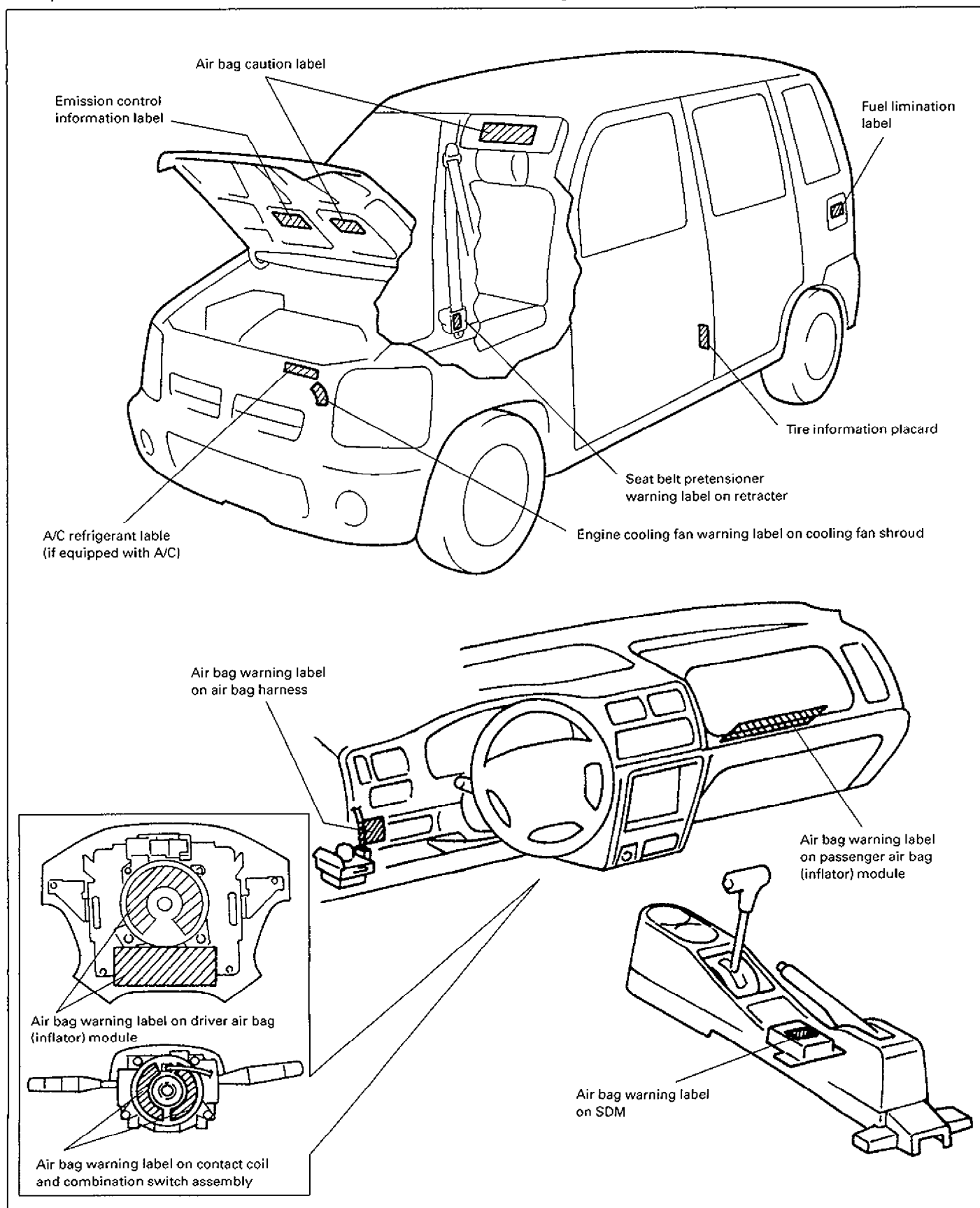
75F00-0A-13-5

TRANSMISSION IDENTIFICATION NUMBER

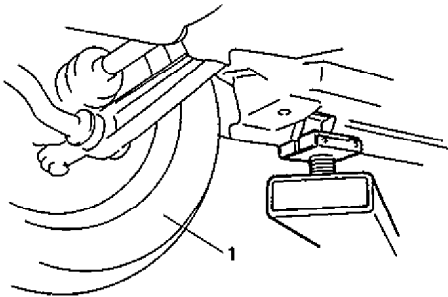
The number is located on the transmission case.

WARNING, CAUTION AND INFORMATION LABELS

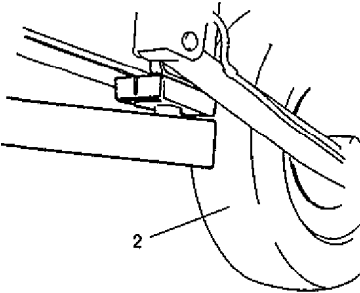
The figure below shows main labels among others that are attached to vehicle component parts. When servicing and handling parts, refer to WARNING/CAUTION instructions printed on labels. If any WARNING/CAUTION label is found stained or damaged, clean or replace it as necessary.



FRONT SIDE



REAR SIDE



1. Front right tire
2. Rear right tire

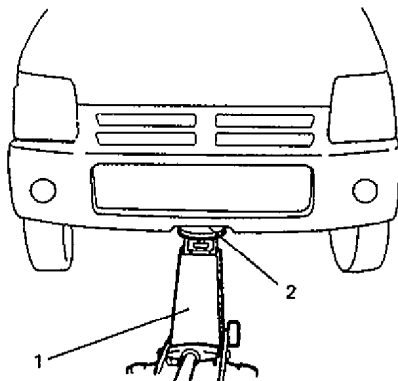
75F00-0A-15-2

VEHICLE LIFTING POINTS

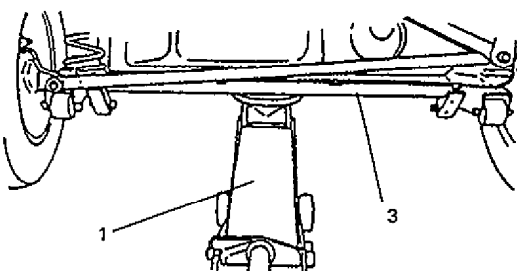
WARNING:

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

FRONT SIDE



REAR SIDE



1. Floor jack
2. Front lower crossmember
3. Rear axle

75F00-0A-15-5

When using floor jack

In raising front or rear vehicle end off the floor by jacking, be sure to put the jack against the front end of the engine mounting member or rear axle.

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

WARNING:

- Never apply jack against suspension parts (i.e., stabilizer, etc) or vehicle floor, or it may get deformed.
- If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety.

After the vehicle is jacked up, be sure to support it on stands. It is extremely dangerous to do any work on the vehicle raised on jack alone.

ABBREVIATIONS 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	: Electrical 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		T	
LH	: Left Hand	TBI	: Throttle Body Fuel Injection (Single-Point Fuel Injection, SPI)
LSPV	: Load Sensing Proportioning Valve	TCC	: Torque Converter Clutch
M		TCM	: Transmission Control Module (A/T Controller, A/T Control Module)
MAF Sensor	: Mass Air Flow Sensor (Air Flow Sensor, AFS, Air Flow Meter, AFM)	TP Sensor	: Throttle Position Sensor
MAP Sensor	: Manifold Absolute Pressure Sensor (Pressure Sensor, PS)	TVV	: Thermal Vacuum Valve (Thermal Vacuum Switching Valve, TVSV, Bimetal Vacuum Switching Valve, BVSV)
Max	: Maximum	TWC	: Three Way Catalytic Converter (Three Way Catalyst)
MFI	: Multiport Fuel Injection (Multipoint Fuel Injection)	2WD	: 2 Wheel Drive
Min	: Minimum	V	
MIL	: Malfunction Indicator Lamp ("CHECK ENGINE" Light)	VIN	: Vehicle Identification Number
M/T	: Manual Transmission	VSS	: Vehicle Speed Sensor
N		W	
NOx	: Nitrogen Oxides	WU-OC	: Warm Up Oxidation Catalytic Converter
O		WU-TWC	: Warm Up Three Way Catalytic Converter
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		
SFI	: Sequential Multiport Fuel Injection		
SOHC	: Single Over Head Camshaft		

METRIC INFORMATION

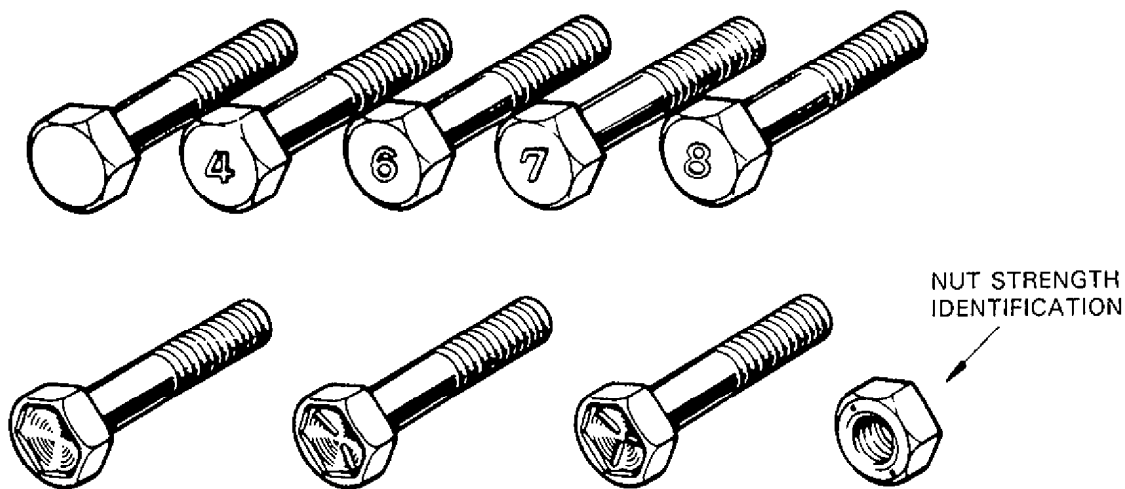
METRIC FASTENERS

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.

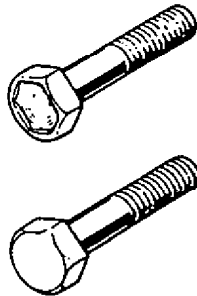
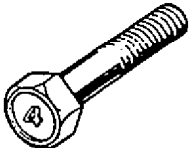
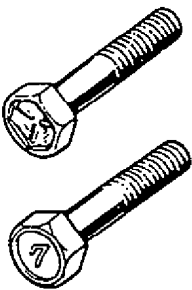
STANDARD TIGHTENING TORQUE

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	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**0B****MAINTENANCE AND LUBRICATION****WARNING:**

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

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MAINTENANCE SCHEDULE

NORMAL CONDITION SCHEDULE

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 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 (× 1,000)	10	20	30	40	50	60	70	80		
	Miles (× 1,000)	6	12	18	24	30	36	42	48		
	Months	6	12	18	24	30	36	42	48		
1. ENGINE											
1-1. Drive belt (tension, damage)		—	I	—	I	—	I	—	R		
1-2. Valve lash (clearance)		—	I	—	I	—	I	—	I		
1-3. Engine oil and engine oil filter		R	R	R	R	R	R	R	R		
1-4. Cooling system, hoses and connections (leakage, damage)		—	I	—	I	—	I	—	I		
1-5. Engine coolant		—	—	—	R	—	—	—	R		
1-6. Exhaust system		—	I	—	I	—	I	—	I		
1-7. Wiring harness and connections		—	—	—	I	—	—	—	I		
2. IGNITION SYSTEM											
2-1. Spark plugs		When unleaded fuel is used		—	I	—	R	—	I	—	R
2-2. Distributor cap and rotor (crack, wear)		—	—	—	I	—	—	—	I		
2-3. Ignition wiring		—	—	—	I	—	—	—	R		
3. FUEL SYSTEM											
3-1. Air cleaner filter element		Paved-road		—	—	—	—	R	—	—	—
		Dusty condition		Refer to “Severe Driving Condition” schedule							
3-2. Fuel tank, cap & lines (deterioration, leakage, damage)		—	—	—	I	—	—	—	I(R)		
3-3. Fuel filter		Replace every 100,000 km (60,000 miles)									
4. EMISSION CONTROL SYSTEM											
4-1. PCV (Positive Crankcase Ventilation) valve		—	—	—	—	—	—	—	I		
4-2. EVAP canister (if equipped)		—	—	—	—	—	—	—	I		

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 (× 1,000)	10	20	30	40	50	60	70	80
	Miles (× 1,000)	6	12	18	24	30	36	42	48
	Months	6	12	18	24	30	36	42	48
5. BRAKE									
5-1. Brake discs and pads (thickness, wear, damage)		I	—	I	—	I	—	I	—
5-2. Brake drums and shoes (wear, damage)									
5-2. Brake hoses and pipes (leakage, damage, clamp)		I	—	I	—	I	—	I	—
5-3. Brake fluid		—	I	—	R	—	I	—	R
5-4. Brake lever and cable (damage, stroke, operation)		I	—	I	—	I	—	I	—
5-5. Brake pedal		—	I	—	I	—	I	—	I
6. CHASSIS AND BODY									
6-1. Clutch pedal free travel (cable type) or fluid level (hydraulic type)		I	I	I	I	I	I	I	I
6-2. Tires/wheel discs and bearing (wear, damage, rotation)		I	I	I	I	I	I	I	I
6-3. Drive shaft (axle) boots (breakage, damage)		I	I	I	I	I	I	I	I
6-4. Suspension system (tightness, damage, rattle, breakage)		I	I	I	I	I	I	I	I
6-5. Steering system (tightness, damage, breakage, rattle)		I	I	I	I	I	I	I	I
6-6. Manual transmission oil		I	I	I	R	I	I	I	R
6-7. 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	—	—
6-8. Door hinges, gear shift control lever and shaft/cables		I	I	I	I	I	I	I	I

NOTES:

- "R": Replace or change
- "I": Inspect and correct or replace if necessary
- Item 3-2 (R) is applicable only to fuel tank cap.

MAINTENANCE RECOMMENDED UNDER SEVERE DRIVING CONDITIONS

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

Severe condition code

A – Repeated short trips

B – Driving on rough and/or muddy roads

C – Driving on dusty roads

D – Driving in extremely cold weather and/or salted roads

E – Repeated short trips in extremely cold weather

F – Leaded fuel use

Severe Condition Code	Maintenance	Maintenance Operation	Maintenance Interval
-- C D --	Drive belt	I	Every 20,000 km (12,000 miles) or 12 months
		R	Every 40,000 km (24,000 miles) or 24 months
A – C D E –	Engine oil and oil filter	R	Every 5,000 km (3,000 miles) or 3 months
-- C --	Air cleaner filter element *1	I	Every 2,500 km (1,500 miles)
		R	Every 50,000 km (30,000 miles) or 30 months
--- D --	Fuel tank, cap and lines	I	Every 20,000 km (12,000 miles) or 12 months
A B C – E –	Brake discs and pads Brake drums and shoes	I	Every 10,000 km (6,000 miles) or 6 months
– B -- E –	Automatic transmission fluid change	R	Every 20,000 km (12,000 miles) or 12 months
– B -- E –	Manual transmission oil	R	Every 20,000 km (12,000 miles) or 12 months
– B C D --	Wheel bearings	I	Every 20,000 km (12,000 miles) or 12 months

NOTES:

- "R": Replace or change
- "I": Inspect and correct or replace if necessary
- *1: Inspect or replace more frequently if the vehicle is used under dusty conditions.

MAINTENANCE SERVICE

ENGINE

ITEM 1-1

Drive Belt Inspection and Replacement

WARNING:

Disconnect negative cable at battery before checking and adjusting belt tension.

Water Pump Belt Inspection

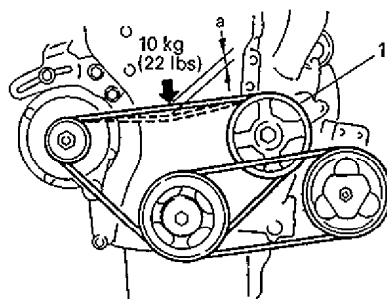
- 1) Inspect belt for cracks, cuts, deformation, wear and cleanliness. Replace, if necessary.
- 2) Check pump belt for tension and adjust it as necessary.

Water pump belt tension "a":

12 – 15 mm (0.47 – 0.59 in.) deflection under 10 kg or 22 lb pressure

NOTE:

When replacing belt with a new one, adjust belt tension to 8 – 9 mm (0.31 – 0.35 in.).



1. Water pump pulley

75F00-0B-5-2

A/C Compressor Drive Belt Inspection (If equipped)

Inspect belt for wear, deterioration and tension.

Replace or adjust, if necessary.

A/C compressor drive belt tension "b":

7 – 9 mm (0.27 – 0.35 in.) deflection under 10 kg or 22 lb pressure

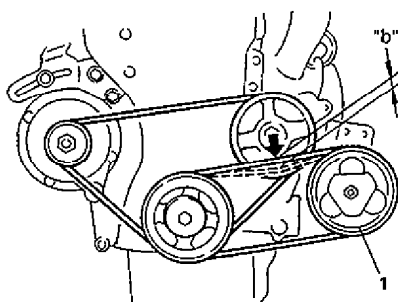
Water Pump Belt Replacement

- 1) Disconnect negative cable from battery.
- 2) Remove A/C compressor drive belt (Refer to A/C compressor drive belt replacement).
- 3) Replace water pump belt with new one.
- 4) Connect negative cable to battery.

A/C Compressor Drive Belt Replacement

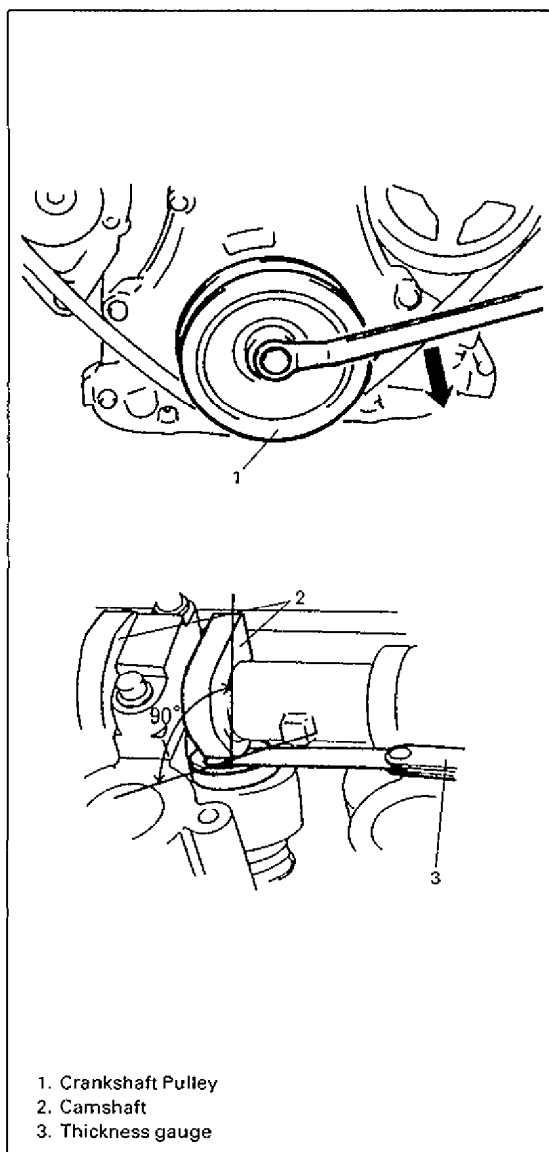
- 1) Disconnect negative cable from battery.
- 2) Loosen belt tension and replace belt with new one.
- 3) Adjust belt tension to specification.
- 4) Connect negative cable to battery.

Vehicle with A/C



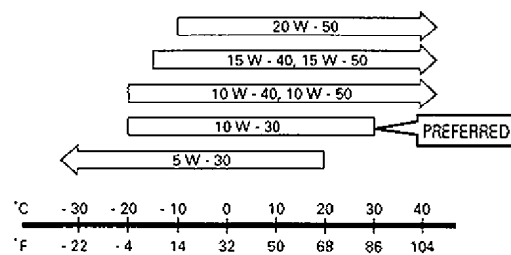
1. A/C compressor pulley

75F00-0B-5-5

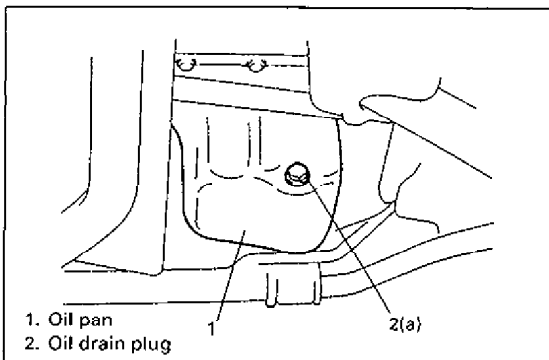


75F00-0B-6-3

Proper Engine Oil Viscosity Chart



75F00-0B-6-4



75F00-0B-6-5

ITEM 1-2

Valve Lash Inspection

- 1) Disconnect negative cable at battery.
- 2) Remove air cleaner case and resonator case.
- 3) Disconnect spark plug caps and PCV hose.
- 4) Remove cylinder head cover.
- 5) Inspect intake and exhaust valve lash and adjust as necessary.

Refer to SECTION 6A4 for valve lash inspection and adjustment procedure.

Valve lash (gap "a") specification		When cold (Coolant temperature is 15 – 25°C or 59 – 77°F)	When hot (Coolant temperature is 60 – 68°C or 140 – 154°F)
	Intake	0.18 – 0.23 mm (0.007 – 0.009 in.)	0.21 – 0.27 mm (0.008 – 0.011 in.)
	Exhaust	0.18 – 0.23 mm (0.007 – 0.009 in.)	0.20 – 0.26 mm (0.008 – 0.010 in.)

- 6) Install cylinder head cover and tighten bolts to specification.
- 7) Connect spark plug caps and PCV hose.
- 8) Install air cleaner case and resonator case.
- 9) Connect negative cable at battery.

ITEM 1-3

Engine Oil and Filter Change

It is recommended to use engine oil of SE, SF, SG, SH or SJ class.

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

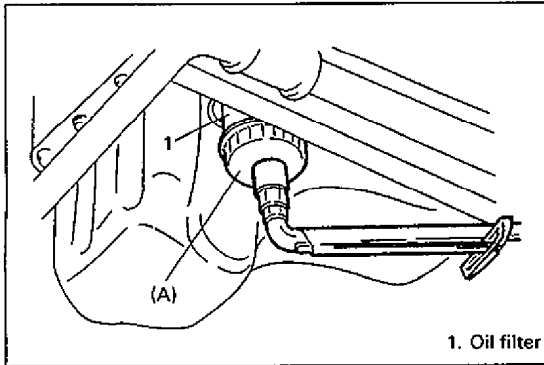
See Owner's Manual for further details.

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

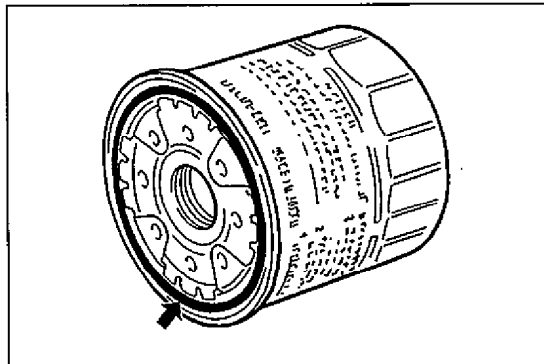
- 1) Drain engine oil by removing drain plug.
- 2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

Tightening Torque

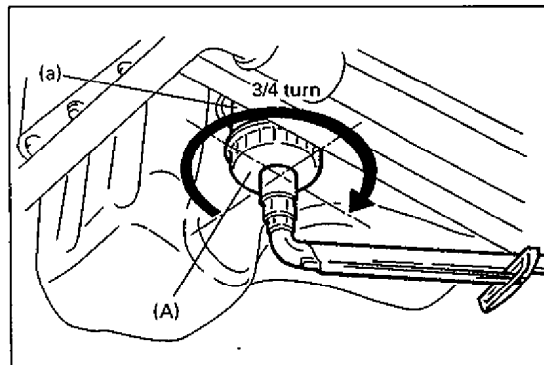
(a): 50 N·m (5.0 kg·m, 36.0 lb·ft)



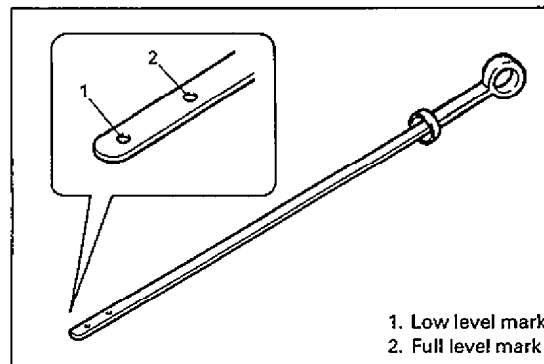
75F00-08-7-1



75F00-08-7-2



75F00-08-7-3



75F00-08-7-4

Engine oil capacity

Oil pan capacity	about 3.2 liters (6.8/5.6 US/Imp pt.)
Oil filter capacity	about 0.2 liters (0.4/0.3 US/Imp pt.)
Others	about 0.1 liters (0.21/0.17 US/Imp pt.)
Total	about 3.5 liters (7.4/6.2 US/Imp pt.)

75F00-08-7-5

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

Special Tool

(A): 09915-47340

- Apply engine oil to new oil filter "O" ring.
- Screw new filter on oil filter stand by hand until filter "O" ring contacts mounting surface.

CAUTION:

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

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

Special Tool

(A): 09915-47340

Tightening Torque

(a): 14 N·m (1.4 kg·m, 10.5 lb·ft)

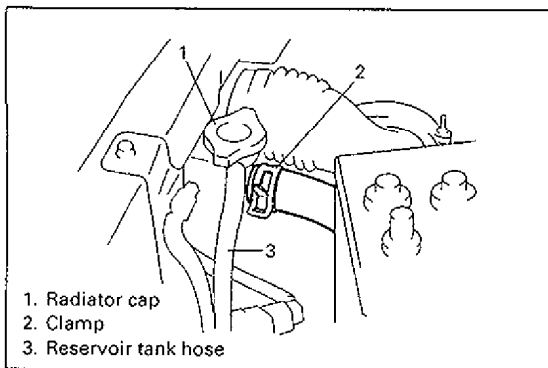
- Replenish oil until oil level is brought to FULL level mark on dipstick. (about 3.2 liters or 6.8/5.6 US/Imp pt.). Filler inlet is at the top of cylinder head cover.
- Start engine and run it for three minutes. Stop it and wait another 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

NOTE:

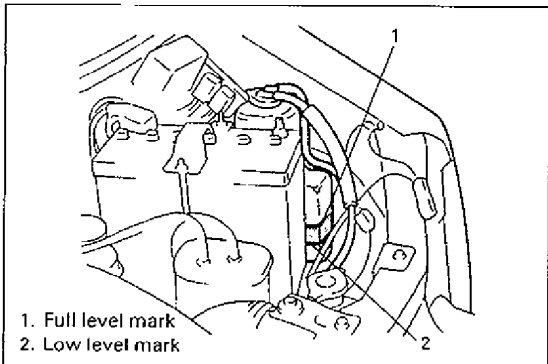
Engine oil capacity is specified as left table.

However, note that amount of oil required when actually changing oil may somewhat differ from data in left table depending on various conditions (temperature, viscosity, etc.).

- Check oil filter and drain plug for oil leakage.



75F00-0B-8-1



75F00-0B-8-2

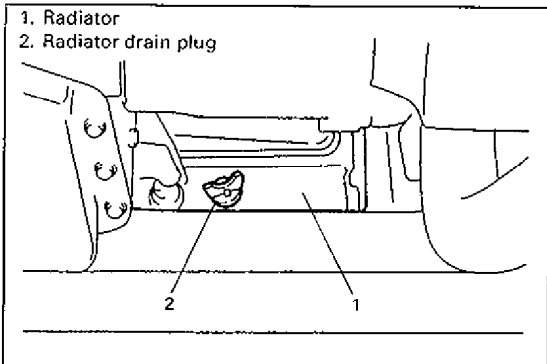
ITEM 1-4**Cooling System, Hoses and Connections Inspection**

- 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.
- 3) Clean frontal area of radiator core.
- 4) Test system and radiator cap for proper pressure holding capacity, 110 kPa (1.1 kg/cm², 15.6 psi).
If replacement cap is needed, use a cap designed for cooling system of this vehicle.
- 5) Check coolant level and concentration.
Add if necessary.
Refer to COOLANT LEVEL of SECTION 6B for procedure of level check.

ITEM 1-5**Engine Coolant Change****WARNING:**

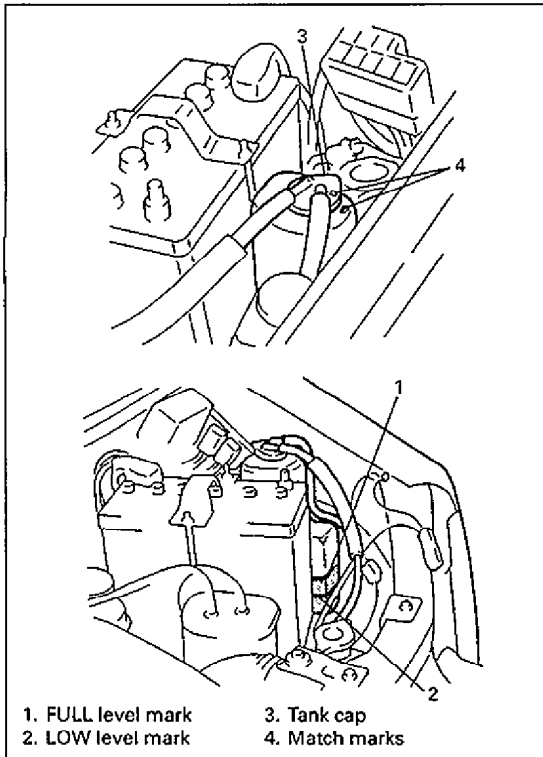
To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

75F00-0B-8-3



75F00-0B-8-4

- 1) Remove radiator cap when engine is cool.
- 2) Loosen radiator drain plug to drain coolant.
- 3) Remove reservoir tank and drain.
- 4) Tighten drain plug securely. Also install reservoir tank.
- 5) Fill radiator with specified amount of coolant, and run engine for 2 or 3 minutes at idle. This drives out any air which may still be trapped within cooling system. STOP ENGINE. Add coolant as necessary until coolant level reaches filler throat of radiator. Reinstall radiator cap.



75F00-0B-9-2

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

CAUTION:

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

Refer to SECTION 6B of this manual for COOLANT CAPACITY.

ITEM 1-6

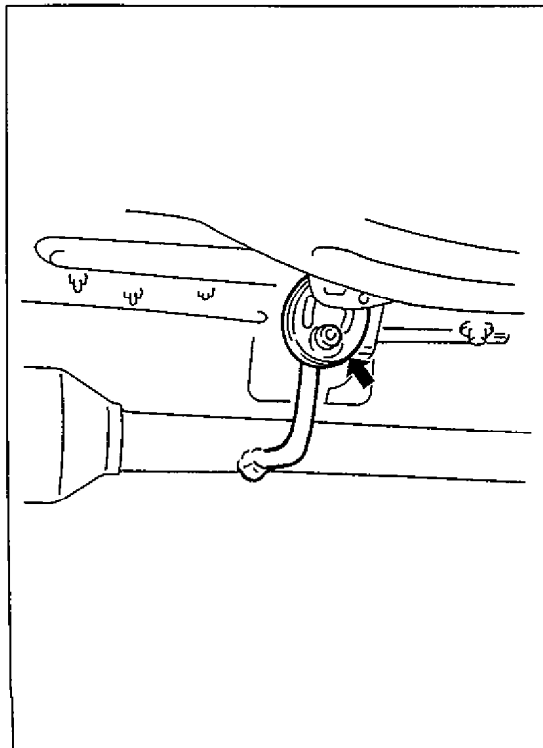
Exhaust System Inspection

WARNING:

To avoid danger of being burned, do not touch exhaust system when it is still hot.

Any service on exhaust system should be performed when it is cool.

75F00-0B-9-3



75F00-0B-9-5

When carrying out periodic maintenance or vehicle is raised for other service, check exhaust system as follows:

- Check rubber mountings for damage and deterioration.
- Check exhaust system for leakage, loose connections, dents, and damages.

If bolts or nuts are loose, tighten them to specification.

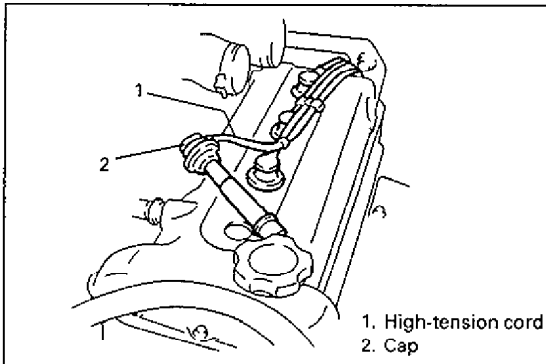
Refer to SECTION 6K for torque specification of bolts and nuts.

- Check nearby body areas for damaged, missing or mispositioned parts, open seams, holes, loose connections or other defects which could permit exhaust fumes to seep into vehicle.
- Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to floor carpet.
- Any defects should be fixed at once.

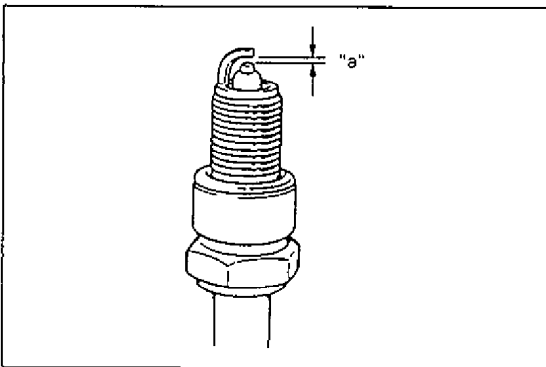
ITEM1-7**Wiring Harness and Connections Inspection**

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

75F00-08-10-1



75F00-08-10-2



75F00-08-10-3

IGNITION SYSTEM**ITEM 2-1****Spark Plugs Inspection and Replacement**

- 1) Remove resonator, air cleaner case and cylinder head upper cover.
- 2) Dust off cylinder head around spark plugs.
- 3) Disconnect high-tension cords at spark plugs.
To avoid inside damage of cords, DO NOT pull on cords for disconnection. Pull on caps.

- 4) Using a spark plug wrench, remove spark plugs.
- 5) Check them for air gap, carbon deposits and insulator damage.
If any abnormality is found, adjust air gap, clean or replace plugs with specified new ones.

Air gap "a": 0.8 – 0.9 mm (0.031 – 0.035 in.)

**Plug type : NGK DCPR7E
DENSO XU22EPR-U**

- 6) Install spark plugs. Tighten plugs to specification.

**Tightening Torque for spark plug:
15 N·m (1.5 kg·m, 10.5 lb·ft)**

- 7) Connect high-tension cords to spark plugs. DO NOT push cords for connection. Push caps.
- 8) Install resonator and air cleaner case.

ITEM 2-2**Distributor Cap and Rotor Inspection**

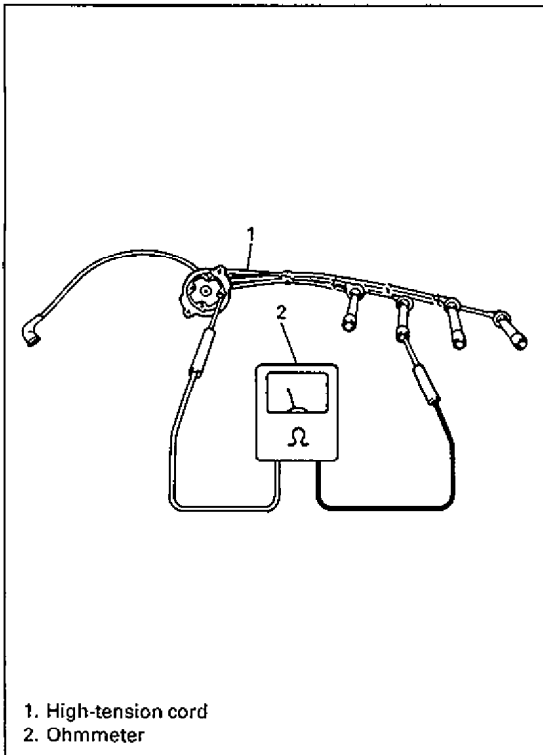
- 1) Remove resonator case.
- 2) Inspect distributor cap and rubber caps for cracks.
- 3) Inspect center electrode and terminals for wear.
- 4) Inspect rotor for cracks, and its electrode for wear.
- 5) Repair or replace as necessary any component which is found to be in malcondition as described above.

NOTE:

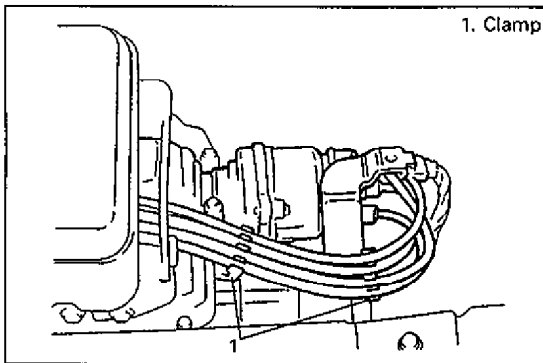
Dust and stains found within distributor can be cleaned by using a dry, soft cloth.

75F00-08-10-4

75F00-08-10-5



75F00-0B-11-2



75F00-0B-11-3

ITEM 2-3**Ignition Wiring (High-tension cord) Inspection**

Check high-tension cords for cracks, connections and resistance. Refer to SECTION 6F1 for resistance data and measuring procedure.

Replace high-tension cords that show evidence of deterioration.

NOTE:

Check to make sure that each of the high-tension cord terminals and connections is secure and fully inserted into its mating component. Any burnt fitting must be replaced.

Replacement

- 1) Disconnect high-tension cords from spark plugs, ignition coil and distributor.
- 2) Connect new high-tension cords and clamp them securely. DO NOT push cords for connection. Push caps.

FUEL SYSTEM**ITEM 3-1****Air Cleaner Element Replacement****NOTE:**

Replace more often under dusty conditions. Ask your dealer for proper replacement interval for your driving conditions.

Replace air cleaner element with new one according to procedure described in SECTION 6A4.

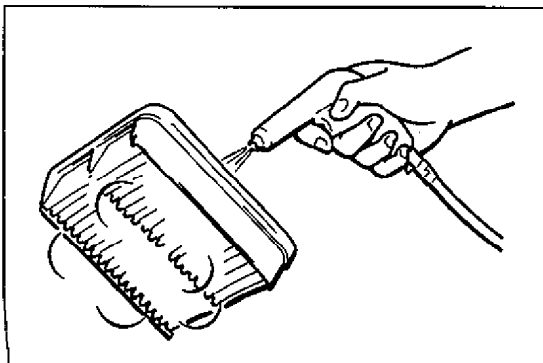
Air Cleaner Element Inspection

- 1) Visually check that air cleaner element is not excessively dirty, damaged or oily.
- 2) Clean element with compressed air from air outlet side of element.

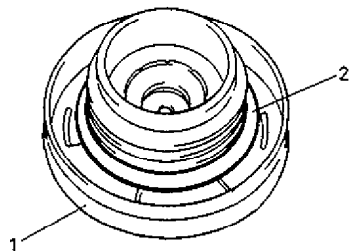
NOTE:

If vehicle is used in dusty area, clean every 2,500 km (1,500 miles) or more frequently.

75F00-0B-11-4



75F00-0B-11-5



1. Fuel filler cap
2. Fuel filler cap gasket

75F00-0B-12-2

ITEM 3-2

Fuel Tank, Cap Gasket and Fuel Lines Inspection

- Check fuel tank, fuel filler cap and fuel lines for loose connection, deterioration or damage which could cause leakage.

Make sure all clamps are secure.

- Check fuel filler cap gasket for an even filler neck imprint or any damage.
 - Replace any damaged or deteriorated parts.
- There should be no sign of fuel leakage or moisture at any fuel connection.

Fuel Tank Cap Replacement

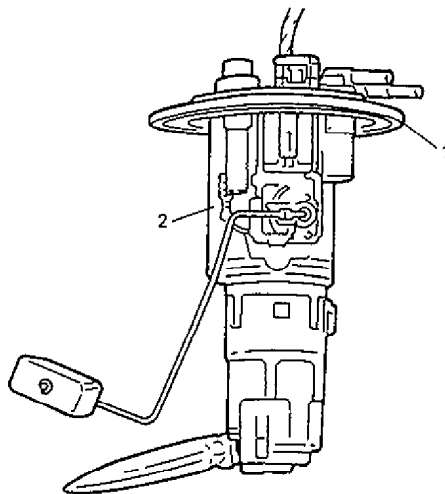
Replace tank cap with new one periodically.

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).

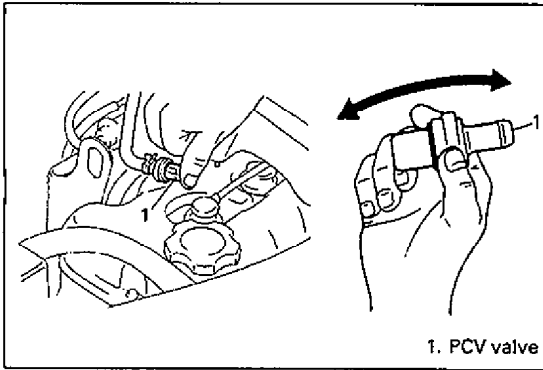


1. Fuel pump assembly
2. Fuel filter

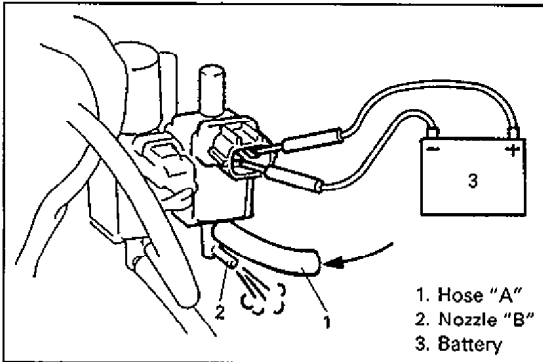
75F00-0B-12-4

Fuel filter is installed in fuel pump assembly.

Replace fuel pump assembly with new one periodically, referring to SECTION 6C for removal and installation.



75F00-0B-13-1



75F00-0B-13-2

EMISSION CONTROL SYSTEM

ITEM 4-1

PCV (Positive Crankcase Ventilation) Valve Inspection

Check crankcase ventilation hoses and PCV hoses for leaks, cracks or clog, and PCV valve for stick or clog. Refer to ON-VEHICLE SERVICE of SECTION 6E1 for PCV valve checking procedure.

ITEM 4-2

EVAP (Evaporative Emission) Canister Inspection (if equipped)

Check EVAP canister. Refer to ON-VEHICLE SERVICE of SECTION 6E1 for procedures to check EVAP canister.

BRAKE

ITEM 5-1

Brake Discs, Pads, Drums and Shoes Inspection

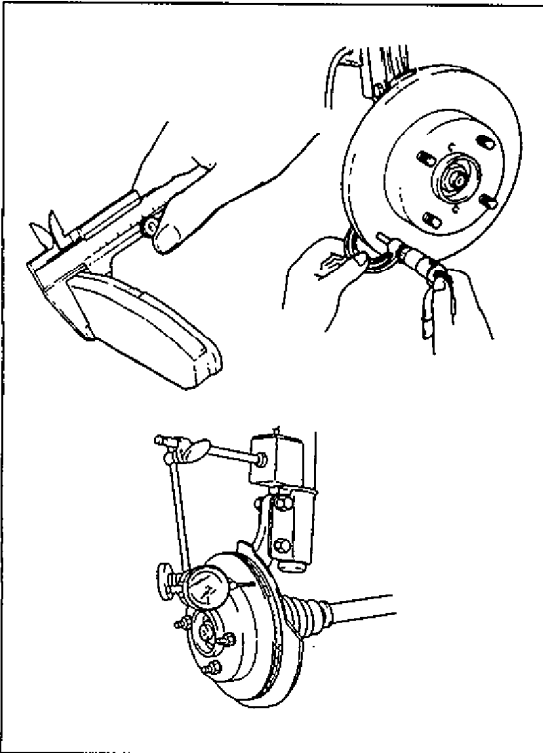
Brake discs and pads

- 1) Remove wheel and caliper but don't disconnect brake hose from caliper.
- 2) Check front disc brake pads and discs for excessive wear, damage and deflection. Replace parts as necessary. For the details, refer to SECTION 5.

Be sure to torque caliper pin bolts to specification.

NOTE:

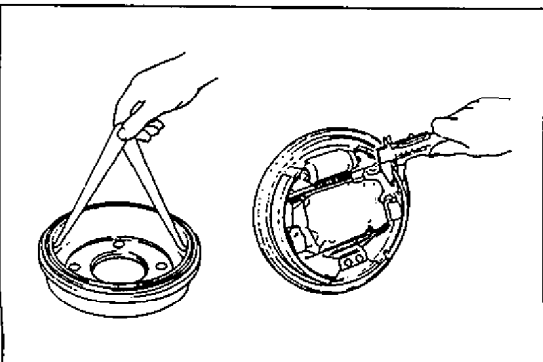
If noise is heard from front brake when brake pedal is depressed, check brake pad lining for wear. If it is worn, both right and left brake pads should be replaced with new ones.



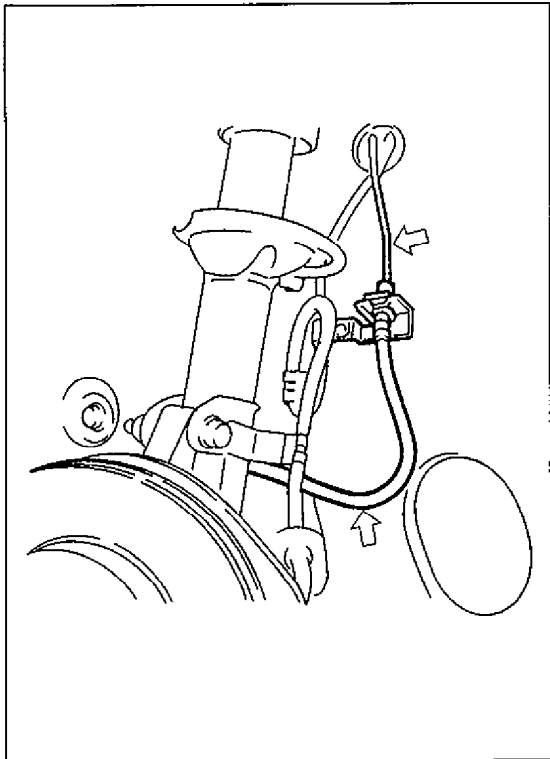
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Brake drums and shoes

- 1) Remove wheel and brake drum.
- 2) Check rear brake drums and brake linings for excessive wear and damage, while wheels and drums are removed. At the same time, check wheel cylinders for leakage. Replace as necessary. For the details, refer to SECTION 5.



75F00-0B-13-5



75F00-0B-14-2

ITEM 5-2**Brake Hoses and Pipes Inspection**

Perform this inspection where there is enough light and use a mirror as necessary.

- Check brake hoses and pipes for proper hook-up, leaks, cracks, chafing, wear, corrosion, bends, twists and other damage.

Replace any of these parts as necessary.

- Check all clamps for tightness and connections for leakage.
- Check that hoses and pipes are clear of sharp edges, moving parts.

CAUTION:

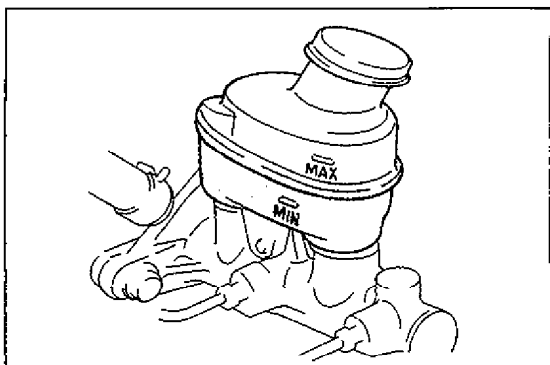
After replacing any brake pipe or hose, be sure to carry out air purge operation.

ITEM 5-3**Brake Fluid Inspection and Change**

[Inspection]

- 1) Check around master cylinder and reservoir for fluid leakage.
If found leaky, correct.

75F00-0B-14-3



75F00-0B-14-4

- 2) Check fluid level.

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.

For the details, refer to ON-VEHICLE SERVICE of SECTION 5.

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.

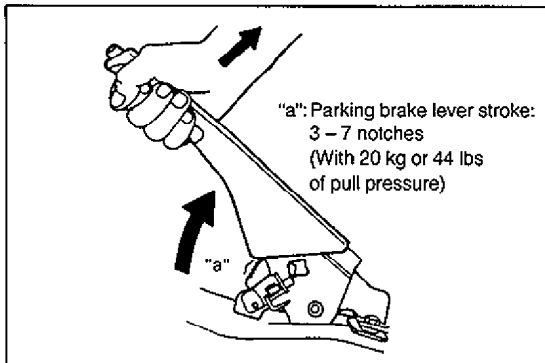
[Change]

Change brake fluid as follows.

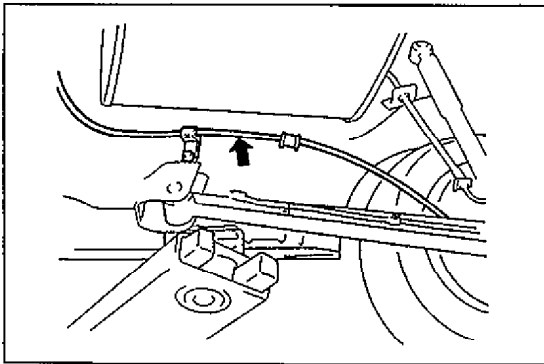
Drain existing fluid from brake system completely, fill system with above recommended fluid and carry out air purge operation.

For air purging procedure, refer to SECTION 5.

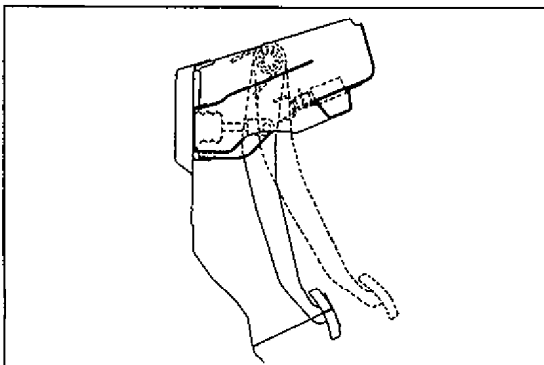
75F00-0B-15-1



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75F00-0B-15-3



75F00-0B-15-4

ITEM 5-4

Brake Lever and Cable Inspection

Parking brake lever

- Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
- Check parking brake lever for proper operation and stroke, and adjust it if necessary.

For checking and adjusting procedures, refer to PARKING BRAKE INSPECTION AND ADJUSTMENT of SECTION 5.

Parking brake cable

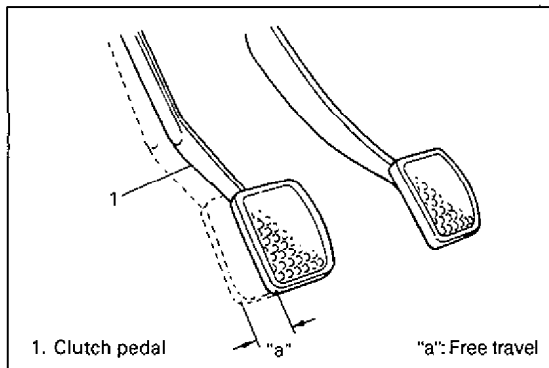
Inspect brake cable for damage and smooth movement. Replace cable if it is in deteriorated condition.

ITEM 5-5

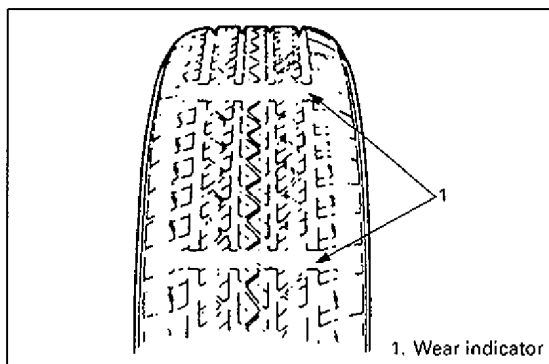
Brake Pedal Inspection

Check brake pedal travel.

For checking procedure, refer to PEDAL TRAVEL CHECK of SECTION 5.



75F00-08-16-1



75F00-08-16-2

CHASSIS AND BODY

ITEM 6-1

Clutch Pedal Free Travel Inspection (Cable type only)

Check clutch pedal free travel. Refer to SECTION 7C for procedure to check and adjust it.

ITEM 6-2

Tire and Wheel Disc Inspection

[Tire inspection]

- 1) Check tire for uneven or excessive wear, or damage. If defective, replace.

- 2) Check inflating pressure of each tire and adjust pressure to specification as necessary.

NOTE:

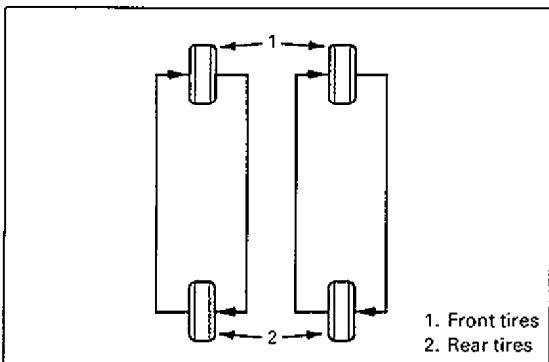
- Tire inflation pressure should be checked when tires are cool.
- Specified tire inflation pressure should be found on tire placard or in owner's manual which came with vehicle.

[Wheel disc inspection]

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

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75F00-08-16-4

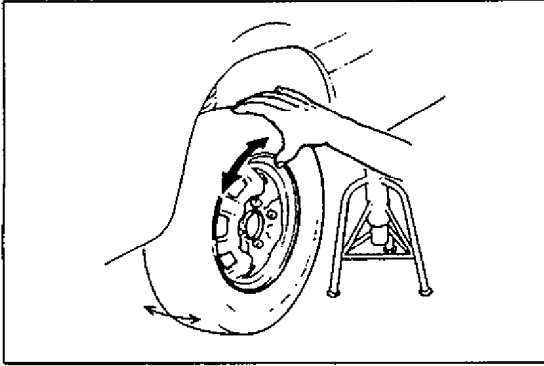


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[Tire rotation]

Rotate tires.

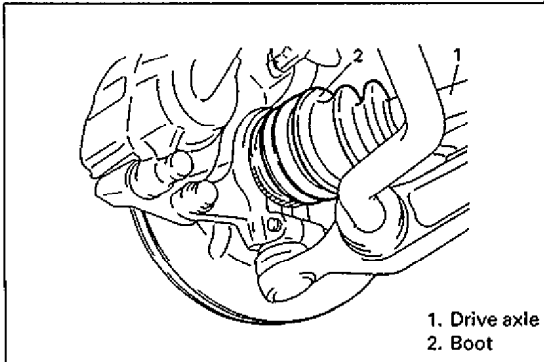
For details of the steps, refer to SECTION 3F.



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[Wheel Bearing Inspection]

- 1) Check front wheel bearing for wear, damage, abnormal noise or rattles. For details, refer to FRONT SUSPENSION INSPECTION of SECTION 3D.
- 2) Check rear wheel bearing for wear, damage abnormal noise or rattle. For details, refer to REAR SUSPENSION INSPECTION of SECTION 3E.

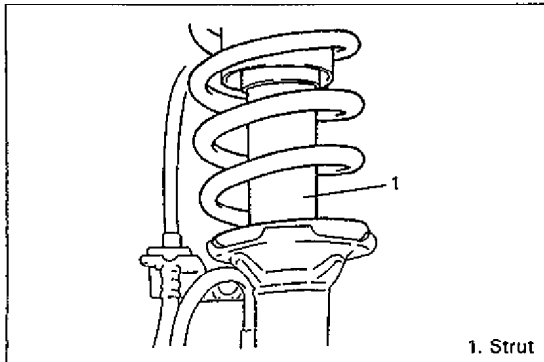


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ITEM 6-3**Drive Axle Boot Inspection**

Check drive axle boots (wheel side and differential side) for leakage, detachment, tear or any other damage.

Replace boot as necessary.

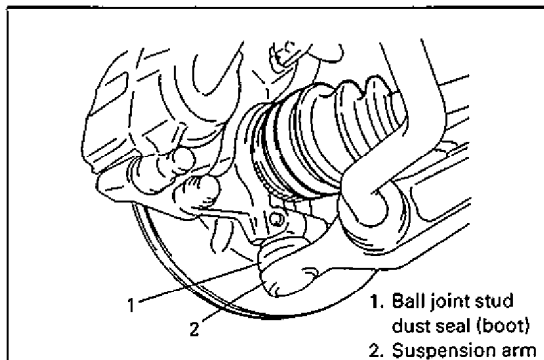


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ITEM 6-4**Suspension System Inspection**

- Inspect front & rear struts for evidence of oil leakage, dents or any other damage on sleeves; and inspect anchor ends for deterioration.

Replace defective parts, if any.



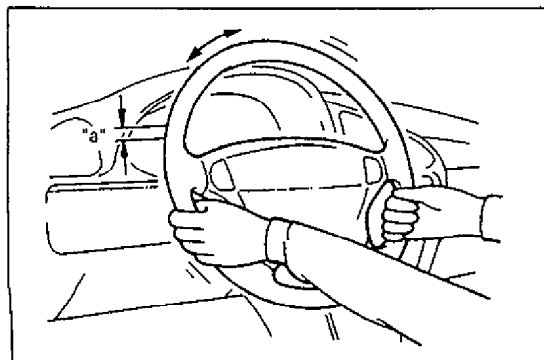
75F00-0B-17-4

- Check front and rear suspension systems for damaged, loose or missing parts; also for parts showing signs of wear or lack of lubrication.

Repair or replace defective parts, if any.

- Check front suspension arm ball joint stud dust seals for leakage, detachment, tear or any other damage.

Replace defective boot, if any.



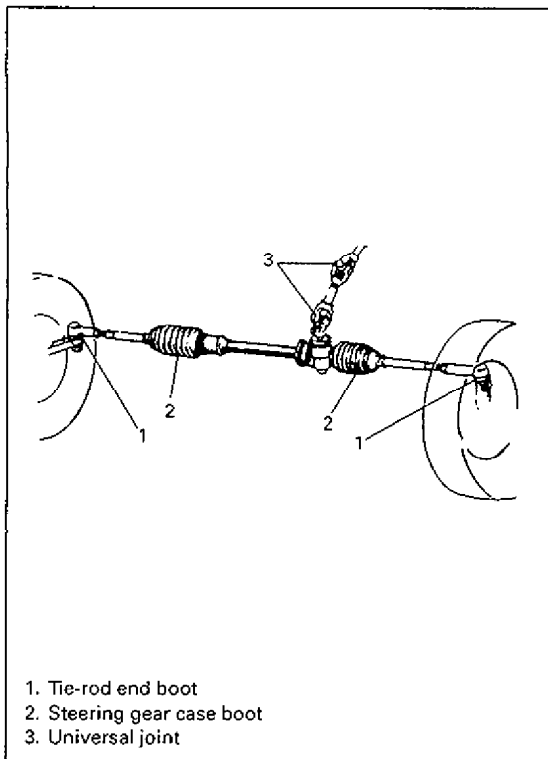
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ITEM 6-5**Steering System Inspection**

- 1) Check steering wheel for play and rattle, holding vehicle straight on ground.

Steering wheel play "a": 0 – 30 mm (0 – 1.1 in.)

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



75F00-0B-18-2

- 3) Check steering linkage for looseness and damage. Repair or replace defective parts, if any.
- 4) Check boots of steering linkage and steering gear case for damage (leaks, detachment, tear, etc.). If damage is found, replace defective boot with new one.
- 5) Check universal joints of steering shaft for rattle and damage. If rattle or damage is found, replace defective part with a new one.
- 6) Check that steering wheel can be turned fully to the right and left. Repair or replace defective parts, if any.
- 7) If equipped with power steering system, check also, in addition to above check items, that steering wheel can be turned fully to the right and left more lightly when engine is running at idle speed than when it is stopped. Repair, if found faulty.
- 8) Check wheel alignment.

NOTE:

For the details of wheel alignment, refer to WHEEL ALIGNMENT (page 3A-1) of SECTION 3A.

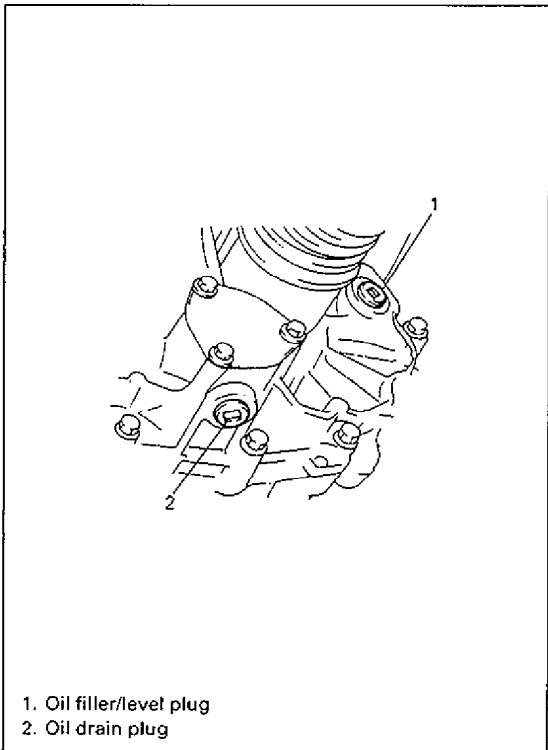
ITEM 6-6**Manual Transmission Oil Inspection and Change****[Inspection]**

- 1) Inspect transmission case for evidence of oil leakage. Repair leaky point if any.
- 2) Make sure that vehicle is placed level for oil level check.
- 3) Remove level plug of transmission.
- 4) Check oil level.

Oil level can be checked roughly by means of filler/level plug hole. That is, if oil flows out of level plug hole or if oil level is found up to hole when level plug is removed, oil is properly filled.

If oil is found insufficient, pour specified oil up to level hole. For specified oil, refer to description of oil change under ON-VEHICLE SERVICE in SECTION 7A.

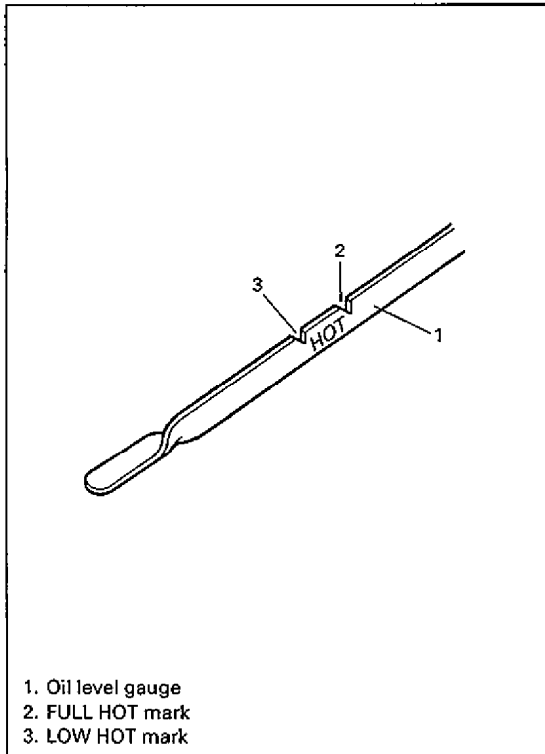
- 5) Tighten level plug to specified torque.



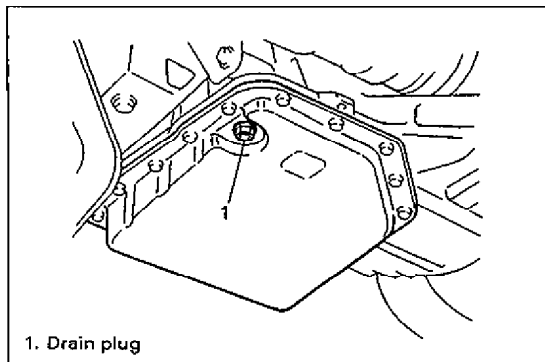
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[Change]

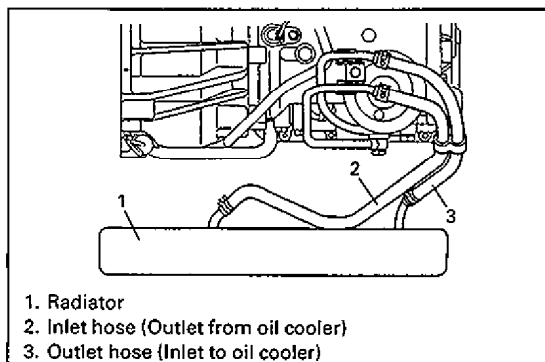
- 1) Place the vehicle level and drain oil by removing drain plug.
 - 2) Apply sealant to drain plug and tighten drain plug to specified torque.
 - 3) Pour specified oil up to level hole.
 - 4) Tighten filler plug to specified torque.
- For recommended oil, its amount and tightening torque data, refer to ON-VEHICLE SERVICE of SECTION 7A.



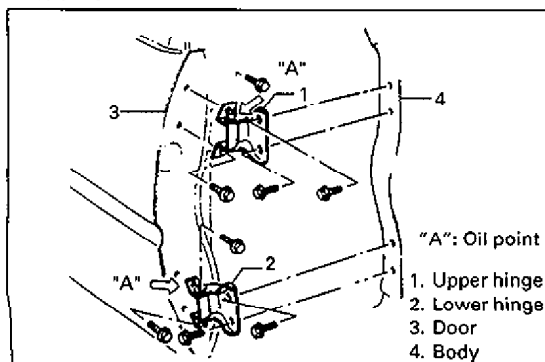
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75F00-0B-19-3



75F00-0B-19-4



75F00-0B-19-5

ITEM 6-7**Automatic Transmission**

[Fluid level inspection]

- 1) Inspect transmission case for evidence of fluid leakage.
Repair leaky point, if any.
- 2) Make sure that vehicle is placed level for fluid level check.
- 3) Check fluid level.

For fluid level checking procedure, refer to ON-VEHICLE SERVICE in SECTION 7B1 and be sure to perform it under specified conditions. If fluid level is low, replenish specified fluid.

[Fluid change]

- 1) Perform steps 1) and 2) of above Fluid Level inspection.
- 2) Change fluid. For its procedure, refer to ON-VEHICLE SERVICE in SECTION 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.

ITEM 6-8**Door Hinges, Gear Shift Control Lever and Shaft/Cables Inspection**

Check that doors and gear shift control lever move smoothly without abnormal noise.

If defective, lubricate as follows.

Wipe off dirt of door hinges and apply a thin coat of engine oil. Open and close door several times to insure that oil has worked in effectively.

Lubricate lever seat and bushings with water resistant chassis grease.

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.

Engine Hood Latch

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.

Doors

Check that each door opens and closes smoothly and locks securely when closed.

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.

Check that seat belt is securely locked.

Battery Electrolyte Level Check

Check that the electrolyte level of all battery cells is between the upper and lower level lines on the case. If battery is equipped with built-in indicator, check battery condition by the indicator.

Accelerator Pedal Operation

Check that pedal operates smoothly without getting caught or interfered by and other part.

Engine Start

Check engine start for readiness.

WARNING:

Before performing the following check, be sure to have enough room around the vehicle. Then, firmly apply both the parking brake and the regular brakes. Do not use the accelerator pedal. If the engine starts, be ready to turn off the ignition promptly. Take these precautions because the car could move without warning and possibly cause personal injury or property damage.

On automatic transmission vehicles, try to start the engine in each gear. The starter should crank only in "P" (Park) or "N" (Neutral).

On manual transmission vehicles, place the shift lever in "Neutral," push the clutch halfway and try to start. The starter should crank only when the clutch is fully depressed.

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 recommendation	SE, SF, SG, SH or SJ (Refer to engine oil viscosity chart in item 1-3.)
Engine coolant (long life coolant)	Ethylene-glycol base coolant ("Antifreeze/Anticorrosion coolant")
Brake fluid	Refer to reservoir tank cap or owner's manual
Manual transmission oil	See oil chart on SECTION 7A
Automatic transmission fluid	4-speed A/T: An equivalent of DEXRON®-III, DEXRON®-IIE or DEXRON®-II
Power steering fluid	See material table on SECTION 3B4
Gear shift control lever and shaft/cables	Water resistance chassis grease (SUZUKI SUPER GREASE A 99000-25010)
Door hinges	Engine oil
Engine hood latch	Engine oil
Key lock cylinder	Spray lubricant

SECTION 1A

HEATER AND VENTILATION

1A

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

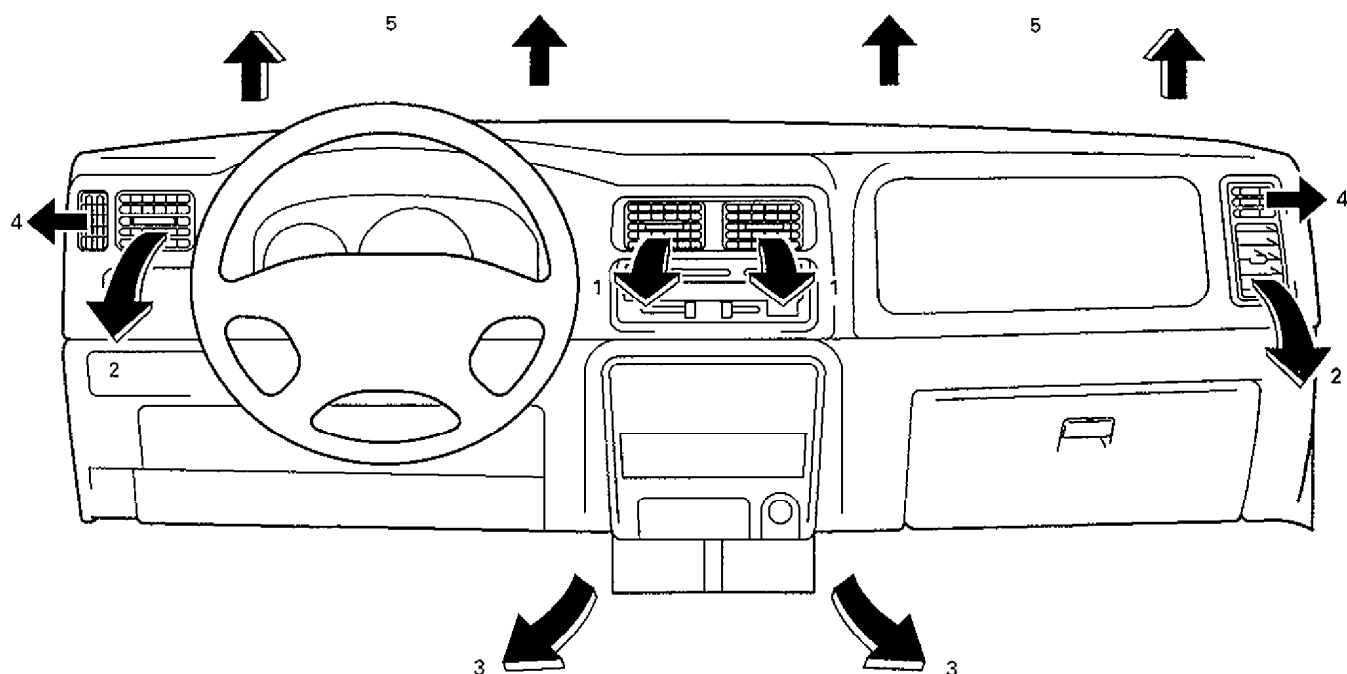
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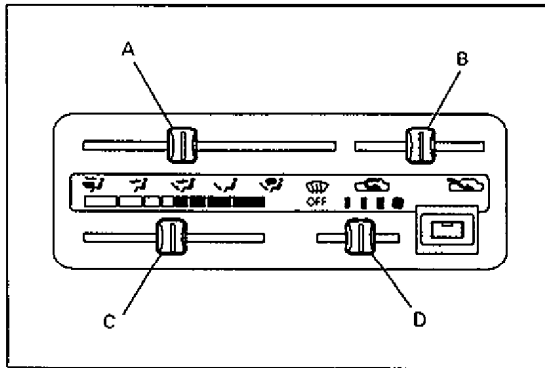
GENERAL DESCRIPTION

HEATER

The heater and ventilation of this vehicle consist of such main components as control levers, blower motor, heater core and air ducts. The blower motor runs on electricity to send air inside. In the heater core, the cooling water warmed by the engine keeps circulating. Each control lever controls the blower motor speed, temperature and operation of the dampers in the air ducts so that the air is delivered where necessary.



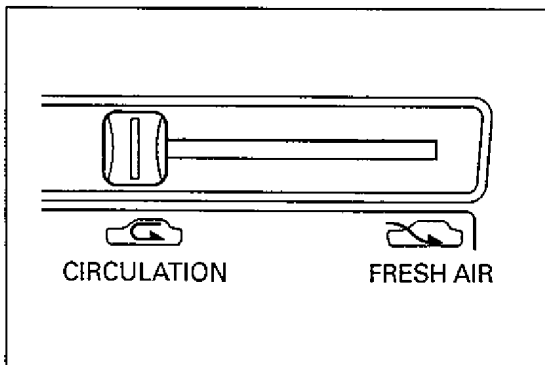
- 1. Center outlet
- 2. Side outlet
- 3. Floor outlet
- 4. Side demister
- 5. Defroster



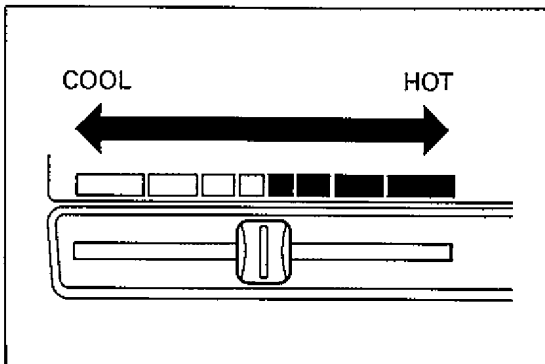
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	VENTILATION/DEFROSTER (1)
	VENTILATION (2)
	BI-LEVEL (3)
	HEAT (4)
	HEAT/DEFROSTER (5)
	DEFROSTER (6)

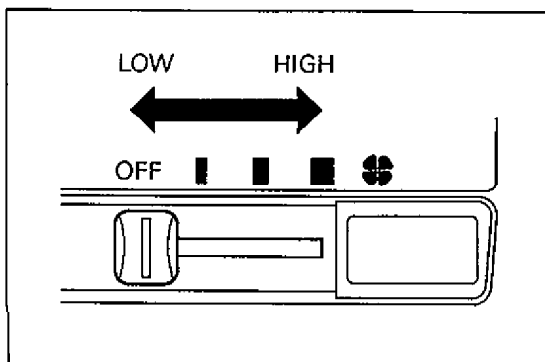
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75F00-1A-3-3



75F00-1A-3-4



75F00-1A-3-5

HEATER CONTROL OPERATION

- A: Air control lever
 B: Fresh air control lever
 C: Temperature control lever
 D: Blower motor speed selection lever

A: Air control lever

- (1) Air flows from center, side, front defroster and side demister.
- (2) Air flows from center and side outlets.
- (3) Air flows from center, side and floor outlets.
- (4) Air flows from floor outlets.
- (5) Air flows from floor outlet, front defroster and side demister outlets.
- (6) Air flows from front defroster and side demister outlet.

B: Fresh air control lever

C: Temperature control lever

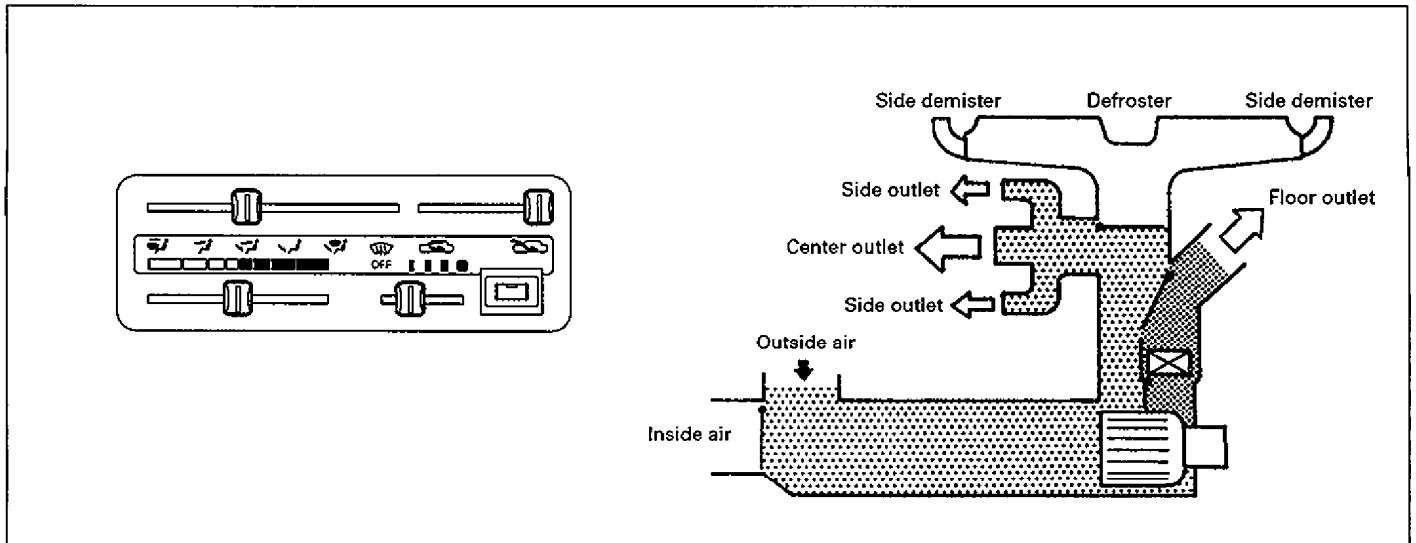
D: Blower motor speed selection lever

The diagram illustrates the climate control system. On the left is a control panel with four sliders, a row of buttons (including 'OFF'), and a fan speed dial. On the right is a schematic of the air distribution system. It shows 'Outside air' and 'Inside air' entering from the bottom left. The air flows through a blower (represented by a fan icon) and is then distributed through a network of ducts. The distribution points are labeled: 'Side outlet', 'Center outlet', 'Side outlet', 'Floor outlet', 'Defroster', and 'Side demister' (two locations). Arrows indicate the direction of airflow from the blower to each outlet.

The diagram on the left shows the control panel with various sliders and buttons for climate control. The diagram on the right shows the air distribution system with outlets for Side demister, Defroster, Side outlet, Center outlet, and Floor outlet. It also indicates the flow of Outside air and Inside air.

The diagram illustrates the climate control system. On the left is the control panel, which includes two temperature sliders, a fan speed control with icons for fan settings and an 'OFF' position, and a mode selector with icons for different air distribution patterns. On the right is a schematic of the car's interior showing the air distribution layout. Labels indicate the 'Side demister', 'Defroster', and 'Side demister' at the top. Below these are the 'Side outlet', 'Center outlet', and 'Side outlet'. At the bottom right, the 'Floor outlet' is shown with an arrow pointing towards the footwell. The 'Outside air' intake is located at the bottom left, and the 'Inside air' intake is indicated by an arrow pointing into the system. The air filter is shown as a rectangular unit with a pleated filter element.

HEAD-COOLED/FEET-WARMED HEATING



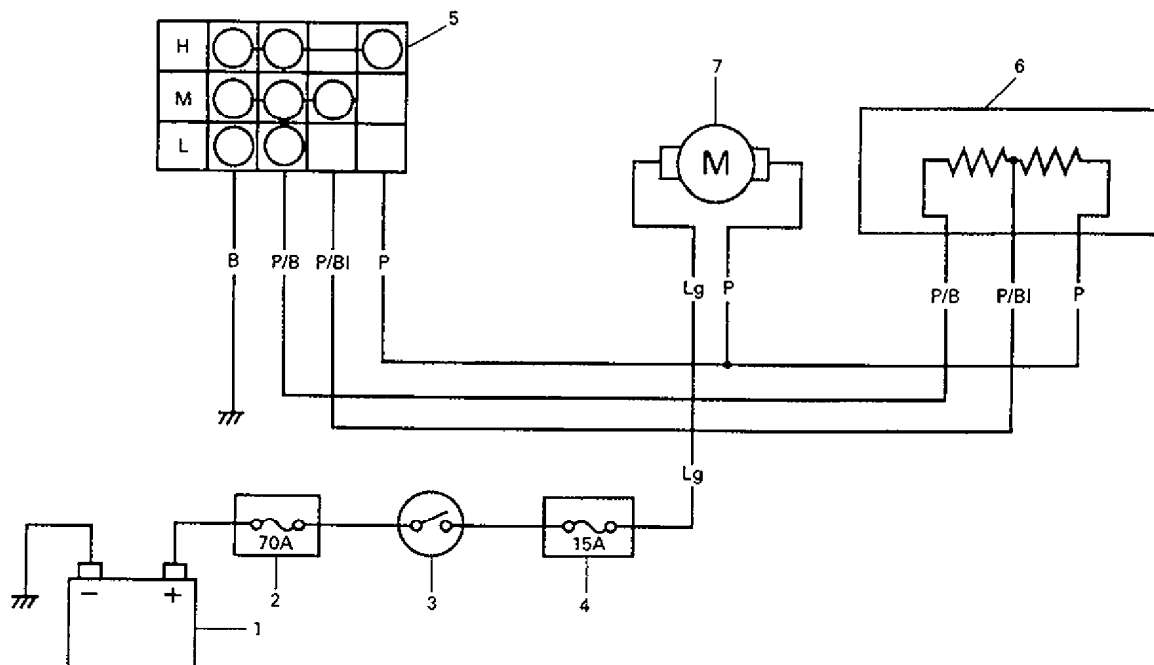
75F00-1A-5-2

DIAGNOSIS

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 continuity. 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.

ON VEHICLE SERVICE

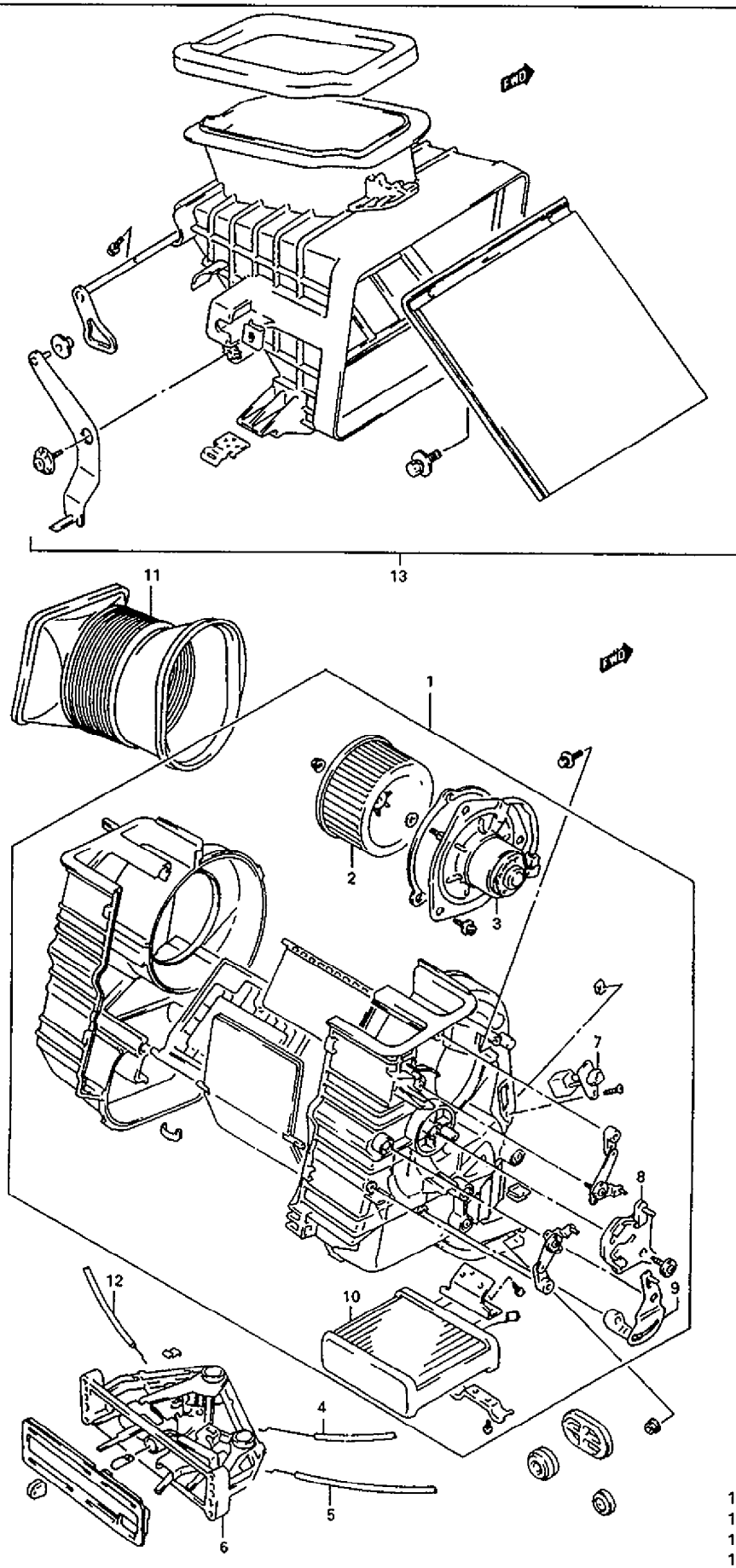
WIRING CIRCUIT



1. Battery
2. Main fuse
3. Ignition switch
4. J/B
5. Heater blower switch
6. Heater resistor
7. Blower motor

- B :Black
 Lg :Light green
 P :Pink
 P/B :Pink/Black
 P/BI :Pink/Blue

HEATER UNIT



1. Heater unit assembly
2. Blower fan
3. Fan motor
4. Air control cable
5. Temperature control cable
6. Heater control lever assembly
7. Resistor
8. Mode link
9. Air mix link
10. Heater core
11. Air duct assembly
12. Fresh air control cable
13. Air damper case

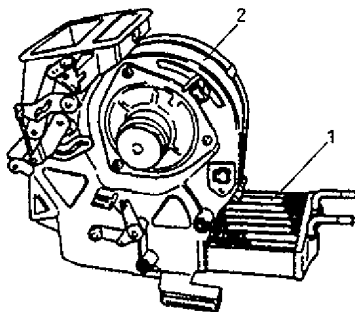
REMOVAL

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) module, 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) module wipe off immediately with a dry cloth.

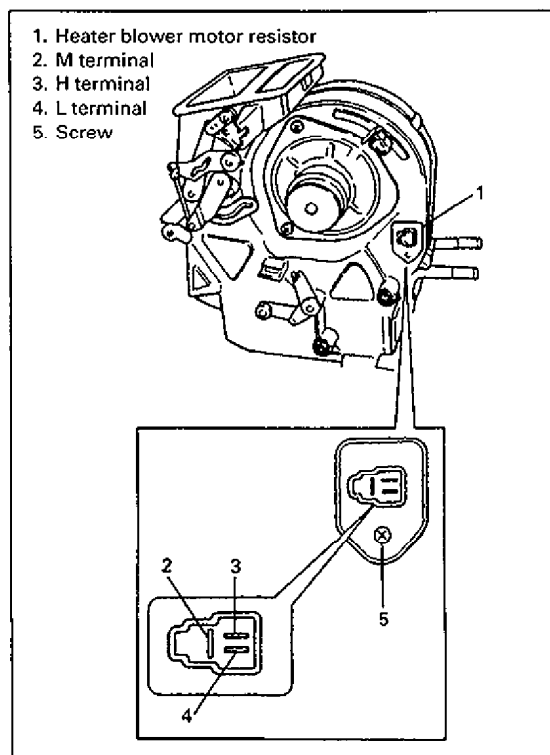
- 1) Disconnect negative (-) cable at battery.
- 2) Drain engine coolant and disconnect water hoses from heater unit in engine room.
- 3) If equipped with air bag system, disable air bag system. Refer to "Disabling Air Bag System" in Section 3C1.
- 4) Remove instrument panel, refer to "Instrument Panel" in Section 9.
- 5) Remove steering support member.
- 6) Disconnect blower motor and resistor lead wires at coupler.
- 7) Remove air damper case.
- 8) Remove air duct or evaporator unit (equipped with A/C system)
- 9) Remove heater unit.
- 10) Pull out heater core from unit.



1. Heater core
2. Heater 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 Section 3C1 "Steering Column".
- 2) Adjust control cables. (Refer to "Heater Control Cables" in this section.)
- 3) Fill engine coolant to radiator.
- 4) If equipped with air bag system, enable air bag system. Refer to "Enabling Air Bag System" in Section 3C1.



75F00-1A-9-4

HEATER BLOWER MOTOR RESISTOR

REMOVAL

- 1) Disconnect battery (-) cable at battery.
- 2) Disconnect blower motor resistor lead wire at coupler.
- 3) Remove heater blower motor resistor.

INSPECTION

Measure the resistor for each terminal-to-terminal resistance.

For left hand steering vehicle

Terminal-to-terminal	Resistance (Ω)
H-M	0.53
H-L	2.18
M-L	1.65

For right hand steering vehicle

Terminal-to-terminal	Resistance (Ω)
H-M	0.65
H-L	2.60
M-L	1.95

If the measured resistor is incorrect, replace the heater blower resistor.

INSTALLATION

Reverse removal procedure for installation.

HEATER BLOWER MOTOR SWITCH

REMOVAL

- 1) Remove control lever knobs.
- 2) Remove control panel.
- 3) Remove control lever assembly.

INSPECTION

Check switch for each terminal-to-terminal continuity. If there is no continuity, replace control lever assembly.

	B	P/B	P/BI	P
H				
M				
L				

B : Black

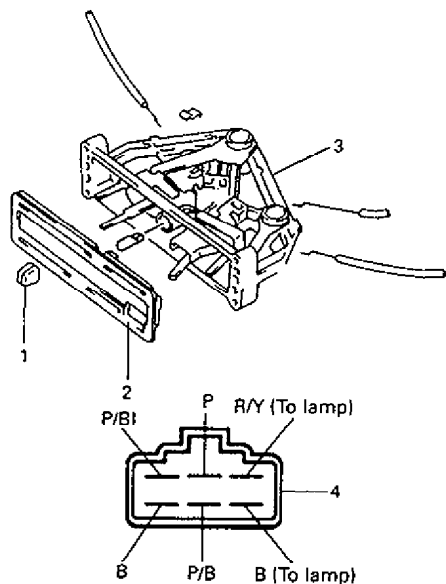
P : Pink

P/B : Pink/Black

P/BI : Pink/Blue

INSTALLATION

Reverse removal procedure for installation.



1. Control lever knob
2. Control panel
3. Control lever assembly
4. Heater blower motor switch connector

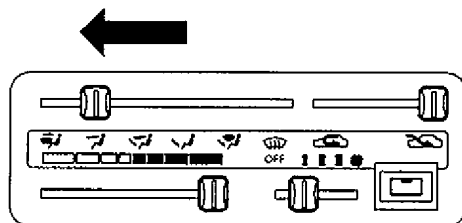
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HEATER CONTROL CABLES

ADJUSTMENT

Air control cable

- 1) Set control lever to ventilation/defroster position.



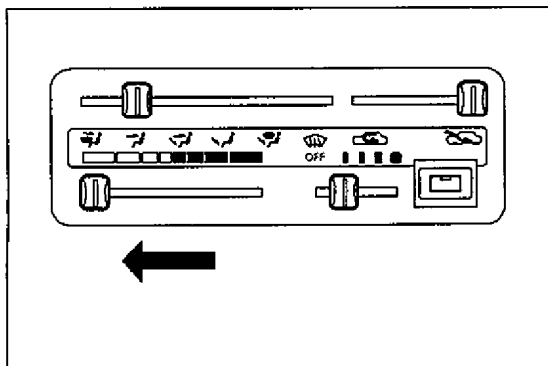
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- 2) Push lever and link in arrow directions fully as shown in figure and fix cable there.



1. Air control cable
2. Mode link

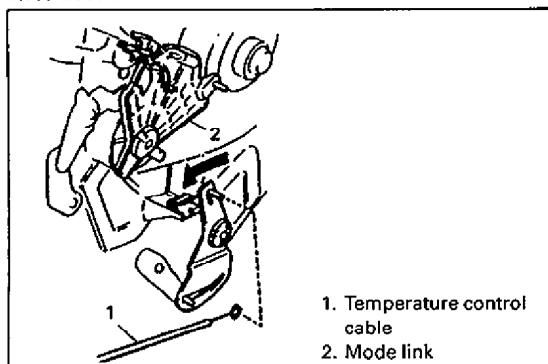
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75F00-1A-11-1

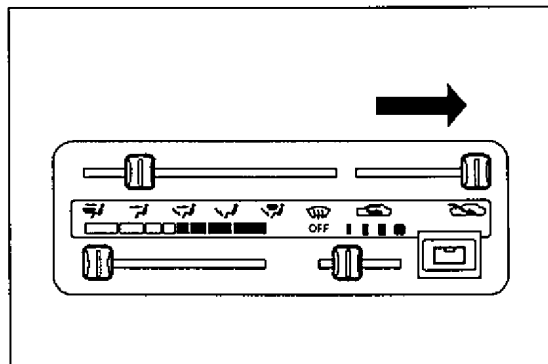
Temperature control cable

1) Set control lever to "COOL" position.



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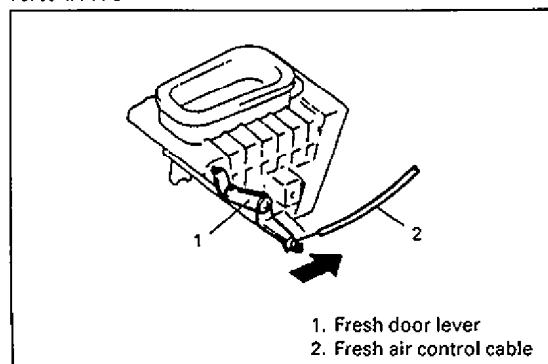
2) Push lever and link in arrow direction fully as shown in left figure and fix cable there.



75F00-1A-11-3

Fresh air control cable

1) Set control lever to "FRESH AIR" position.



75F00-1A-11-4

2) Push lever in arrow direction fully as shown in left figure and fix cable there.

SECTION 1B

AIR CONDITIONING (OPTIONAL)

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

1B

CAUTION:

The air conditioning system of this model 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.

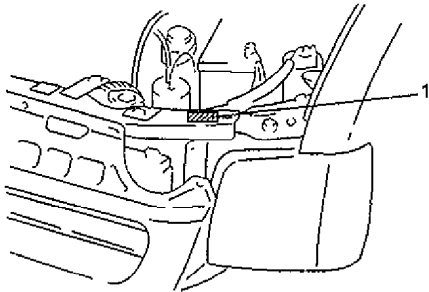
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is packed with air conditioning parts.		Performance Test	1B-19
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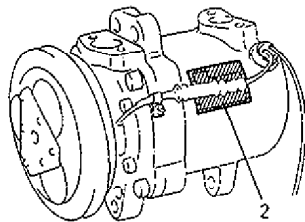
GENERAL DESCRIPTION

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

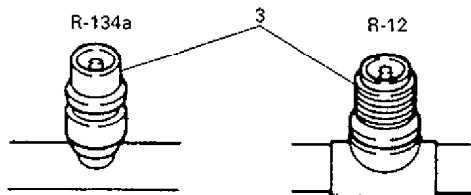
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1. A/C caution plate



2. Compressor label

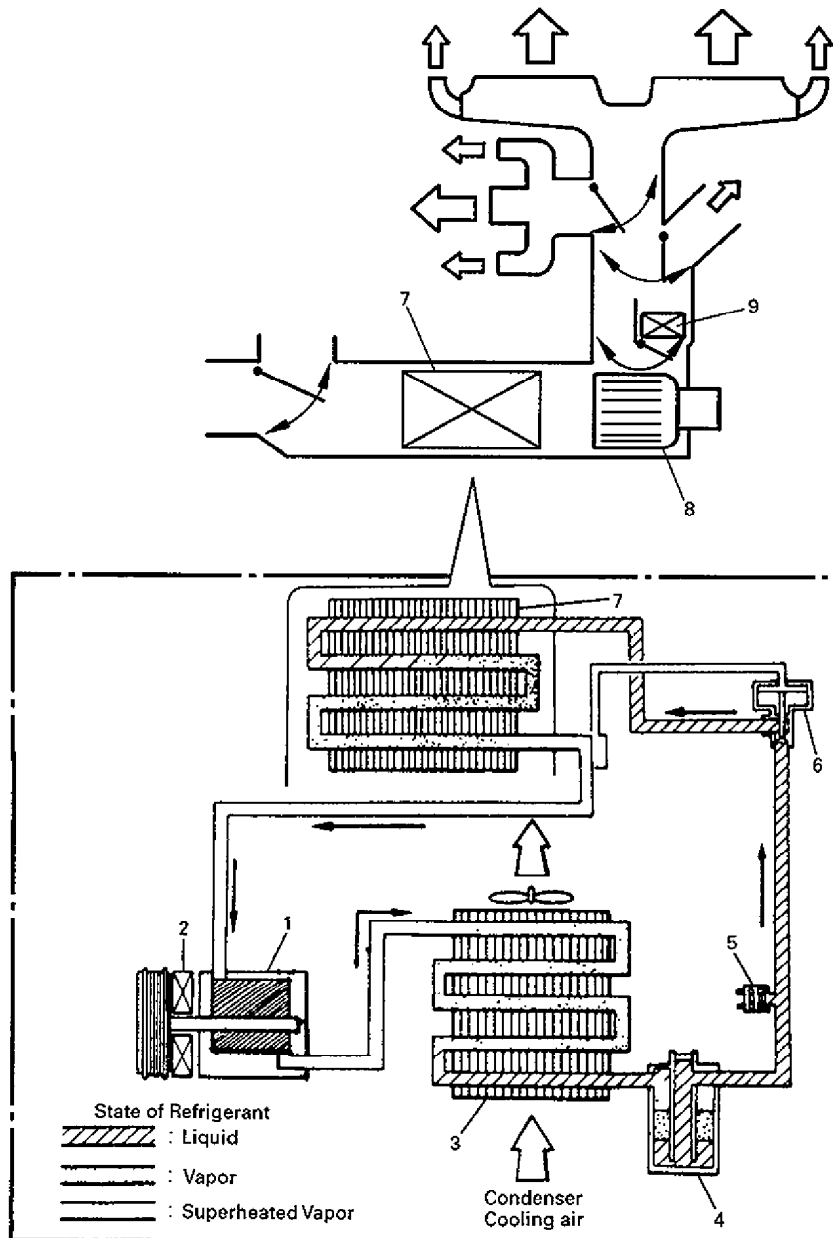


3. Service valve

75F00-1B-2-4

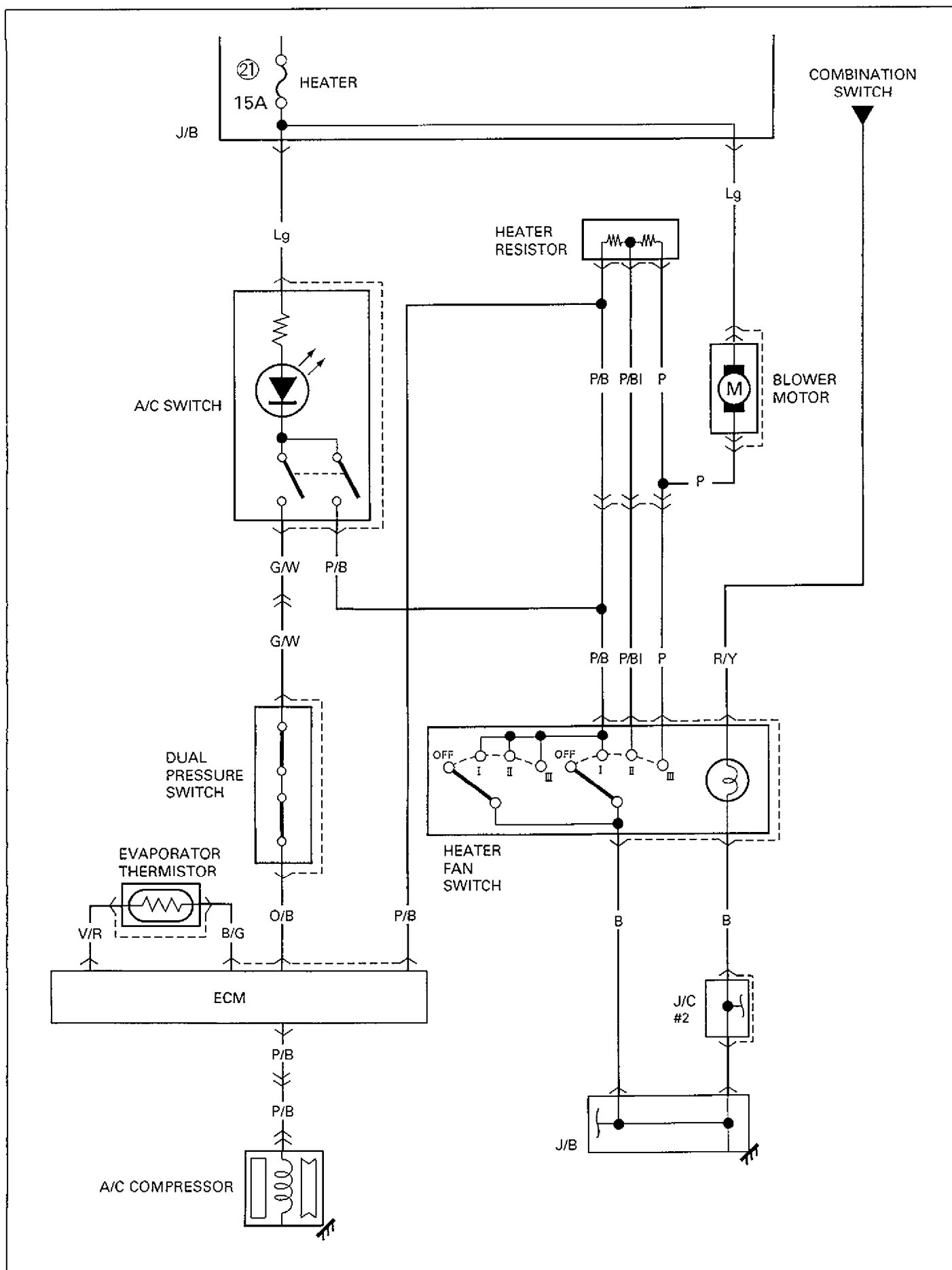
Whether the A/C in the vehicle being serviced uses R-134a or R-12 is indicated on A/C CAUTION PLATE attached on the hood lock member or LABEL on the compressor. Also, it can be checked by the shape of the service (charge) valve.

MAJOR COMPONENTS AND REFRIGERANT FLOW OF AIR CONDITIONING SYSTEM



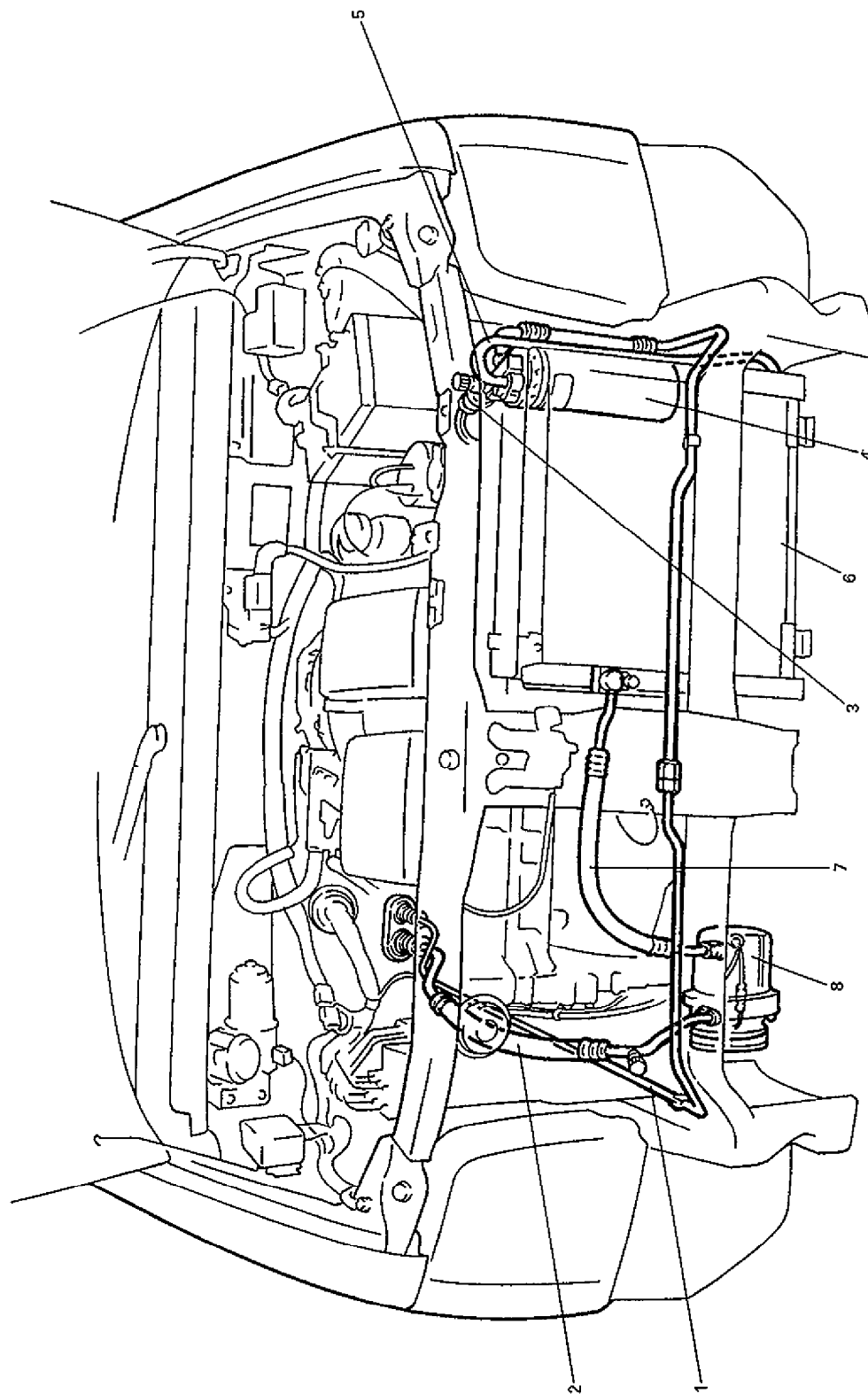
1. Compressor
2. Magnet clutch
3. Condenser
4. Receiver/dryer
5. Dual pressure switch
6. Expansion valve
7. Evaporator
8. Blower motor
9. Heater core

WIRING CIRCUIT



COMPONENT LOCATION IN ENGINE ROOM

LH Steering vehicle shown



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

INSTALLATION OF AIR CONDITIONING COMPONENTS

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. And, when installing air conditioner, you have to use covers for protection of fender and seat.

PRECAUTION FOR INSTALLATION

- 1) Negative (-) cable should 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.

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.

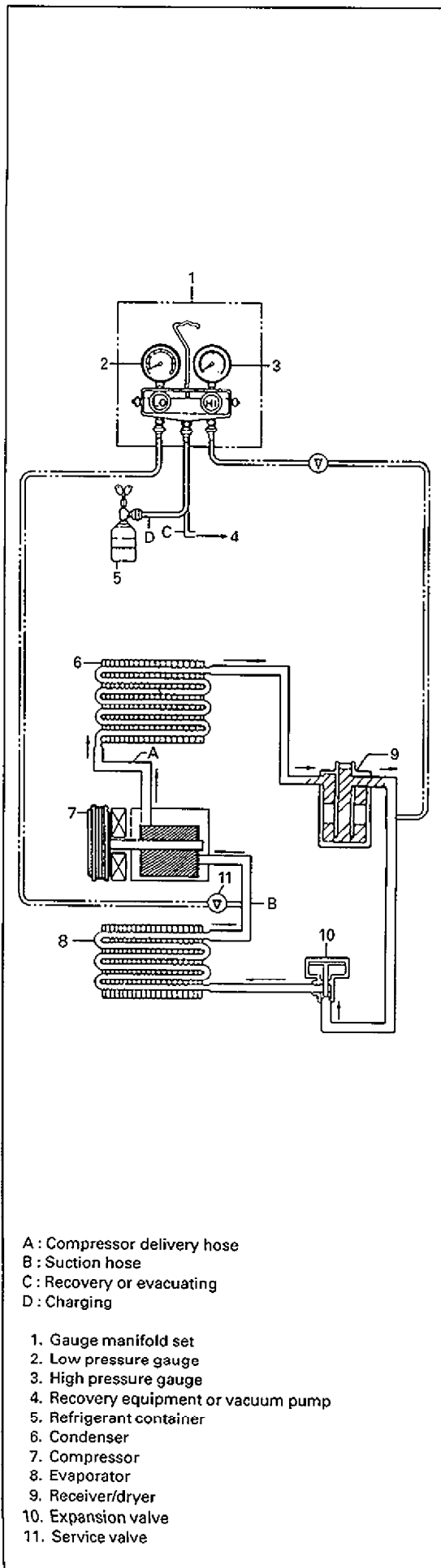
NOTE:

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.

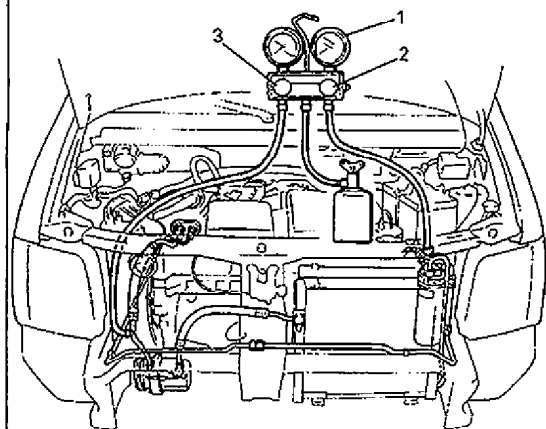
WARNING:

- 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:

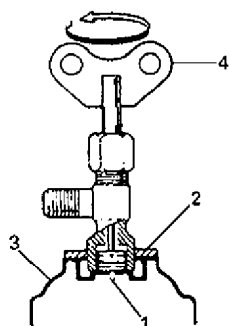
- ALWAYS CHARGE THROUGH LOW-SIDE of A/C system.
- NEVER CONNECT ON HIGH-SIDE of A/C system.
- Do not charge while compressor is hot.
- When installing tap valve to refrigerant container to make a hole therethrough, carefully follow directions given by manufacturer.
- A pressure gauge should always be 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



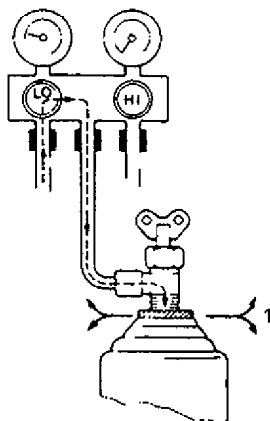
1. Manifold gauge set
2. High pressure side (Delivery side hose)
3. Low pressure side (Suction side hose)

75F00-1B-9-1



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

75F00-1B-9-3



1. "Hiss"

75F00-1B-9-5

PROCEDURE OF CHARGING

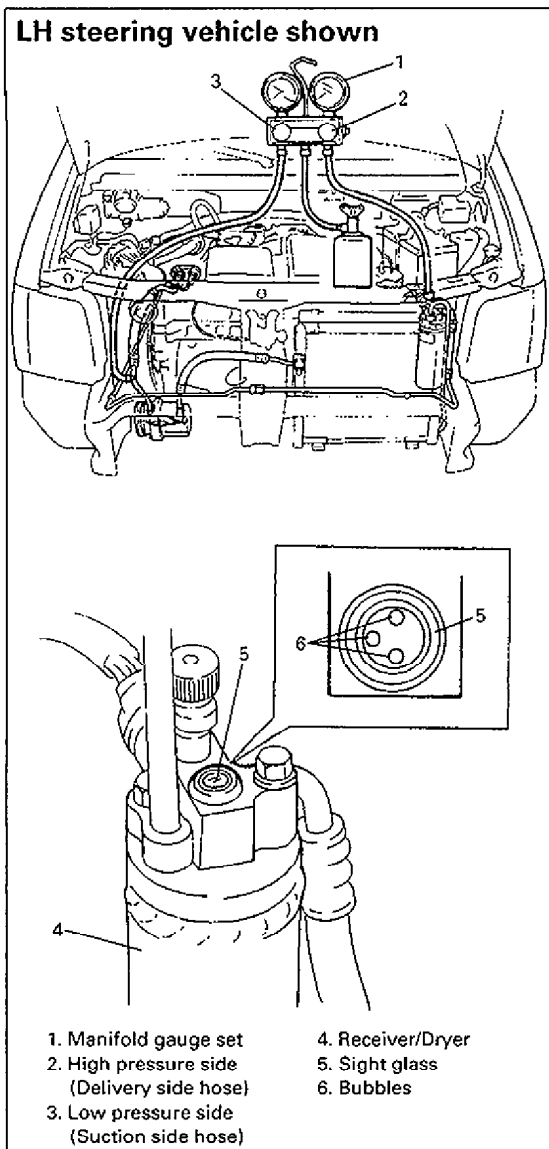
- 1) Make sure that hoses are routed properly after evacuating the system (see left figure).
- 2) Connect the manifold gauge set in position. Thus open refrigerant container valve to purge the charging line. Then open the low pressure-side valve.

WARNING:

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

- 3) Start engine and keep engine speed at 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.

- 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.



75F00-1B-10-3

- 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/cm², 29 – 43 psi)

High pressure gauge when charged with specified amount
 About 1370 – 1670 kPa (14 – 17 kg/cm², 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.

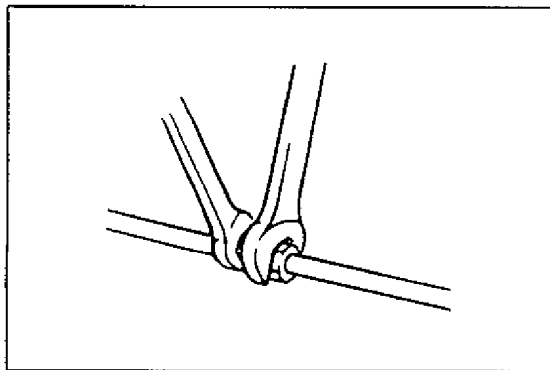
WARNING:

**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.

75F00-1B-10-4

75F00-1B-10-5



75F00-1B-11-1

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.

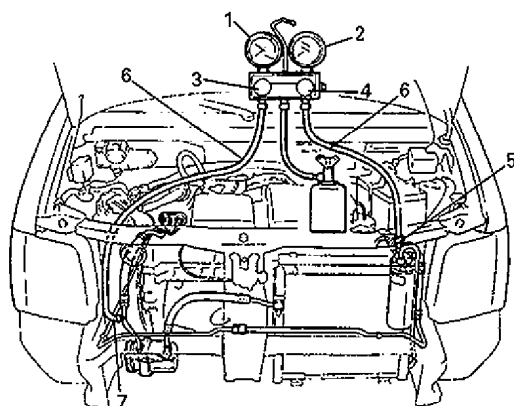
For confined areas, such as sections of the evaporator and condenser, an electronic (gas) leak detector is more practical for determining leaks.

75F00-1B-11-2

DIAGNOSIS

Condition	Possible Cause	Correction
No cooling or warm air.	● Magnetic clutch does not engage properly a) Fuse blown b) Magnet clutch faulty c) A/C switch faulty d) Thermister faulty e) Dual pressure switch faulty f) Wiring or grounding faulty g) No refrigerant h) ECM faulty ● Compressor is not rotating properly a) Drive belt loose or broken b) Compressor faulty ● Blower inoperative ● Expansion valve faulty ● Leak in system ● Receiver/dryer having clogged screw	Replace fuse and check for short. Check clutch. Check switch. Check thermister. Check switch. Repair as necessary. Check A/C circuit. Replace ECM. Tighten or replace drive belt. Check compressor. Check blower. Check expansion valve. Check system for leaks. Check receiver/dryer.
Cool air comes out only inter-mittently.	● Magnetic clutch slipping ● ECM faulty ● Expansion valve faulty ● Wiring connection faulty ● Excessive moisture in system	Check magnetic clutch. Replace ECM. Check expansion valve. Repair as necessary. Evacuate and charge system.
Cool air comes out only at high speeds.	● Condenser clogged ● Drive belt slipping ● Compressor faulty ● Insufficient or excessive charge of refrigerant ● Air in system	Check condenser. Check or replace drive belt. Check compressor. Check charge of refrigerant. Evacuate and charge system.
Insufficient cooling.	● Condenser clogged ● Drive belt slipping ● Magnetic clutch faulty ● Compressor faulty ● Expansion valve faulty ● Thermistor faulty ● Insufficient or excessive charge of refrigerant ● Air or excessive compressor oil existing in system ● Receiver/dryer clogged	Check condenser. Check or replace drive belt. Check magnetic clutch. Check compressor. Check expansion valve. Check thermister. Check charge of refrigerant. Evacuate and charge system. Check receiver/dryer.
Insufficient velocity of cooled air	● Evaporator clogged or frosted ● Air leaking from cooling unit or air duct ● Air inlet blocked ● Blower motor faulty	Check evaporator. Repair as necessary. Repair as necessary. Replace blower motor.

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, utilising the refrigerant pressure. When a hiss is heard, immediately tighten nut.

CAUTION:

Do not interchange high and low pressure charging hoses by mistake.

If the compressor is equipped with service valves with different thread diameters, the smaller is the high pressure side, and the larger the low pressure side.

TROUBLESHOOTING INFORMATION

- 1) Beginning on the next page, the manifold gauge pressure values shown have been obtained under conditions listed below. However, keep in mind that the actual on-the-vehicle readings are somewhat affected by the ambient temperature.

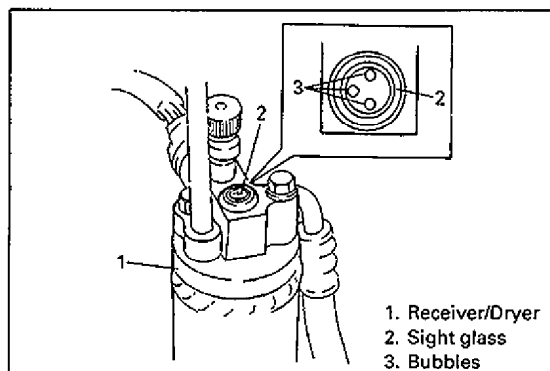
A/C inlet air temperature	30 – 35°C (86 – 95°F)
Engine rpm	1,500 rpm
Blower switch	Max.
Temperature control	Max. cold
Doors	All open
Air inlet damper position	Recirculation

- 2) Since the operating pressure for the HFC134a refrigerant at high temperatures is higher than that of the R12, the gauge readings will be slightly higher.

CORRECTIVE MEASURES FOR MALFUNCTION SYMPTOMS

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

MANIFOLD GAUGE $\frac{\text{MPa}}{(\frac{\text{kg}}{\text{cm}^2})}$ 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-sensitising 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-sensitising 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 repeats indication of 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-sensitising tube. - Refrigerant flow is not regulated properly.	- Inspect if heat-sensitising tube is properly attached. - Replace expansion valve.



75F00-1B-15-1

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.

75F00-1B-15-4

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.

GENERAL INFORMATION

When servicing the compressor, keep dirt or foreign material away from getting on or into the compressor parts and system. Clean tools and a clean work area are important for proper service.

The compressor connection and the outside of the compressor should be cleaned before any "On-vehicle" repair or before removal of the compressor. The parts must be kept clean at all times and any parts to be reassembled should be cleaned with Trichloroethane, naphtha, kerosene or equivalent solvent and dried with dry air. Use only lint free cloths to wipe parts.

The operations described below are based on bench overhaul with compressor removed from the vehicle, except as noted. They have been prepared in order of accessibility of the components.

When compressor is removed from the vehicle for servicing, the oil remaining in the compressor should be discarded and new refrigerant oil added to the compressor.

Minor repair procedures may be done on the vehicle without discharging the system. Major repair procedures require that the system be discharged of refrigerant.

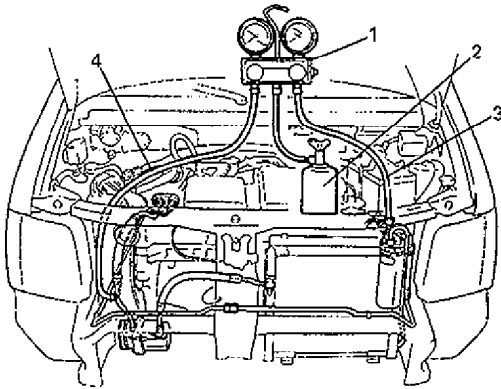
DIAGNOSIS

Compressor troubles are mainly following three types: gas leakage, noise and insufficient pressure.

Compressor gas leakages in most cases develop from the shaft seal. When detecting gas leakage, always use a leak tester. If a small amount of oil seeps out from the shaft seal, there is no necessity of replacing the seal. The shaft seal has been designed to allow a small amount of oil to leak out for lubricating purpose. Thus, the shaft seal should be replaced only when a large amount of compressor oil is leaking out or when gas leakage is discovered by using gas tester.

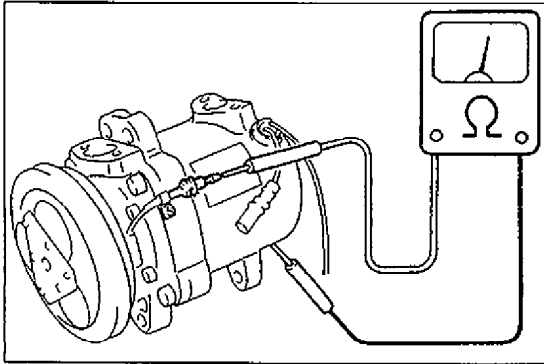
In regard to noise and insufficient pressure, repairs should be made only after diagnosing the trouble properly.

ITEM	PROBLEM	POSSIBLE CAUSES	CORRECTION
1	Noise from compressor	- Defective 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 1-1 to 1-3 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

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)

75F00-1B-17-2



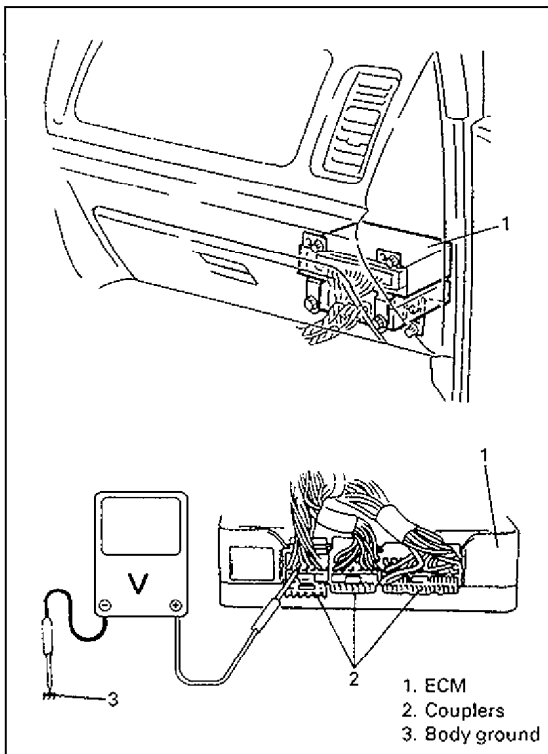
75F00-1B-17-3

SYSTEM 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.

- 5) Check magnetic clutch.
 - 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
3.0 – 5.5 Ω



75F00-1B-18-2

INSPECTION OF ECM AND ITS CIRCUITS

ECM and its Circuits can be checked at ECM wiring couplers by measuring voltage.

CAUTION:

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

Voltage Check

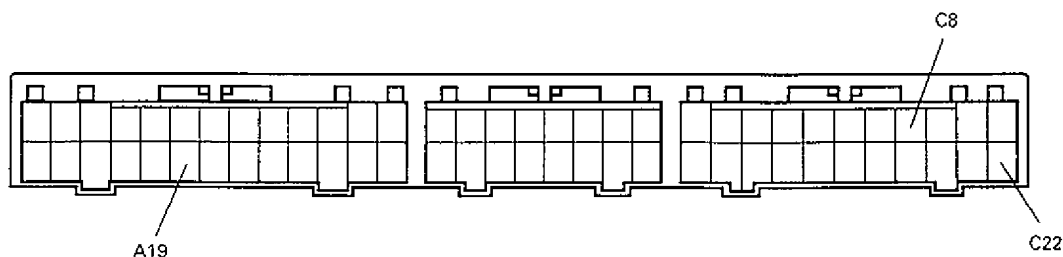
- 1) Remove ECM from vehicle.
- 2) Connect ECM couplers to ECM.
- 3) Check voltage at each terminal of couplers connected.

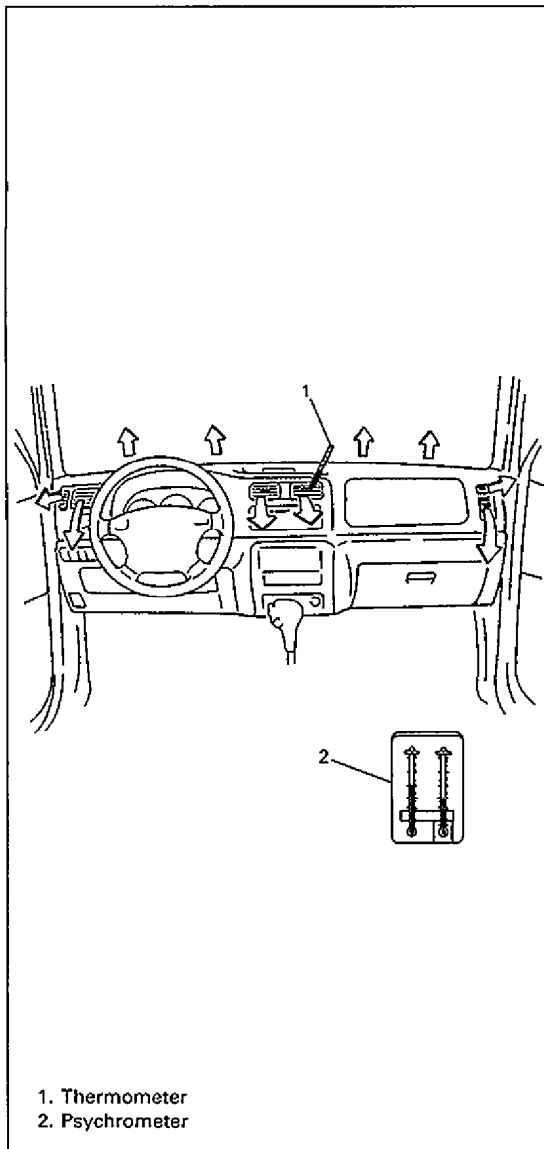
Refer to "Inspection of ECM and its circuit" in Section 6E1 ENGINE AND EMISSION CONTROL SYSTEM.

NOTE:

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

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)





75F00-1B-19-3

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/cm², 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.

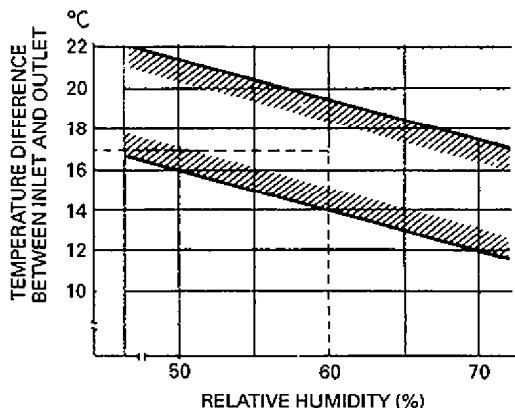
- 7) The dry bulb thermometer at air inlet should be within 25 to 35°C (77 to 95°F).

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.



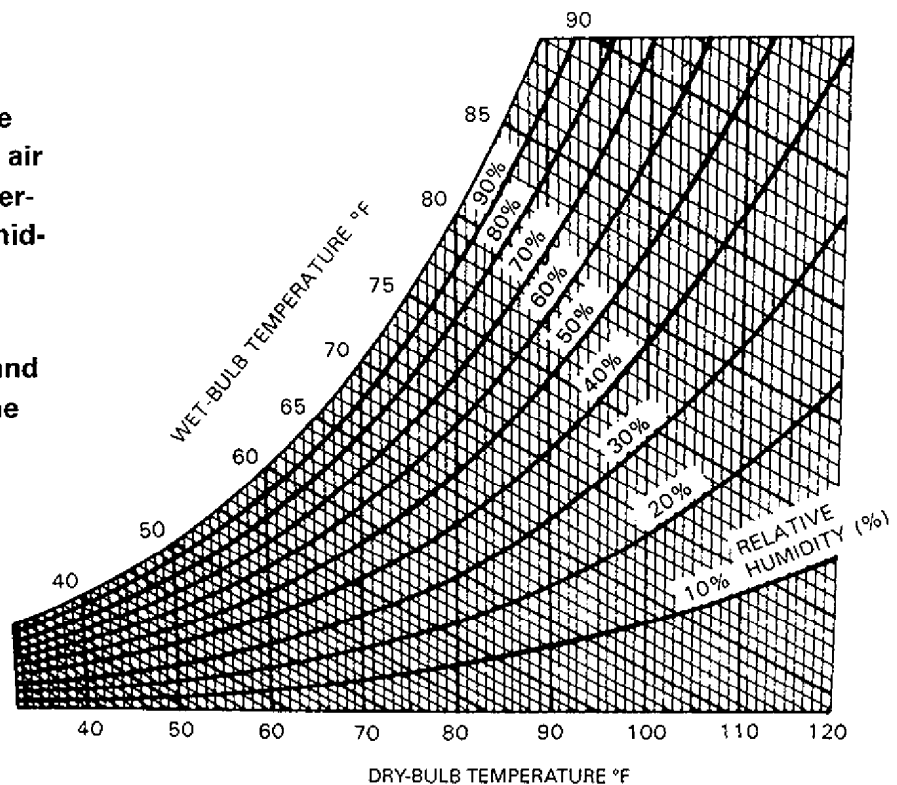
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HOW TO READ RELATIVE HUMIDITY (°F)

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%.

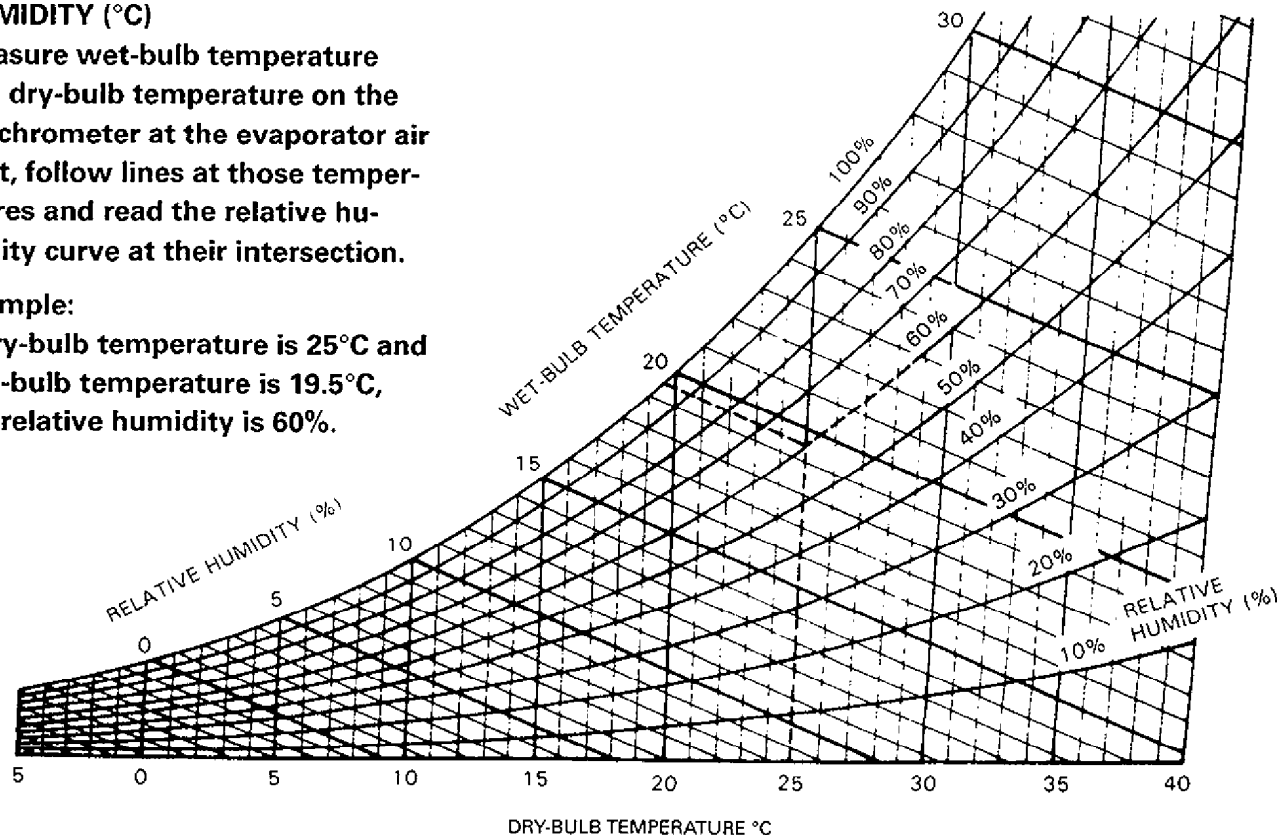


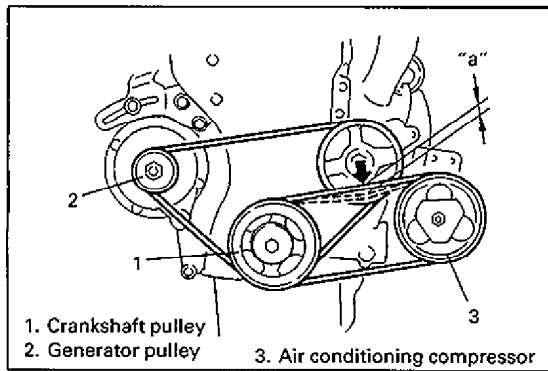
HOW TO READ RELATIVE HUMIDITY (°C)

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%.





75F00-1B-21-1

MISCELLANEOUS

DRIVE BELT INSPECTION

- 1) Check belt tension, and adjust as necessary.

**Belt tension "a": 6 – 9 mm (0.24 – 0.35 in.)
as deflection/10 kg (22 lbs)**

- 2) Check belt for wear and cracks, and replace as required.

SECTION 3

STEERING, SUSPENSION, WHEELS AND TIRES

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

3

FRONT END ALIGNMENT	SECTION 3A
MANUAL RACK AND PINION	SECTION 3B
ELECTRICAL POWER STEERING (P/S) SYSTEM (IF EQUIPPED)	SECTION 3B4
AIR BAG STEERING WHEEL AND COLUMN	SECTION 3C1
FRONT SUSPENSION	SECTION 3D
REAR SUSPENSION	SECTION 3E
WHEELS AND TIRES	SECTION 3F

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DIAGNOSIS

GENERAL DIAGNOSIS

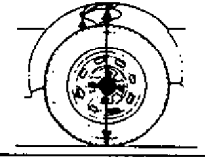
Since the problems in steering, suspension, wheels and tires involve several systems, they must all be considered when diagnosing a complaint. To avoid using the wrong symptom, always road test the vehicle first. Proceed with the following preliminary inspection and correct any defects which are found.

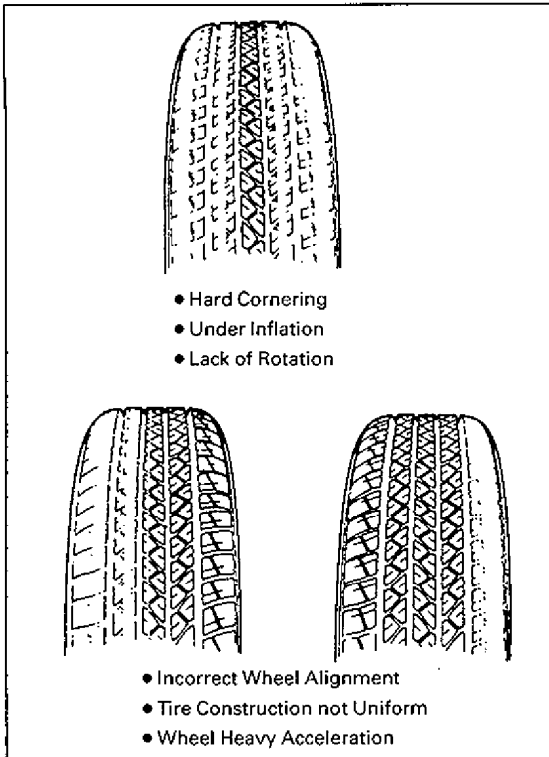
- 1) Inspect tires for proper pressure and uneven wear.
- 2) Raise vehicle on a hoist and inspect front and rear suspension and rack and pinion for loose or damaged parts.
- 3) Spin front wheels. Inspect for out-of-round tires, out-of-balance tires, bent rims, loosen and/or rough wheel bearings.

GENERAL DIAGNOSIS TABLE		
Condition	Possible Cause	Reference Item
Vehicle Pulls (Leads)	● Mismatched or uneven tires ● Tires not adequately inflated ● Broken or sagging springs ● Radial tire lateral force ● Disturbed front end alignment ● Disturbed rear wheel alignment ● Brake dragging in one road wheel ● Loose, bent or broken front or rear suspension parts	Replacement tires in Section 3F Inflation of tires in Section 3F Strut damper assembly in Section 3D or coil spring in Section 3E Replacement tires in Section 3F Section 3A Check and adjust rear wheel alignment Refer to Section 5 Tighten or replace suspension parts
Abnormal or Excessive Tire Wear	● Broken or sagging spring ● Tire out of balance ● Disturbed front or rear end alignment ● Faulty strut (shock absorber) ● Hard driving ● Overloaded vehicle ● Not rotating tire ● Worn or loose road wheel bearing ● Wobbly wheel or tire ● Tires not adequately inflated	Strut damper assembly in Section 3D or coil spring in Section 3E General balance procedure or replacement tires in Section 3F Section 3A Strut damper assembly in Section 3D Replacement tires in Section 3F Replacement tires in Section 3F Replacement tires or tire rotation in Section 3F Knuckle/bearing in Section 3D Replacement wheels or tires in Section 3F Inflation of tires in Section 3F
Wheel Tramp	● Blister or bump on tire ● Improper strut (shock absorber) action	Replacement tires in Section 3F Strut damper assembly in Section 3D

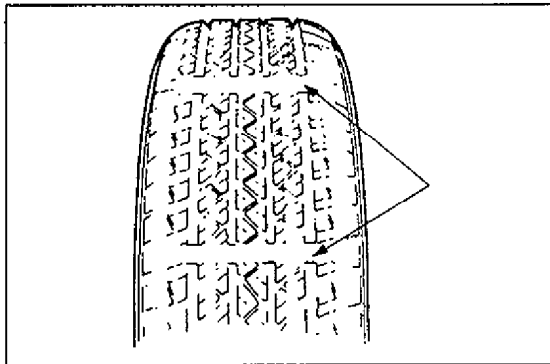
Condition	Possible Cause	Reference Item
Shimmy, Shake or Vibration	• Tire or wheel out of balance • Loosen wheel bearings • Worn tie rod ends • Worn lower ball joints • Excessive wheel runout • Blister or bump on tire • Excessively loaded radial runout of tire/wheel assembly • Disturbed front end alignment • Loose or worn steering linkage • Loose steering gear case bolts	Balance wheels or general balance procedure in Section 3F Knuckle/Bearing in Section 3D and/or wheel bearing and wheel stud in Section 3E Tie rod end in Section 3B Suspension arm/bushing in Section 3D Replacement wheels or tires in Section 3F Replacement tires in Section 3F Replacement wheels or tires in Section 3F Section 3A Section 3B and 3C1 Manual rack and pinion assembly in Section 3B
Hard Steering	• Tire not adequately inflated • Malfunctioning Electrical power steering system • Bind in tie rod end ball studs or lower ball joints • Disturbed front end alignment • Rack and pinion adjustment • Bind in steering column	Inflation of tires in Section 3F Refer to "Diagnosis" in Section 3B4 Tie rod end in Section 3B or suspension arm/bushing in Section 3D Section 3A Steering rack plunger in Section 3B Steering column in Section 3C1
Too Much Play in Steering	• Wheel bearings worn • Loose steering gear case bolts • Rack and pinion adjustments (Manual steering only) • Worn steering shaft joints • Worn tie rod ends or tie rod inside ball joints • Worn lower ball joints	Knuckle/Bearing in Section 3D Manual rack and pinion assembly in Section 3B Section 3A Steering shaft lower joint in Section 3C1. Tie rod end or rack boot/tie rod in Section 3B Suspension arm/bushing in Section 3D
Poor Returnability	• Bind in tie rod end ball studs • Bind in ball joints • Bind in steering column • Poorly lubricated rack and pinion • Disturbed front end alignment • Rack and pinion adjustment • Tires not adequately inflated	Tie rod end in Section 3B Rack boot/tie rod, tie rod end in Section 3B and suspension arm/bushing in Section 3D Steering column in Section 3C1 Steering pinion or steering rack in Section 3B Section 3A Steering rack plunger in Section 3B Inflation of tires in Section 3F

Condition	Possible Cause	Reference Item
Rack and Pinion Noise (Rattle or Chuckle)	- Loose steering gear case bolts - Worn rack bush - Rack and pinion adjustment	Manual rack and pinion assembly in Section 3B Rack bushing in Section 3B Steering rack plunger in Section 3B
Abnormal Noise, Front End	- Worn, sticky or loose tie rod ends, lower ball joints, tie rod inside ball joints or drive shaft joints - Damaged struts or mountings - Worn suspension arm bushings - Loose or worn stabilizer bar mountings - Loose wheel nuts - Loose suspension bolts or nuts - Broken or otherwise damaged wheel bearings - Broken suspension springs - Poorly lubricated or worn strut bearings	Rack boot/tie rod, tie rod end in Section 3B, suspension arm in Section 3D or drive shaft in Section 4A Strut damper assembly in Section 3D Suspension arm/bushing in Section 3D Stabilizer bar and/or bushings Section 3F Section 3D or 3E Knuckle/bearing in Section 3D or wheel bearing and wheel stud in Section 3E Strut damper assembly in Section 3D or coil spring in Section 3E Strut damper assembly in Section 3D
Wander or Poor Steering Stability	- Mismatched or uneven tires - Loosen ball joints and tie rod ends - Faulty struts or mounting - Loose stabilizer bar - Broken or sagging springs - Rack and pinion adjustment - Front end alignment	Replacement tires or inflation tires in Section 3F Suspension arm/bushing in Section 3D and tie rod end in Section 3B Strut damper assembly in Section 3D Stabilizer bar and/or bushing in Section 3D Strut damper assembly in Section 3D or coil spring in Section 3E Steering rack plunger in 3B Section 3A
Erratic Steering When Braking	- Worn wheel bearings - Broken or sagging springs - Wheel tires are inflated unequally - Disturbed front end alignment - Brakes not working in unison	Knuckle/bearing in Section 3D and/or wheel bearing and wheel stud in Section 3E Strut damper assembly in Section 3D Inflation of tire in Section 3F Section 3A Refer to Section 5

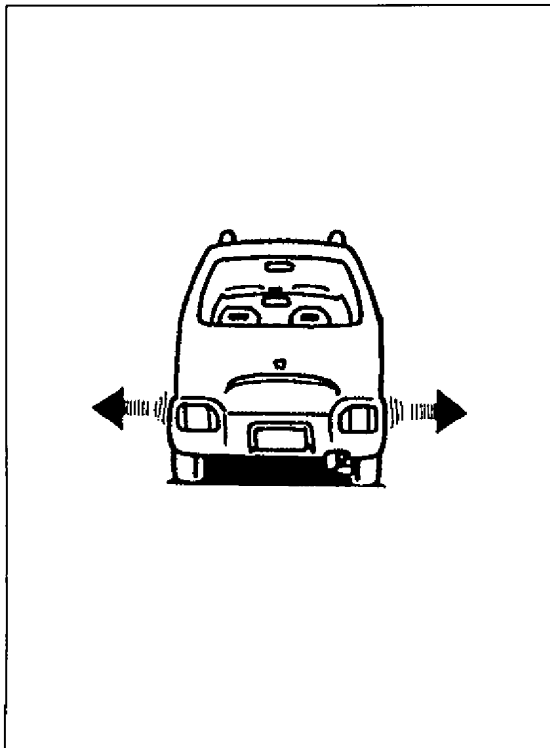
Condition	Possible Cause	Reference Item
Low or Uneven Trim Height Right-to-left trim height (H) difference should be within 15 mm (0.6 in.) with curb weight.  *Same with rear side.	• Broken or sagging springs • Over loaded • Incorrect springs	Strut damper assembly in Section 3D or coil spring in Section 3E Check loading Strut damper assembly in Section 3D or coil spring in Section 3E
Ride Too Soft	• Faulty struts (shock absorber)	Strut damper assembly in Section 3D
Suspension Bottoms	• Overloaded • Faulty struts (shock absorber) • Incorrect broken or sagging springs	Check loading Strut damper assembly in Section 3D Strut damper assembly in Section 3D or coil spring in Section 3E
Body Leans or Sways in Corners	• Loose stabilizer bar • Faulty struts (shock absorbers) or mounting • Broken or sagging springs • Overloaded	Stabilizer bar and/or bushing in Section 3D Strut damper assembly in Section 3D Strut damper assembly in Section 3D or coil spring in Section 3E Check loading
Cupped Tires	• Front struts defective • Worn wheel bearings • Excessive tire or wheel run-out • Worn ball joints • Tire out of balance	Strut damper assembly in Section 3D Knuckle/bearing in Section 3D or wheel bearing and wheel stud in Section 3E Replacement tires in Section 3D Suspension arm/bushing in Section 3D General balance procedures in Section 3F



75F00-3-6-2



75F00-3-6-3



75F00-3-6-5

TIRE DIAGNOSIS

IRREGULAR AND/OR PREMATURE WEAR

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

If the following conditions are noted, rotation is necessary:

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

A wheel alignment check is necessary if following conditions are noted:

- 1) Front tire wear is unequal between the right and left.
- 2) Wear is uneven across the tread of any front tire.
- 3) Front tire treads have scuffed appearance with "feather" edges on one side of tread ribs or blocks.

WEAR INDICATORS

Original equipment tires have built-in tread wear indicators to show when they need replacement.

These indicators will appear as 12 mm (0.47 in.) wide bands when the tire tread depth becomes 1.6 mm (0.063 in.).

When the indicators appear in 3 or more grooves at 6 locations, tire replacement is recommended.

RADIAL TIRE WADDLE

Waddle is side to side movement at the front and/or rear of the vehicle. It is caused by the steel belt not being straight within the tire. It is most noticeable at a low speed, 8 to 48 km/h (5 to 30 mph).

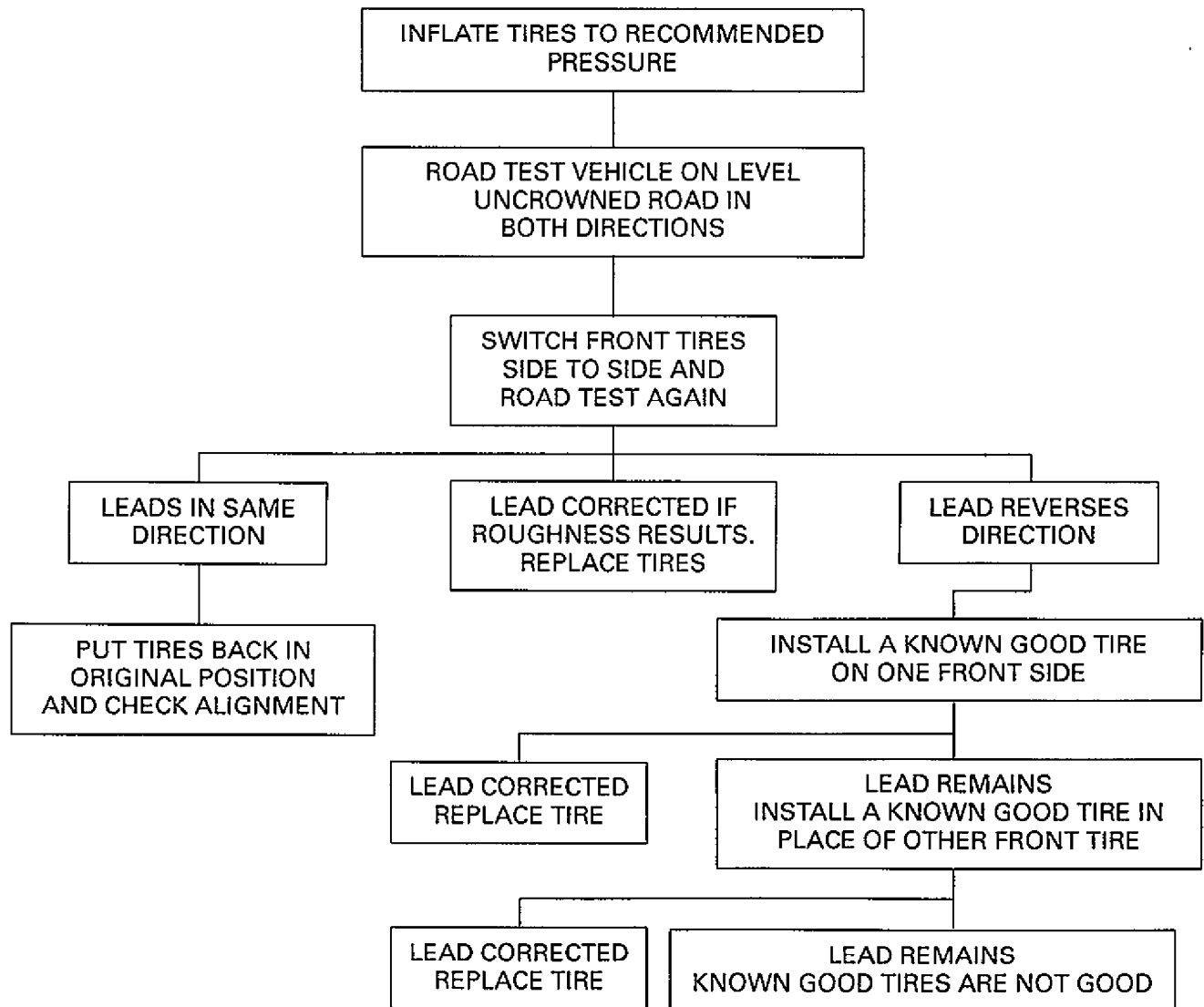
It is possible to locate the faulty tire by road testing the vehicle. If it is on the rear, the rear end of the vehicle shakes from side to side or "waddles". To the driver in his seat, it feels as though someone is pushing on the side of vehicle.

If the faulty tire is on the front, waddling is more visual. The front sheet metal appears to be moving back and forth and the driver feels as though he is at the pivot point in vehicle.

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

If TPD is not available, an alternative method of substituting known good tire/wheel assemblies can be used as follows, although it takes a longer time.

- 1) Ride vehicle to determine whether the front or rear waddles.
- 2) Install tires and wheels that are known to be good (on similar vehicle) in place of those on waddling end of vehicle. If waddling end cannot be identified, substitute rear ones.
- 3) Road test again. If improvement is noted, reinstall originals one at a time till waddle causal tire is found. If no improvement is noted, install known good tires in place of all four. Then reinstall originals in the same manner as above.



RADIAL TIRE LEAD

"Lead" is the deviation of the vehicle from a straight path on a level road even with no pressure on the steering wheel.

Lead is usually caused by:

- 1) Incorrect alignment
- 2) Uneven brake adjustment
- 3) Tire construction

The way in which a tire is built can produce lead in a vehicle. An example of this is placement of the belt. Off center belts on radial tires can cause the tire to develop a side force while rolling straight down the road. If one side of the tire has a little larger diameter than the other, the tire will tend to roll to one side. This will develop a side force which can produce vehicle lead.

The procedure in above figure (Lead Diagnosis) should be used to make sure that front alignment is not mistaken for tire lead.

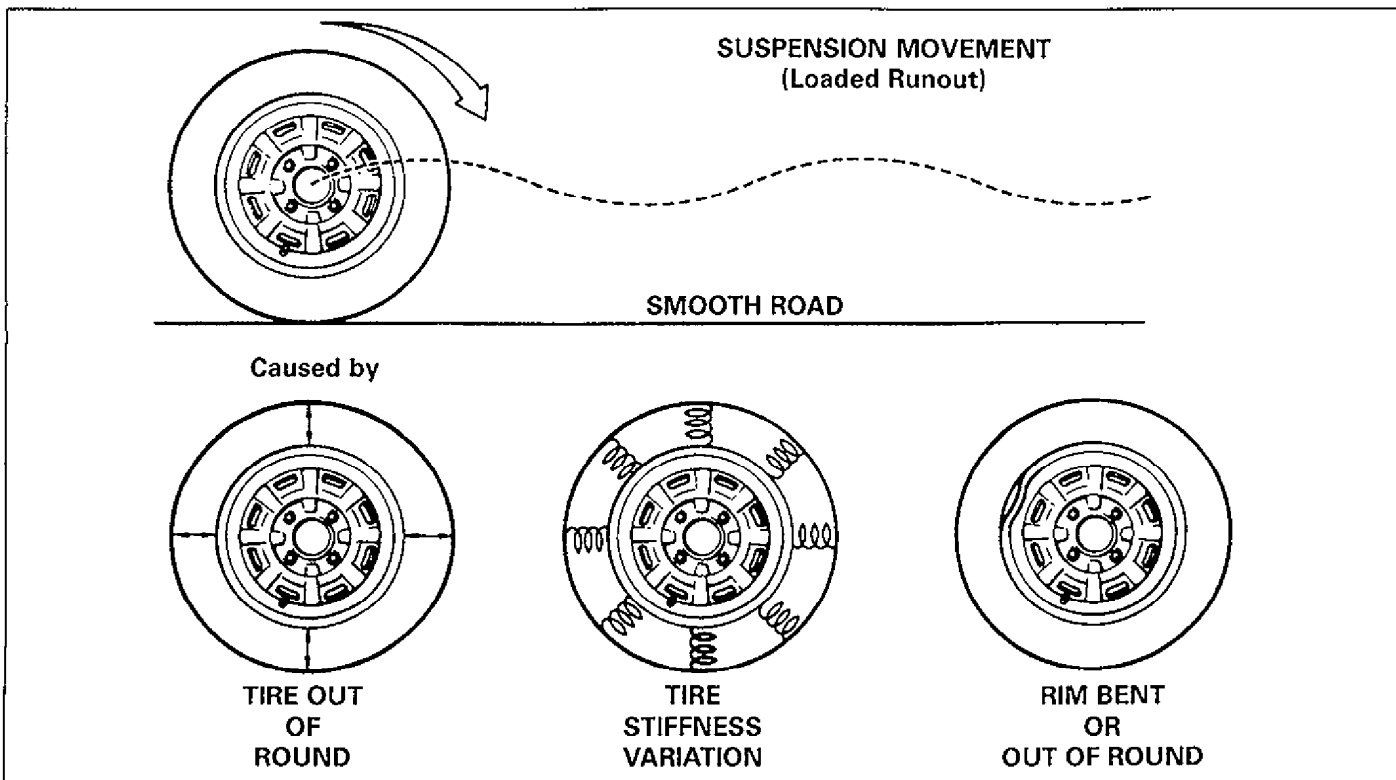
- 1) Part of the lead diagnosis procedure is different from the proper tire rotation pattern currently in the owner and service manuals. If a medium to high mileage tire is moved to the other side of the vehicle, be sure to check that ride roughness has not developed.
- 2) Rear tires will not cause lead.

VIBRATION DIAGNOSIS

Wheel unbalance causes most of the highway speed vibration problems. If a vibration remains after dynamic balancing, its possible causes are as follows.

- 1) Tire runout
- 2) Wheel runout
- 3) Tire stiffness variation

Measuring tire and/or wheel free runout will uncover only part of the problem. All three causes, known as loaded radial runout, must be checked by using a Tire Problem Detector (TPD). If TPD is not available, alternative method of substituting known good tire and wheel assemblies on the problem vehicle can be used, although it takes a longer time.



SECTION 3A

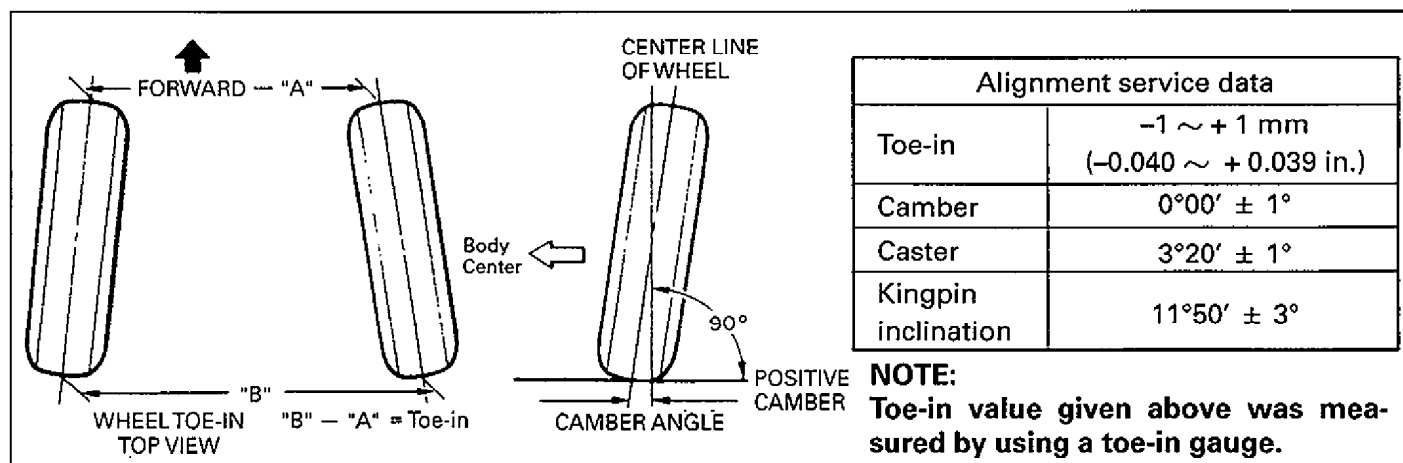
FRONT END ALIGNMENT

CONTENTS

DIAGNOSIS	3-1	Preliminary Checks Prior to Adjusting	
GENERAL DESCRIPTION	3A-1	Front Alignment	3A-2
Toe Setting	3A-1	Toe Adjustment	3A-2
Camber	3A-1	Camber and Caster Adjustment	3A-2
		Steering Angle	3A-3

3A

GENERAL DESCRIPTION



Front alignment refers to the angular relationship between the front wheels, the front suspension attaching parts and the ground. Generally, the only adjustment required for front alignment is toe setting.

Camber and caster can't be adjusted. Therefore, should camber or caster be out of specification due to the damage caused by hazardous road conditions or collision, whether the damage is in body or in suspension should be determined. If the body is damaged, it should be repaired and if suspension is damaged, it should be replaced.

TOE SETTING

Toe is the turning in or out of the front wheels. The purpose of a toe specification is to ensure parallel rolling of the front wheels (Excessive toe-in or toe-out may increase tire wear).

Amount of toe can be obtained by subtracting "A" from "B" as shown in above figure and therefore is given in mm (in.).

CAMBER

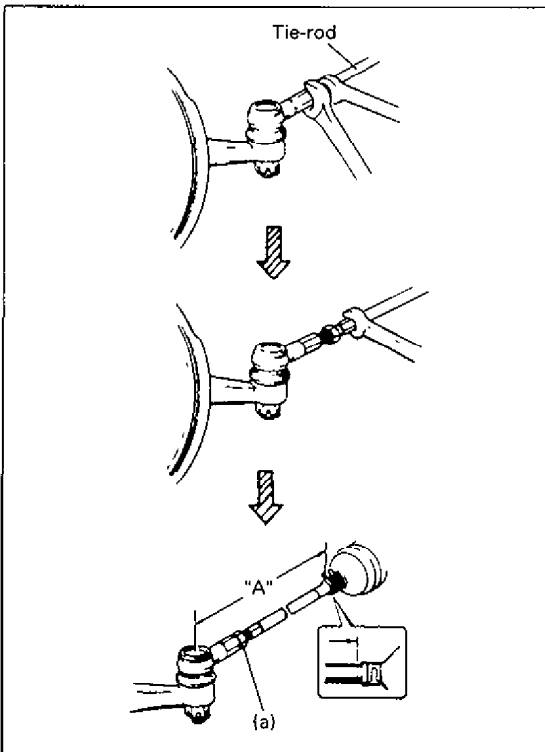
Camber is the tilting of the front wheels from the vertical, as viewed from the front of the vehicle. When the wheels tilt outward at the top, the camber is positive. When the wheels tilt inward at the top, the camber is negative. The amount of tilt is measured in degrees.

PRELIMINARY CHECKS PRIOR TO ADJUSTING FRONT ALIGNMENT

Steering and vibration complaints are not always the result of improper alignment. An additional item to be checked is the possibility of tire lead due to worn or improperly manufactured tires. "Lead" is the deviation of the vehicle from a straight path on a level road without hand pressure on the steering wheel. Section 3 of this manual contains a procedure for determining the presence of a tire lead problem. Before making any adjustment affecting toe setting, the following checks and inspections should be made to ensure correctness of alignment readings and alignment adjustments:

- 1) Check all tires for proper inflation pressures and approximately the same tread wear.
- 2) Check for loose of ball joints. Check tie rod ends; if excessive looseness is noted, it must be corrected before adjusting.
- 3) Check for run-out of wheels and tires.
- 4) Check vehicle trim heights; if out of limits and a correction is to be made, it must be made before adjusting toe.
- 5) Check for loose of suspension arms.
- 6) Check for loose or missing stabilizer bar attachments.
- 7) Consideration must be given to excess loads, such as tool boxes. If this excess load is normally carried in vehicle, it should remain in vehicle during alignment checks.
- 8) Consider condition of equipment being used to check alignment and follow manufacturer's instructions.
- 9) Regardless of equipment used to check alignment, vehicle must be on a level surface both fore and aft and transversely.

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TOE ADJUSTMENT

Toe is adjusted by changing the tie rod length. Loosen right and left tie rod end lock nuts first and then rotate right and left tie rods by the same amount to align toe-in to specification. In this adjustment, right and left tie rods should become equal in length ("A" in left figure).

Before rotating tie rods, apply grease between tie rods and rack boots so that boots won't be twisted.

After adjustment, tighten lock nuts to specified torque and make sure that rack boots are not twisted.

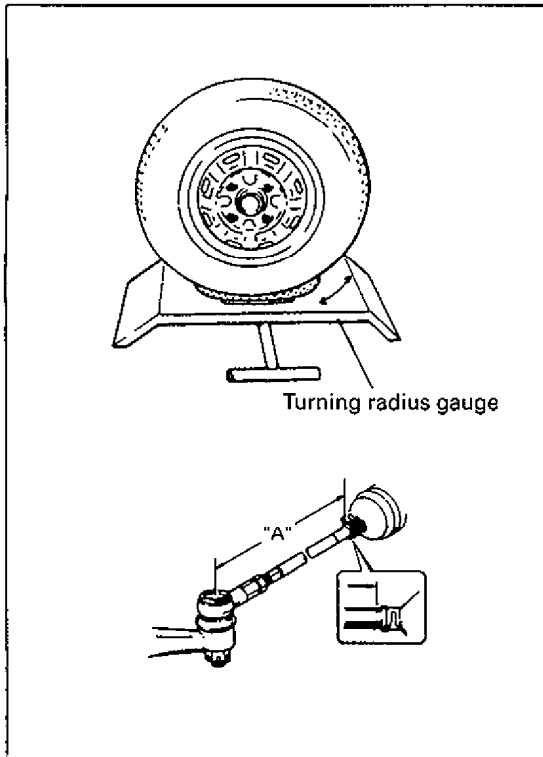
Tightening Torque

(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

CAMBER AND CASTER ADJUSTMENT

Should camber or caster be found out of specifications upon inspection, locate its cause first. If it is in damaged, loose, bent, dented or worn suspension parts, they should be replaced. If it is in vehicle body, repair it so as to attain specifications.

To prevent possible incorrect reading of camber or caster, vehicle front end must be moved up and down a few times before inspection.



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STEERING ANGLE

When tie rod or tie rod end was replaced, check toe and then also steering angle with turning radius gauge.

If steering angle is not correct, check if right and left tie rods are equal in length ("A" in left figure).

NOTE:

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

Steering angle inside : 38°
 outside : 32°

Reference Information:

Side slip:

For inspecting front wheel side slip with side slip tester:

Side slip limit : Less than 3 mm/m
 (Less than 0.118 in/3.3 ft)

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

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SECTION 3B

MANUAL RACK AND PINION

3B

WARNING:

For vehicles equipped with a Air Bag System

- Service on or around air bag system components or wiring must be performed only by an authorized suzuki dealer. Please observe all WARNINGS and CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location view in Section 10B or 10B1 before performing service on or around 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.
- 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 deployed by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

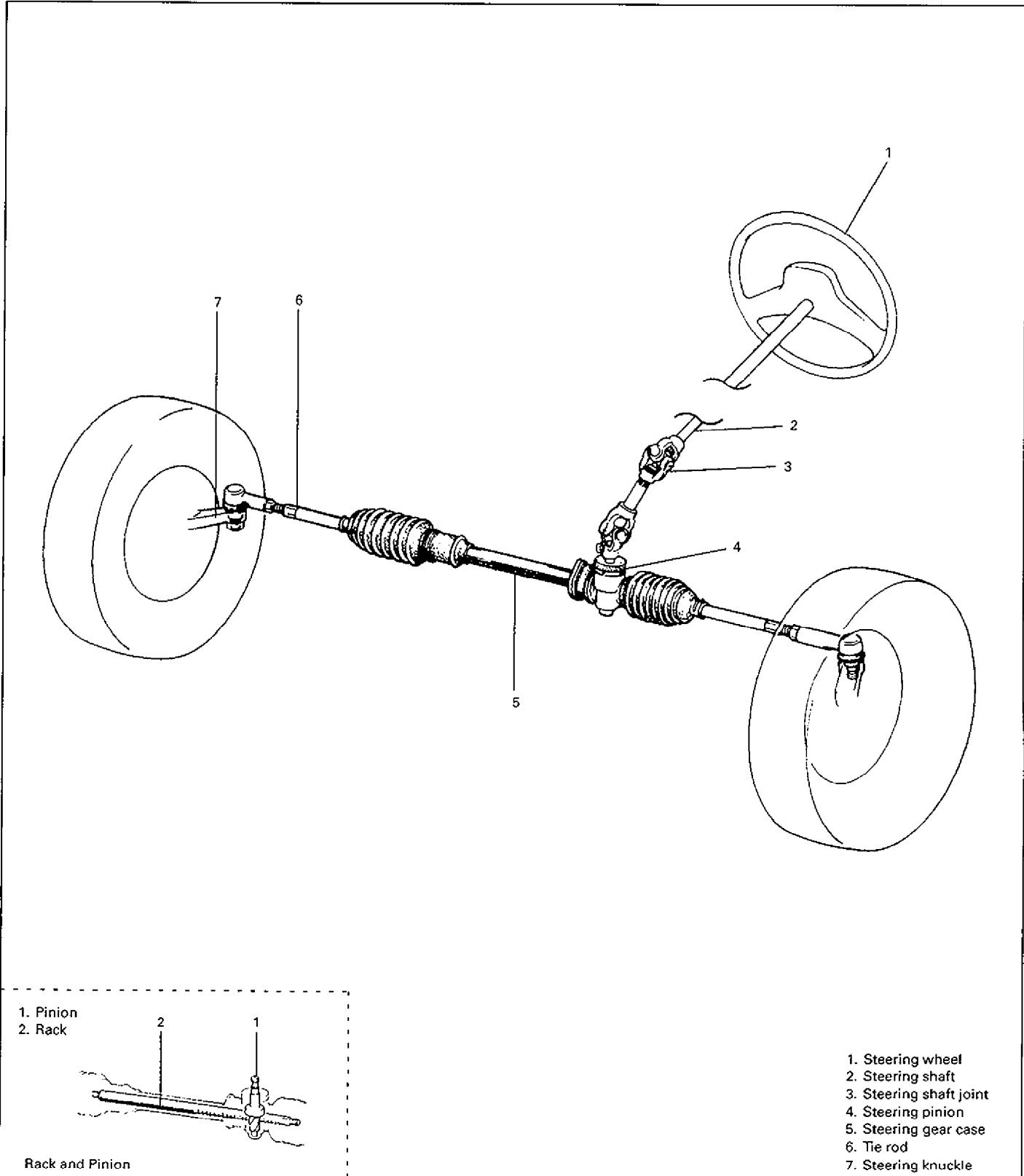
All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expence. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

CONTENTS

GENERAL DESCRIPTION	3B- 2	Steering Rack Plunger	3B-15
DIAGNOSIS	Refer to Section 3	Steering Pinion	3B-16
ON-VEHICLE SERVICE	3B- 3	Steering Rack	3B-17
Lubrication	3B- 3	Pinion Bearing	3B-19
Inspection	3B- 4	Rack Bushing	3B-19
Tie Rod End	3B- 5	TIGHTENING TORQUE	
Manual Rack and Pinion Assembly		SPECIFICATIONS	3B-21
(Steering Gear Case)	3B- 7	REQUIRED SERVICE MATERIAL	3B-21
Rack Boot/Tie Rod	3B-13	SPECIAL TOOLS	3B-22

GENERAL DESCRIPTION

The rack and pinion steering system consists of two components, the rack and the pinion. When the steering wheel is turned, the motion is transmitted to the steering shaft joint and then to the pinion. Since the pinion teeth mesh with teeth on rack, the motion is further transferred to the rack and changed to linear motion. The force is then transmitted through the tie rods to the steering knuckles which turn wheels.

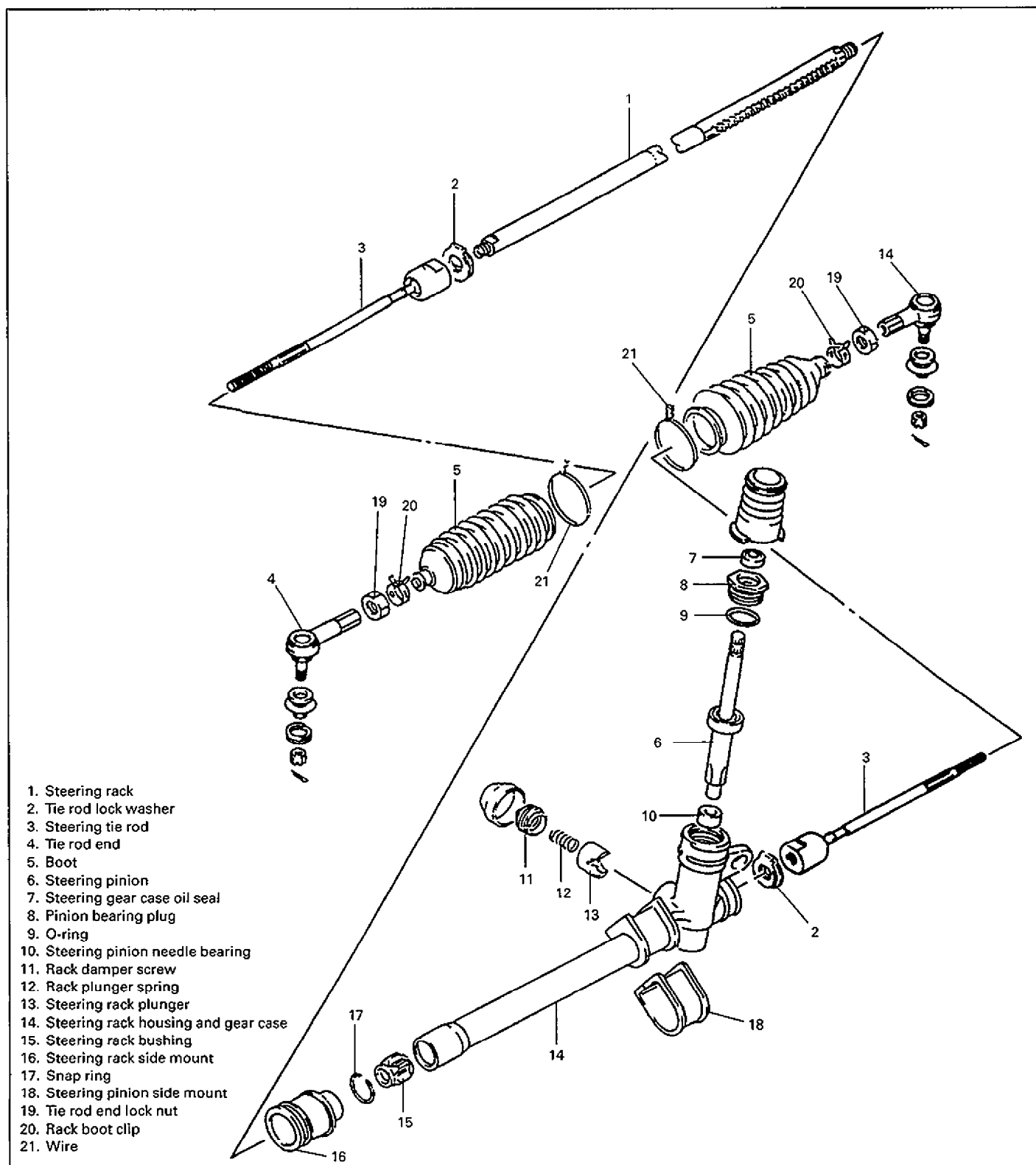


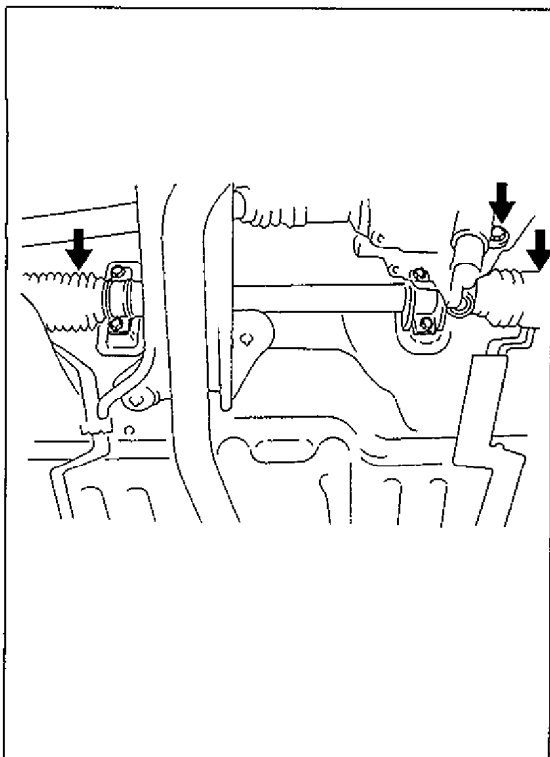
ON-VEHICLE SERVICE

LUBRICATION

When inner parts of the steering gear case were disassembled, they should be washed clean before reassembly. It is recommended to use the grease as given at the right where grease application is indicated in the text.

*** SUZUKI SUPER GREASE (E) 99000-25050, or Lithium grease (applicable for $-40^{\circ}\text{C}\sim 130^{\circ}\text{C}$ or $104^{\circ}\text{F}\sim 266^{\circ}\text{F}$)**





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INSPECTION

STEERING RACK BOOT

Hoist vehicle.

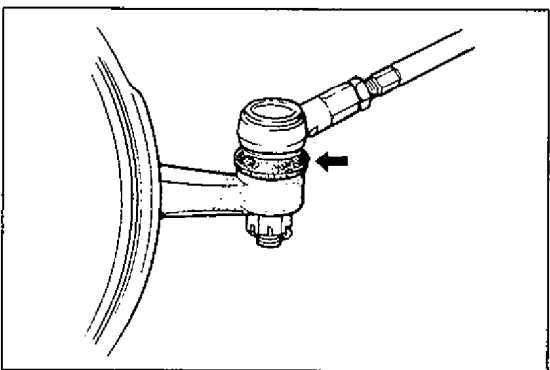
Inspect each boot for tear. A torn boot allows entry of dust and water which can cause wear to steering rack and pinion to produce noise as well as rust to result in malfunction of steering system.

If even a small tear is noted, replace with new one.

Boots should be visually inspected for any damage and tear during every periodical inspection at specified intervals and whenever vehicle is hoisted for any other purpose.

UPPER MOUNT CUSHION

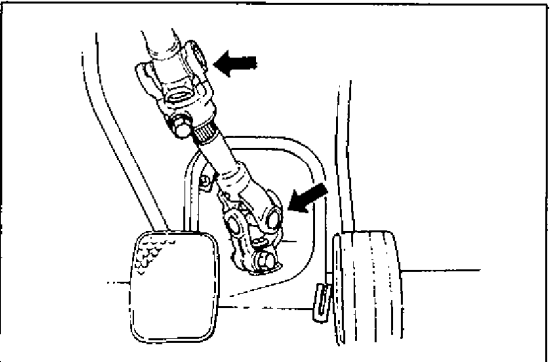
Check the cushion for deterioration which will cause the steering system to rattle during operation.



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TIE ROD END BOOTS

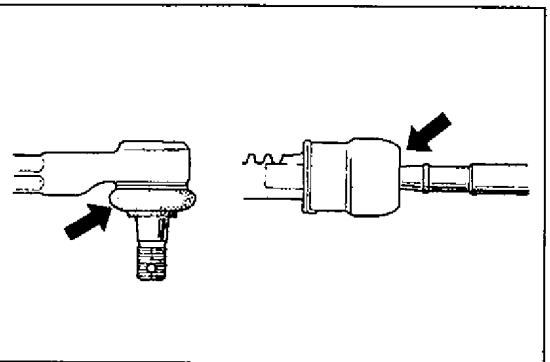
Inspect each boot for tear. If even a small tear is noted, replace with new one.



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STEERING SHAFT JOINT

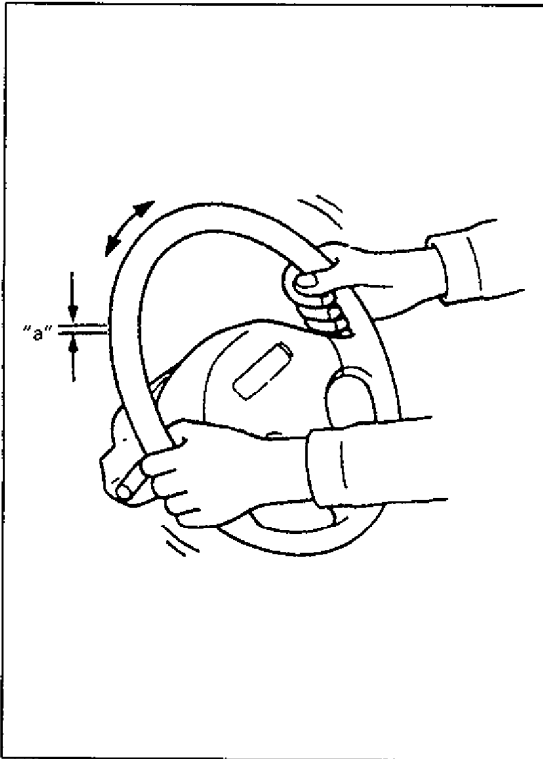
Check shaft joint for wear, breakage and other damage and replace if any defect exists.



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TIE ROD END

- 1) Inspect for play in ball joint.
 - 2) Inspect for play in rack end ball joint.
- In either case, if found defective, replace.



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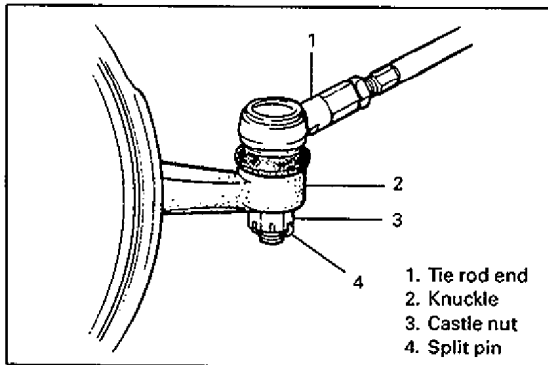
STEERING WHEEL

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

Steering wheel play "a": 0 – 30 mm (0 – 1.1 in.)

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

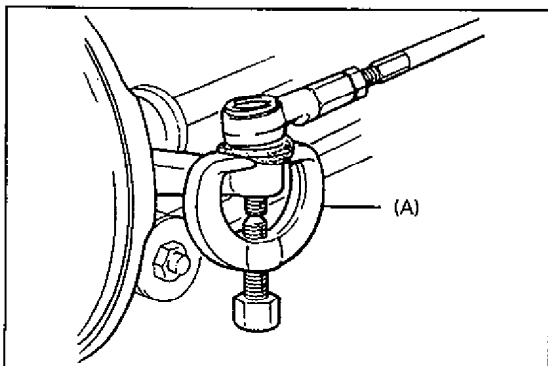
- Tie-rod end ball stud for wear (ball stud should move when more than 2 kg-cm torque is applied.)
- Lower ball joint for wear
- Steering shaft joint for wear
- Steering pinion or rack gear for wear or breakage
- Each part for looseness



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TIE ROD END REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Remove split pin and tie rod end castle nut from steering knuckle.

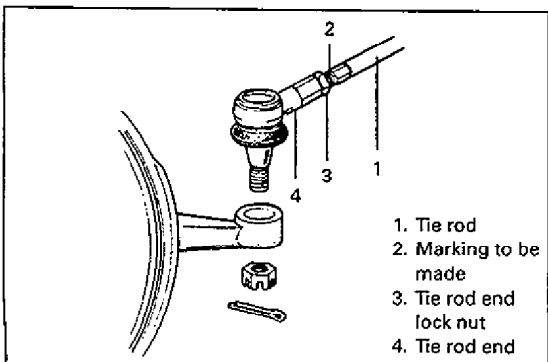


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- 3) Disconnect tie rod end from knuckle, using special tool.

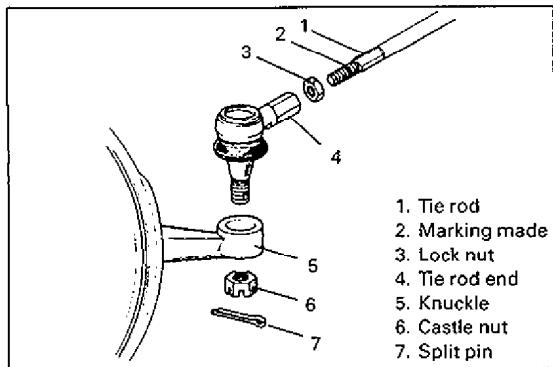
Special Tool

(A): 09913-65210

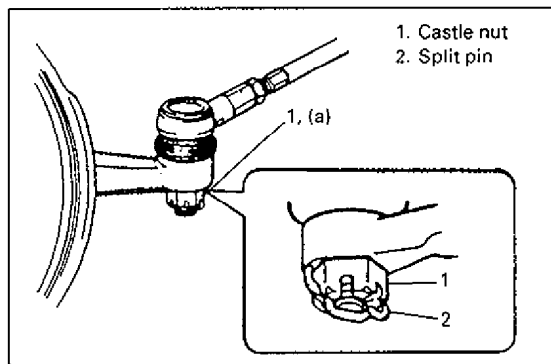


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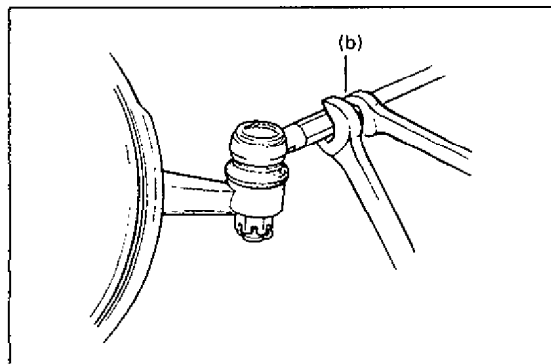
- 4) For ease of adjustment after installation, make marking of tie rod end lock nut position on tie rod end thread. Then loosen lock nut and remove tie rod end from tie rod.



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75F00-3B-6-3

INSTALLATION

- 1) Install tie rod end lock nut and tie rod end to tie rod. Align lock nut with mark on tie rod thread

- 2) Connect tie rod end to knuckle. Tighten castle nut until holes for split pin are aligned, but only within specified torque.

Tightening Torque

(a): 43 N·m (4.3 kg-m, 31.5 lb-ft)

- 3) Bend split pin as shown.

- 4) Inspect for proper toe (Refer to FRONT END ALIGNMENT).
- 5) After confirming proper toe, tighten tie rod end lock nut to specified torque.

Tightening Torque

(b): 45 N·m (4.5 kg-m, 32.5 lb-ft)

- 6) Tighten wheel to specified torque and lower hoist.

Tightening Torque for wheel nuts:

85 N·m (8.5 kg-m, 61.5 lb-ft)

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MANUAL RACK AND PINION ASSEMBLY (STEERING GEAR CASE)

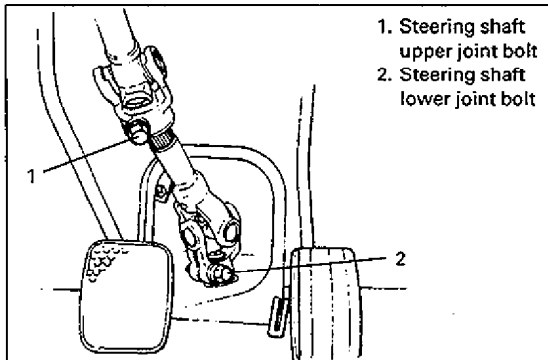
REMOVAL

For left-hand steering vehicle

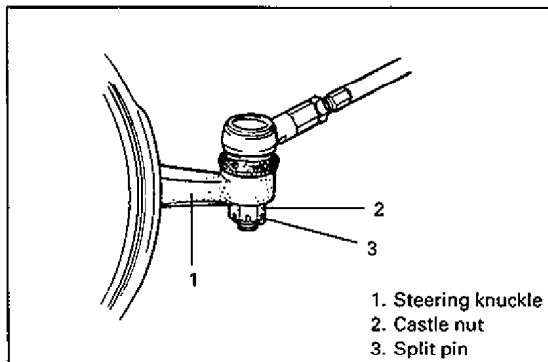
CAUTION:

Be sure to set front wheels in straight direction and remove ignition key from key cylinder before these steps, otherwise contact coil of airbag system may get damaged.

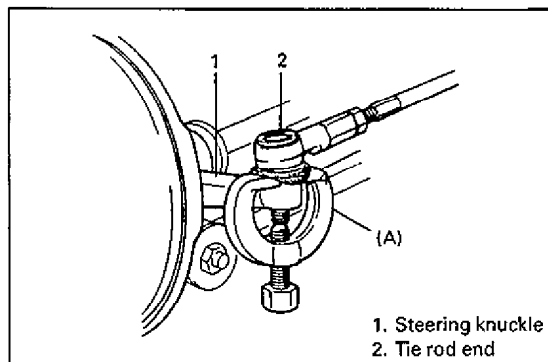
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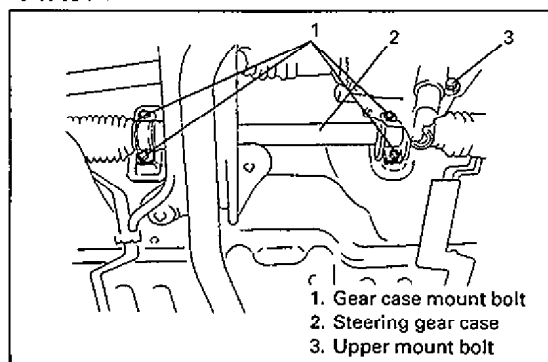
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- 1) Slide driver's seat as far back as possible.
- 2) Pull off front part of floor mat on driver's side and remove steering shaft joint cover.
- 3) For ease of installation, loosen steering shaft upper joint bolt but don't remove.
- 4) Remove steering shaft lower joint bolt and disconnect lower joint from pinion.

- 5) Hoist vehicle and remove both wheels.
- 6) Remove split pins and tie rod castle nuts from both knuckles.

- 7) Disconnect both tie rod ends from knuckles, using special tool.

Special Tool

(A): 09913-65210

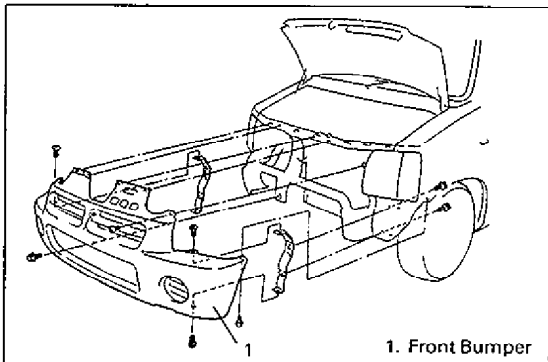
- 8) For ease of adjustment after installation, make marking of tie rod end lock nut position on tie rod end thread. Then loosen lock nut and remove tie rod end.
- 9) Remove steering gear case mount bolts, gear case brackets and upper mount bolt, then remove gear case.

For right-hand steering vehicle

1) Use the same removal procedure.

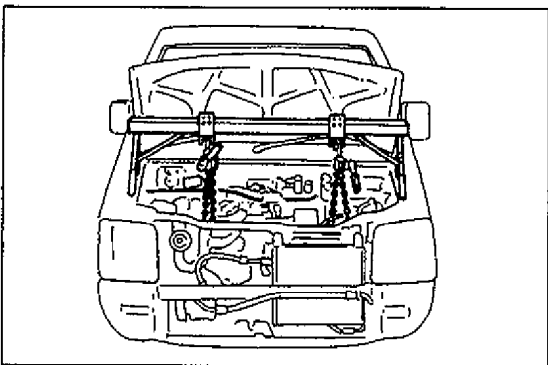
Steps 1) – 8), as for the left-hand steering vehicle.

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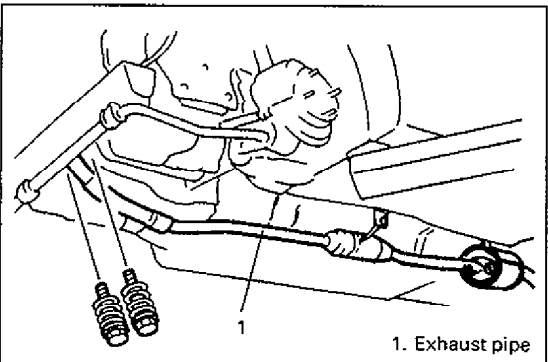
2) Remove front bumper.

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3) Hang engine and transmission together.

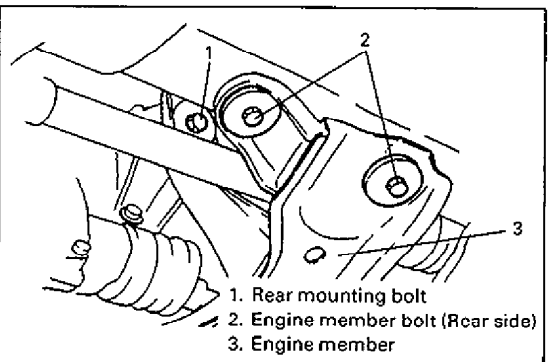
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4) Remove exhaust pipe.

5) Support engine member with garage jack.

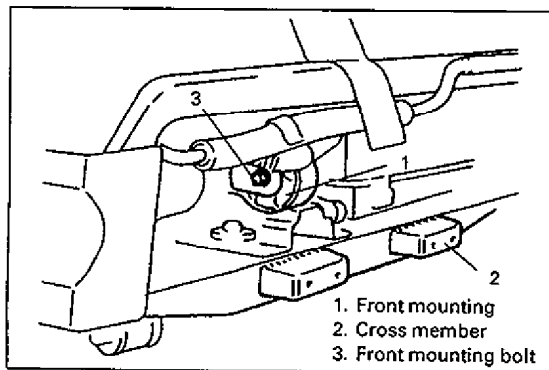
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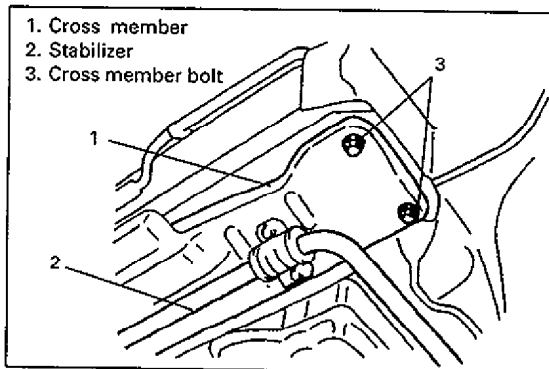
6) Remove rear mounting bolts.

7) Remove rear engine member bolt and remove engine member and cross member.

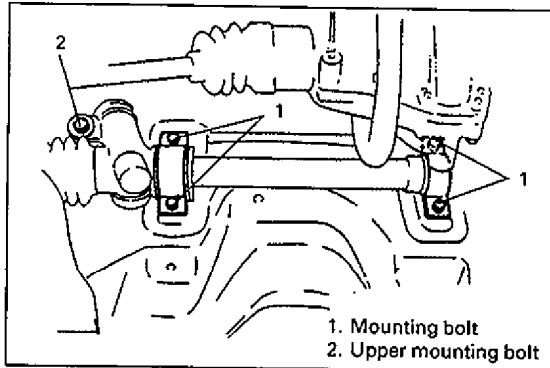
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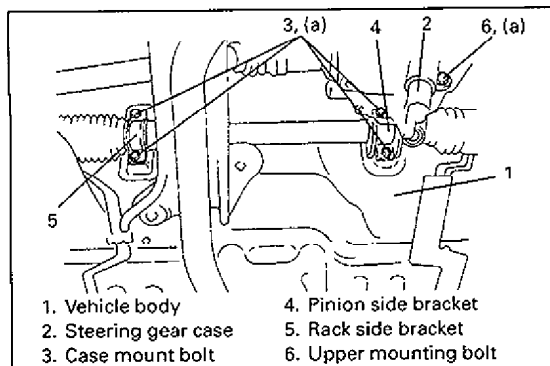
8) Remove engine front mounting bolt.

9) Remove stabilizer. Refer to STABILIZER BAR AND/OR BUSHINGS of section 3D.

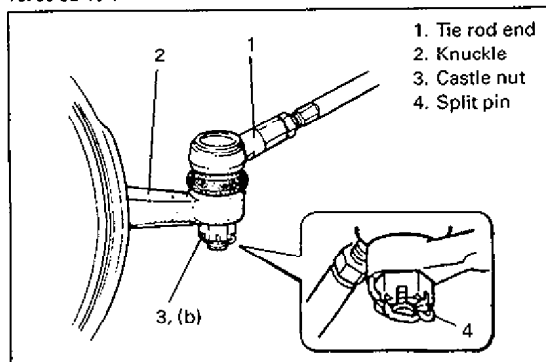
10) Remove cross member bolts.

11) Lower jack and remove engine member and cross member.

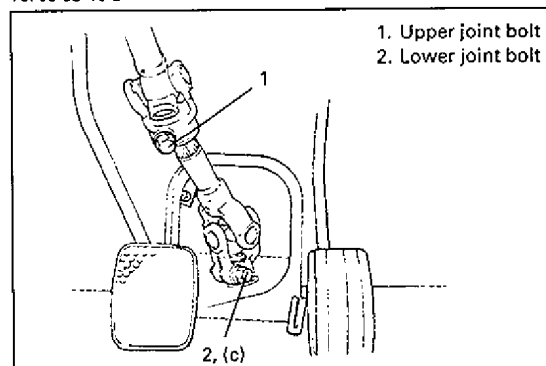
12) Remove steering gear case.



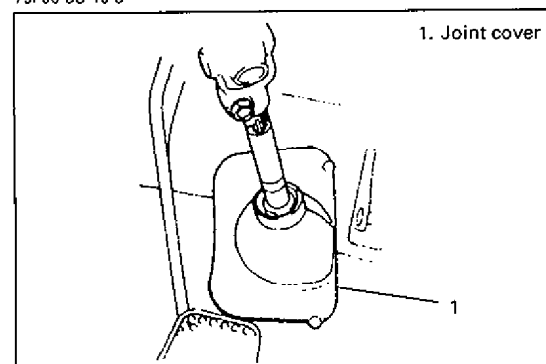
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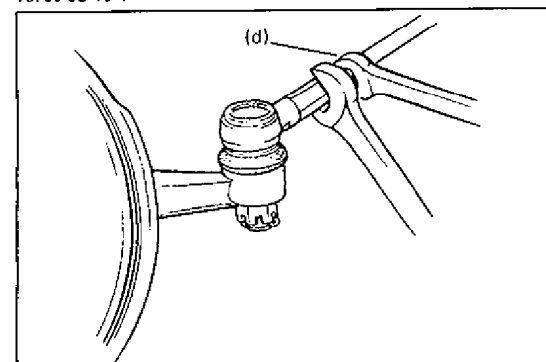
75F00-3B-10-2



75F00-3B-10-3



75F00-3B-10-4



75F00-3B-10-5

INSTALLATION

For left-hand steering vehicle

- 1) Mount steering gear case to body and tighten gear case mount bolts to specified torque.

Tightening Torque

(a): 25 N·m (2.5 kg-m, 18.0 lb-ft)

- 2) Install tie rod ends to knuckles (R & L). Tighten each castle nut until holes for split pin align but within specified torque and then bend split pin as shown.

Tightening Torque

(b): 43 N·m (4.3 kg-m, 31.5 lb-ft)

- 3) Be sure that steering wheel and brake discs (R & L) are all straightahead driving state and then insert steering lower joint into steering pinion shaft.
- 4) Tighten steering shaft joint bolts to specified torque (Lower side first and then upper side).

Tightening Torque

(c): 25 N·m (2.5 kg-m, 18.0 lb-ft)

- 5) Reinstall cover removed previously to steering shaft joint.
- 6) Put back floor mat as it was.
- 7) Install both wheels and tighten wheel nuts to specified torque.

Tightening Torque for wheel nuts:

85 N·m (8.5 kg-m, 61.5 lb-ft)

- 8) Lower hoist.
- 9) Check toe setting. Adjust as required (Refer to Section 3A FRONT END ALIGNMENT).
- 10) Tighten both tie rod end lock nuts to specified torque.

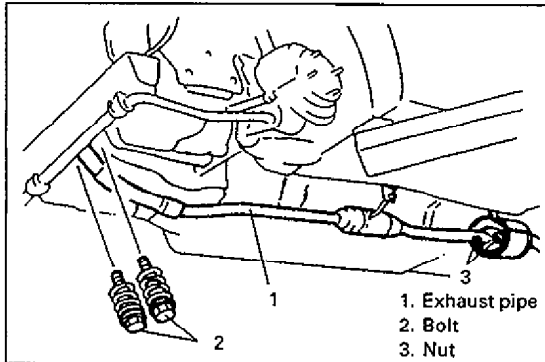
Tightening Torque

(d): 45 N·m (4.5 kg-m, 32.5 lb-ft)

For right-hand steering vehicle

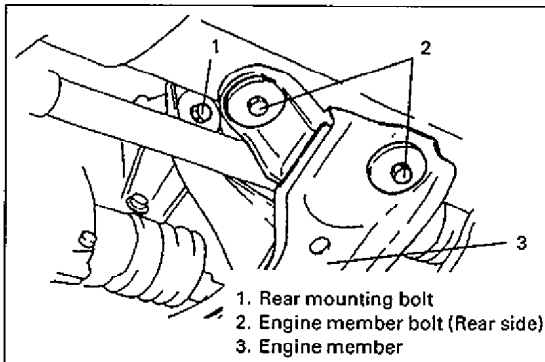
- 1) Use the same removal procedure, Steps 1) – 6), as for the left-hand steering vehicle.

75F00-3B-11-1



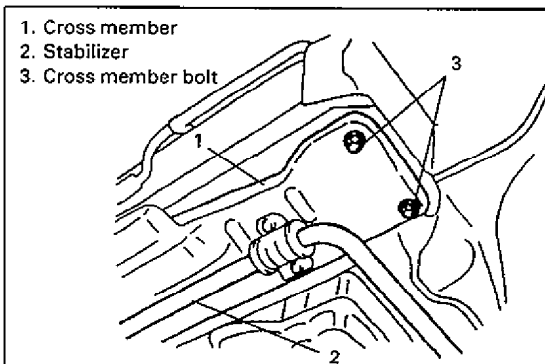
- 2) Tighten exhaust pipe bolts and nuts to specified torque. (Refer to ENGINE ASSEMBLY of Section 6A4.)

75F00-3B-11-2



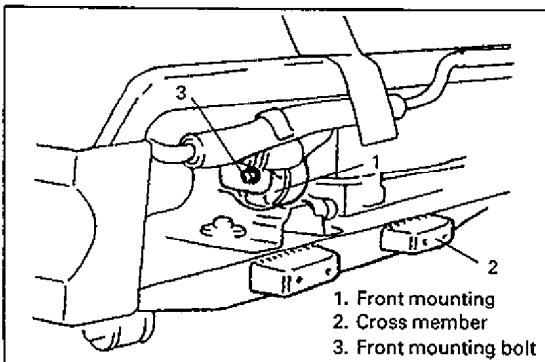
- 3) Install engine member and cross member, then tighten rear engine member bolts to specified torque. (Refer to ENGINE ASSEMBLY of Section 6A4.)
- 4) Tighten rear mounting bolt to specified torque. (Refer to ENGINE ASSEMBLY of Section 6A4.)

75F00-3B-11-3



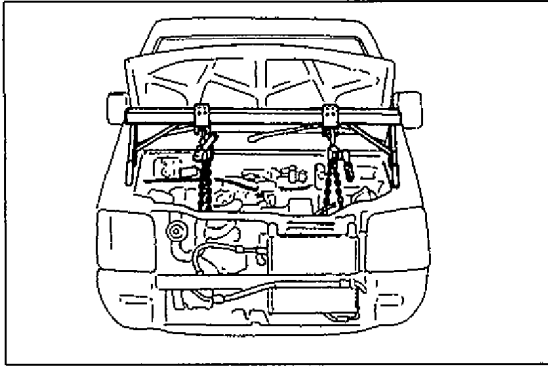
- 5) Tighten cross member bolts to specified torque. (Refer to ENGINE ASSEMBLY of Section 6A4.)
- Then install stabilizer, and tighten bolts to specified torque. (Refer to STABILIZER BAR AND/OR BUSHINGS of Section 3D.)

75F00-3B-11-4



- 6) Tighten front mounting bolts to specified torque. (Refer to ENGINE ASSEMBLY of Section 6A4.)

75F00-3B-11-5

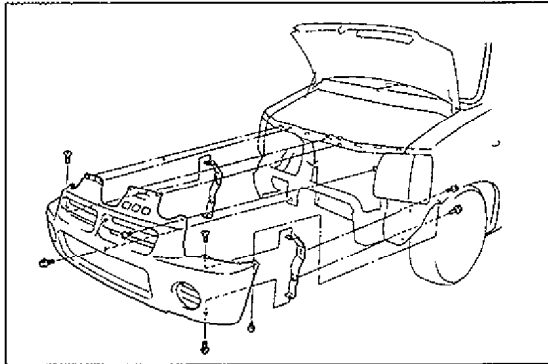


75F00-3B-12-1

- 7) Remove the engine hanger.

CAUTION:

Check all connected parts for secure connection before removing the engine hanger.



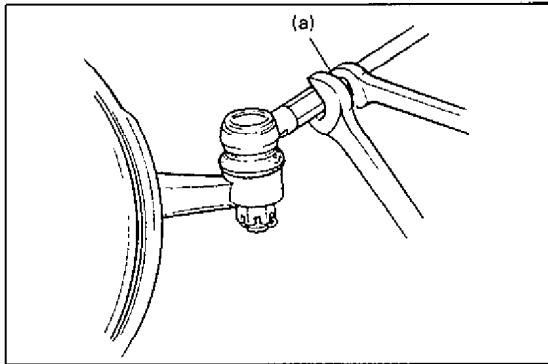
75F00-3B-12-2

- 8) Install bumper.
9) Install both wheels and tighten wheel nuts to specified torque.

Tightening Torque for wheel nuts:

85 N·m (8.5 kg-m, 61.5 lb-ft)

- 10) Lower hoist.

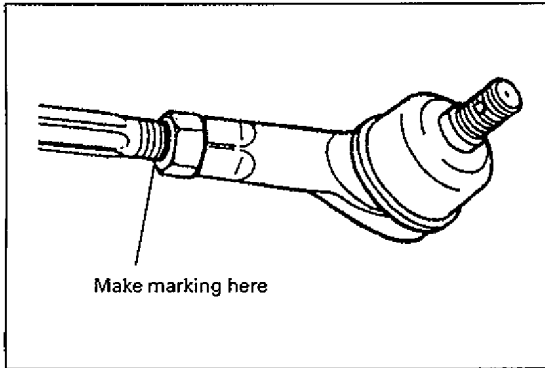


75F00-3B-12-3

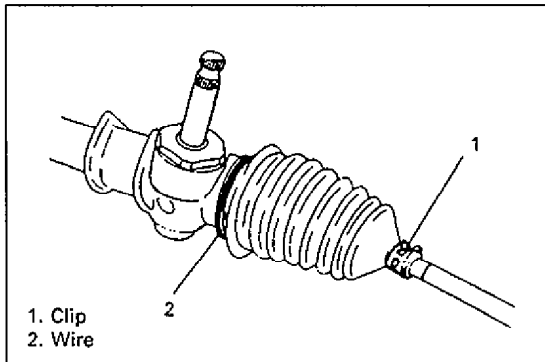
- 11) Check toe setting. Adjust as required. (Refer to FRONT END ALIGNMENT.)
12) Tighten both tie rod end lock nuts to specified torque.

Tightening Torque

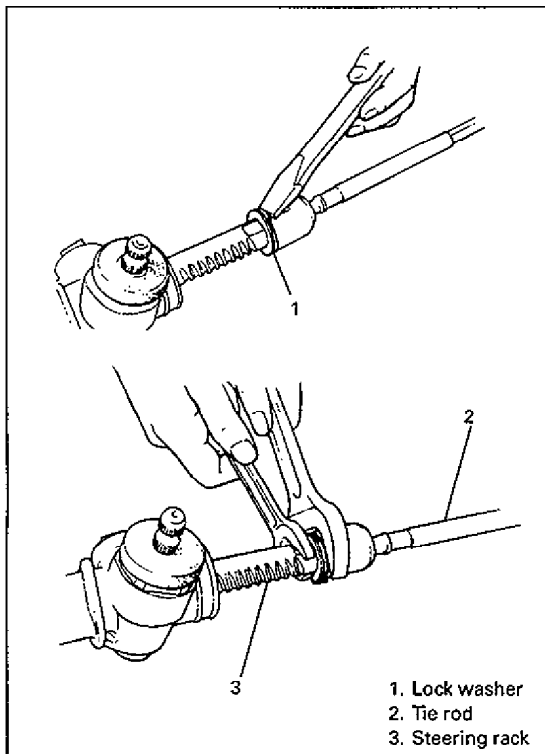
(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)



75F00-3B-13-1



75F00-3B-13-2

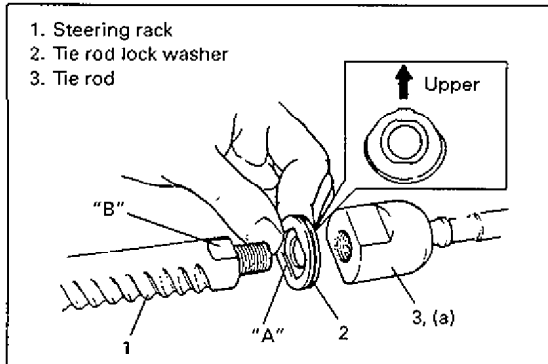


75F00-3B-13-4

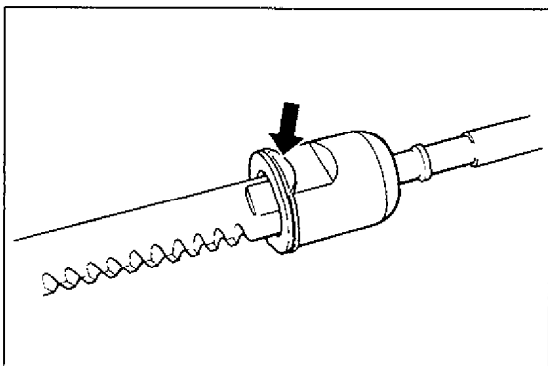
RACK BOOT/TIE ROD

REMOVAL

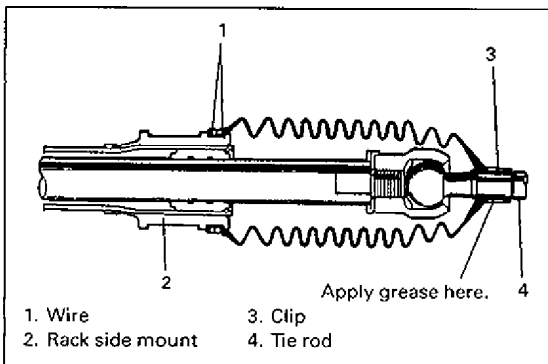
- 1) Remove steering gear case by performing Steps 1) – 9) for left-hand steering vehicle, Steps 1) – 12) for right-hand steering vehicle in MANUAL RACK AND PINION REMOVAL of this section.
- 2) For ease of adjustment after installation, make marking of tie rod end lock nut position of tie rod end thread.
- 3) Loosen tie rod end lock nut and remove tie rod end.
- 4) Remove boot wire and clip.
- 5) Remove boot from tie rod.
- 6) Unbend bent part of tie rod lock washer and remove tie rod from rack.



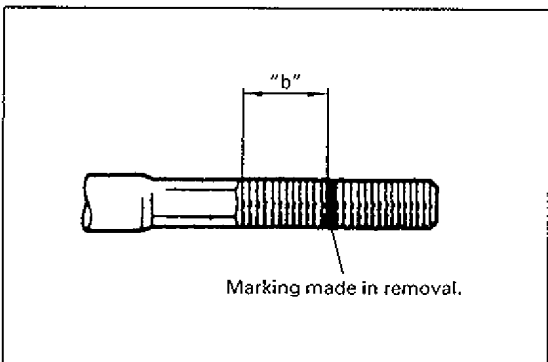
75F00-3B-14-1



75F00-3B-14-2



75F00-3B-14-3



75F00-3B-14-4

INSTALLATION

- 1) Install new tie rod lock washer and tie rod to rack. Align straight part "A" of washer with flat part "B" of rack.

NOTE:

For correct installation of tie rod lock washer, refer to figure at left.

- 2) Tighten tie rod inside ball nut to specified torque.

Tightening Torque

(a): 85 N·m (8.5 kg·m, 61.5 lb·ft)

- 3) Bend lock washer to tie rod side as shown.

- 4) Position boot properly in grooves of gear case and tie rod and clamp it with wire and clip.

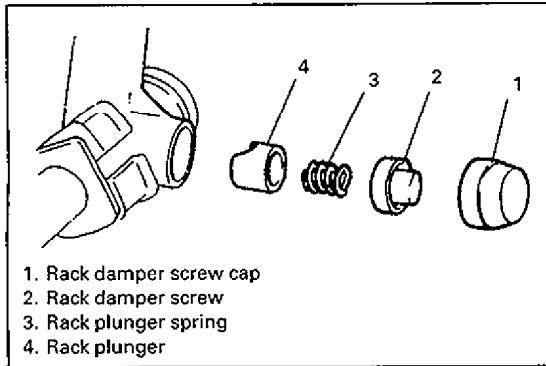
Wire should be new and should go around twice and be tightened with its both ends twisted together. The twisted ends should be bent in the circumferential direction. After this, check to ensure that boot is free from twist and dent.

- 5) Install tie rod end lock nut and tie rod end to tie rod. Position lock nut to marking made in removal.

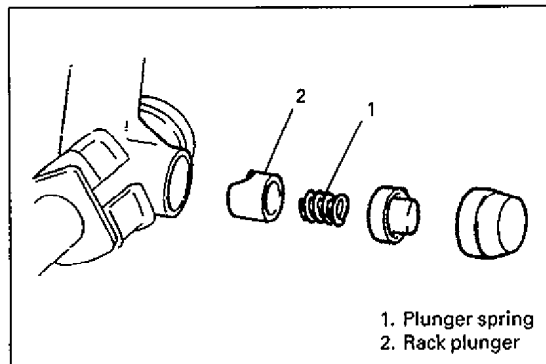
NOTE:

When tie rod end was replaced, measure length "b" on removed tie rod end and use it on new replacement tie rod end so as to position lock nut properly.

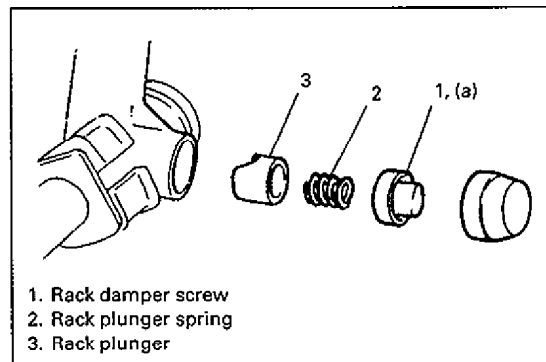
- 6) For installation procedures following the above, use Steps 1) – 10) (or Steps 1) – 12) for right-hand steering vehicle) in INSTALLATION of STEERING GEAR CASE.



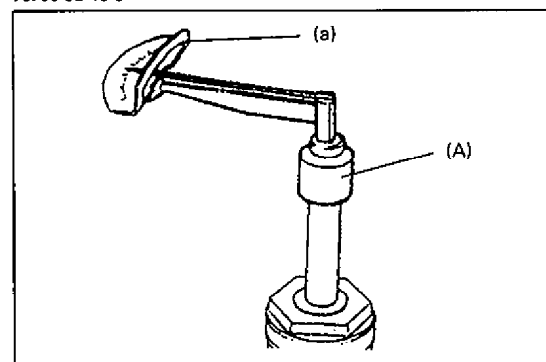
75F00-3B-15-1



75F00-3B-15-2



75F00-3B-15-3



75F00-3B-15-4

STEERING RACK PLUNGER

REMOVAL

- 1) Remove rack boots and tie rods.
- 2) Remove parts as shown.

INSPECTION

- Inspect rack plunger for wear or damage.
 - Inspect rack plunger spring for deterioration.
- In either case, if found defective, replace.

INSTALLATION

- 1) Apply grease lightly to sliding part of plunger against rack.
- 2) Install parts as shown and tighten rack damper screw to specified torque.

Tightening Torque

(a): 15N·m (1.5 kg-m, 11.0 lb-ft)

- 3) After tightening rack damper screw to specified torque, turn it back by 30° and check for rotation torque of pinion.

Special Tool

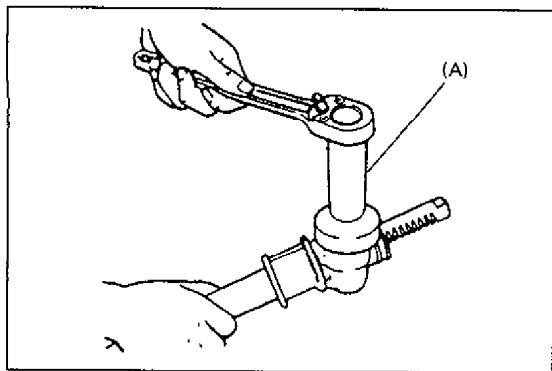
(A): 09944-18211

Rotation Torquer of pinion

(a): 0.8 ± 0.4 N·m (0.08 ± 0.04 kg-m, 0.58 ± 0.29 lb-ft)

Also, check if rack as a whole moves smoothly.

- 4) After adjustment, put rack damper screw cap as deeply as possible.



75F00-3B-16-1

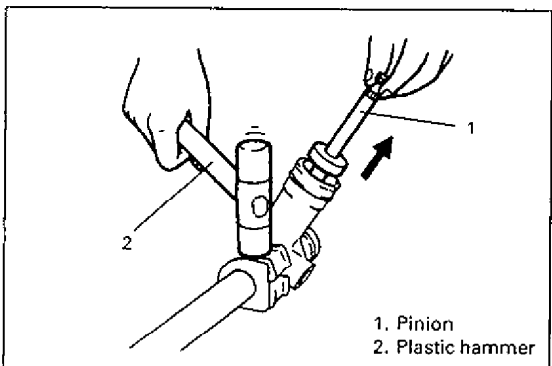
STEERING PINION

REMOVAL

- 1) Remove rack plunger as shown in STEERING RACK PLUNGER.
- 2) Remove bearing plug with special tool.

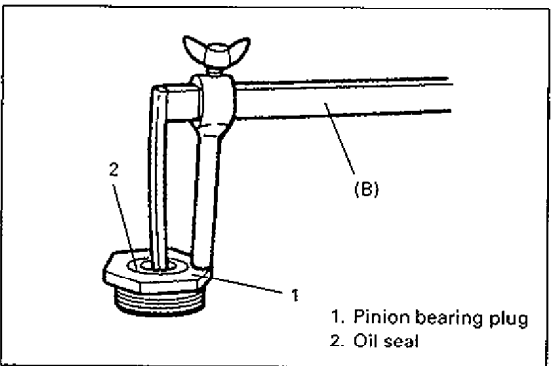
Special Tool

(A): 09944-26010



75F00-3B-16-2

- 3) Tap on position as shown with plastic hammer to separate pinion assembly from housing, and remove pinion assembly.

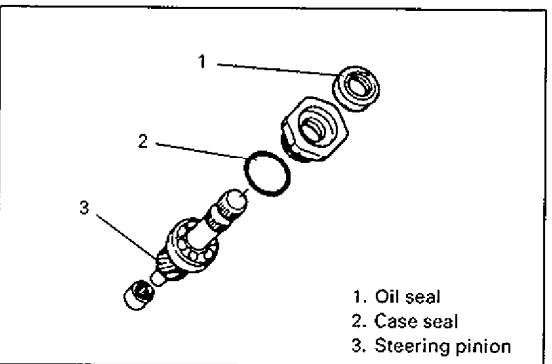


75F00-3B-16-3

- 4) Remove oil seal with special tool from pinion bearing plug.

Special Tool

(B): 09913-50121



75F00-3B-16-4

INSPECTION

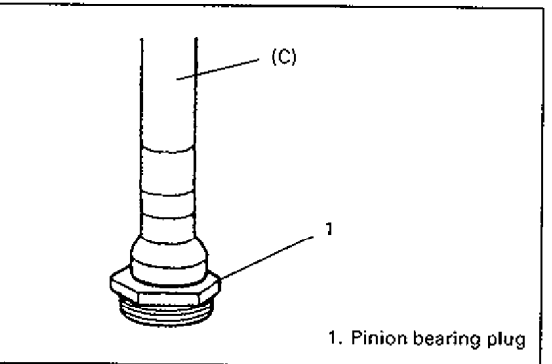
- Inspect pinion teeth surface for wear or damage.
- Inspect oil seal for damage.
- Replace any part found defective.
- Check rotation condition of bearing and inspect for wear. If found defective, replace.

INSTALLATION

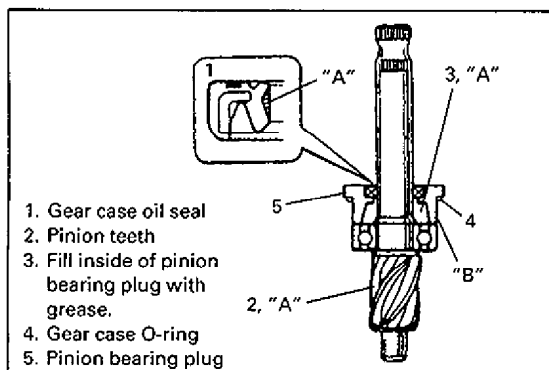
- 1) Install oil seal with special tool to pinion bearing plug.

Special tool

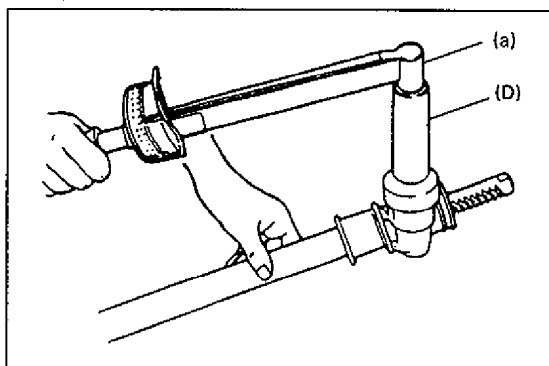
(C): 09925-98210



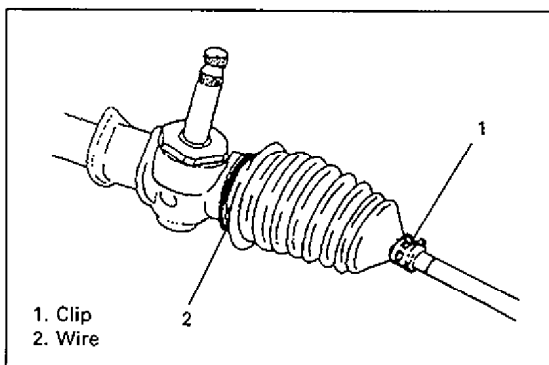
75F00-3B-16-5



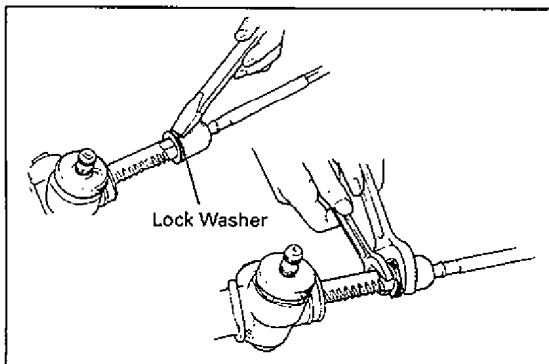
75F00-3B-17-1



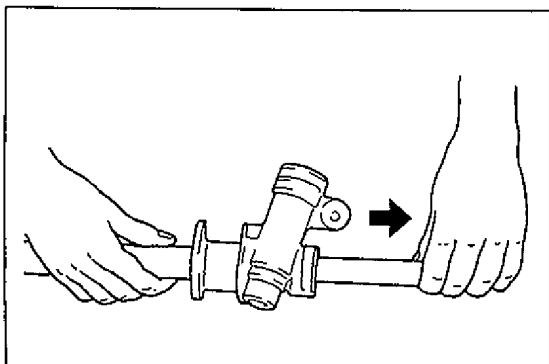
75F00-3B-17-2



75F00-3B-17-3



75F00-3B-17-4



75F00-3B-17-5

- 2) Apply grease to all around pinion teeth, pinion needle bearing and gear case oil seal lip.

"A": Grease 99000-25050

- 3) Install pinion assembly and after applying lock cement to pinion bearing plug thread as shown.

"B": Lock Cement 99000-32050

- 4) Tighten pinion bearing plug to specified torque.

Tightening Torque

(a): 95 N·m (9.5 kg-m, 69.0 lb-ft)

Special Tool

(D): 09944-26010

- 5) Install rack plunger as described in STEERING RACK PLUNGER.

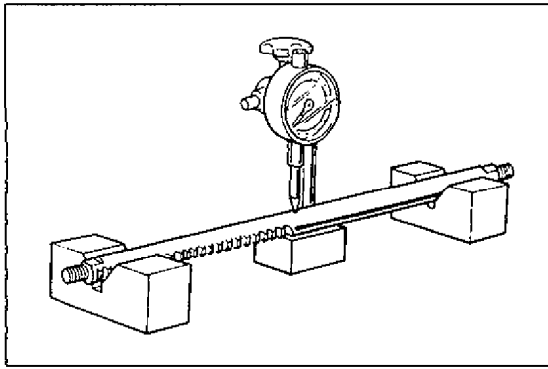
STEERING RACK

REMOVAL

- 1) Remove steering gear case.
- 2) Remove boot wires and clips.
- 3) Move both boots toward tie rod end.
- 4) Unbend bend part of tie rod lock washers and remove tie rods from right and left sides of steering rack.
- 5) Mark left and right tie rods accordingly.
- 6) Remove rack plunger and pinion assembly from gear case by performing Steps 1) – 3) in STEERING PINION REMOVAL of this section.
- 7) Remove rack from gear case. Direction for rack removal is as shown.

CAUTION:

Inside of steering rack bushing is coated with special coating. As it is damageable, be very careful not to cause damage to it when removing rack from steering gear case.



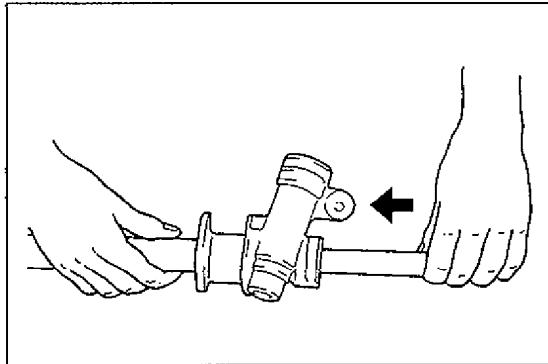
75F00-3B-18-1

INSPECTION

Inspect for deflection, teeth wear, or damage, back surface wear or damage.

Limit of rack deflection: 0.4 mm (0.016 in.)

If deflection exceeds limit, replace rack.



75F00-3B-18-2

INSTALLATION

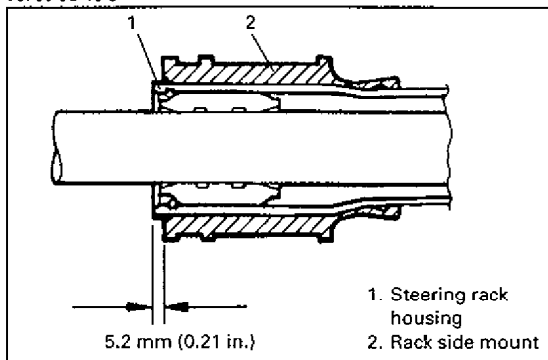
- 1) Apply grease to entire teeth surface of rack and its periphery.
- 2) Slide rack into steering gear case in the direction as shown.

CAUTION:

Inside of steering rack bushing is coated with special coating. As it is damageable, be very careful not to cause damage to it when inserting rack into steering gear case.

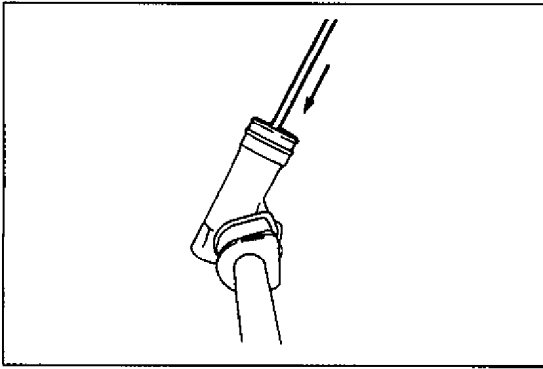
- 3) Install pinion assembly to gear case by performing Steps 2) – 5) in STEERING PINION INSTALLATION of this section.
- 4) Perform Step 1) – 4) in STEERING RACK PLUNGER INSTALLATION of this section.

75F00-3B-18-3



75F00-3B-18-4

- 5) Before installing boot to steering rack housing, make sure that rack side mount is positioned as shown. Install tie rods to rack by performing Steps 1) – 6) in RACK BOOT/TIE ROD INSTALLATION of this section.

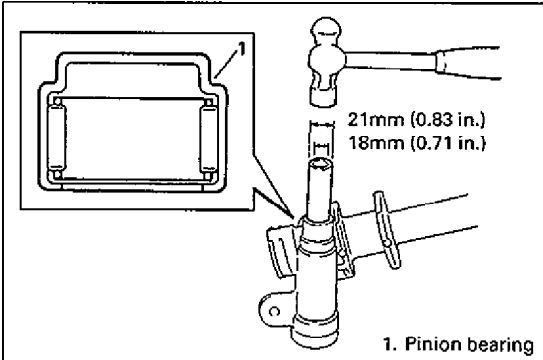


75F00-3B-19-1

PINION BEARING

REMOVAL

- 1) Remove rack from steering gear case, referring to STEERING RACK REMOVAL of this section.
- 2) Remove pinion bearing from gear case.



70F00-3B-19-2

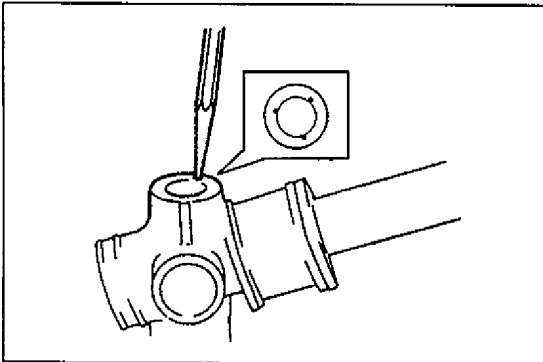
INSTALLATION

- 1) Apply grease to rollers of pinion bearing.
- 2) Press-fit new pinion bearing into gear case with pipe as shown.

After press-fitting, make sure that bearing rollers are installed properly.

CAUTION:

Do not reuse pinion bearing.



75F00-3B-19-3

- 3) After driving in pinion bearing, calk case as shown.

CAUTION:

Calk at three locations avoiding previously caulked locations.

- 4) Follow Steps 1) – 5) in STEERING RACK INSTALLATION of this section to complete installation.

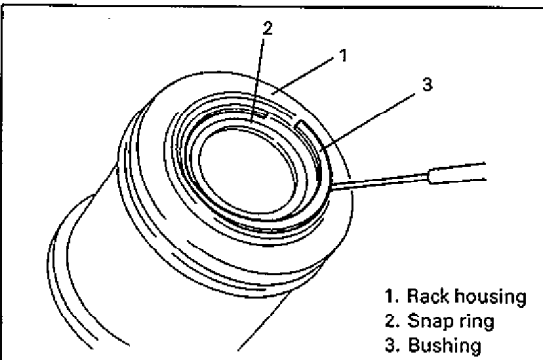
RACK BUSHING

REMOVAL

NOTE:

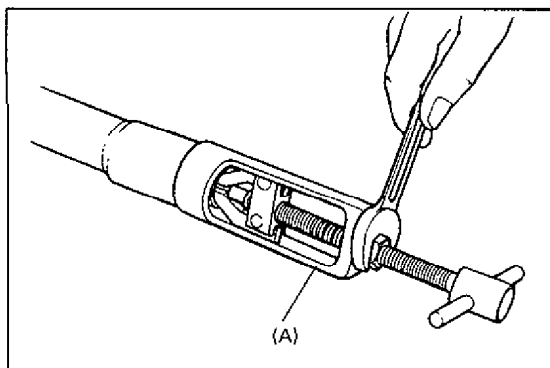
When removing rack bushing, be careful not to pull out bushing by holding gear case in a vise. Or housing (pipe) may come off gear case. For this work, be sure to use the below specified special tool.

75F00-3B-19-4



75F00-3B-19-5

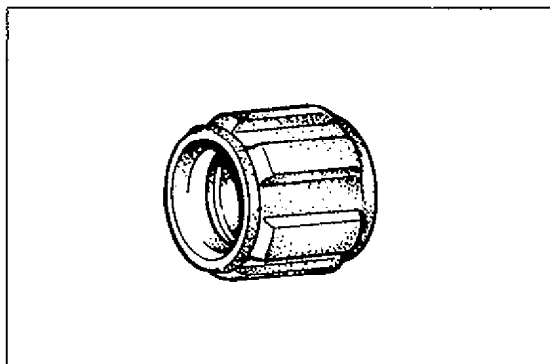
- 1) Remove rack from steering gear case, referring to STEERING RACK REMOVAL of this section.
- 2) Remove snap ring.



75F00-3B-20-1

- 3) Pull out bushing from rack housing with special tool as shown.

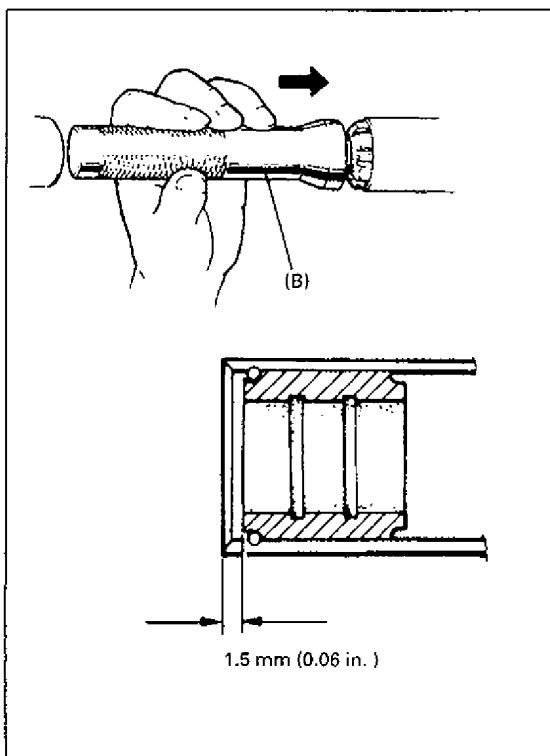
Special Tool
(A): 09944-48210



75F00-3B-20-2

INSPECTION

Inspect rack bushing for wear or damage.
If found defective, replace.



75F00-3B-20-4

INSTALLATION

- 1) Apply grease lightly to entire inner surface of bushing.
- 2) Press-fit bushing as far into rack housing as shown by using special tool.

CAUTION:

Inside of bushing is coated with special coating. As it is damageable, be sure to use special tool and special care not to cause damage to inside of bushing when press-fitting it.

Special tool
(B): 09943-78210

- 3) Install snap ring.
- 4) Follow Steps 1) – 5) in STEERING RACK INSTALLATION of this section to complete installation.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Steering shaft joint bolts	25	2.5	18.0
Steering gear case bolts	25	2.5	18.0
Upper mount bolts	25	2.5	18.0
Tie-rod end castle nuts	43	4.3	31.5
Tie-rod end lock nuts	45	4.5	32.5
Steering pinion bearing plug	95	9.5	69.0
Tie-rod	85	8.5	61.5
Wheel nut	75	7.5	54.5

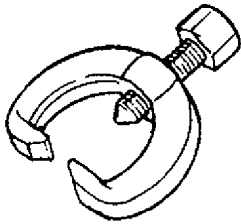
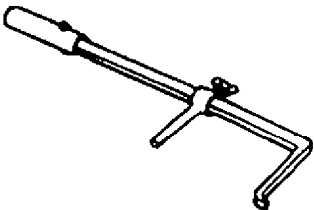
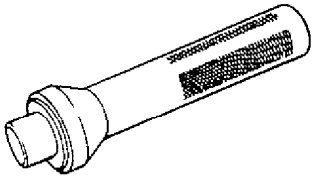
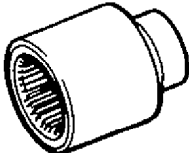
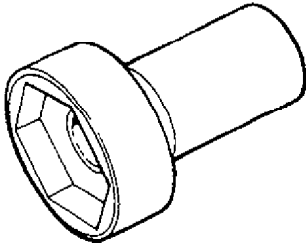
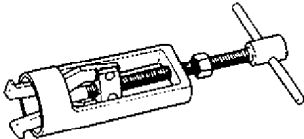
75F00-3B-21-2

REQUIRED SERVICE MATERIAL

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium Grease (Should be applicable for -40°C ~ 130°C)	SUZUKI SUPER GREASE (E) (99000-25050)	• Sliding part of rack against steering housing (All around rack plunger, rack bushing and rack) • Sliding part against steering pinion (Oil seal lip, needle bearing) • Steering rack and pinion gear teeth • Filled into pinion bearing cap • Contacting parts of tie-rod and rack side boots • Rack end ball joint
Lock cement	SUZUKI LOCK SUPER (99000-32050)	• Pinion bearing plug thread

75F00-3B-21-4

SPECIAL TOOLS

 09913-65210 Tie-rod end remover	 09913-50121 Oil seal remover	 09925-98210 Bearing installer	 09943-78210 Rack bush installer
 09944-18211 Pinion torque checking socket	 09944-26010 43 mm Socket (Pinion bearing plug remover)	 09944-48210 Rack bush remover	

SECTION 3B4

ELECTRICAL POWER STEERING (P/S) SYSTEM (IF EQUIPPED)

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result 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).

3B4

NOTE:

All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

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Indication of Diagnostic Trouble		DTC 15 Sud Circuit of Torque	
Code (DTC)	3B4-9	Sensor	3B4-17

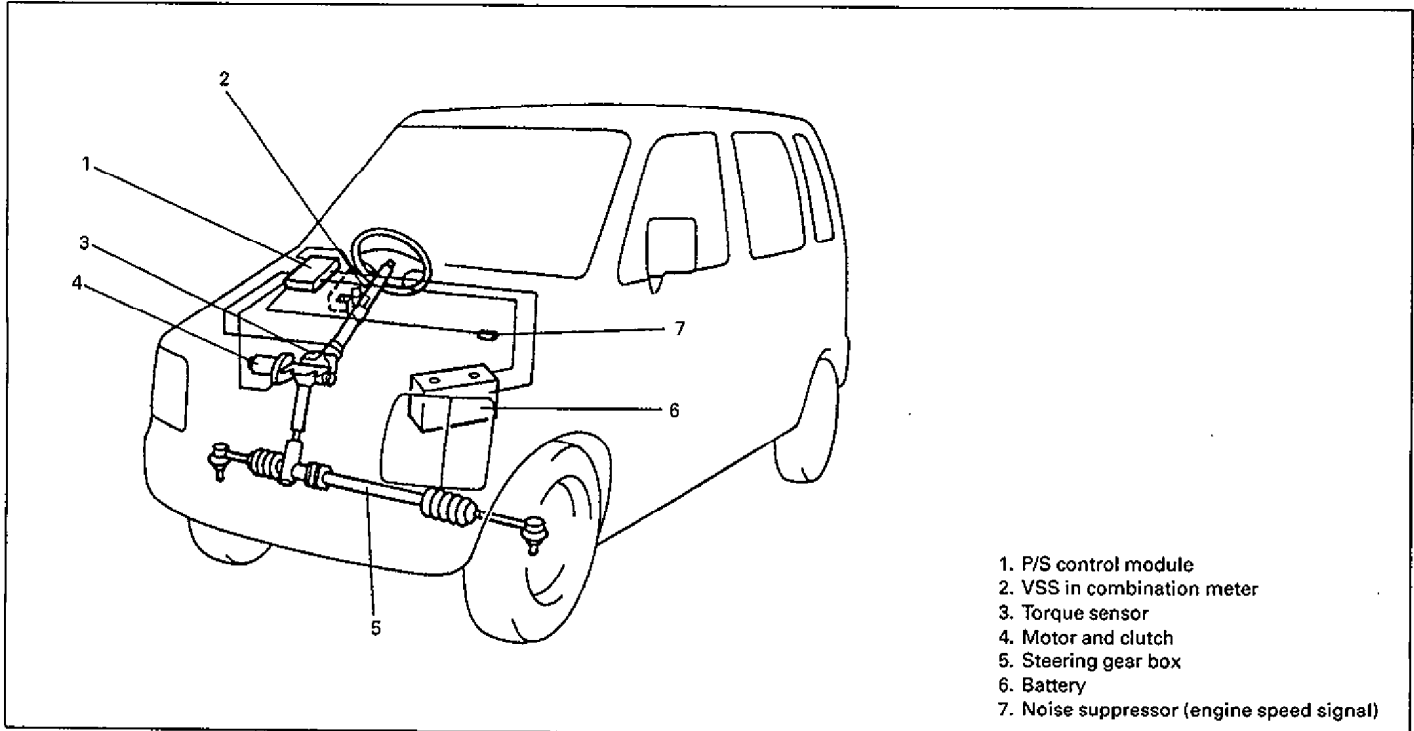
DTC 21/23/24 VSS Circuit	3B4-18
DTC 22 Engine Speed Signal	3B4-20
DTC 41/42/43/44/45 Motor	3B4-21
DTC 51 Clutch Circuit	3B4-22
DTC 54 Power Supply Circuit of P/S Control Module	3B4-23
DTC 52/55 P/S Control Module	3B4-23
Inspection of P/S Control Module Circuit	3B4-24
Voltage check	3B4-24
Resistance check	3B4-26
Trouble Diagnosis	3B4-27

ON-VEHICLE SERVICE	3B4-28
Inspection of Steering Wheel Play	3B4-28
Inspection of Steering Force	3B4-28
P/S Control Module (Remove and Installation)	3B4-29
Torque Sensor (On-vehicle inspection)	3B4-29
Motor And Clutch (On-vehicle inspection)	3B4-30
Noise Suppressor	See SECTION 6F1
VSS	See SECTION 6E1

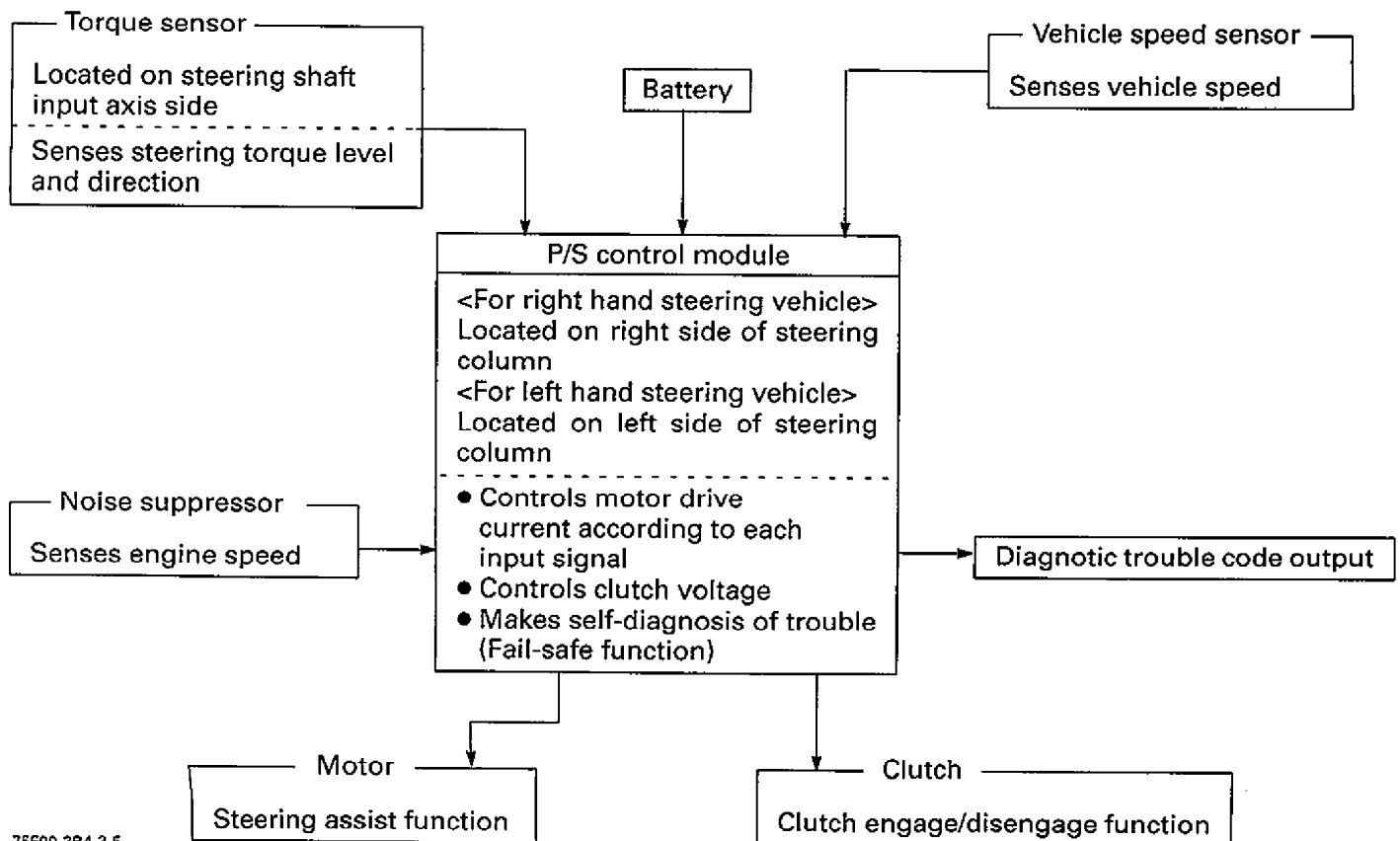
GENERAL DESCRIPTION

This electrical power steering (P/S) system consists of a P/S control module, a VSS (vehicle speed sensor) and a noise suppressor and other components installed to the steering column.

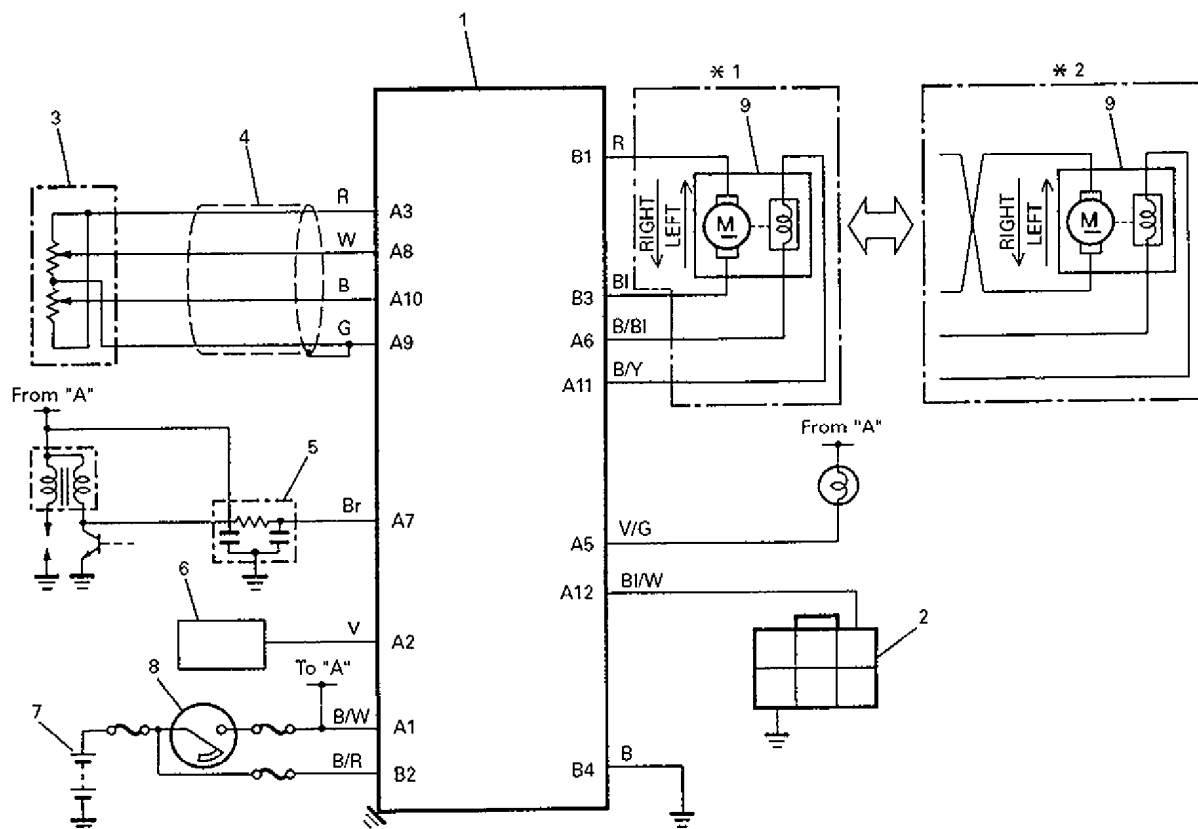
They are a torque sensor, a motor and clutch. In this system, the P/S control module determines the level and direction of the assist force for the steering wheel according to the signals from the torque sensor and the vehicle speed, runs the motor so as to assist operation of the steering wheel.



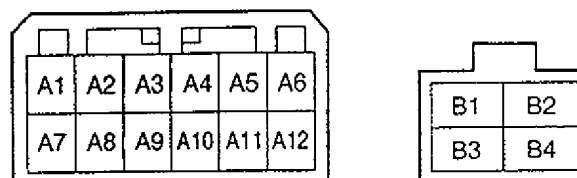
CONTROL FLOW CHART



WIRING DIAGRAM

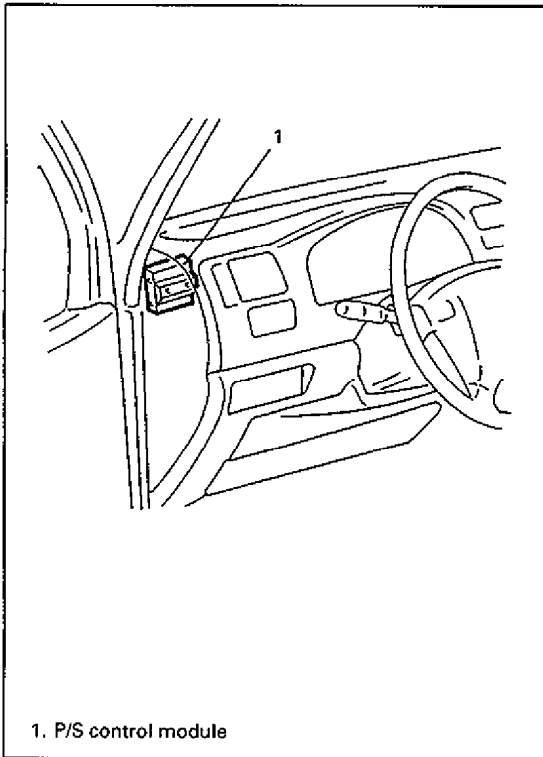


TERMINAL ARRENGEMENT OF P/S CONTROL MODULE SIDE



- *1: For right hand steering vehicle
 *2: For left hand steering vehicle

1. P/S control module
2. Monitor coupler
3. Torque sensor
4. Shield wire
5. Noise suppressor
6. Speedometer
7. Battery
8. Ignition switch
9. Motor and clutch



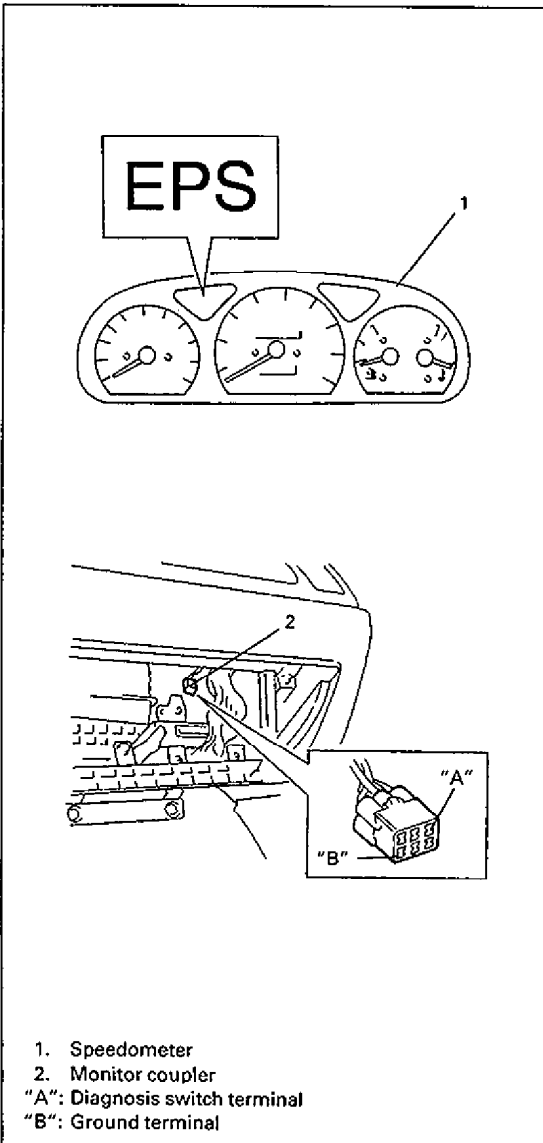
1. P/S control module

75F00-3B4-5-2

P/S CONTROL MODULE

P/S control module is installed under the instrument panel at driver's side. P/S control module is a precision unit consisting of microcomputer, A/D (Analog/Digital) converter, I/O (Input/Output) unit, etc..

It is an essential part of the electronic control system, for its functions include not only such a major function as to control assisting force level and direction but also on-board diagnostic system (self-diagnosis function) and fail-safe function as described in the following section.



1. Speedometer
2. Monitor coupler
"A": Diagnosis switch terminal
"B": Ground terminal

75F00-3B4-5-5

On-Board Diagnostic System (Self-Diagnosis Function)

P/S control module diagnoses troubles which may occur in the area including the following parts when the ignition switch is ON and the engine is running, and indicates the result with lighting or flashing of "EPS" indicator light.

- Torque sensor
- VSS
- Engine speed signal
- Motor
- Clutch
- P/S control module

P/S control module and "EPS" indicator light operate as follows.

- If no trouble exists in the above area when the ignition switch is turned ON without grounding the diagnosis switch terminal, "EPS" indicator light turns on for 2 seconds and then turns off. This is to check "EPS" indicator light bulb and its circuit.
- When P/S control module detects a trouble which has occurred in the above area, it causes "EPS" indicator light to turn on to warn occurrence of a trouble to the driver. At the same time, it stores the trouble area in the back-up memory of P/S control module.

NOTE:

"EPS" indicator light does not turn on even if one alone, or two or more of DTC21, 22 and 24 have occurred.

- When the diagnosis switch terminal is grounded, P/S control module indicates the trouble area by making "EPS" indicator light flash.

NOTE:

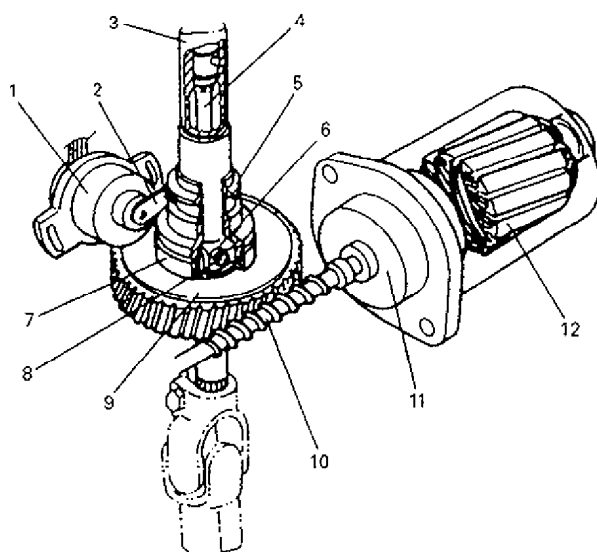
Whenever the ignition switch is turned ON and the engine is stopped, DTC22 is output. Therefore, the engine should be running when checking DTC.

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Fail-Safe Function

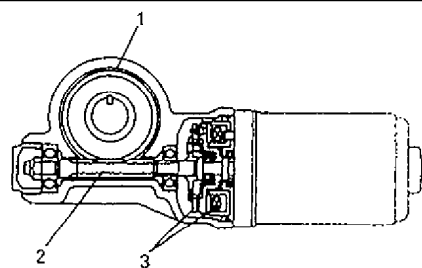
When an abnormal DTC has occurred, P/S control module turns OFF the motor & clutch.

75F00-3B4-6-2

STEERING COLUMN

- | | |
|------------------|---------------|
| 1. Torque sensor | 8. Steel ball |
| 2. Lever | 9. Worm wheel |
| 3. Sensor shaft | 10. Worm gear |
| 4. Torsion bar | 11. Clutch |
| 5. Slider | 12. Motor |
| 6. Ball groove | |
| 7. Ring | |

75F00-3B4-6-4



1. Helical gear
2. Worm gear
3. Clutch (electromagnetic type)

Motor and Clutch

The motor installed onto the steering column consists of a worm gear, an electromagnetic clutch and a DC motor. As the worm gear is engaged with a helical gear fixed to the column output shaft, it decelerates the motor speed and transmits it to the output shaft. The electromagnetic clutch is installed between a reduction gear and the motor.

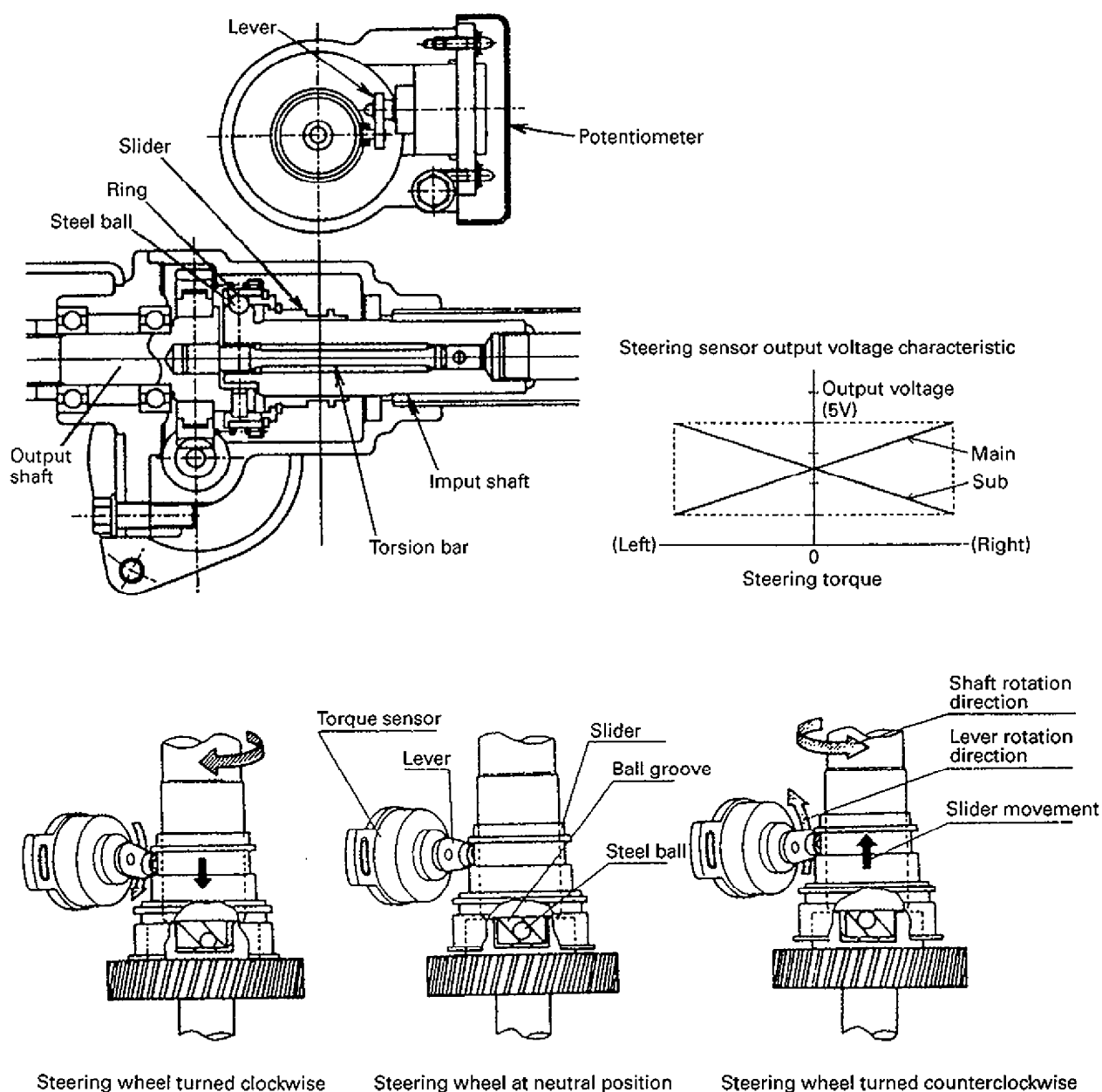
75F00-3B4-6-5

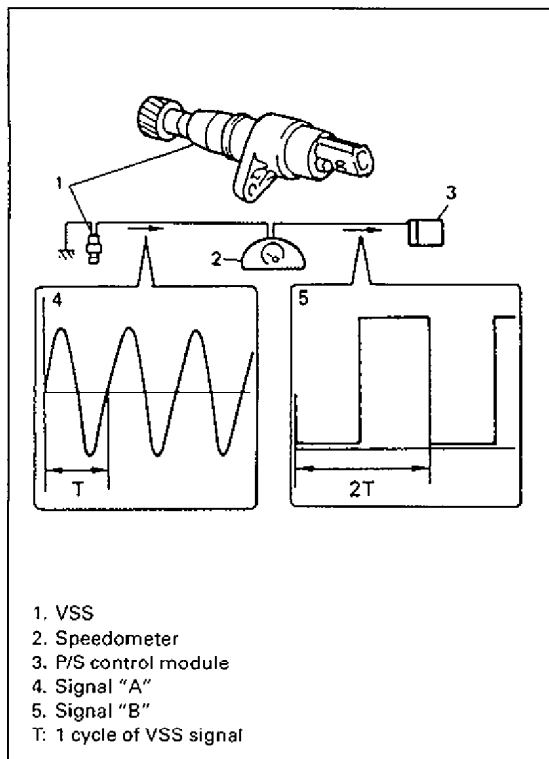
Torque Sensor

The torque sensor consists of a slider, a steel ball, a ring and a potentiometer. It detects the steering wheel operation force and its direction, converts them into voltage values and transmits them to P/S control module.

The steel ball is held by the spiral ball groove in the outside of the input shaft and the ball hole in the inside of the slider. The slider can move in the spiral direction with respect to the input shaft.

Also, as the slider is installed to the output shaft with a pin and it can move only in the vertical direction with respect to the output shaft. Therefore, when the input shaft rotates to the output shaft, the slider moves vertically (in the shaft direction) according to the direction and the amount of the input shaft rotation with respect the output shaft. When the steering wheel is steered and a torque is applied to the torsion bar, a deviation occurs in the rotation direction between the input shaft and the output shaft. This deviation causes the slider to move in the shaft direction and this movement in the shaft direction is converted into the rotation angle of the potentiometer in the lever section as shown bellow. As a result, the torque is taken out as a variation in the voltage and transmitted to the P/S control module.

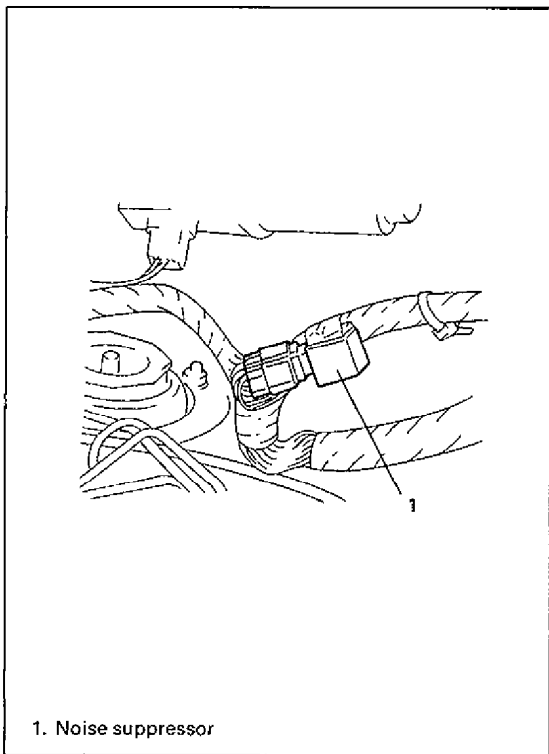




75F00-3B4-8-2

VSS (VEHICLE SPEED SENSOR)

The vehicle speed sensor, located on the transmission, generates a signal in proportion to the vehicle speed (Signal "A"). Receiving this signal, the speedometer uses it for operation of its indicator and also converts it into the ON/OFF signal by doubling the cycle (Signal "B").



75F00-3B4-8-4

ENGINE SPEED SIGNAL

The ignition signal from the ignition coil is sent as an engine speed signal through the noise suppressor to P/S control module.

DIAGNOSIS

P/S control module has on-board diagnostic system (a system self-diagnosis function) as described previously. Investigate where the trouble is by referring to "Diagnostic Flow Chart" in this section.

PRECAUTIONS IN DIAGNOSING TROUBLES

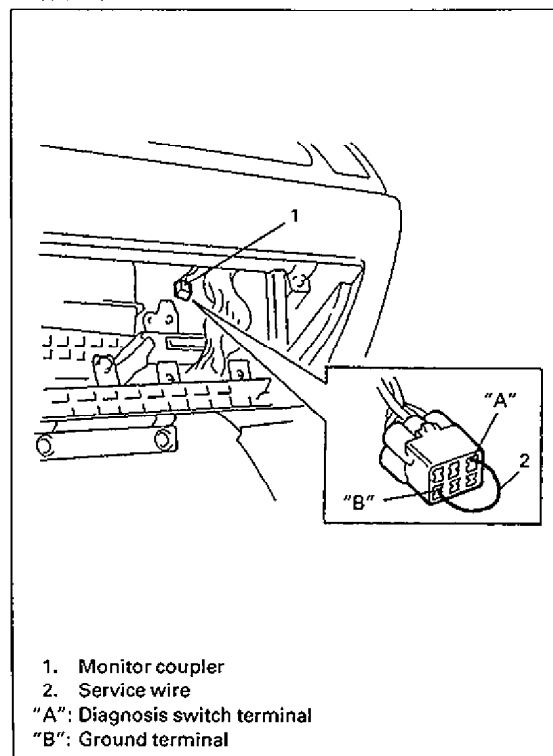
[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

- When two or more troubles have occurred, their diagnostic trouble codes are indicated once each starting with the smallest code number and up.
- DTC 22 (engine speed signal) is indicated when ignition switch ON and engine not running but if indication changes to a normal one when engine is started, it means nothing abnormal.
- As diagnostic trouble code (DTC) is stored in backup memory of P/S control module, be sure to clear memory after repair by disconnecting negative terminal of battery for 30 seconds or more.
- Take a note of diagnostic trouble code indicated first.
- Be sure to read "Precautions for Electronic Circuit Service" in SECTION 0A before inspection and observe what is written there.

[INTERMITTENT TROUBLE] and [NOTES ON SYSTEM CIRCUIT INSPECTION]

Refer to Section 0A.

75F00-3B4-9-2



75F00-3B4-9-4

INDICATION OF DIAGNOSTIC TROUBLE CODE (DTC)

- 1) Remove glove box.
- 2) Connect service wire between monitor coupler terminals "A" and "B".
- 3) Apply chocks to right and left wheels (tires) and pull parking brake fully.
- 4) Start engine. (Unless engine is running, DTC 22 will be indicated.)
- 5) When two or more troubles have occurred, their DTCs are indicated once each starting with the smallest code number and up.

CLEARING DIAGNOSTIC TROUBLE CODE (DTC)

As diagnostic trouble code (DTC) is stored in backup memory of P/S control module, be sure to disconnect battery cord from its negative (-) terminal for 30 seconds or more to clear DTC in memory.

75F00-3B4-9-5

DIAGNOSTIC FLOW CHART

STEP	ACTION	YES	NO
1	1) Make sure that battery voltage is about 11 V or higher. 2) Note "EPS" light as ignition switch is turned ON. 3) Does "EPS" light come ON for about 2 seconds when ignition switch is turned ON?	Go to step 2.	Proceed to Chart A-1. ("EPS" light circuit check)
2	1) Remove glove box. 2) Ground diagnosis switch terminal by using service wire. 3) Apply chocks to wheels, set M/T to neutral (A/T to P range) and pull parking brake fully. 4) Start engine. 5) Does "EPS" light flash?	Go to step 3.	Proceed to Chart A-2. ("EPS" light circuit check)
3	Does "EPS" light indicate DTC 12?	Proceed to "Trouble Diagnosis" in p. 3B4-27.	Check and repair according to flow chart corresponding to that code No.

Fig. for STEP 1, 2 and 3

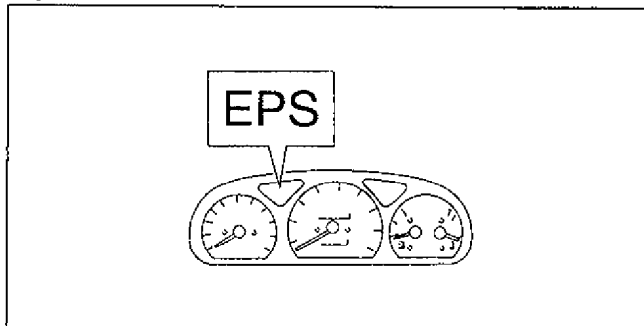
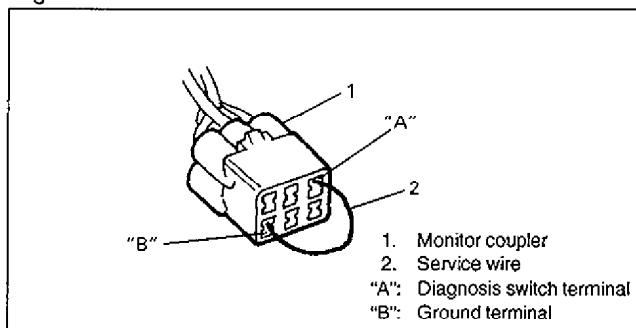


Fig. for STEP 2



CAUTION:

Upon completion of inspection and repair work, check the system by performing the following procedure.

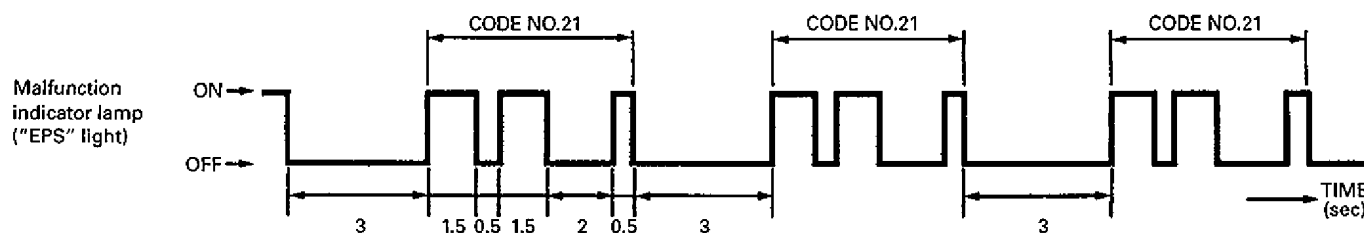
- 1) Disconnect battery negative cable for longer than 30 sec. to erase diagnosis trouble code stored in P/S control module memory and reconnect it.
- 2) Perform confirmation test.
- 3) Apply chocks to wheels, set M/T to neutral (A/T to P range) and pull parking brake fully.
- 4) Connect between diagnosis switch terminal and ground terminal of monitor coupler by using service wire.
- 5) Start engine and observe "EPS" light.
- 6) Check diagnostic trouble code No.12 is indicated.

NOTE:

- Steering column assembly cannot be disassembled. If any part of it is found faulty, replace assembly as a whole.
- When replacing steering column assembly, be careful not to cause a shock to it.
- DTC 22 is indicated when ignition switch ON and engine not running but if DTC No.12 is indicated when engine is started, it means nothing abnormal.
- When two or more troubles have occurred, their diagnostic trouble codes are indicated once each starting with the smallest code number and up.

DIAGNOSTIC TROUBLE CODE TABLE

Example: When only DTC 21 is set



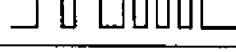
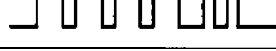
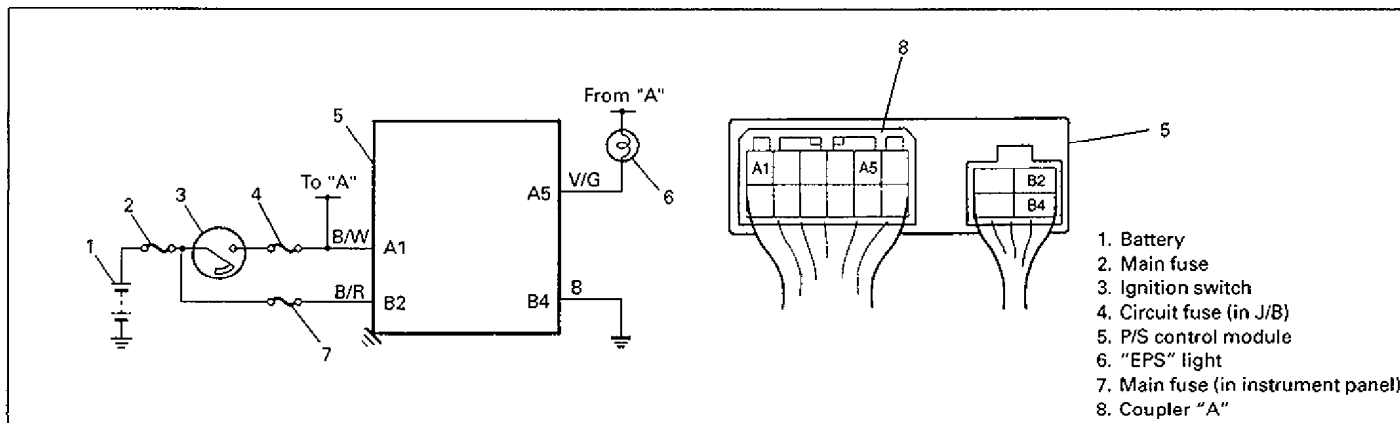
DIAGNOSTIC TROUBLE CODE		DIAGNOSTIC ITEM	DIAGNOSIS
NO.	"EPS" LIGHT FLASHING PATTERN		
12		Normal	This code appears when none of the other codes are identified.
11		Torque sensor	
15			
13			
14			
21		VSS signal	
23			
24			
22		Engine speed signal	
41		Motor	
42			
43			
44			
45			
51		Clutch	
52		P/S control module	
54			
55			

CHART A-1 "EPS" LIGHT CIRCUIT CHECK

("EPS" LIGHT DOESN'T LIGHT AT IGNITION SWITCH ON)



STEP	ACTION	YES	NO
1	Are main and circuit fuses in good condition?	Go to step 2.	Main fuse or Circuit fuse brown.
2	1) Turn ignition switch ON. 2) Check voltage between terminal "A1" and body ground. 3) Is it battery voltage?	Go to step 3.	"B/W" wire open or short.
3	1) Check voltage between terminal "B2" and body ground. 2) Is it battery voltage?	Go to step 4.	"B/R" wire open or short.
4	1) With ignition switch turned OFF, disconnect coupler "A" from P/S control module. 2) Body-ground terminal "A5" in coupler disconnected. 3) Does "EPS" light turn ON at ignition switch ON?	Go to step 5.	Bulb burned out or "V/G" wire open.
5	Is coupler connected to P/S control module properly?	• "B" wire open. • Poor terminal "A1", "B2", "A5" or "B4". • Poor "B" wire ground. • Poor P/S control module body ground. If all above are OK, substitute a known-good P/S control module and recheck.	Poor connection.

Fig. for STEP 4

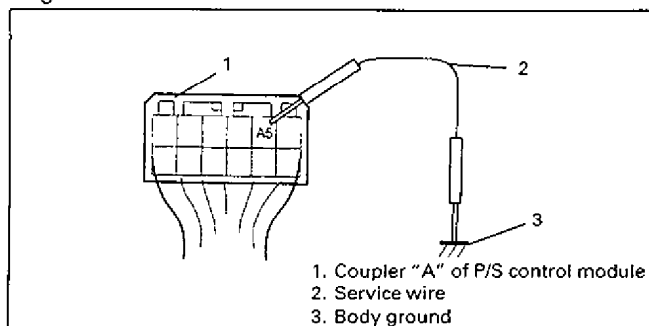
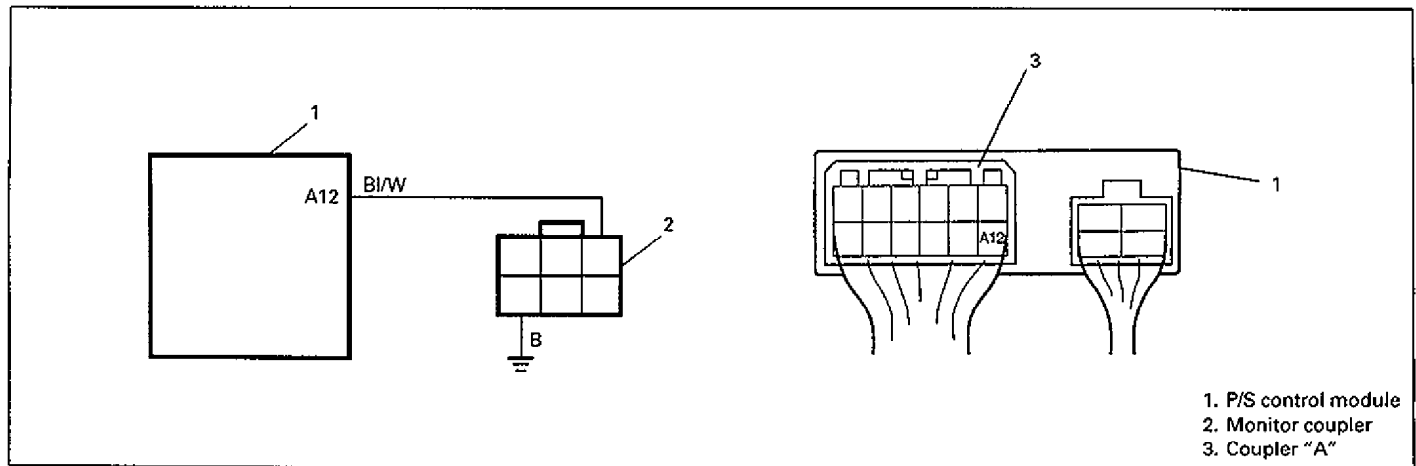


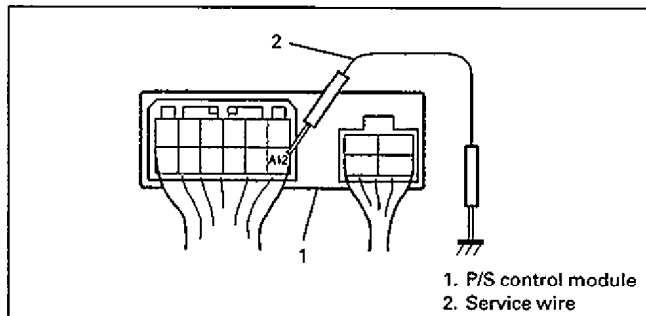
CHART A-2 "EPS" LIGHT CIRCUIT CHECK

("EPS" LIGHT DOESN'T FLASH OR JUST REMAINS ON EVEN WITH SERVICE WIRE CONNECTED TO DIAGNOSIS SWITCH TERMINAL AND GROUND TERMINAL)

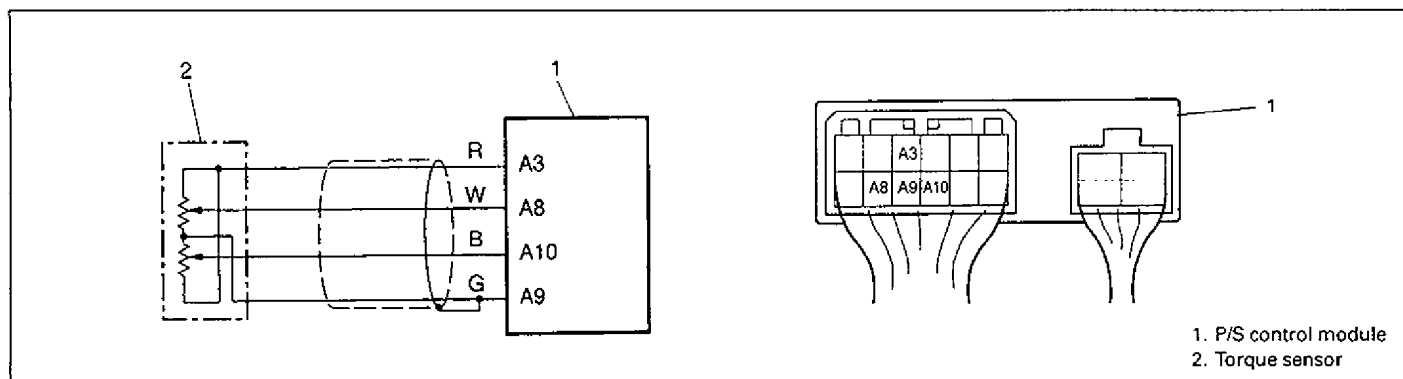


STEP	ACTION	YES	NO
1	Is coupler "A" (terminal "A12") connected to P/S control module properly?	Go to step 2.	Poor connection.
2	1) Using service wire, ground terminal "A12" with coupler connected to P/S control module. 2) Does "EPS" light flash at ignition switch ON?	• Service wire open. • "BI/W" wire circuit open or poor "B" wire grounding.	Substitute a known-good P/S control module and recheck.

Fig. for STEP 2



DTC 11 MAIN CIRCUIT OF TORQUE SENSOR (MAIN CIRCUIT OPEN OR SHORT)



STEP	ACTION	YES	NO
1	1) Remove column hole cover. 2) With ignition switch ON and steering wheel held at position for vehicle to run straight, check voltage at "W" wire terminal of torque sensor coupler. Is it about 2.5 V?	• "W" wire open. • Poor terminal "A8" connection. If all above are OK, substitute a known-good P/S control module and recheck.	Go to step 2.
2	1) With ignition OFF, disconnect torque sensor coupler. 2) Check resistance between "a" and "d" terminals of torque sensor coupler on torque sensor. 3) Is it about 0.82 Ω ?	• "W" wire shorted to battery or ground. • Poor torque sensor coupler-to-harness coupler connection.	Faulty torque sensor.

Fig. for STEP 1

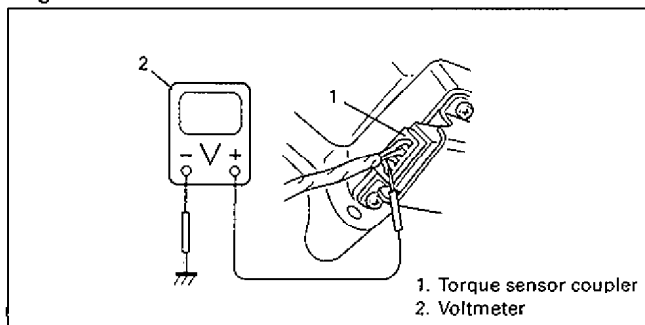
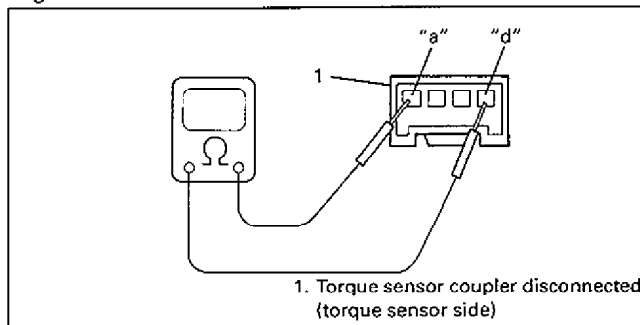
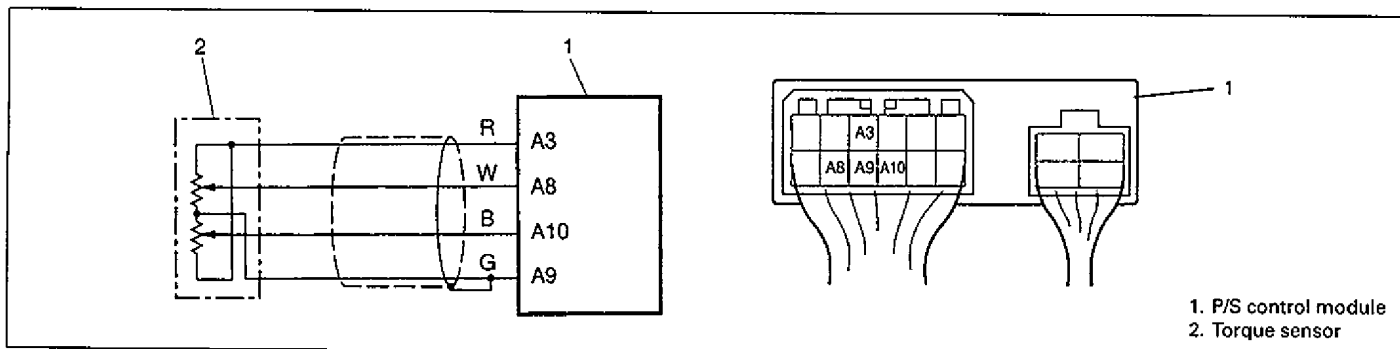


Fig. for STEP 2



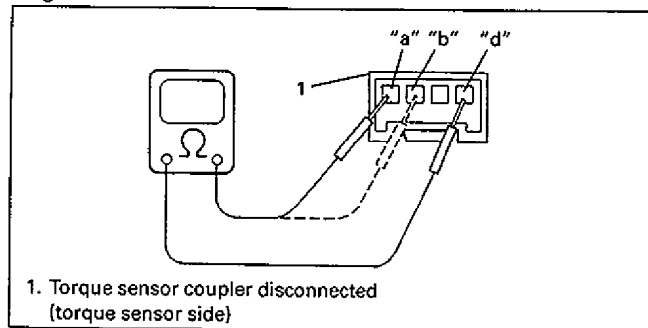
DTC13 TORQUE SENSOR

(LARGE DIFFERENCE BETWEEN OUTPUT FROM MAIN CIRCUIT AND THAT FROM SUB CIRCUIT OF TORQUE SENSOR)



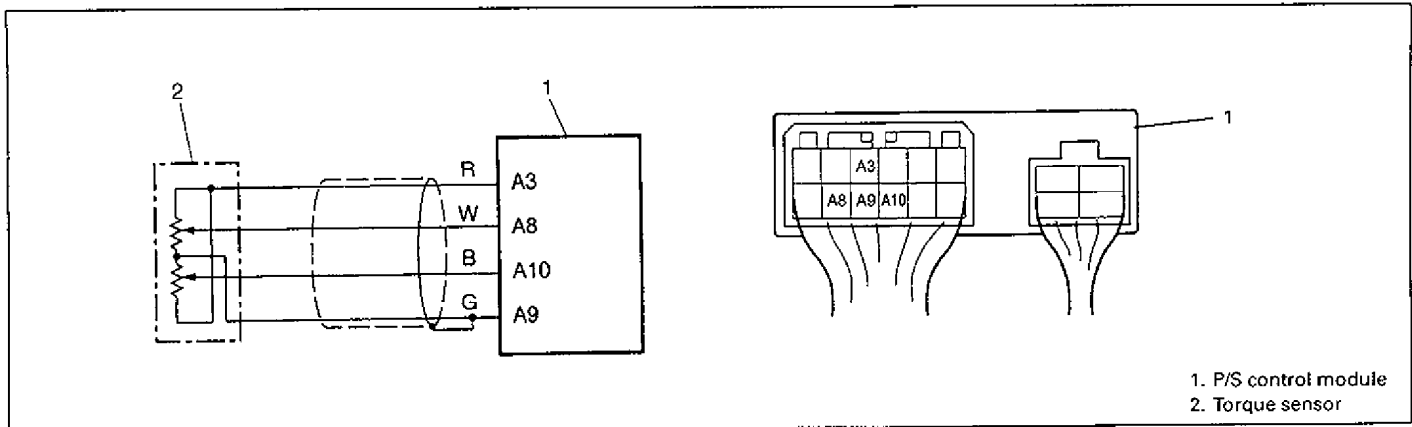
STEP	ACTION		YES	NO
1	1) Remove column hole cover. 2) With ignition switch OFF, disconnect torque sensor coupler. 3) Check resistance between wire terminals of torque sensor coupler on torque sensor under each condition below.		• "W" or "B" wire faulty. • Poor terminal "A8" or "A10" connection. If all above are OK, substitute a known-good P/S control module and recheck.	Faulty torque sensor.
Between "a" and "d" terminals of torque sensor coupler		About 0.82 Ω (Steering wheel held at position for vehicle to run straight)		
		About 0.48 Ω (Steering wheel turned fully right)		
		About 1.02 Ω (Steering wheel turned fully left)		
Between "b" and "d" terminals of torque sensor coupler		About 0.82 Ω (Steering wheel held at position for vehicle to run straight)		
		About 1.02 Ω (Steering wheel turned fully right)		
		About 0.48 Ω (Steering wheel turned fully left)		

Fig. for STEP 1



DTC14 TORQUE SENSOR

(EXCESSIVELY HIGH OR LOW TORQUE SENSOR POWER VOLTAGE)



STEP	ACTION	YES	NO
1	1) Remove column hole cover. 2) With ignition switch ON, check voltage between "R" wire terminal of torque sensor coupler and body ground. 3) Is it about 5 V?	Substitute a known-good P/S control module and recheck.	Go to STEP 2.
2	1) With ignition switch OFF, disconnect torque sensor coupler. 2) Check resistance between "c" and "d" terminals of torque sensor coupler on torque sensor. 3) Is it about 1.09 Ω ?	• Poor terminal "A3" or "A9" connection. • Poor torque sensor coupler-to-harness coupler connection. • "R" or "G" wire open. • "R" or "G" wire shorted to ground or battery.	Faulty torque sensor.

Fig. for STEP 1

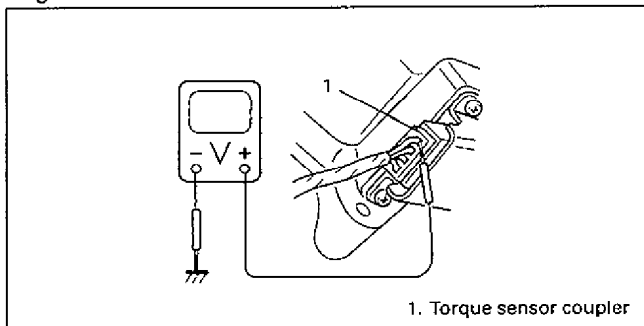
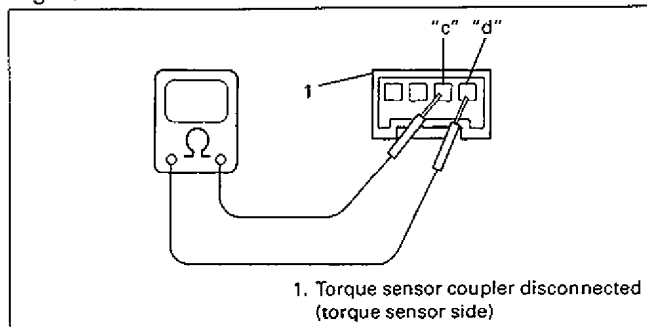
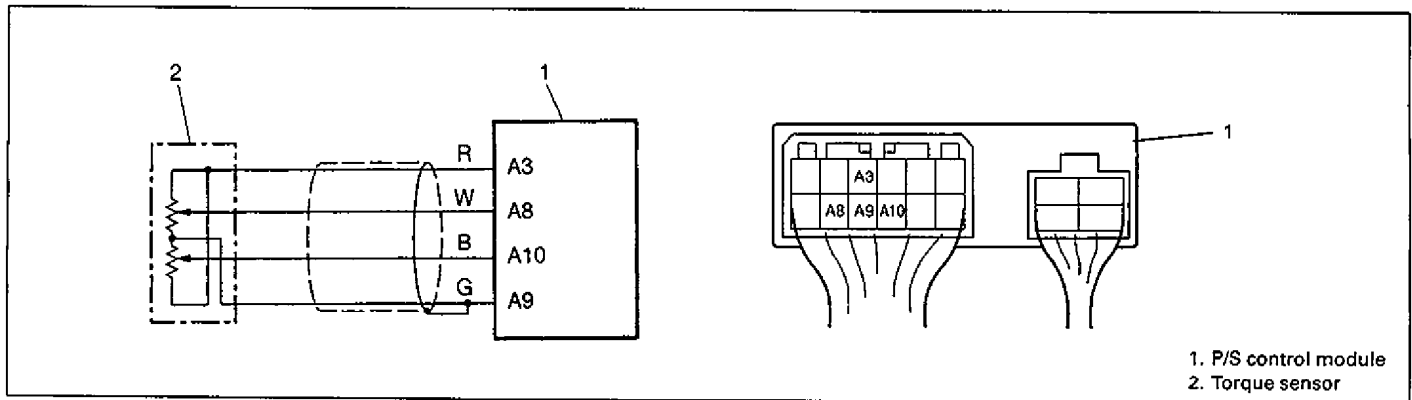


Fig. for STEP 2



DTC 15 SUB CIRCUIT OF TORQUE SENSOR (SUB CIRCUIT OPEN OR SHORT)



STEP	ACTION	YES	NO
1	1) Remove column hole cover. 2) With ignition switch ON and steering wheel held at position for vehicle to run straight, check voltage at "B" wire terminal of torque sensor coupler. 3) Is it about 2.5 V?	"B" wire open. - Poor terminal "A10" connection. If all above are OK, substitute a known-good P/S control module and recheck.	Go to step 2.
2	1) With ignition switch OFF, disconnect torque sensor coupler. 2) Check resistance between "b" and "d" terminals of torque sensor coupler on torque sensor. 3) Is it about 0.82 Ω ?	"B" wire shorted to battery or ground. - Poor torque sensor coupler-to-harness coupler connection.	Faulty torque sensor.

Fig. for STEP 1

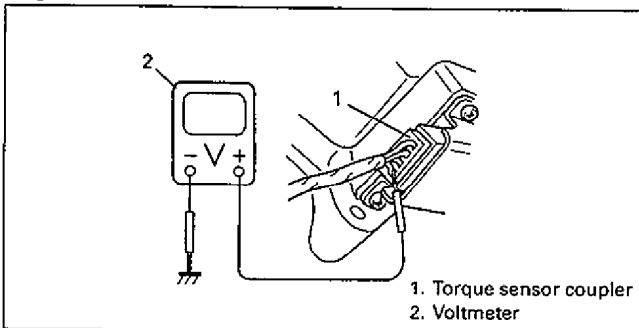
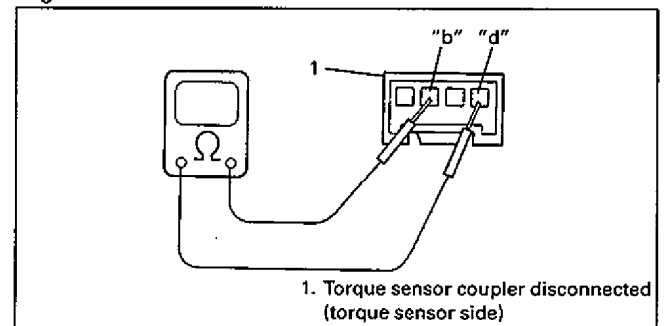


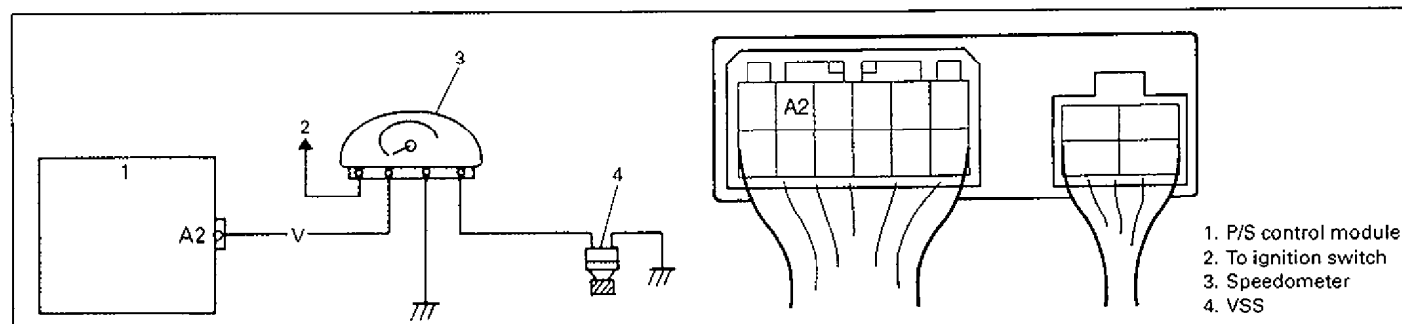
Fig. for STEP 2



DTC21 VSS CIRCUIT (ENGINE RUNNING AT 2500 RPM OR HIGHER (4000 RPM OR HIGHER IMMEDIATELY AFTER ENGINE START) AND NO VEHICLE SPEED SIGNAL INPUT FOR 60 SECONDS)

DTC23 VSS CIRCUIT (ENGINE RUNNING AT 2500 RPM OR HIGHER (4000 RPM OR HIGHER IMMEDIATELY AFTER ENGINE SPEED) AND NO VEHICLE SPEED SIGNAL INPUT FOR 30 SECONDS)

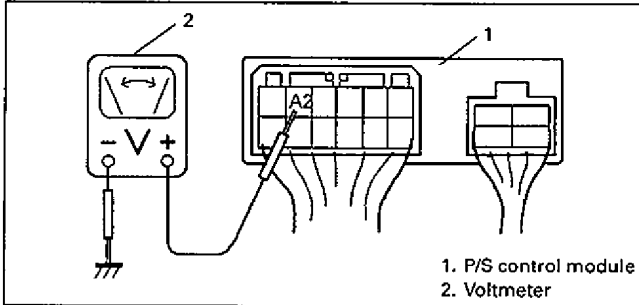
DTC24 VSS CIRCUIT (NO VEHICLE SPEED SIGNAL INPUT FOR 5 SECONDS AFTER DETECTION OF DECELERATION EXCEEDING STANDARD LEVEL)



STEP	ACTION	YES	NO
1	Is there DTC 23 ?	Go to step 3.	Go to step 2.
2	1) Clear DTC referring to "Clearing DTC" in this section. 2) Start engine, shift 1st gear ("L" rang for A/T) and then drive the vehicle at more than 4000rpm for a minute. 3) Check DTC with idling referring to "Indication of DTC" in this section. 4) Are there DTC 21 or 24 ?	Go to step 3.	Intermittent trouble. Recheck referring to "Intermittent Trouble" in SECTION 0A.
3	Does speedometer indicate vehicle speed ?	Go to step 2.	Faulty speedometer, VSS or its wire harness. Refer to "Speedometer Control" in SECTION 8.
4	1) Remove P/S control module and connect coupler to P/S control module with ignition switch OFF. 2) Connect voltmeter between "A2" terminal of P/S control module coupler and body ground. 3) Hoist front end of vehicle and lock front right tire. 4) Turn front left tire quickly with ignition switch ON. Does voltmeter indicate deflection between 0 – 1 V and 4 – 6 V a few times while tire is turned one revolution?	Intermittent trouble or faulty ECM. Recheck referring to "Intermittent Trouble" in SECTION 0A.	Go to step 3.

STEP	ACTION	YES	NO
5	Does voltmeter indicate 0 – 1V?	Voltmeter indicate 0 – 1V Poor "A2" connection or "V" wire shorted to ground. If wire and connection are OK, substitute a known-good speedometer and recheck.	Voltmeter indicate 4 – 6V "V" wire open or poor connection of "V" wire terminal in combination meter. If wire and connection are OK, substitute a known-good speedometer and recheck.

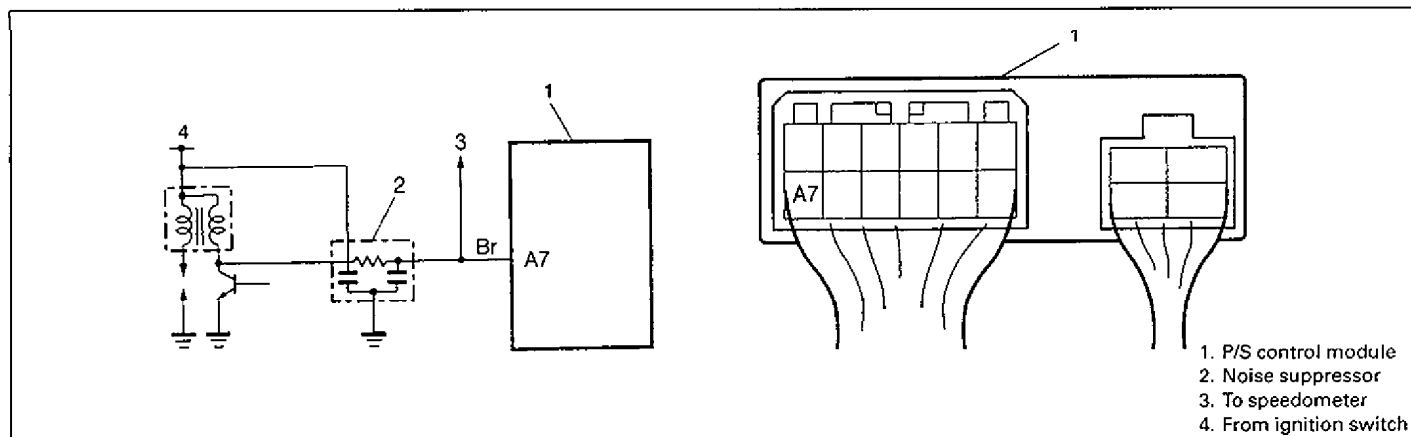
Fig. for STEP 4



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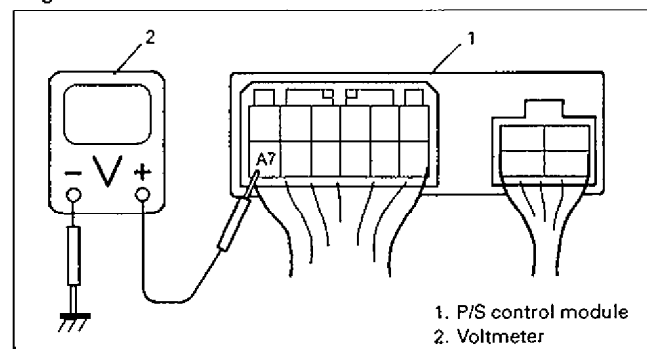
DTC22 ENGINE SPEED SIGNAL

(NO ENGINE SPEED SIGNAL INPUT)



STEP	ACTION	YES	NO
1	Does tachometer indicate engine speed?	Go to step 2.	• Faulty noise suppressor. • Poor noise suppressor coupler connection. • "Br/W" wire or "Br" wire open.
2	1) Remove P/S control module and connect P/S control module couplers with ignition switch OFF. 2) Check voltage between "A7" terminal of P/S control module and body ground with ignition switch ON. 3) Is it 10 – 14V?	Poor "A7" connection. If connection is OK, substitute a known-good P/S control module and recheck.	"Br" wire open.

Fig. for STEP 2



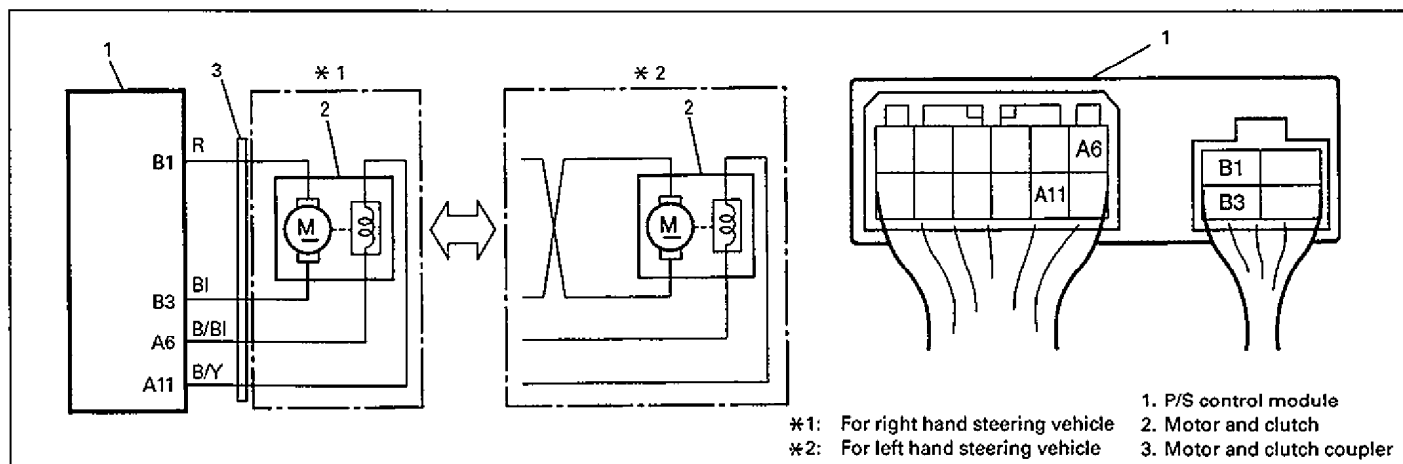
DTC41 MOTOR (EXCESSIVELY HIGH OR LOW MOTOR TERMINAL VOLTAGE)

DTC43 MOTOR (EXCESSIVE MOTOR CURRENT)

DTC42 MOTOR (EXCESSIVELY LARGE DIFFERENCE BETWEEN CURRENT INDICATED BY P/S CONTROL MODULE AND THAT ACTUALLY FLOWING TO MOTOR)

DTC44 MOTOR (MOTOR NOT RUNNING IN SPITE OF COMMAND FOR ROTATION FROM P/S CONTROL MODULE)

DTC45 MOTOR (CURRENT ACTUALLY FLOWING TO MOTOR LOWER THAN THAT INDICATED BY P/S CONTROL MODULE OUT OF SPECIFIED VALUE)



STEP	ACTION	YES	NO
1	Is there DTC44?	Faulty motor.	Go to step 2.
2	1) Remove column hole cover. 2) Disconnect motor and clutch coupler with ignition switch OFF. 3) Check continuity between "a" and "c" terminals of motor and clutch coupler. 4) Is it continuity?	Go to step 3.	Faulty motor.
3	1) Check resistance between "c" terminal of motor and clutch coupler and body ground. 2) Is it infinity (∞)?	• "R" or "BI" wire open. • "R" or "BI" wire shorted to ground. • Poor motor and clutch coupler connection. • Poor "B1" or "B3" terminal connection. If all above are OK, substitute a known-good P/S control module and recheck.	Faulty motor.

Fig. for STEP 2

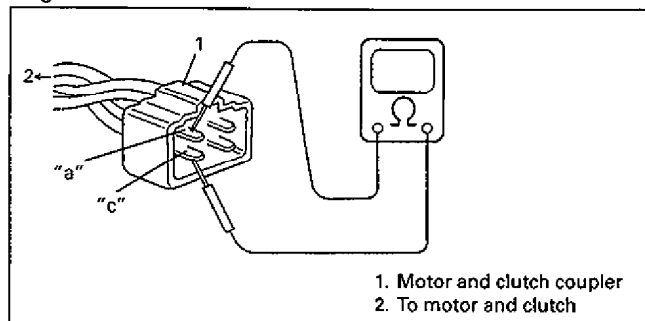
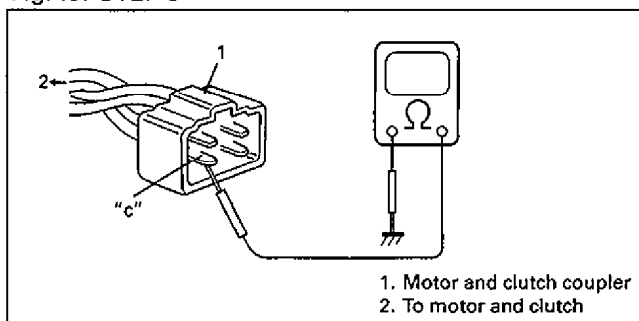
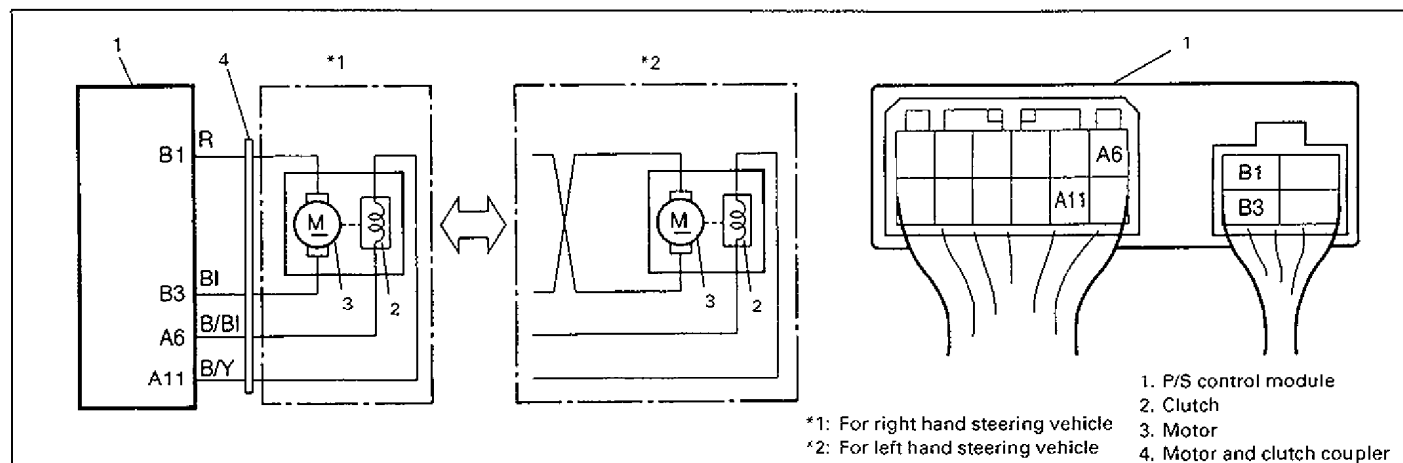


Fig. for STEP 3



DTC51 CLUTCH

(CLUTCH CIRCUIT OPEN OR SHORT)



STEP	ACTION	YES	NO
1	1) Remove column hole cover. 2) Disconnect motor and clutch coupler with ignition switch OFF. 3) Check continuity between "d" and "b" terminals of motor and clutch coupler. 4) Is it continuity?	Go to step 2.	Faulty clutch.
2	1) Check resistance between "d" terminal of motor and clutch coupler and body ground. 2) Is it infinity (∞)?	• "B/BI" or "B/Y" wire open. • "B/BI" or "B/Y" wire shorted to ground. • Poor motor and clutch coupler connection. • Poor "A6" or "A11" terminal connection. If all above are OK, substitute a known-good P/S control module and recheck.	Faulty clutch.

Fig. for STEP 1

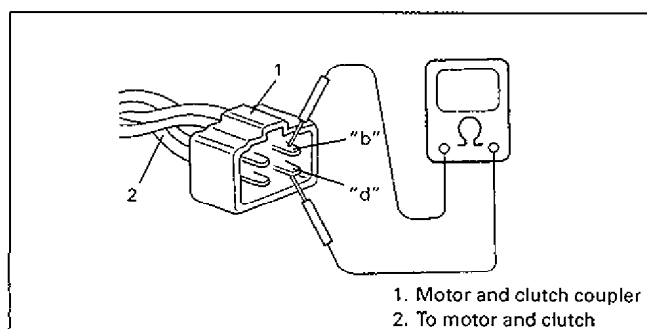
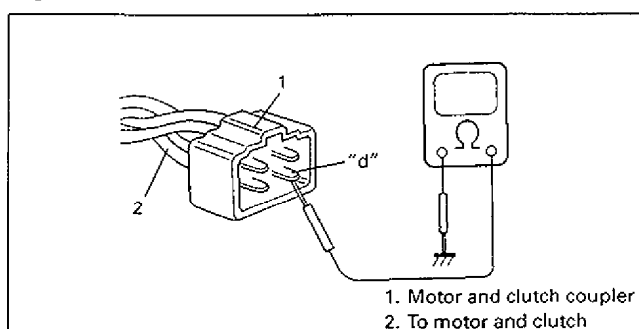
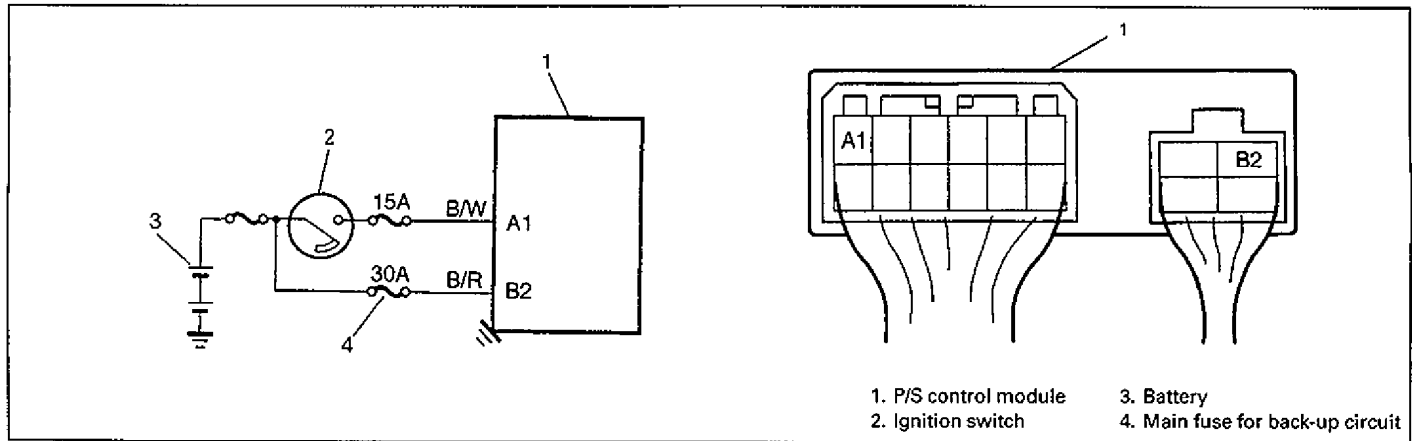


Fig. for STEP 2



DTC54 POWER SUPPLY CIRCUIT OF P/S CONTROL MODULE (BATTERY VOLTAGE LOW)



STEP	ACTION	YES	NO
1	1) Remove P/S control module and connect P/S control module couplers with ignition switch OFF. 2) Check voltage between "B2" terminal of P/S control module and body ground with ignition switch ON. 3) Is it 10 – 14V?	Poor "B2" terminal. If the above is OK, substitute a known-good P/S control module and recheck.	Faulty battery.

75F00-3B4-23-3

DTC52, 55 P/S CONTROL MODULE (FAULTY P/S CONTROL MODULE)

Substitute a known-good P/S control and recheck.

75F00-3B4-23-4

INSPECTION OF P/S CONTROL MODULE AND ITS CIRCUITS

P/S control module and its circuits can be checked at P/S control module wiring couplers by measuring voltage and resistance.

CAUTION:

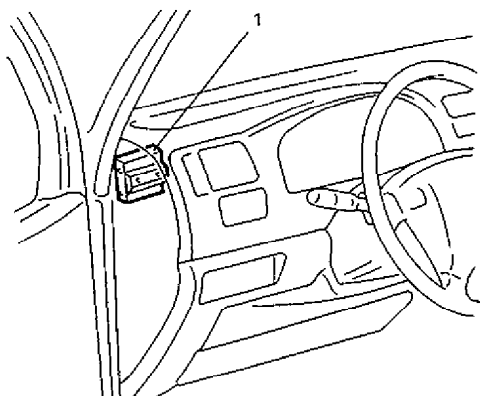
P/S control module cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to P/S control module with coupler disconnected from it.

Voltage Check

- 1) Remove P/S control module from body with ignition switch OFF referring to p. 3B4-28.
- 2) Connect P/S control module couplers to P/S control module.
- 3) Check voltage at each terminal of couplers connected.

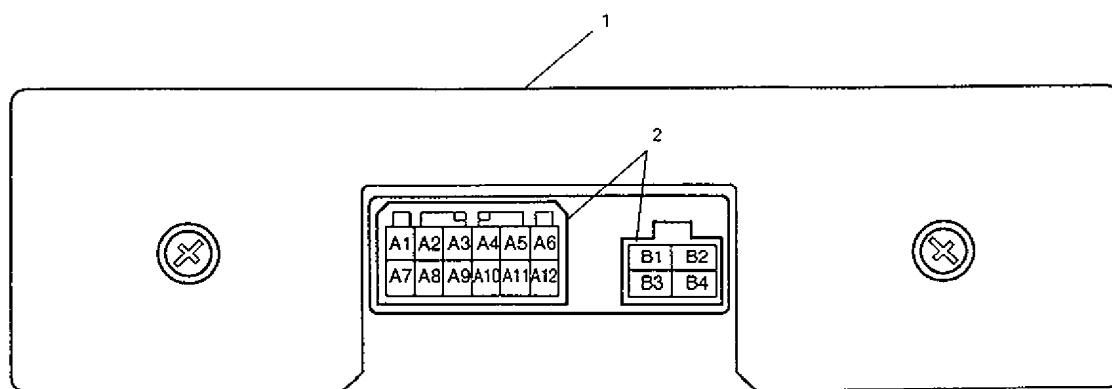
NOTE:

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



1. P/S control module

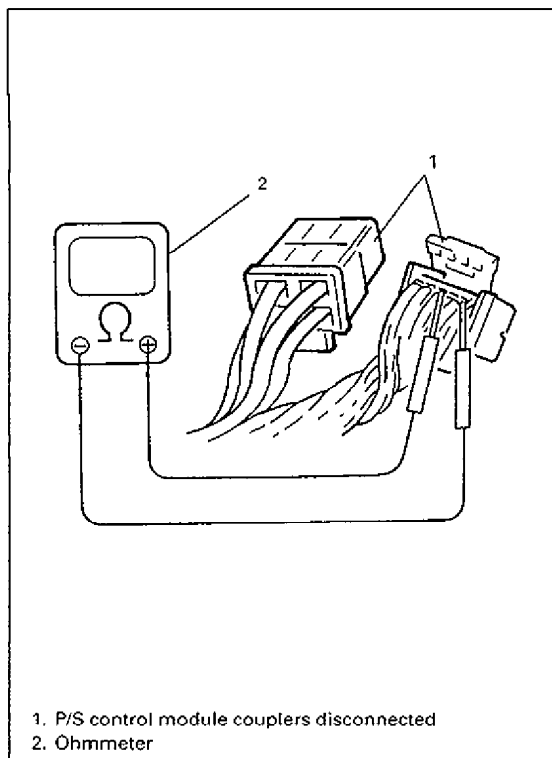
75F00-3B4-24-3



1. P/S control module
2. P/S control module couplers

75F00-3B4-24-5

TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
A1	P/S control module power supply for ignition switch	10 – 14V	Engine idling
A2	VSS	Indicator deflection repeated 0 – 1V and 4 – 6V	Ignition switch ON Front left tire turned quickly with front tight tire locked
A3	Power supply for torque sensor	About 5V	Ignition switch ON Check voltage between A3 and A9 terminals
A4	Blank	–	–
A5	"EPS" light	0 – 2V	Engine idling "EPS" light ON
		10 – 14V	Engine idling "EPS" light ON
A6	Clutch output +	10 – 14V	Engine idling and steering wheel held at position for vehicle to run straight
A7	Engine speed signal	–	–
A8	Torque sensor (Main)	About 2.5V	Engine idling and steering wheel held at position for vehicle to run straight Check voltage between A8 and A9 terminals.
A9	Torque sensor (GND)	0V	–
A10	Torque sensor (Sub)	About 2.5V	Engine idling and steering wheel held at position for vehicle run straight Check voltage between A10 and A9 terminals.
A11	Clutch output –	0V	–
A12	Diagnosis switch terminal	5V	Ignition switch ON
B1	Motor output +	5 – 7V	Engine idling and steering wheel held at position for vehicle to run straight
B2	P/S control module power supply for back-up circuit	10 – 14V	Engine idling
B3	Motor output –	5 – 7V	Engine idling and steering wheel held at position for vehicle to run straight
B4	Ground	–	–



Resistance Check

- 1) Disconnect P/S control module couplers from P/S control module with ignition switch OFF.

CAUTION:

Never touch terminals of P/S control module itself or connect voltmeter or ohmmeter.

- 2) Check resistance between each terminal of couplers disconnected.

CAUTION:

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

75F00-3B4-26-2

TERMINALS	CIRCUIT	NORMAL RESISTANCE	CONDITION
B1-B3	Motor	Continuity	—
A6-A11	Clutch	Continuity	—
A5-A1	"EPS" light	Continuity	—
A3-A9	Power supply circuit for torque sensor	About 1.09 Ω	—
A8-A3	Main circuit for torque sensor	About 0.82 Ω	Steering wheel held at position for vehicle to run straight
		About 0.48 Ω	Steering wheel turned fully right
		About 1.02 Ω	Steering wheel turned fully left
A10-A3	Sub circuit for torque sensor	About 0.82 Ω	Steering wheel held at position for vehicle to run straight
		About 1.02 Ω	Steering wheel turned fully right
		About 0.48 Ω	Steering wheel turned fully left

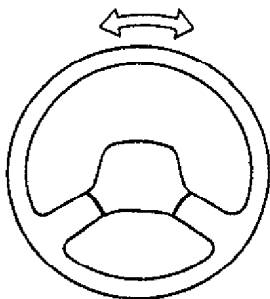
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TROUBLE DIAGNOSIS

This section describes trouble diagnosis of electrical power steering system parts whose trouble is not indicated by the on-board diagnostic system (self-diagnostic function).

When diagnostic trouble code No.12 is indicated by the on-board diagnostic system (self-diagnosis function) and assuredly those steering basic parts as described in "Diagnosis Chart" in SECTION 3 are all in good condition, check following electrical power steering system parts which may be a possible cause for each symptom of the steering.

SYMPTOM	POSSIBLE CAUSE	INSPECTION
Steering wheel feels heavy	- Steering wheel installed improperly (twisted) - Poor performance of torque sensor - Poor performance of motor and clutch - Faulty steering column - Poor performance of VSS	Install steering wheel correctly. See torque sensor in "On-Vehicle Service". See motor and clutch in "On-Vehicle Service". Replace. See SECTION 6E1.
Vehicle pulls to one side during straight driving	Poor performance of torque sensor	See torque sensor in "On-Vehicle Service".
Poor recovery from turns	- Poor performance of torque sensor - Faulty steering column	See torque sensor in "On-Vehicle Service". Replace.



ON-VEHICLE SERVICE

INSPECTION OF STEERING WHEEL PLAY

Check steering wheel for looseness or rattle by trying to move it in its shaft direction and lateral direction.

If found defective, repair or replace.

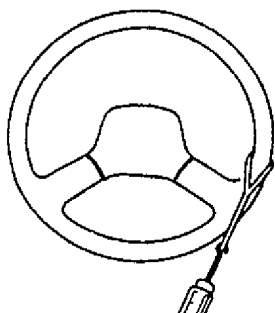
Check steering wheel for play, holding vehicle in straight forward condition on the ground and with engine stopped.

Steering wheel play : 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

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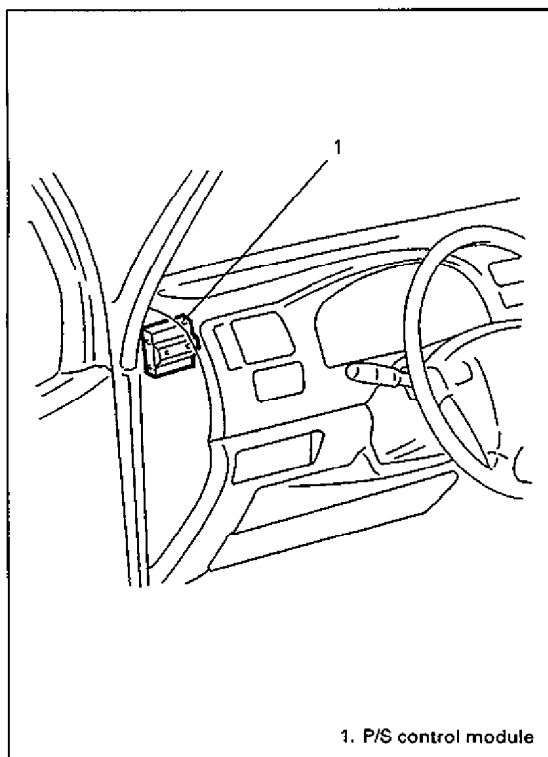


INSPECTION OF STEERING FORCE

- 1) Place vehicle on level road and set steering wheel at straight-ahead position.
- 2) Check that tire inflation pressure is as specified. (Refer to tire placard.)
- 3) Start engine.
- 4) With engine idling, measure steering force by pulling spring balancer hooked on steering wheel in tangential direction.

Steering force : Less than 35 N (3.5 kg)

75F00-3B4-28-4



75F00-3B4-29-2

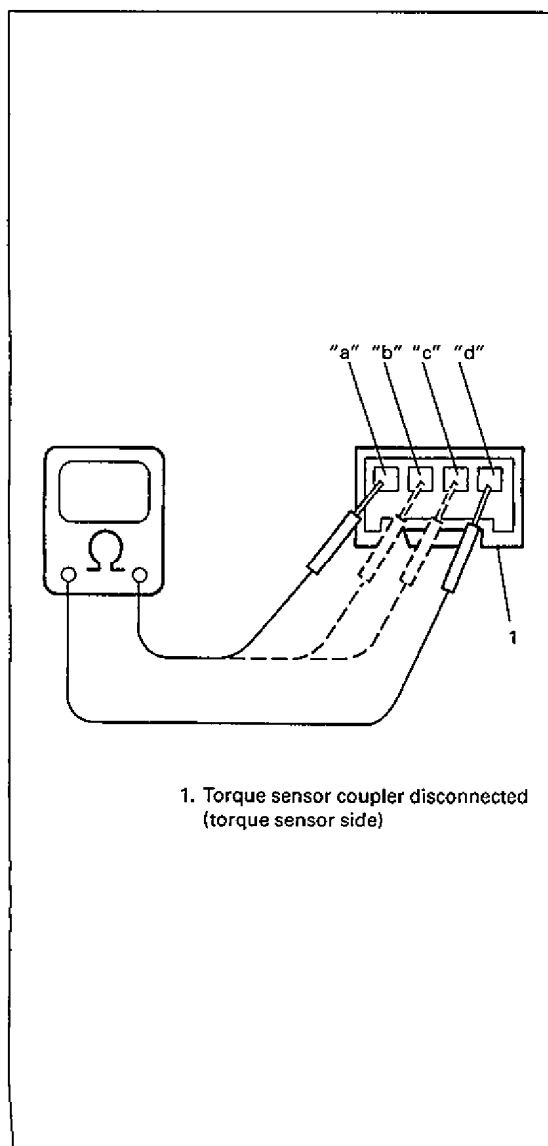
P/S CONTROL MODULE

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove column hole cover.
- 3) Remove meter cluster hood.
- 4) Disconnect couplers at power door lock controller (if equipped) and immobilizer control module (if equipped).
- 5) Remove J/B and its bracket with coupler connected.
- 6) Disconnect hood latch release cable at hood latch release lever.
- 7) Remove P/S control module.

INSTALLATION

Reverse removal procedure for installation.



75F00-3B4-29-5

TORQUE SENSOR

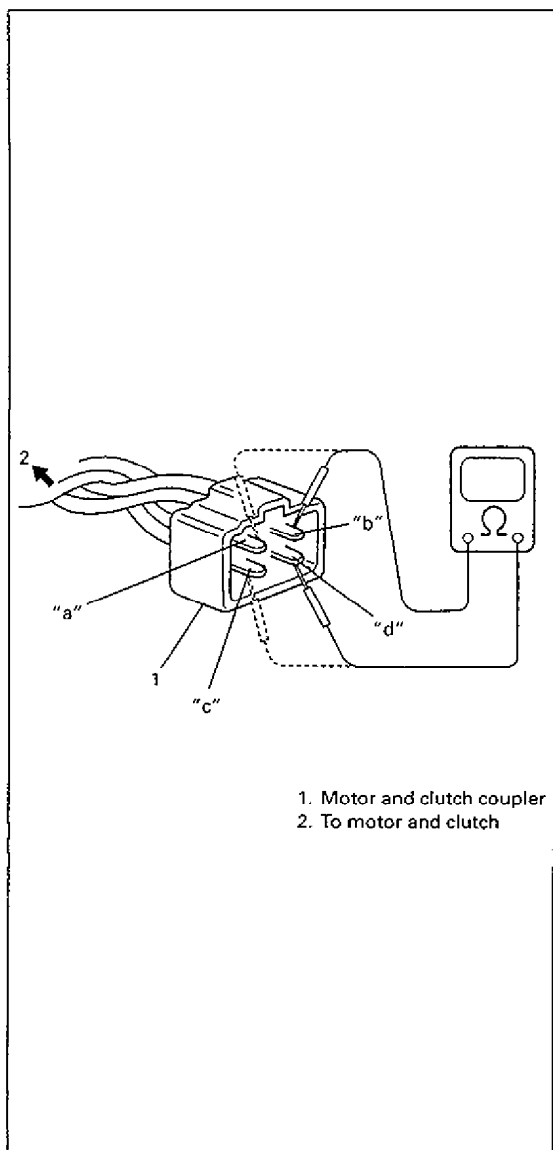
ON-VEHICLE INSPECTION

- 1) Remove column hole cover.
- 2) Disconnect torque sensor coupler with ignition switch OFF.
- 3) Check resistance between terminals of torque sensor.

"d" and "a"	About 0.82 Ω (Steering wheel held at position for vehicle to run straight)
	About 0.48 Ω (Steering wheel turned fully right.)
	About 1.02 Ω (Steering wheel turned fully left.)
"d" and "b"	About 0.82 Ω (Steering wheel held at position for vehicle to run straight)
	About 1.02 Ω (Steering wheel turned fully right.)
	About 0.48 Ω (Steering wheel turned fully left.)
"d" and "b"	About 1.09 Ω

If check result is not satisfactory, replace steering column by referring to SECTION 3C1.

- 4) Connect torque sensor coupler.
- 5) Install column hole cover.



75F00-3B4-30-3

MOTOR AND CLUTCH

ON-VEHICLE INSPECTION

- 1) Remove column hole cover.
- 2) Disconnect motor and clutch coupler with ignition switch OFF.
- 3) Check continuity between terminals of motor and clutch coupler.

"a" and "c" (For motor)	Continuity
"b" and "d" (For clutch)	Continuity

If check result is not satisfactory, replace steering column by referring to SECTION 3C1.

- 4) Check resistance between terminals of motor and clutch coupler under each condition below.

"c" and body ground	Infinity (∞)
"d" and body ground	Infinity (∞)

If check result is not satisfactory, replace steering column by referring to SECTION 3C1.

- 5) Connect motor and clutch coupler.
- 6) Install column hole cover.

SECTION 3C1

AIR BAG STEERING WHEEL AND COLUMN

WARNING:

The procedures in this section must be followed in the order listed to temporarily disable the air bag system and prevent false diagnostic codes from setting. Failure to follow procedures could result in possible air bag system activation, 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.

3C1

NOTE:

For this vehicle, two types of a driver air bag (inflator) module are available; one has a built-in SDM and other does not. For their identification, refer to "General Description" in this section.

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GENERAL DESCRIPTION	3C1- 2	Live (undeployed) driver air bag	
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GENERAL DESCRIPTION

STEERING COLUMN

This double tube type steering column has following three important features in addition to the steering function:

- The column is energy absorbing, 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.

75F00-3C1-2-2

STEERING WHEEL AND DRIVER AIR BAG (INFLATOR) MODULE

CAUTION:

For this vehicle, two types of a driver air bag (inflator) module are available; one has a built-in SDM and the other doesn't.

The SDM built-in type can be identified by "AIR BAG" warning lamp installed to the trim cover (Refer to the figure as shown below), while it is not installed to the other type.

As handing procedure may vary due to type difference, be sure to identify the type before starting the work.

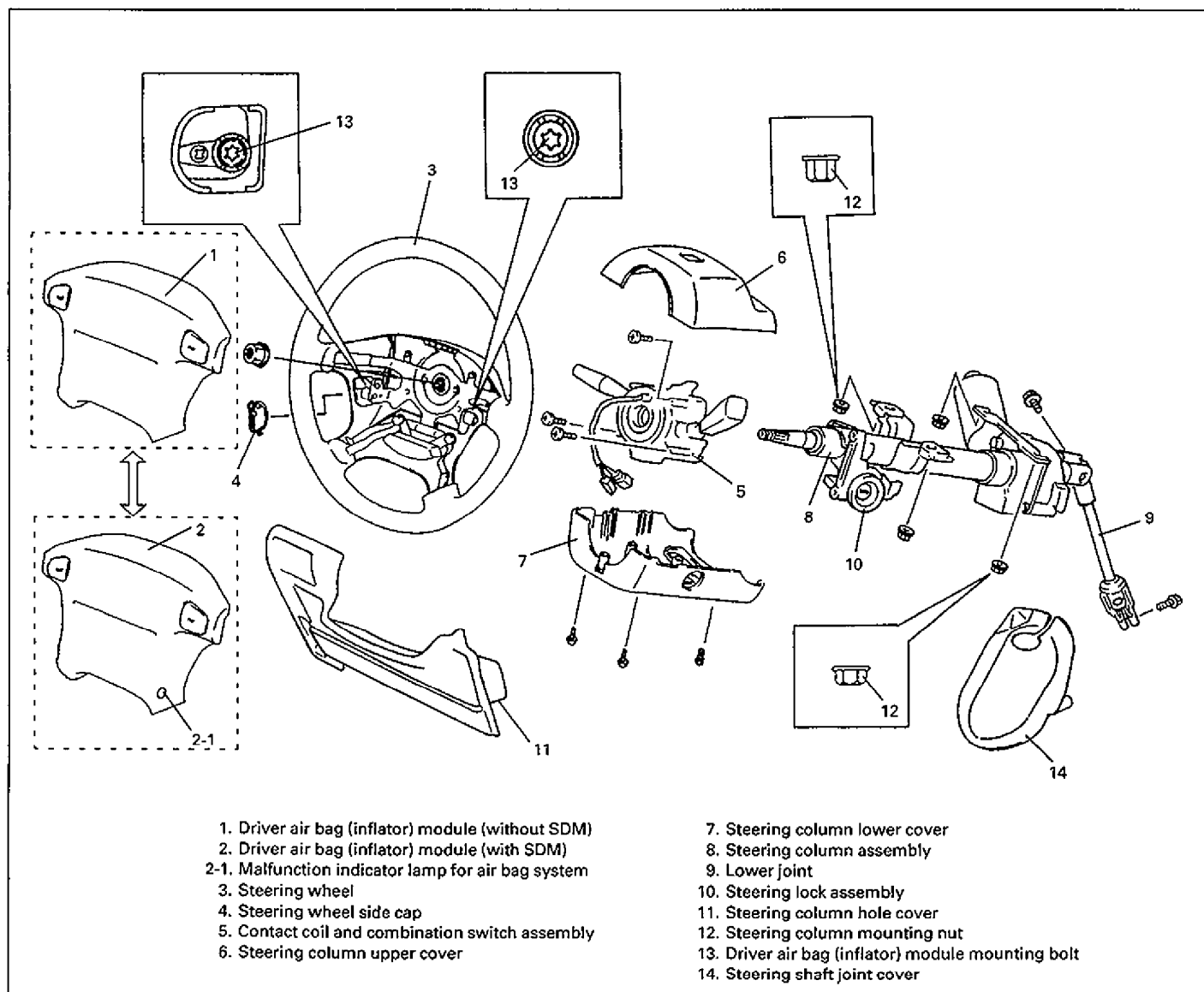
The driver air bag (inflator) module is one of the supplemental restraint air bag system components and is mounted to the center of the steering wheel.

During certain frontal crashes, the air bag system supplements the restraint of the driver's and/or passenger's seat belts by deploying the air bag in each air bag (inflator) module.

The air bag (inflator) module should be handled with care to prevent accidental deployment. When servicing, be sure to observe all WARNINGS and CAUTIONS in this section. Refer to "Precautions" later in this section, and to SECTION 10B or 10B1.

- For driver air bag (inflator) module with SDM Refer to SECTION 10B
- For driver air bag (inflator) module without SDM Refer to SECTION 10B1

75F00-3C1-2-4



75F00-3C1-3-3

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 or 10B1.

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 or 10B1.

PRECAUTIONS

SERVICE PRECAUTION

- **WARNING/CAUTION** labels are attached on each part of air bag system components (SDM, air bag (inflator) module(s) and seat belt pretensioners (if equipped)). Be sure to follow the instructions.

WARNING:

- If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.
 - Do not modify the steering wheel, dashboard, or any other air bag system component. Modifications can adversely affect air bag system performance and lead to injury.
 - Failure to follow procedures could result in possible air bag activation, personal injury or unneeded air bag system repairs.
- Many of the service procedures require disconnection of the "AIR BAG" fuse and all air bag (inflator) module(s) (driver and passenger) from the initiator circuit to avoid an accidental deployment.
 - Never use air bag component parts from another vehicle.
 - If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components.
 - When servicing, if shocks may be applied to air bag system component parts, remove those parts beforehand.

WARNING:

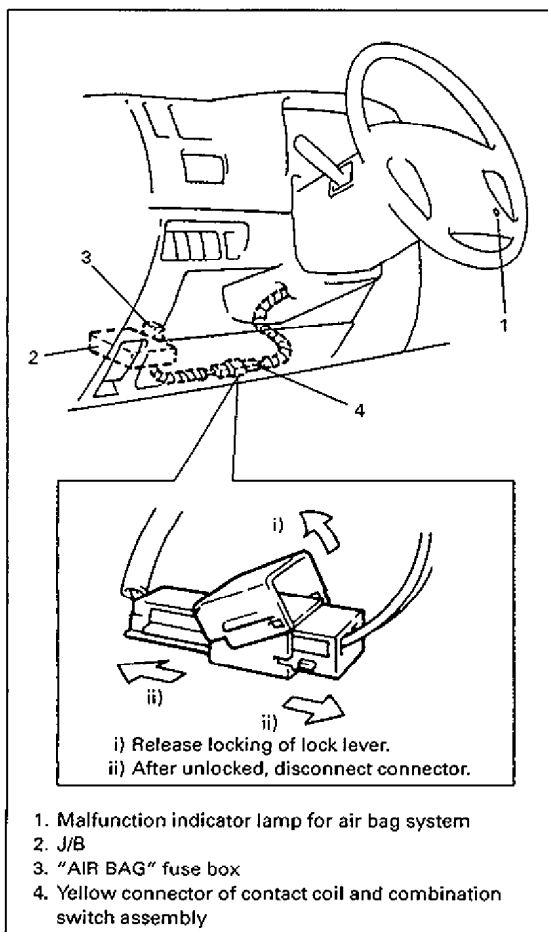
When performing service on or around air bag system components or air bag system wiring, follow the procedures listed below to temporarily disable the air bag system. Refer to appropriate service manual procedures.

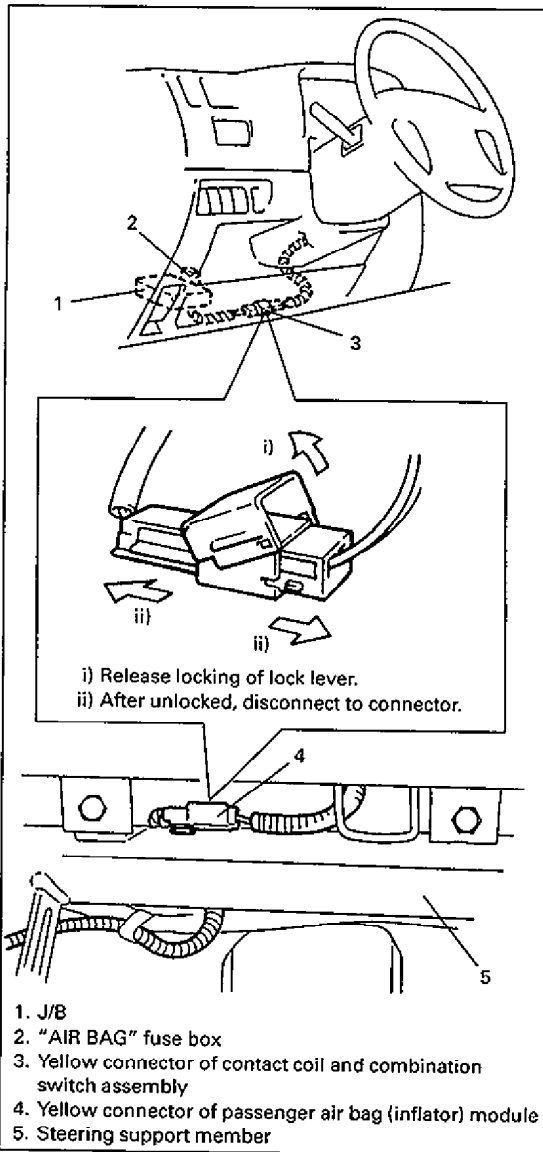
NOTE:

For this vehicle, two types of a driver air bag (inflator) module are available; one has a built-in SDM and the other doesn't. The specific procedures for "Disabling Air Bag System" and "Enabling Air Bag System" vary between these two types. Be sure to identify the type and use the procedure applicable to that type.

DISABLING AIR BAG SYSTEM (FOR DRIVER AIR BAG (INFLATOR) MODULE WITH SDM)

- 1) Turn steering wheel so that vehicle's wheels (front tires) are pointing straight ahead.
- 2) Turn ignition switch to "LOCK" position and remove key.
- 3) Remove "AIR BAG" fuse from "AIR BAG" fuse box.
- 4) Disconnect Yellow connector of contact coil and combination switch assembly.





75F00-3C1-5-3

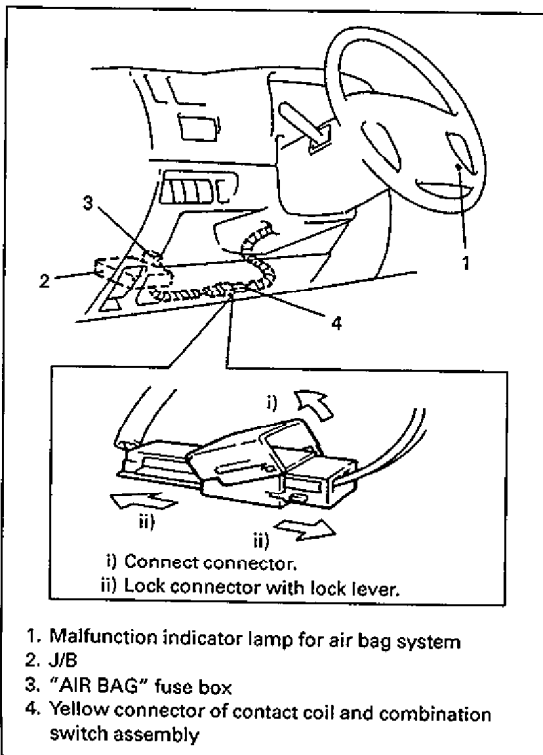
DISABLING AIR BAG SYSTEM (FOR DRIVER AIR BAG (INFLATOR) MODULE WITHOUT SDM)

- 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.
- 5) Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector of passenger air bag (inflator) module.

NOTE:

With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.

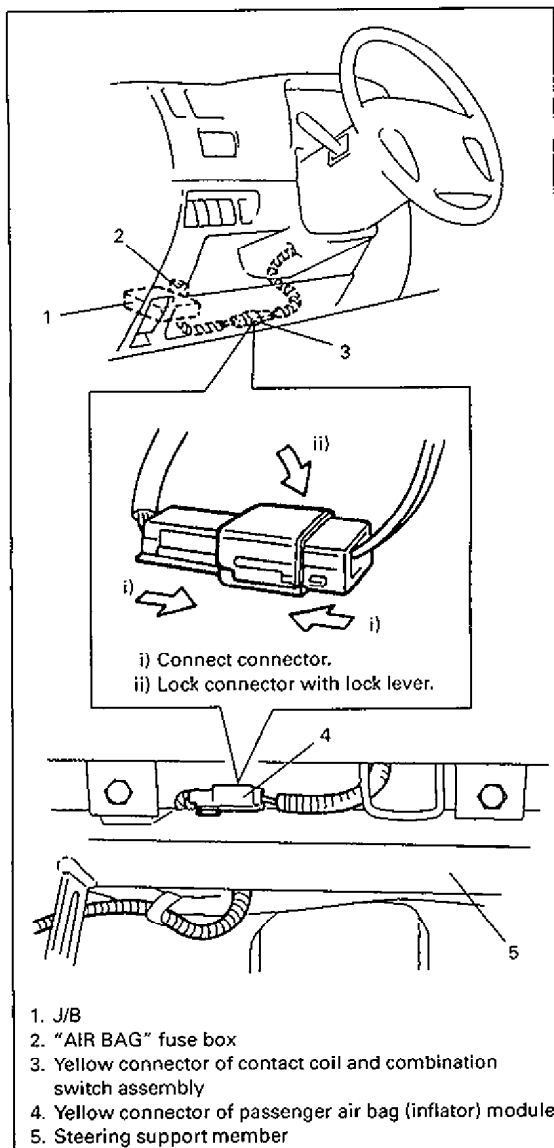
This is normal operation and does not indicate an air bag system malfunction.



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ENABLING AIR BAG SYSTEM (FOR DRIVER AIR BAG (INFLATOR) MODULE WITH SDM)

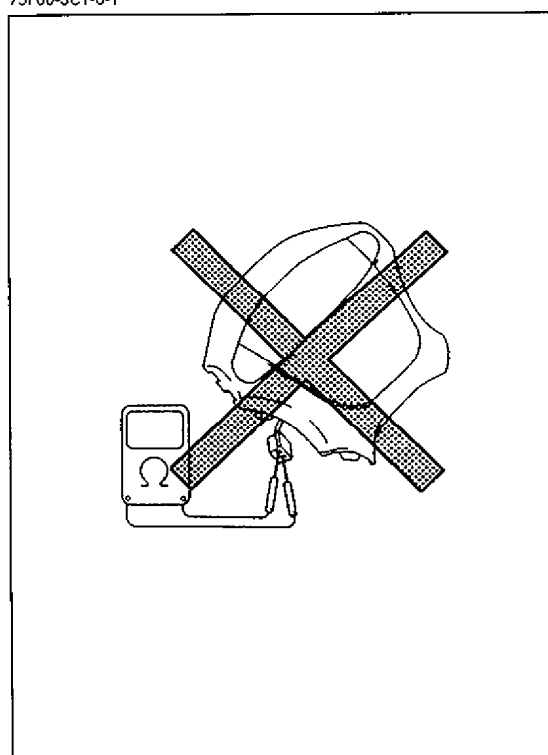
- 1) Turn ignition switch to "LOCK" and remove key.
 - 2) Connect Yellow connect of contact coil and combination switch assembly, and be sure to lock connector with lock lever.
 - 3) Install "AIR BAG" fuse to the "AIR BAG" fuse box.
 - 4) Turn ignition switch to "ON" and verify that Malfunction indicator lamp on driver air bag (inflator) module comes on about 6 seconds and then turns OFF.
- If it does not operate as described, perform "Air Bag Diagnostic System Check" in SECTION 10B.



75F00-3C1-6-1

ENABLING AIR BAG SYSTEM (FOR DRIVER AIR BAG (INFLATOR) MODULE WITHOUT SDM)

- 1) Turn ignition switch to "LOCK" and remove key.
- 2) Connect Yellow connector of passenger air bag (inflator) module and Yellow connector of contact coil and combination switch assembly respectively, and be sure to lock each connector with lock lever.
- 3) Install glove box.
- 4) Install "AIR BAG" fuse to "AIR BAG" fuse box.
- 5) Turn ignition switch to "ON" and verify that "AIR BAG" warning lamp comes on for 6 seconds and then turns off. If it does not operate as described, perform "Air Bag Diagnostic System Check" in SECTION 10B1.



75F00-3C1-6-5

HANDLING PRECAUTION

Live (Undeployed) Driver Air Bag (Inflator) Module

WARNING:

Never attempt to measure the resistance of the air bag (inflator) module. It is very dangerous as the electric current from the tester may deploy the air bag.

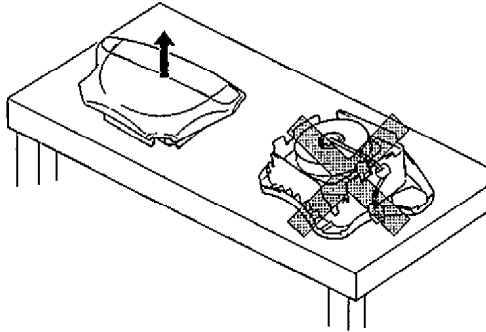
Special care is necessary when handling and storing a live (undeployed) air bag (inflator) module. The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

- Never attempt disassembly of the air bag (inflator) module.
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When grease, cleaning agent, oil water, etc., got on the air bag (inflator) module, wipe it off immediately with a dry cloth.

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.



75F00-3C1-7-3

- If air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.
- When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it. (Refer to "Air Bag (Inflator) Module Disposal" in SECTION 10B or "Air Bag (Inflator) Module Disposal" in SECTION 10B1.

WARNING:

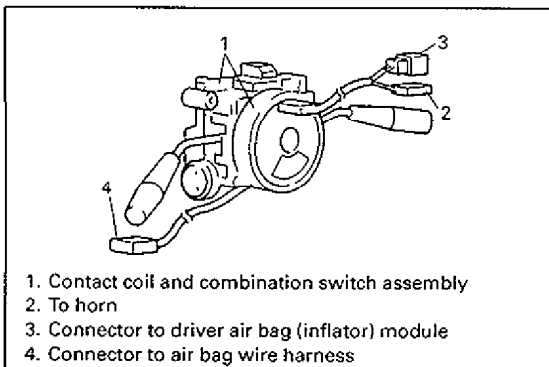
- For handling and storing an air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an accidental deployment, the bag will then deploy with minimal chance of injury. Never carry the air bag (inflator) module by the wires or connector on the underside of the module.
- When placing a live air bag (inflator) module on a bench or other surface, always face the bag up, away from the surface.
It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) module.
This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

DEPLOYED DRIVER AIR BAG (INFLATOR) MODULE

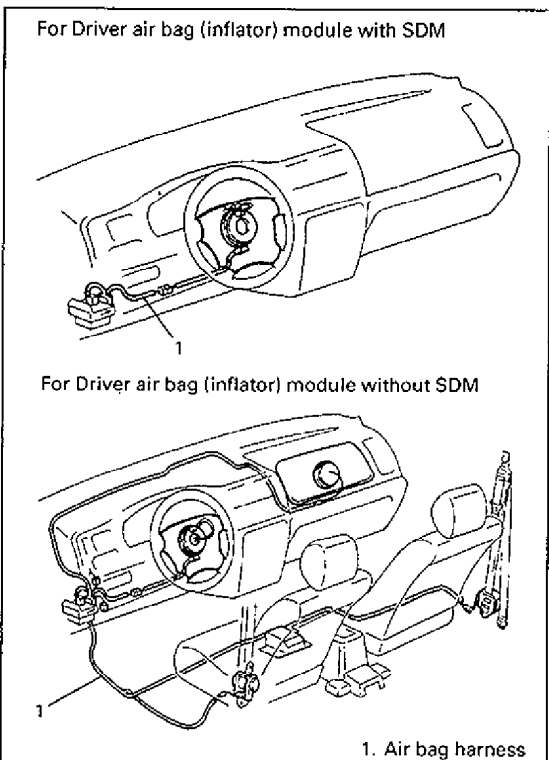
WARNING:

- Immediately after deployment, the air bag (inflator) module is very hot. Wait for at least 30 minutes to cool it off before starting servicing (handling) it.
- Do not apply water, etc. to deployed air bag (inflator) module.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-products of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.
- Wash your hands with mild soap and water after completing the work.

Refer to the procedure described under "Deployed Air Bag (Inflator) Module Disposal" in SECTION 10B or "Deployed Air Bag (inflator) Modules Disposal" in SECTION 10B1, for details.



75F00-3C1-8-1



75F00-3C1-8-2

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

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

AIR BAG WIRE HARNESS AND CONNECTOR

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 PRECAUTION

Do not dispose of live (undeployed) air bag (inflator) module. When disposal is necessary, be sure to deploy it first according to the procedure described in SECTION 10B or 10B1 and then dispose it.

WARNING:

Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which could cause personal injury. Undeployed air bag (inflator) 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.

ON-VEHICLE SERVICE

DRIVER AIR BAG (INFLATOR) MODULE

WARNING:

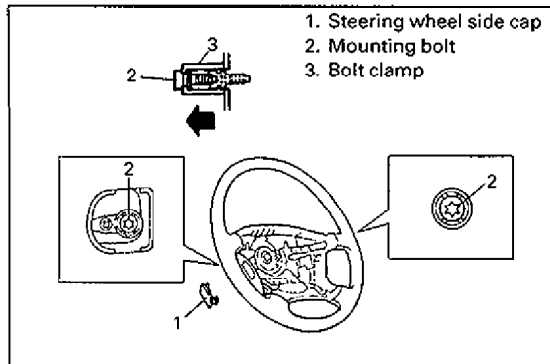
When handling an air bag (inflator) module, be sure to read "Precautions" given earlier in this section and observe each instruction. Failure to follow them could cause a damage to the air bag (inflator) module or result in personal injury.

75F00-3C1-9-1

REMOVAL

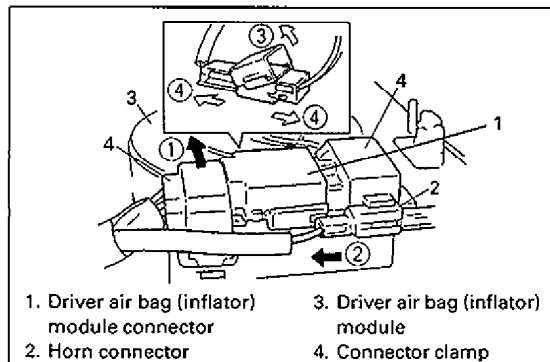
- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.

75F00-3C1-9-2



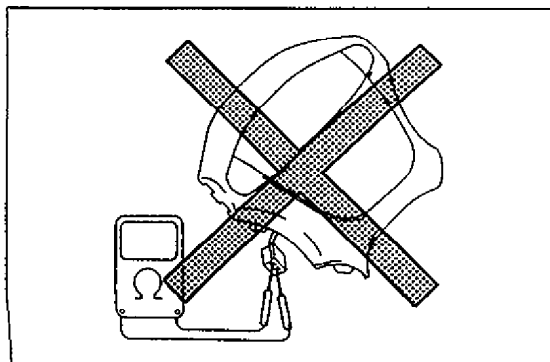
- 3) Remove steering wheel side cap of left side.
- 4) Loosen 2 bolts mounting driver air bag (inflator) module till it turns freely, pull them out and fix them to bolt clamps.

75F00-3C1-9-3



- 5) Remove air bag (inflator) module from steering wheel.
- 6) Disconnect yellow connector of driver air bag (inflator) module and horn connector as shown in left figure.

75F00-3C1-9-4



INSPECTION

WARNING:

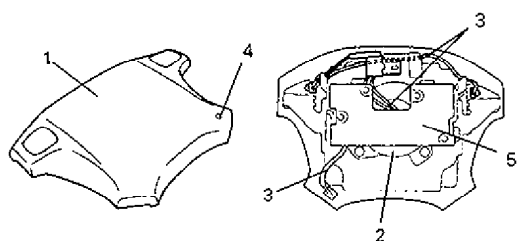
Never disassemble air bag (inflator) module or measure its resistance. Otherwise, personal injury may result.

CAUTION:

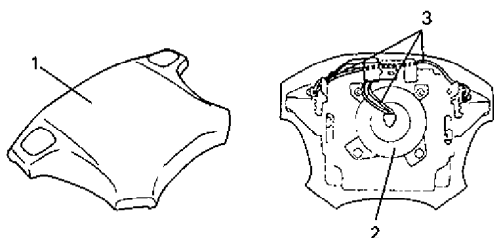
If air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.

75F00-3C1-9-5

For driver air bag (inflator) module with SDM

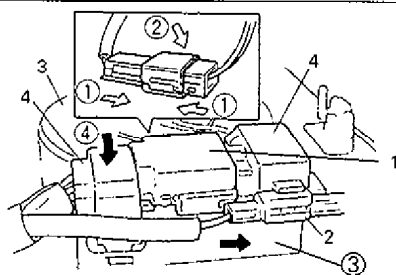


For driver air bag (inflator) module without SDM



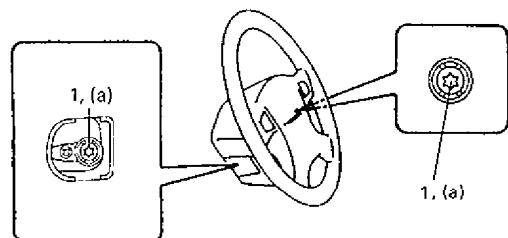
- | | |
|-----------------------------|--|
| 1. Trim cover (pad surface) | 4. Malfunction indicator lamp for air bag system |
| 2. Inflator case | |
| 3. Wire harness | 5. SDM |

75F00-3C1-10-1



- | | |
|---|--------------------|
| 1. Driver air bag (inflator) module connector | 4. Connector clamp |
| 2. Horn connector | |
| 3. Driver air bag (inflator) module | |

75F00-3C1-10-3



1. Mounting bolt

75F00-3C1-10-5

Check air bag (inflator) module visually and if any of the following is found, replace it with a new one.

- Air bag being deployed
- Trim cover (pad surface) being cracked
- Wire harness or connector being damaged
- Air bag (inflator) module being damaged or having been exposed to strong impact (dropped)

INSTALLATION

- 1) Check that horn wire is connected to horn terminal securely.
- 2) Connect yellow connector of driver air bag (inflator) module and horn connector as shown in left figure securely.

- 3) Install driver air bag (inflator) module to steering wheel, taking care so that no part of wire harness is caught between them.
- 4) Make sure that clearance between module and steering wheel is uniform all the way.
- 5) Tighten driver air bag (inflator) module mounting bolts to specified torque.

Tightening Torque

(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

- 6) Connect negative battery cable.
- 7) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

STEERING WHEEL

CAUTION:

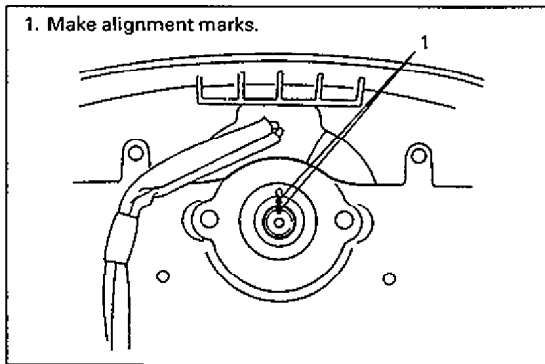
Removal of the steering wheel allows the contact coil to turn freely but do not turn the contact coil (on the combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counterclockwise respectively), or coil will break.

75F00-3C1-11-1

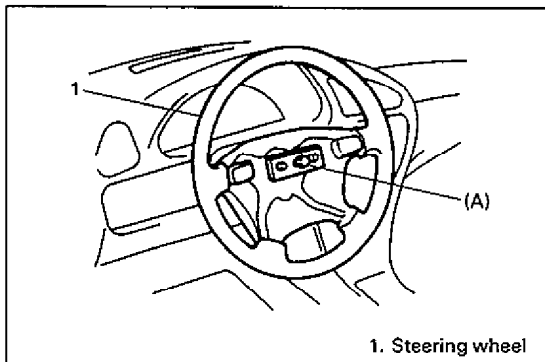
REMOVAL

- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove driver air bag (inflator) module from steering wheel referring to "Driver Air Bag (Inflator) Module" earlier in this section.

75F00-3C1-11-2



75F00-3C1-11-3



75F00-3C1-11-4

- 4) Remove steering shaft nut.
- 5) Make alignment marks on steering wheel and shaft for a guide during reinstallation.

- 6) Remove steering wheel with special tool.

Special Tool

(A): 09944-36011

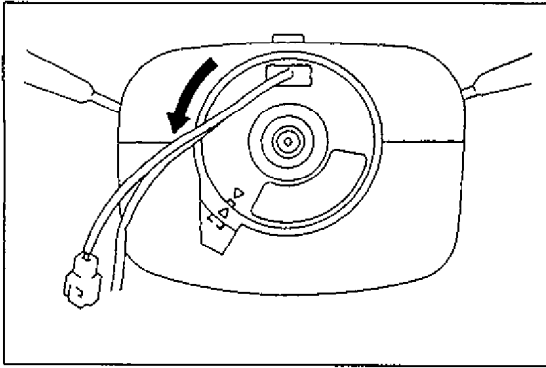
CAUTION:

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

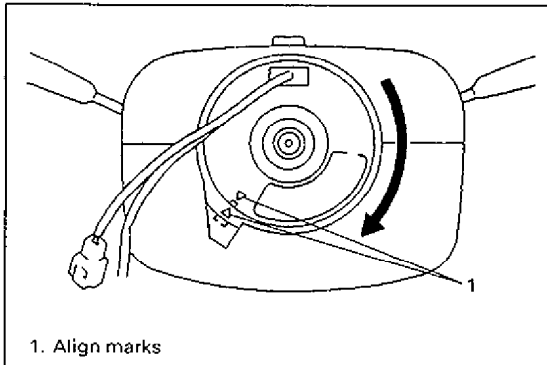
CENTERING CONTACT COIL

- 1) Check that vehicle's wheels (front tires) are set at straight-ahead position.
- 2) Check that ignition switch is at "LOCK" position.

75F00-3C1-11-5



75F00-3C1-12-1



75F00-3C1-12-2

- 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.

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.

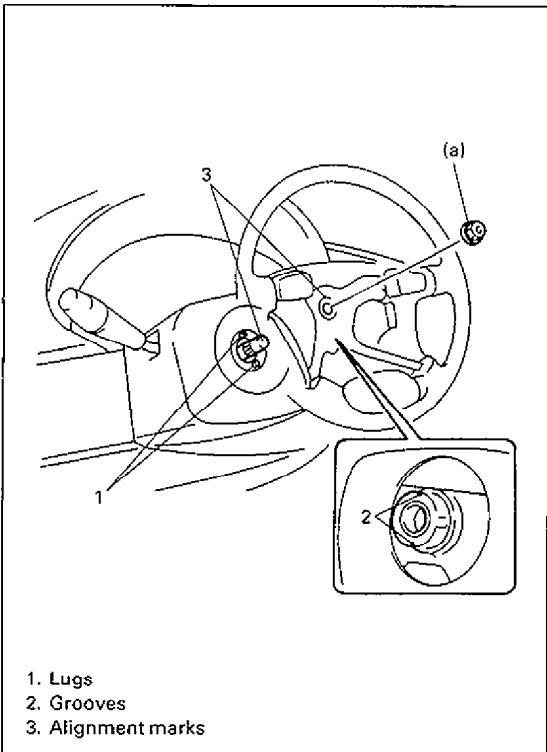
CAUTION:

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)



75F00-3C1-12-4

- 4) Install driver air bag (inflator) module to steering wheel. Refer to "Driver Air Bag (Inflator) Module" earlier in this section.
- 5) Connect negative battery cable.
- 6) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

CAUTION:

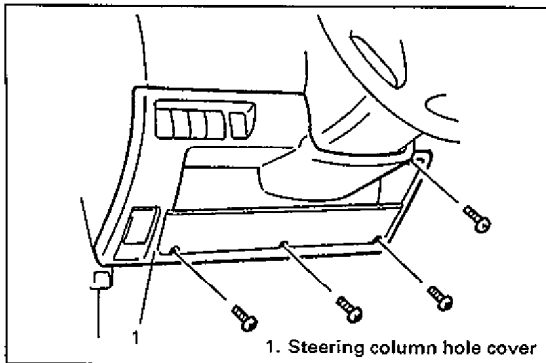
Do not turn contact coil (on combination switch) more than allowable number of turns (about two and a half turns from the center position clockwise or counter-clockwise respectively), or coil will break.

75F00-3C1-13-1

REMOVAL

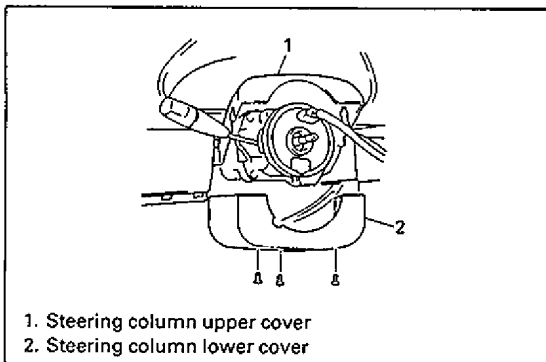
- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove steering wheel from steering column. Refer to "Steering Wheel" earlier in this section.

75F00-3C1-13-2



- 4) Remove steering column hole cover.

75F00-3C1-13-3

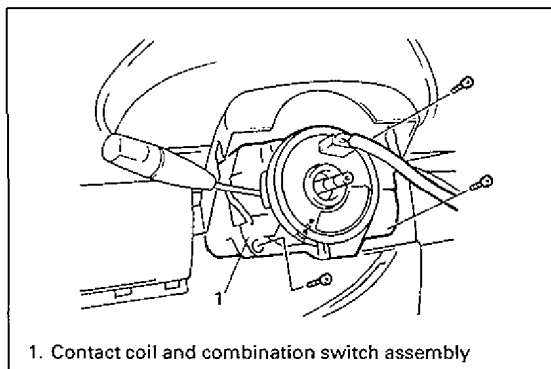


- 5) Remove steering column cover screws (3 pcs).
- 6) Separate upper cover and lower cover, then remove them.

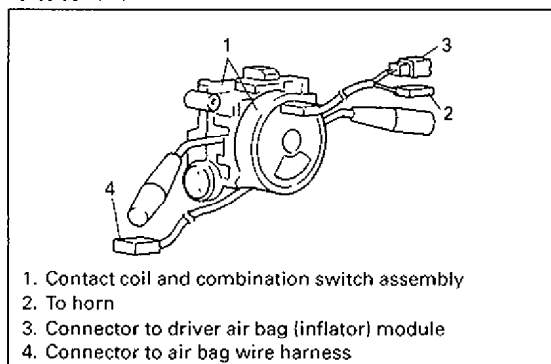
75F00-3C1-13-4

- 7) Disconnect all connectors for contact coil and combination switch wire harness from J/B and other wire harness.

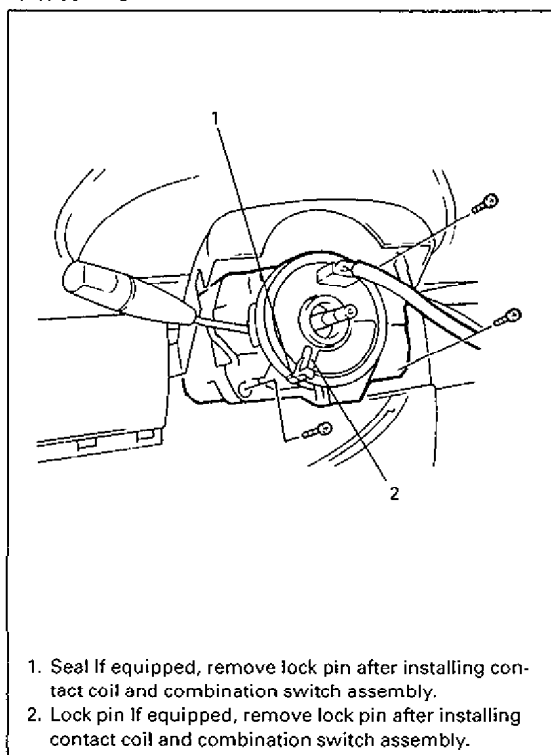
75F00-3C1-13-5



75F00-3C1-14-1



75F00-3C1-14-2



75F00-3C1-14-4

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

INSPECTION

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

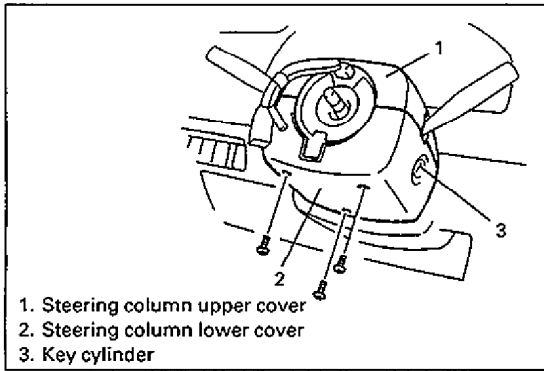
INSTALLATION

- 1) Check to make sure that vehicle's front tires are set at straight-ahead position and then ignition switch is at "LOCK" position.
- 2) Install contact coil and combination switch assembly to steering column.

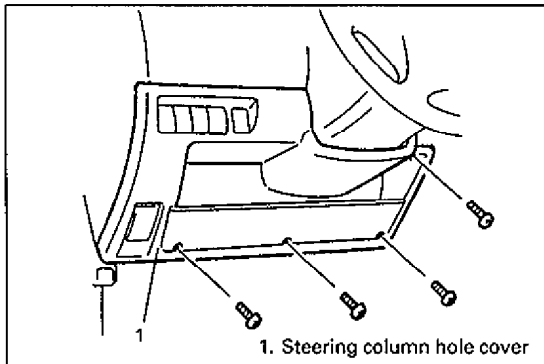
NOTE:

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.

- 3) Connect all connectors for contact coil and combination switch wire harness to J/B and other wire harness.



75F00-3C1-15-1



75F00-3C1-15-2

4) Install steering column upper and lower cover, and then tighten steering column cover screws.

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.

8) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

75F00-3C1-15-3

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.

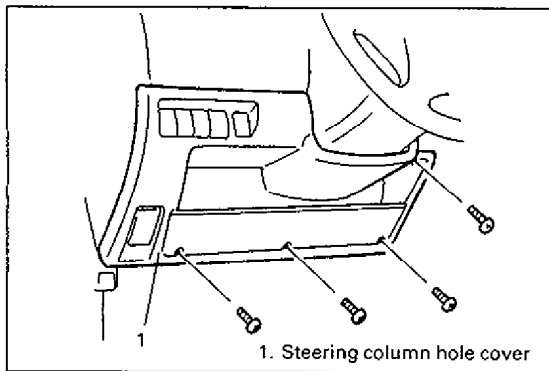
Any of the above damage could impair the column's collapsible design.

Steering column mounting nuts should not be loosened with steering shaft joint upper side bolt tightened as this could cause damage to shaft joint bearing.

NOTE:

When servicing steering column or any column-mounted component, remove steering wheel. But when removing steering column simply to gain access to instrument panel components, leave steering wheel installed on steering column.

75F00-3C1-15-5

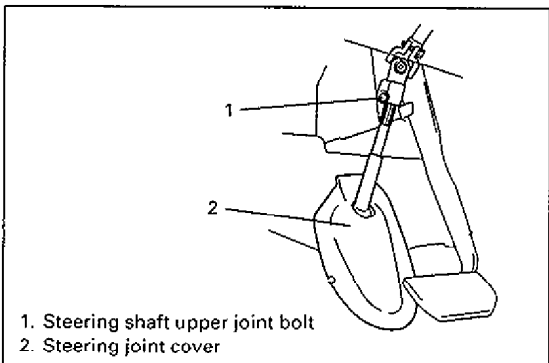


75F00-3C1-16-1

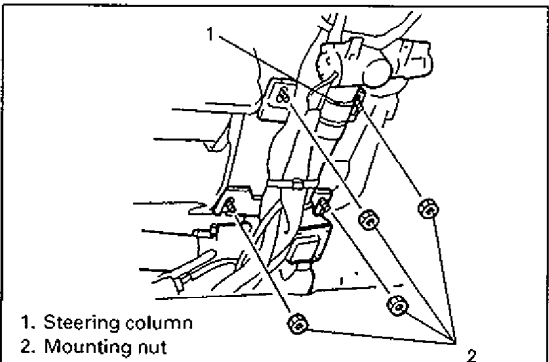
REMOVAL

- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove steering wheel and contact coil and combination switch assembly, if necessary. Refer to "Steering Wheel" and "Contact Coil and Combination Switch Assembly" earlier in this section.
- 4) Remove steering column hole cover.
- 5) Disconnect all connectors for following parts.
 - Contact coil and combination switch assembly
 - Ignition switch
 - Electrical power steering system parts (if equipped)
 - Immobilizer control system parts (if equipped)
 - Suspension control system parts (if equipped)

75F00-3C1-16-2



75F00-3C1-16-3



75F00-3C1-16-4

- 6) Remove steering shaft upper joint bolt.
- 7) Remove steering column mounting nuts (4 pcs).
- 8) Remove steering column from vehicle.

WARNING:

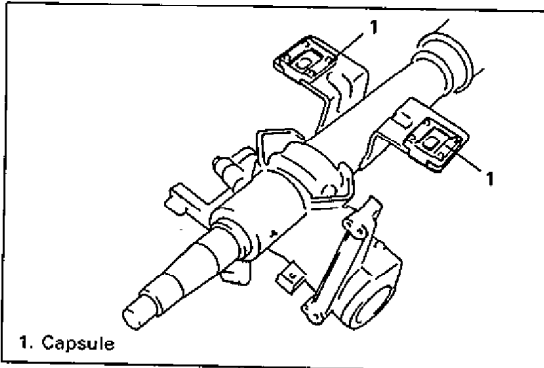
Never rest a steering column assembly on the steering wheel with the air bag (inflator) module face down and column vertical. Otherwise, personal injury may result.

INSPECTION

NOTE:

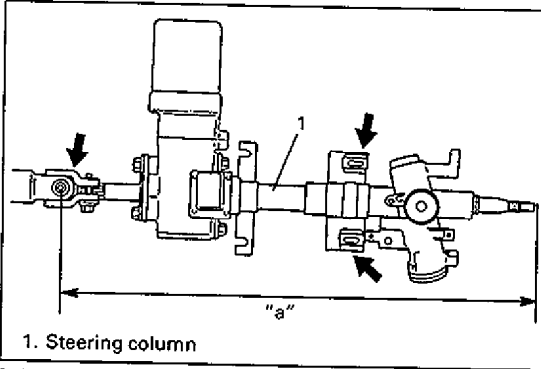
Vehicles involved in accidents resulting in body damage, where steering column has been impacted or air bag deployed, may have a damaged or misaligned steering column.

75F00-3C1-17-1



1. Capsule

75F00-3C1-17-2



1. Steering column

75F00-3C1-17-3

CHECKING PROCEDURE

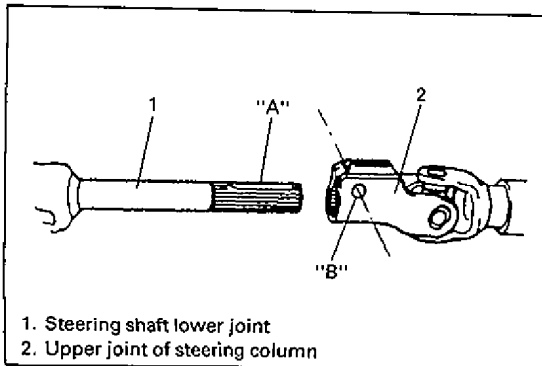
- 1) Check that two capsules are attached to steering column bracket securely. Check clearance between capsules and steering column bracket. Clearance should be 0.0 mm (0.0 in.) on both sides. If found loose or clearance, replace steering column assembly.

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

Length "a": $519.5 \pm 1 \text{ mm}$ ($20.45 \pm 0.04 \text{ in.}$)

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

75F00-3C1-17-4



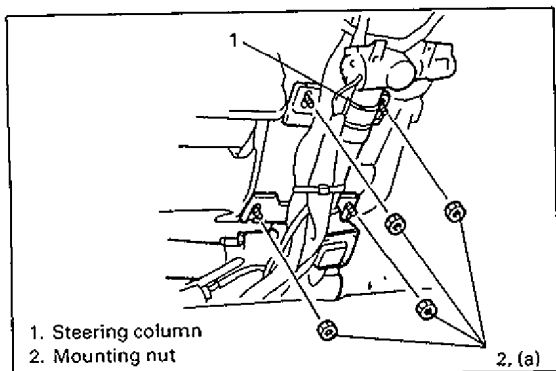
1. Steering shaft lower joint

2. Upper joint of steering column

60G00-3C1-17-5

INSTALLATION

- 1) Align flat part "A" of lower joint shaft with bolt hole "B" of upper side joint of steering column as shown. Then insert upper side joint of steering column into lower joint shaft.

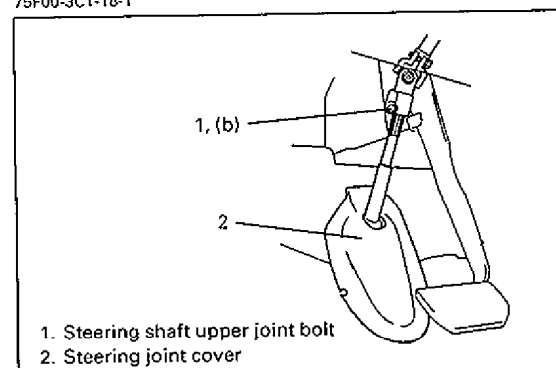


75F00-3C1-18-1

- 2) Install steering column assembly to lower and upper brackets. Torque steering column lower nuts first and then upper nuts to specifications as given below.

Tightening Torque

(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)



75F00-3C1-18-2

- 3) Install bolt to steering shaft upper joint and tighten it to specified torque.

NOTE:

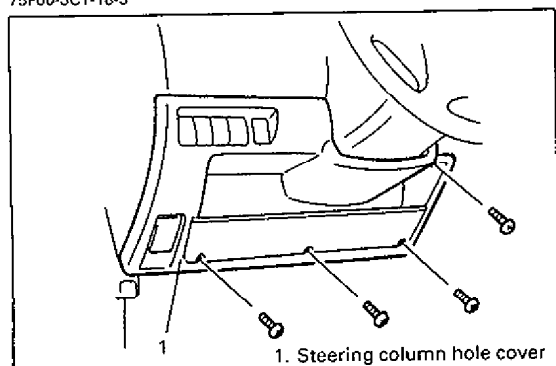
After tightening column nuts, bolt to steering shaft upper joint should be tightened.

Tightening Torque

(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)

- 4) If contact coil and combination switch assembly is removed, install contact coil and combination switch assembly.
Refer to "Contact Coil and Combination Assembly" earlier in this section.
- 5) Connect all connectors that have been removed in "Removal".

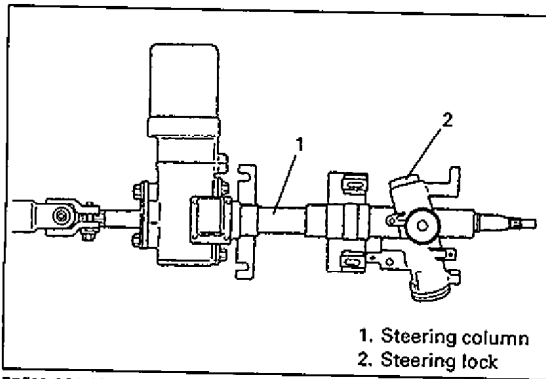
75F00-3C1-18-3



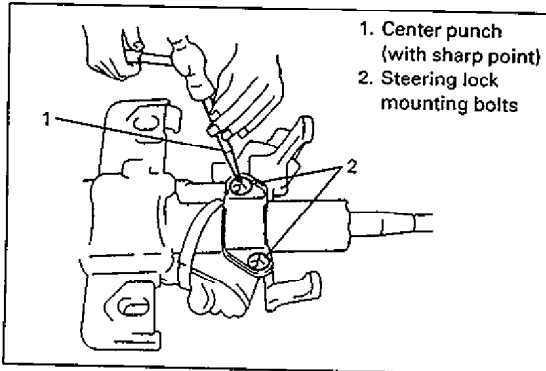
75F00-3C1-18-4

- 6) Install steering column hole cover.

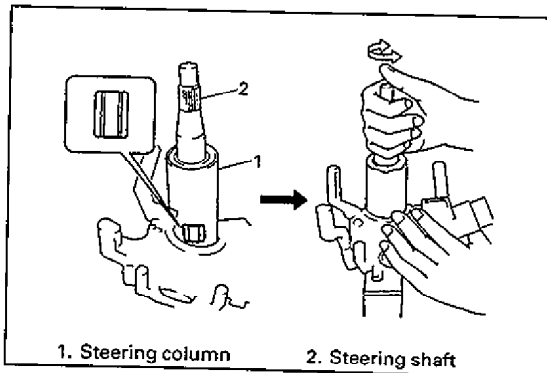
- 7) If steering wheel is removed, install steering wheel. Refer to "Steering Wheel" earlier in this section.
- 8) Connect negative battery cable.
- 9) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.



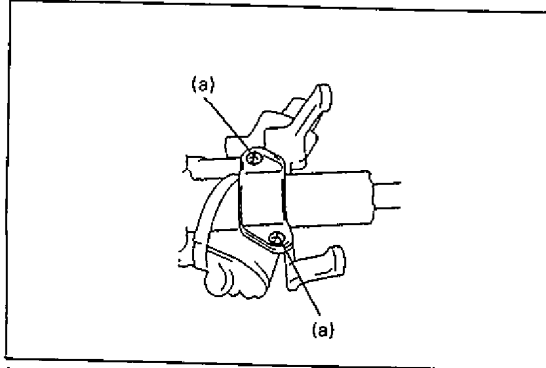
75F00-3C1-19-1



75F00-3C1-19-2



75F00-3C1-19-3



75F00-3C1-19-4

STEERING LOCK (IGNITION SWITCH)

REMOVAL

- 1) Disconnect negative battery cable at battery terminal.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" under "Precautions" earlier in this section.
- 3) Remove steering column. Refer to "Steering Column" earlier in this section.

- 4) Using center punch as shown, loosen and remove steering lock mounting bolts.

NOTE:

Use care not to damage aluminum part of steering lock body with center punch.

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

INSTALLATION

- 1) Position oblong hole of steering shaft in the center of hole in column.
- 2) Turn ignition key to "ACC" or "ON" position and install steering lock assembly onto column.
- 3) Now turn ignition key to "LOCK" position and pull it out.
- 4) Align hub on lock with oblong hole of steering shaft and rotate shaft to assure that steering shaft is locked.

- 5) Tighten two new bolts to specified torque.

Tightening Torque

(a) : 14 N·m (1.4 kg-m, 10.0 lb-ft)

- 6) Turn ignition key to "ACC" or "ON" position and check to be sure that steering shaft rotates smoothly. Also check for lock operation.

- 7) Install steering column. Refer to "Steering Column" earlier in this section.

- 8) Connect negative battery cable.
- 9) Enable air bag system. Refer to "Enabling Air Bag System" under "Precautions" earlier in this section.

STEERING SHAFT LOWER JOINT

REMOVAL

- 1) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
- 2) Turn ignition switch to "LOCK" position and remove key.

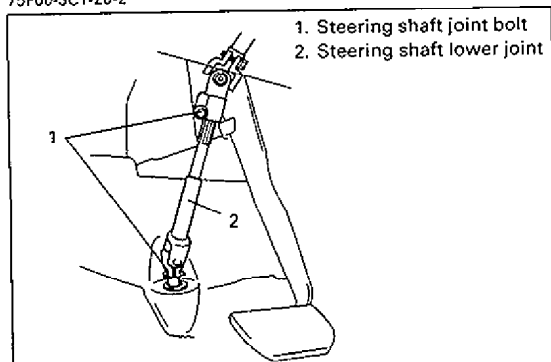
CAUTION:

Never turn steering wheel while steering shaft lower joint is removed.

Should it have been turned and contact coil (on combination switch) have got out of its centered position, it needs to be centered again. Also, turning steering wheel more than about two and a half turns will break contact coil.

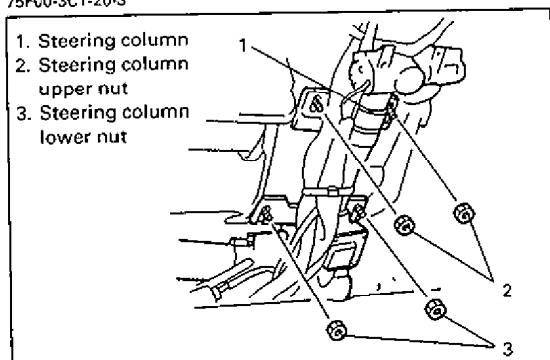
- 3) Remove steering joint cover.

75F00-3C1-20-2



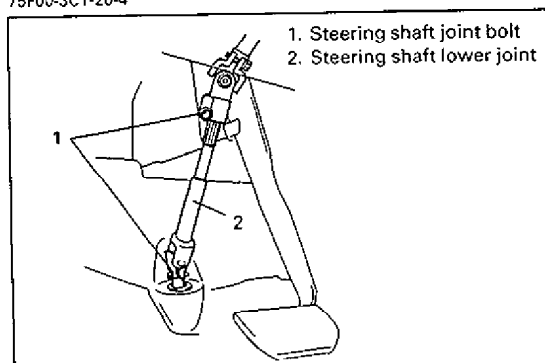
- 4) Loosen steering shaft joint bolts.

75F00-3C1-20-3



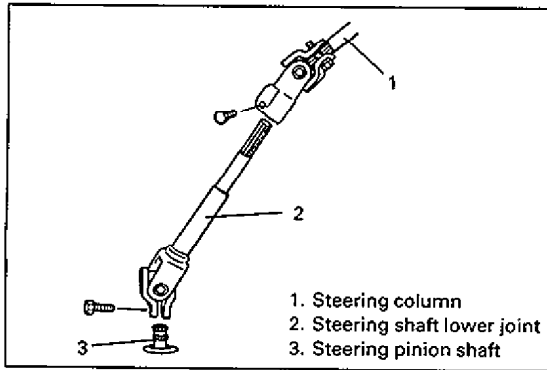
- 5) Remove steering column lower nuts, and then loosen upper nuts.

75F00-3C1-20-4

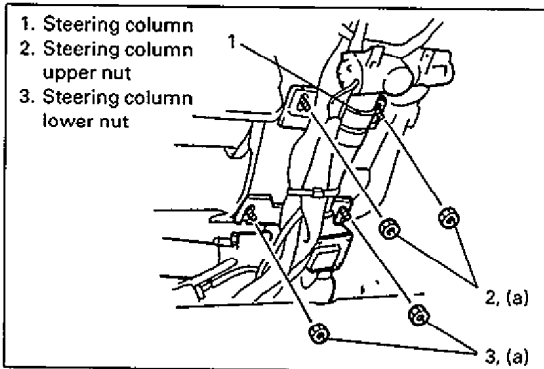


- 6) Remove steering shaft joint bolts and then remove steering shaft lower joint.

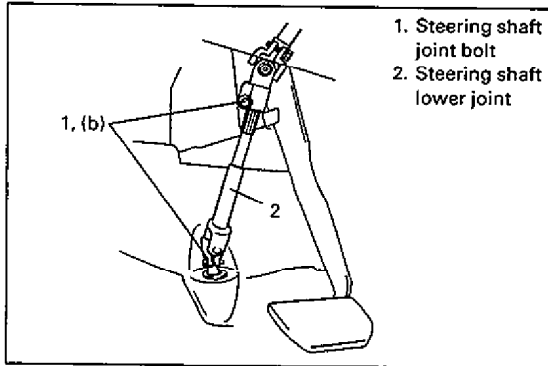
75F00-3C1-20-5



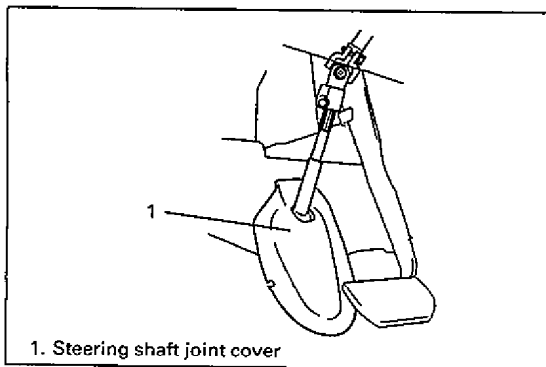
75F00-3C1-21-1



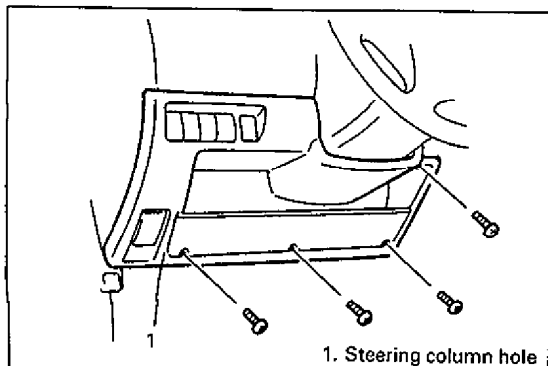
75F00-3C1-21-2



75F00-3C1-21-3



75F00-3C1-21-4



75F00-3C1-21-5

INSTALLATION

- 1) Align flat part of steering shaft lower joint with bolt hole of upper joint as shown. Then insert lower joint shaft into upper joint.
- 2) Be sure that front wheels and steering wheel are in straight-forward state and insert lower joint into steering pinion shaft.

- 3) Tighten steering column lower nuts first and then upper nuts to specified torque.

Tightening Torque

(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

- 4) Torque steering shaft joint bolts to specification.

Tightening Torque

(b): 25 N·m (2.5 kg-m, 18.0 lb-ft)

- 5) Install steering shaft joint cover.

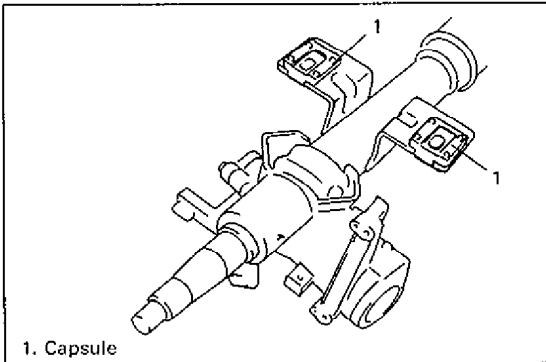
- 6) Install steering column hole cover.

CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

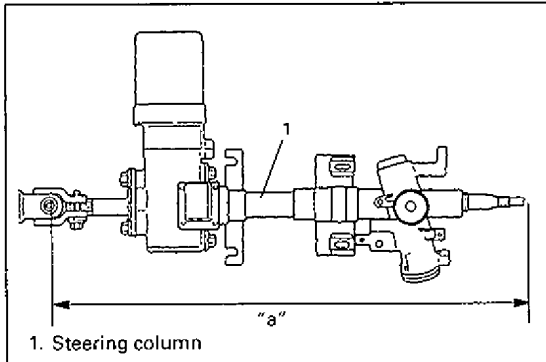
NOTE:

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

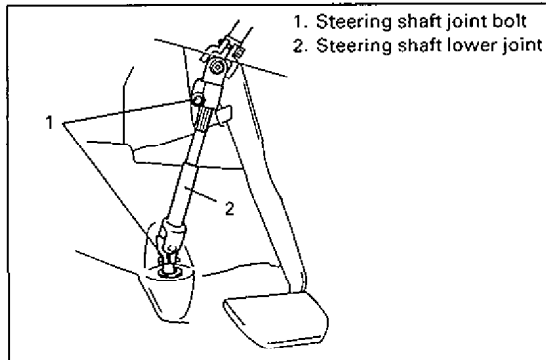
75F00-3C1-22-1



75F00-3C1-22-2



75F00-3C1-22-3



75F00-3C1-22-4

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

Length "a": 519.5 ± 1 mm (20.45 ± 0.04 in.)

- 3) Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play. If anything is found faulty, replace as lower joint assembly or column assembly.

- 4) Check steering shaft for smooth rotation.
If found defective, replace as column assembly.
- 5) Check steering shaft and column for bend, cracks or deformation.
If found defective, replace.

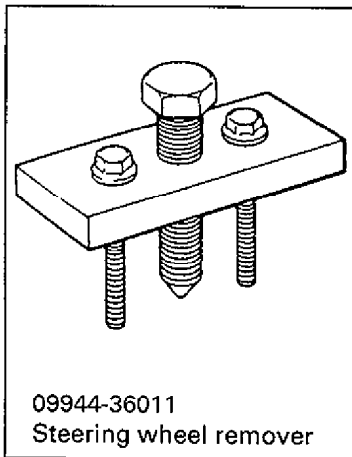
75F00-3C1-22-5

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 nut	14	1.4	10.5
Steering shaft joint bolt	25	2.5	18.0
Steering lock mounting bolt	14	1.4	10.0

75F00-3C1-23-2

SPECIAL TOOL



75F00-3C1-23-4

SECTION 3D

FRONT SUSPENSION

NOTE:

- All front suspension fasteners are an important attaching part in that it could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- Never attempt to heat, quench or straighten any front suspension part. Replace it with a new part or damage to the part may result.

75F00-3D-1-2

CONTENTS

3D

GENERAL DESCRIPTION	3D- 2
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Strut Damper Assembly	3D- 8
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Suspension Arm/Bushing	3D-15
Knuckle/Bearing	3D-17
TIGHTENING TORQUE SPECIFICATIONS	3D-20
REQUIRED SERVICE MATERIALS	3D-20
SPECIAL TOOLS	3D-21

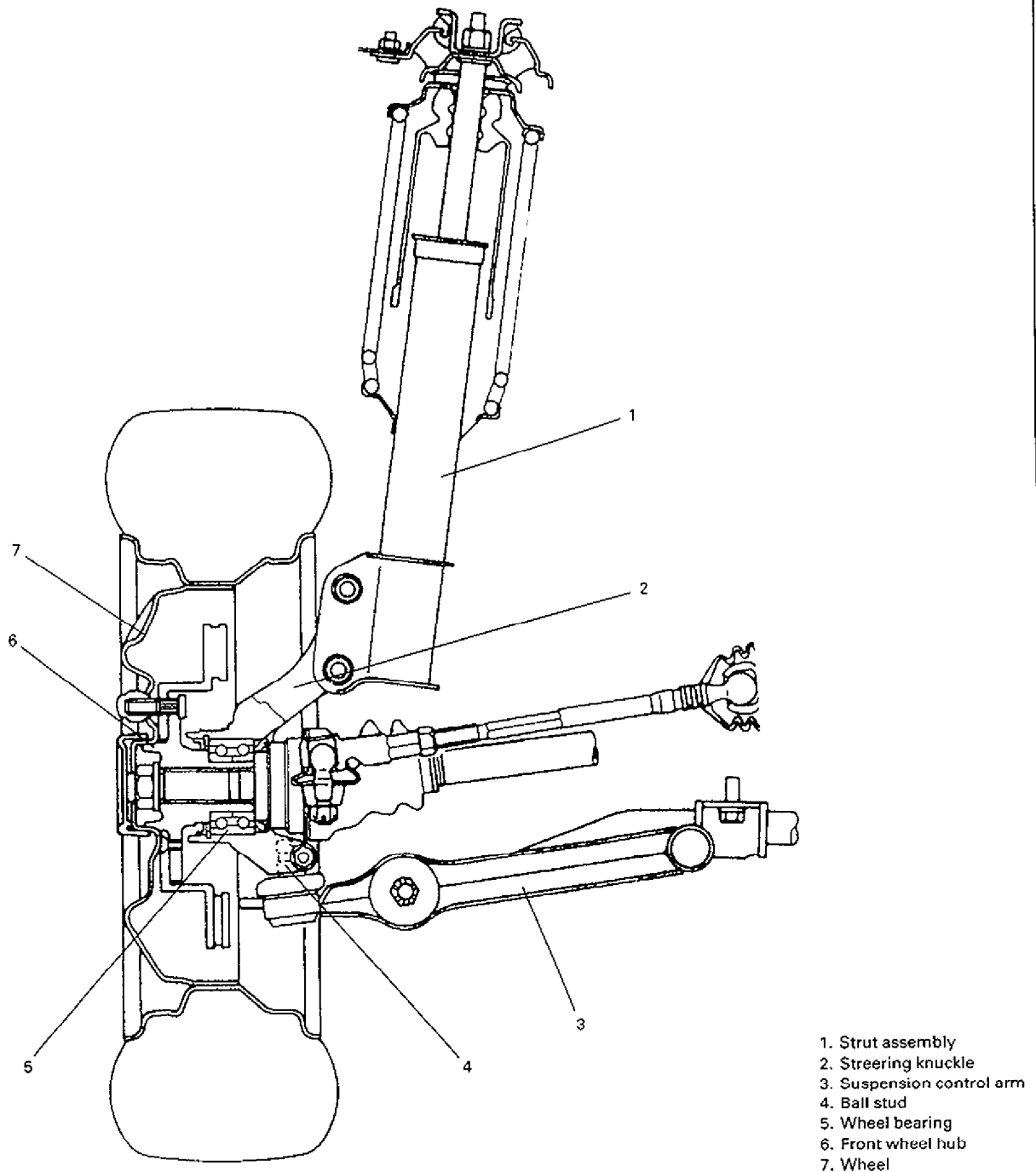
75F00-3D-1-4

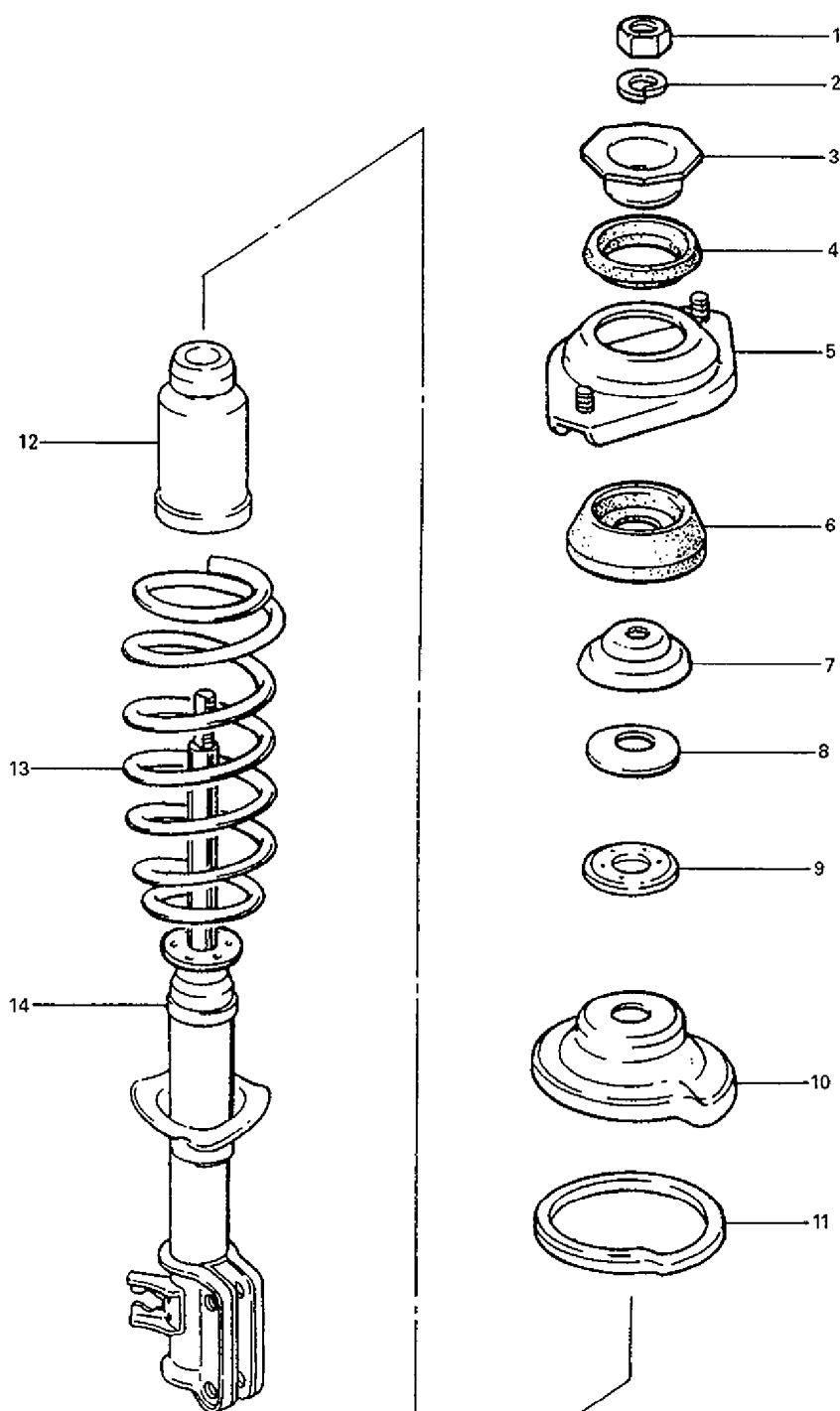
GENERAL DESCRIPTION

The front suspension is the strut type independent suspension. The upper end of a strut is anchored to the vehicle body by a strut support. The strut and strut support are isolated by a rubber mount. A strut bearing is also installed a little lower to the rubber mount.

The lower end of the strut is connected to the upper end of a steering knuckle and lower end of knuckle is attached to the stud of a ball joint which is incorporated in a unit with a suspension control arm. And connected to this steering knuckle is the tie-rod end.

Thus, movement of the steering wheel is transmitted to the tie-rod end and then to the knuckle, eventually causing the wheel-and tire to move. In this operation, with the movement of the knuckle, the strut also rotates by means of the strut bearing and lower ball joint.

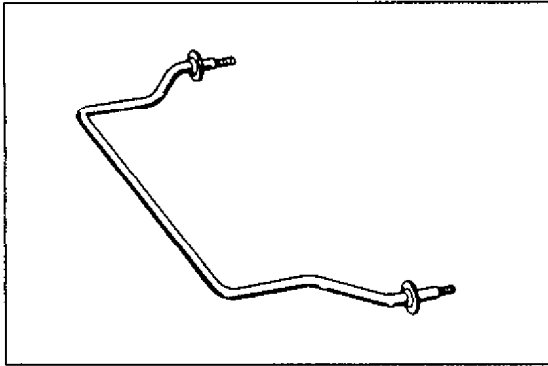




1. Strut nut
2. Strut lock washer
3. Strut inner support
4. Strut rebound stopper
5. Strut support

6. Strut mount
7. Strut mount seat
8. Strut bearing seat
9. Strut bearing
10. Spring upper seat

11. Strut spring seat
12. Bump stopper
13. Coil spring
14. Strut assembly



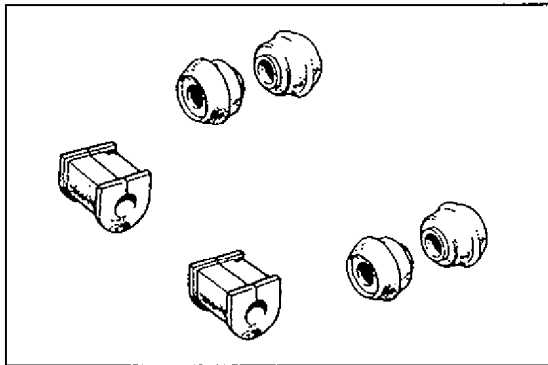
75F00-3D-4-1

INSPECTION

STABILIZER BAR AND/OR BUSHING

Bar

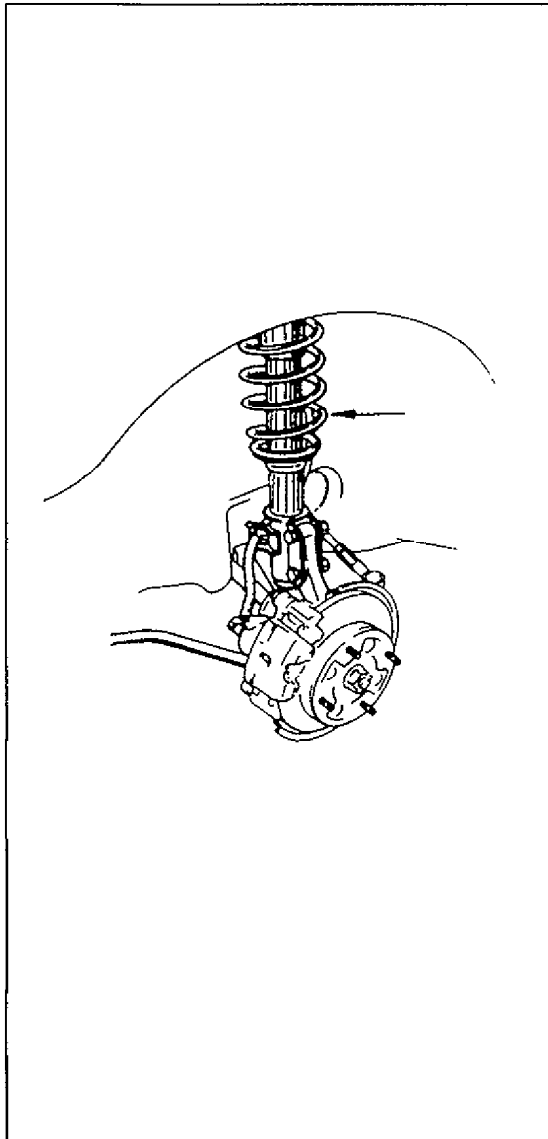
Inspect for damage or deformation. If defective, replace.



75F00-3D-4-2

Bushing

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

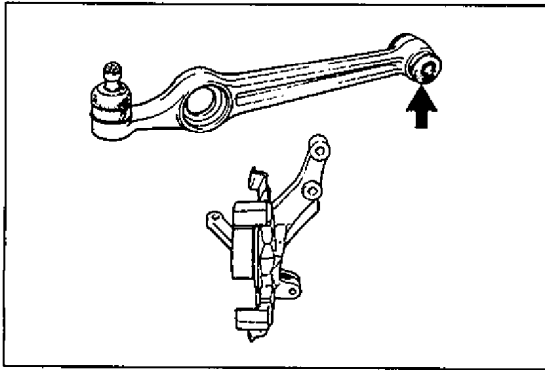


75F00-3D-4-5

STRUT DAMPER

- 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 vehicle 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, vehicle body should come to stop the moment hands are off or after only one or two small rebounds if struts are suspected, compare them with known good vehicle or strut.
- 3) Inspect for damage or deformation.
- 4) Inspect bearing for wear, abnormal noise or gripping.
- 5) Inspect for cracks or deformation in the spring seat.
- 6) Inspect for deterioration of the bump stopper.
- 7) Inspect rebound stopper and strut mount for wear, cracks or deformation.

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



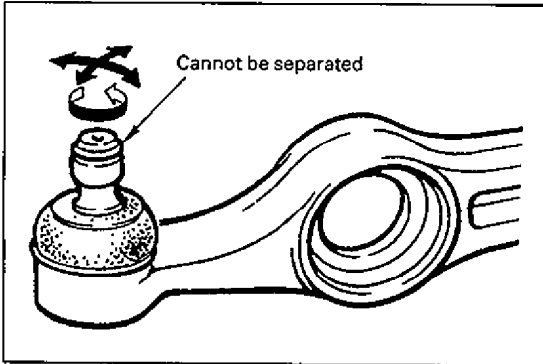
75F00-3D-5-1

SUSPENSION CONTROL ARM/KNUCKLE ARM

Inspect for cracks, deformation or damage.

SUSPENSION CONTROL ARM BUSHING

Inspect for damage, wear or deterioration.



75F00-3D-5-2

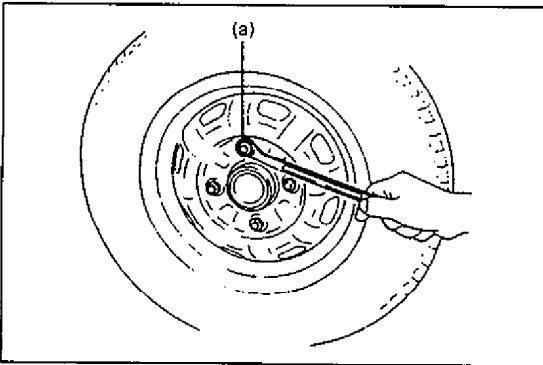
SUSPENSION CONTROL ARM JOINT

- 1) Check for smooth rotation.
- 2) Inspect ball stud for damage.
- 3) Inspect dust cover for damage.
- 4) Inspect for play in ball joint. If found defective, replace.

NOTE:

Suspension arm and arm joint cannot be separated.

If there is any damage to either, control arm assembly must be replaced as a complete unit.



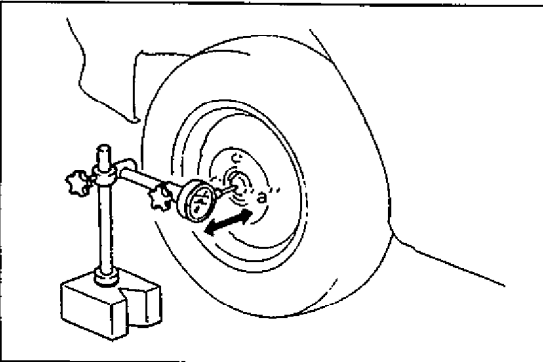
75F00-3D-5-3

WHEEL DISC, NUT & BEARING

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

Tightening Torque

(a): 85 N·m (8.5 kg·m, 61.5 lb·ft)

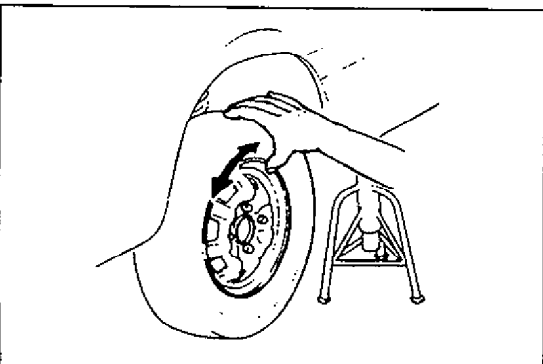


75F00-3D-5-4

- 3) Check wheel bearing for wear. When measuring thrust play, apply a dial gauge to wheel hub center after removing wheel center cap from wheel disc.

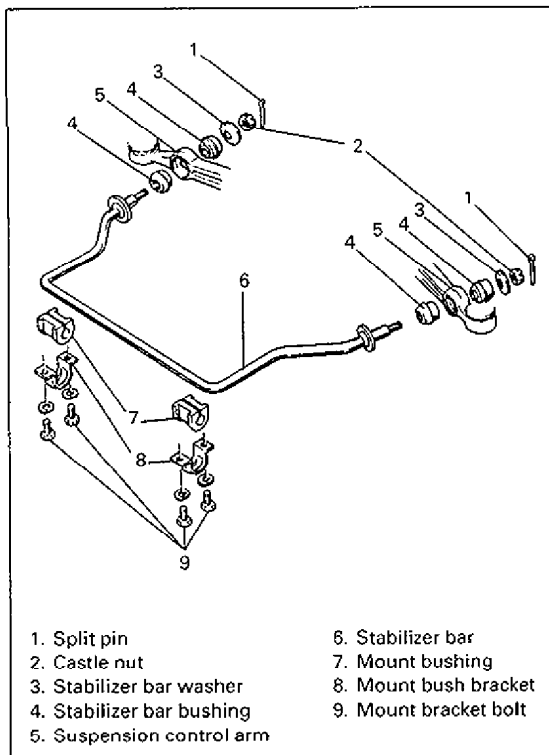
Thrust play limit "a": 0.4 mm (0.016 in.)

When measurement exceeds limit, replace bearing.



75F00-3D-5-5

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



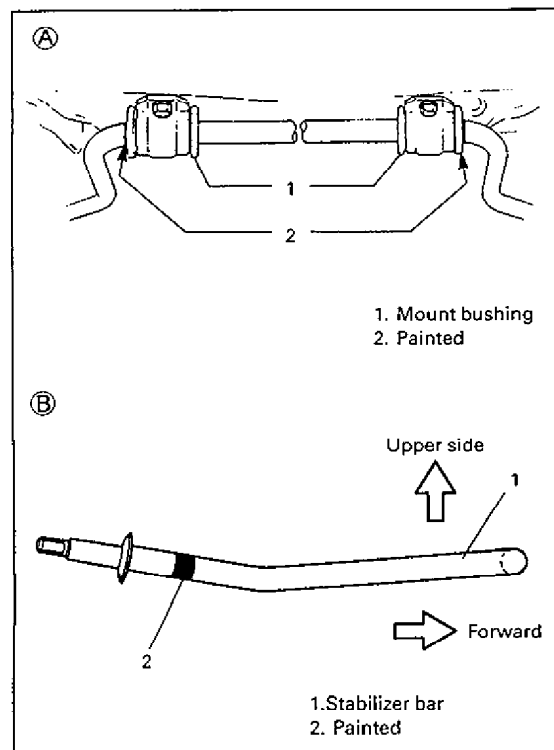
75F00-3D-6-2

ON-VEHICLE SERVICE

STABILIZER BAR AND/OR BUSHINGS

REMOVAL

- 1) Hoist vehicle and allow the front suspension control arms to hang free.
- 2) Remove left and right front wheels.
- 3) Remove stabilizer bar mount bushing bracket bolts.
- 4) Remove stabilizer bar from front suspension control arms (right & left) as shown.



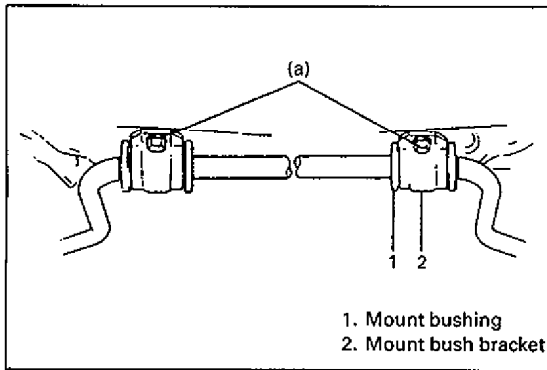
75F00-3D-6-5

INSTALLATION

- 1) When installing stabilizer, loosely assemble all components while insuring that stabilizer is centered, side-to-side. Refer to figure A for its check.
For correct installation in vertical direction, Refer to figure B.

NOTE:

- For correct installation of stabilizer bar, side-to-side, be sure that color paint on stabilizer bar aligns with mount bushing, both right and left, as shown in figure A.
- Install painted side to suspension control arm on the right.
- Bring the oblong hole drilled side of bracket to the rear.

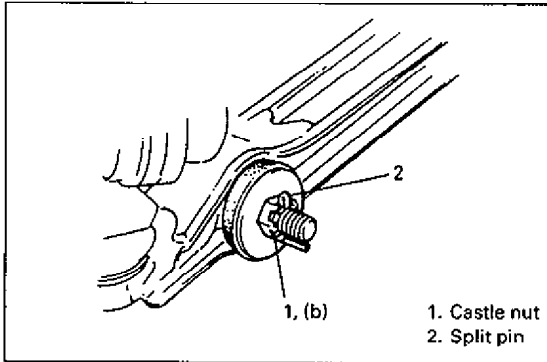


75F00-3D-7-1

- 2) Tighten stabilizer bar mount bushing bracket bolts to specified torque.

Tightening Torque

(a): 43 N·m (4.3 kg-m, 31.5 lb-ft)



75F00-3D-7-2

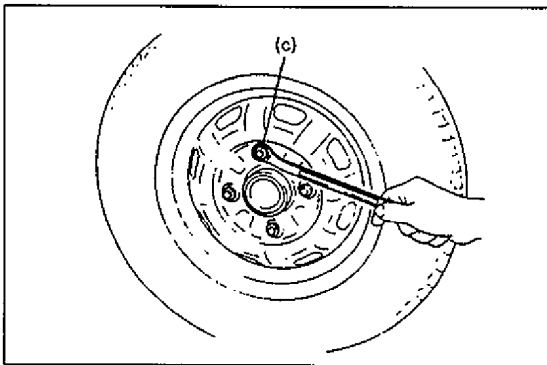
- 3) After tightening castle nut to specified torque, be sure to bend split pin as shown.

Tightening Torque

(b): 65 N·m (6.5 kg-m, 47.0 lb-ft)

NOTE:

Removed split pin should be replaced with new one.



75F00-3D-7-3

- 4) Install wheel and tighten wheel nuts to specified torque.

Tightening torque

(c): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 5) Lower hoist
6) Check toe setting and adjust as required.
Refer to WHEEL ALIGNMENT (SECTION 3A).

STRUT DAMPER ASSEMBLY

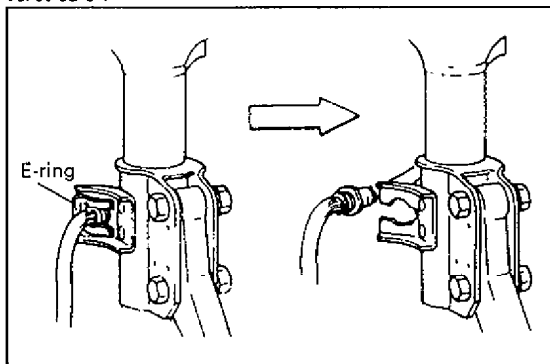
NOTE:

When disassembling strut assembly, loosen strut nut a little before removing strut assembly from vehicle. This will make disassembly easier. Note, however, nut must not be removed at this point.

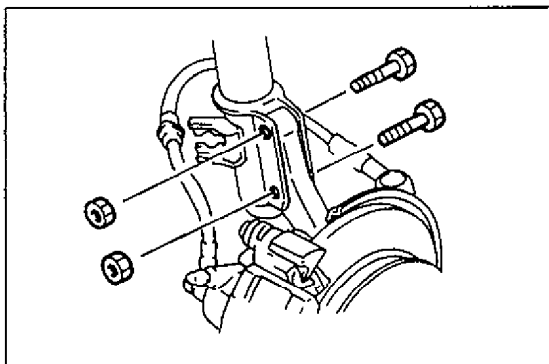
REMOVAL

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

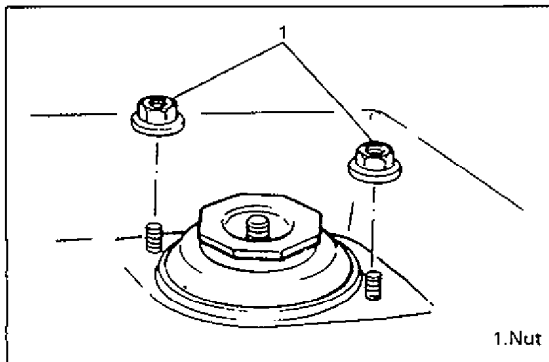
75F00-3D-8-1



75F00-3D-8-2

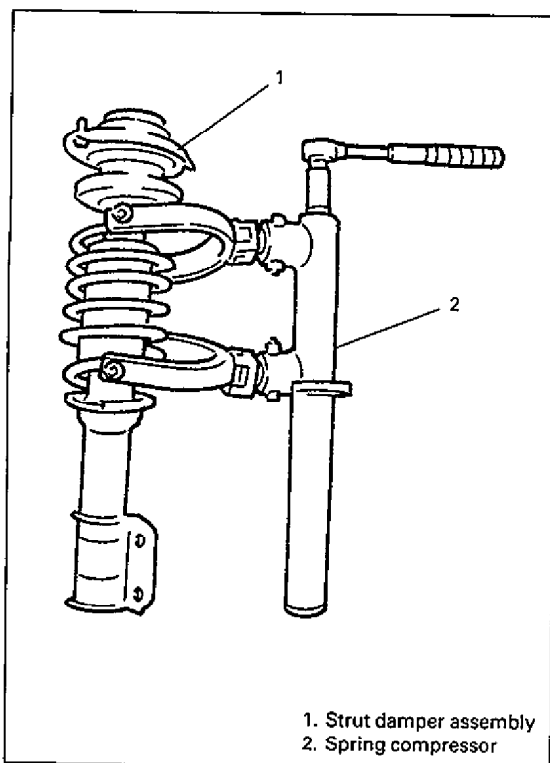


75F00-3D-8-3



75F00-3D-8-4

- 5) Remove wheel speed sensor harness clamp bolt from strut (if equipped).
- 6) Remove strut bracket bolts.
- 7) Remove strut support nuts.
Hold strut by hand so that it will not fall off.
- 8) Remove strut assembly.



75F00-3D-9-2

DISASSEMBLY

- 1) Using a spring compressor, compress the strut spring till its force pressing the spring seat is released.

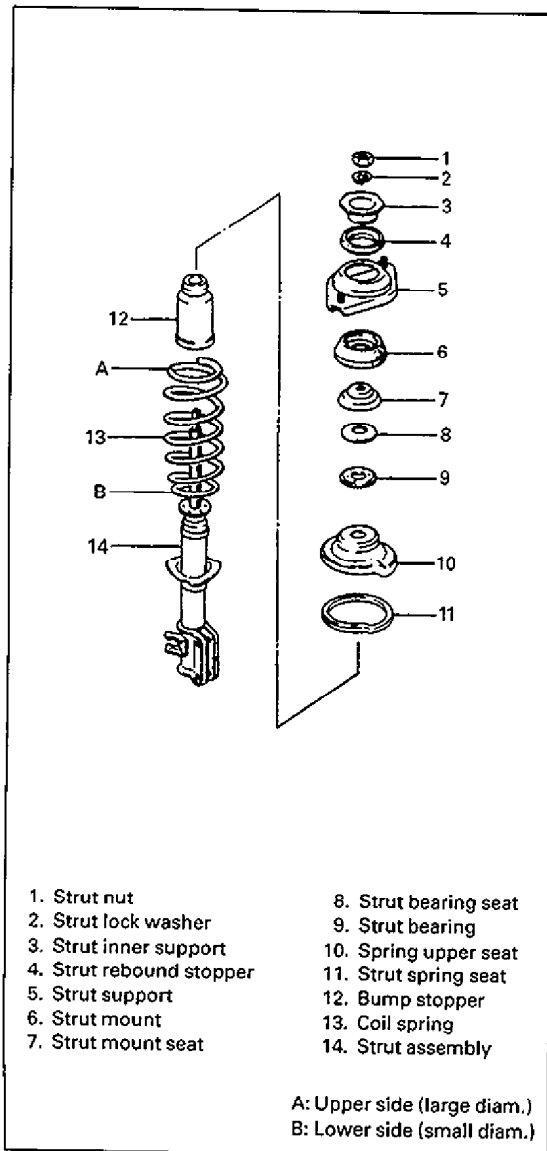
CAUTION:

Use a commercially available spring compressor and follow the operation procedure described in the Instruction Manual supplied with that spring compressor.

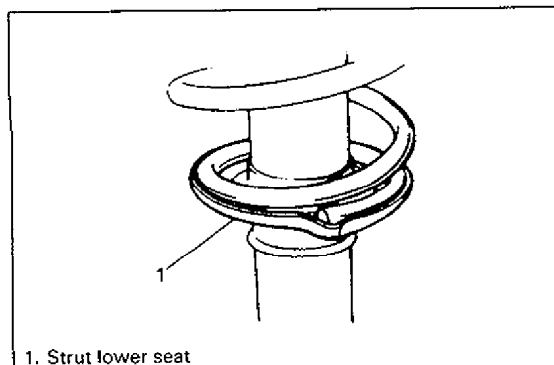
- 2) While keeping spring compressed with spring compressor, remove strut nut and then disassemble parts.

ASSEMBLY

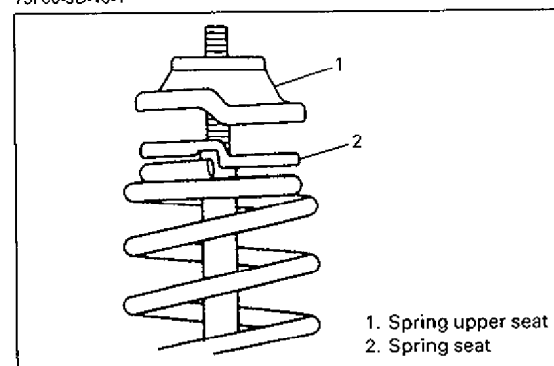
For assembly, reverse disassembly procedure, observing following instruction.



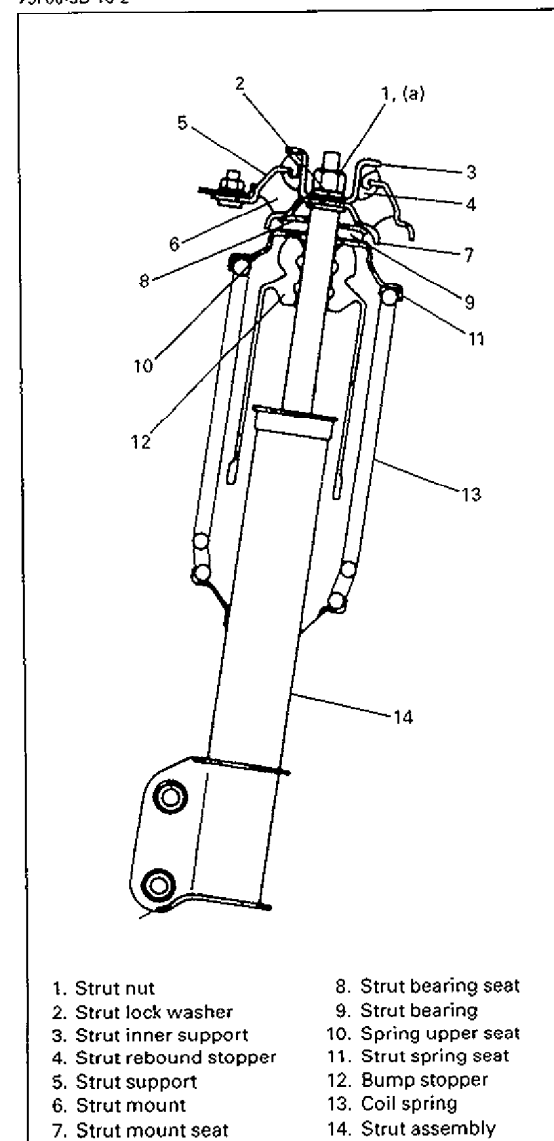
75F00-3D-9-5



75F00-3D-10-1



75F00-3D-10-2



75F00-3D-10-5

- Mate spring end with stepped part of lower seat as shown.

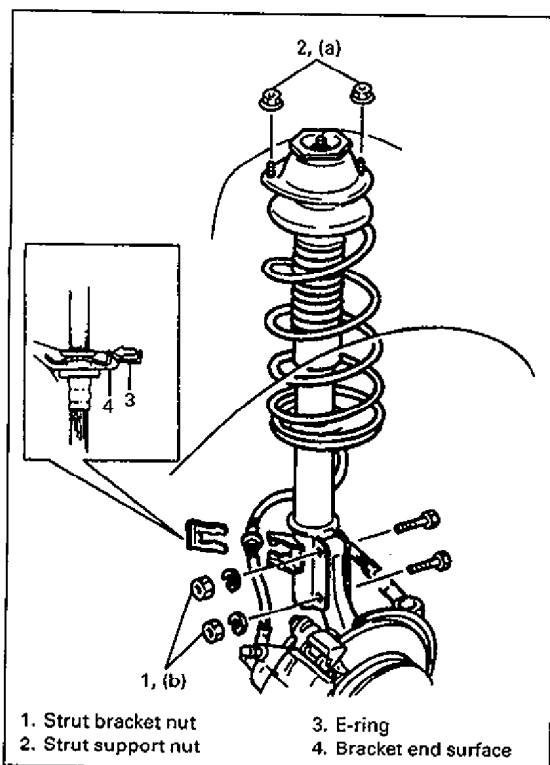
- Install spring seat, mating stepped part of seat with spring upper end as shown. And then similarly install spring upper seat on seat.

- Install bump stopper onto strut rod. For installing direction, refer to left figure.
- Clean strut bearing and install it on spring upper seat. For installing direction, refer to figure at left.
- Wash bearing seat and install it as shown.
- On bearing seat, install mount seat, strut mount, support-and-rebound stopper and inner support in this sequence. Be careful for installing directions. Tighten strut nut to specified torque and then apply water-proof coating (paint or lacquer) all around nut and strut rod screw part.

Tightening Torque

(a): 50 N·m (5.0 kg·m, 36.0 lb·ft)

- Recheck that stepped part of spring seat and spring end are in place to each other as described.



75F00-3D-11-2

INSTALLATION

- 1) Install strut by reversing REMOVAL Steps 1) – 8). Insert bolts in such a direction as shown.
- 2) Torque all fasteners to specification.

Tightening Torque

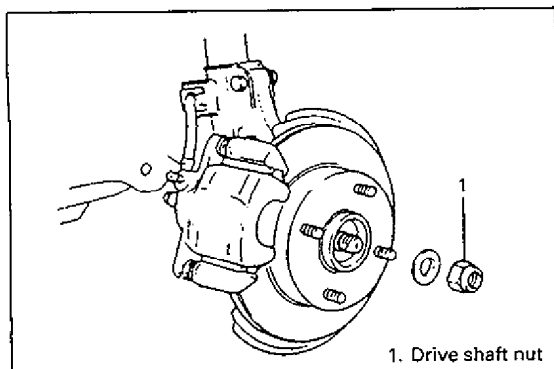
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

(b): 90 N·m (9.0 kg-m, 65.0 lb-ft)

NOTE:

Don't twist brake hose when installing it.

Install E ring as far as it fits to bracket as shown.



75F00-3D-12-1

WHEEL HUB, WHEEL STUD/WHEEL BEARING OUTSIDE INNER RACE

REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Uncalk drive shaft nut.
- 3) Depress foot brake pedal and hold it there. Remove drive shaft nut.

- 4) Remove caliper carrier bolts.
- 5) Remove caliper with carrier.

NOTE:

Hang removed caliper with a wire hook of the like so as to prevent brake hose from bending and twisting excessively or being pulled.

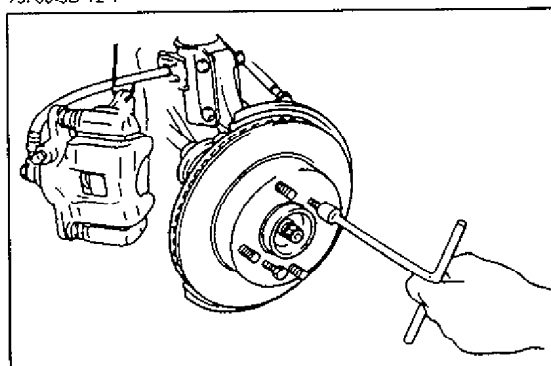
Don't operate brake pedal with pads removed.

- 6) Pull brake disc off by using two 8 mm bolts.
- 7) Pull out wheel hub with special tools.

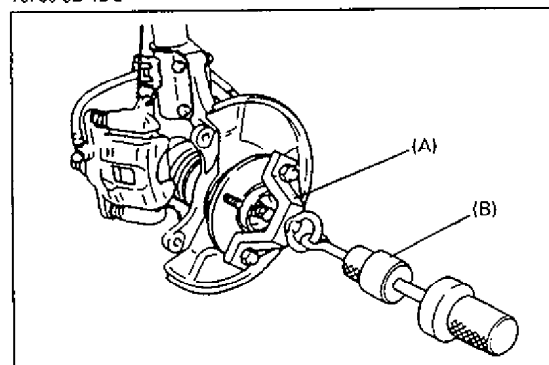
Special Tool

(A): 09943-17912

(B): 09942-15510



75F00-3D-12-2

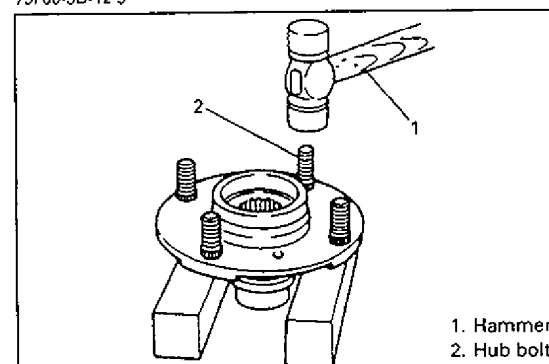


75F00-3D-12-3

- 8) Remove hub bolts.

CAUTION:

Never remove bolt unless replacement is necessary.
Be sure to use a new bolt for replacement.



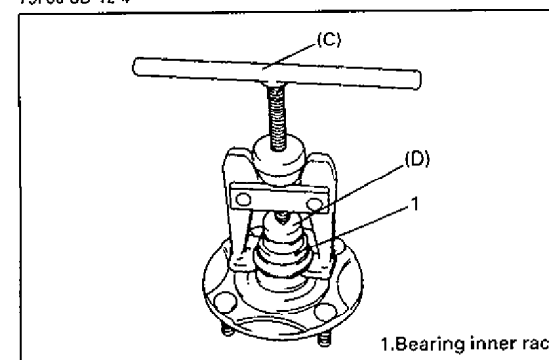
75F00-3D-12-4

- 9) Remove wheel bearing inner race.

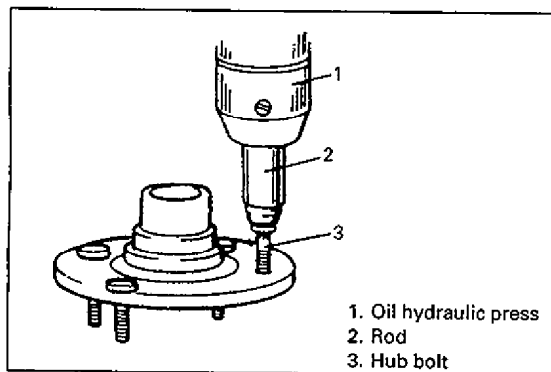
Special Tool

(C): 09913-61110

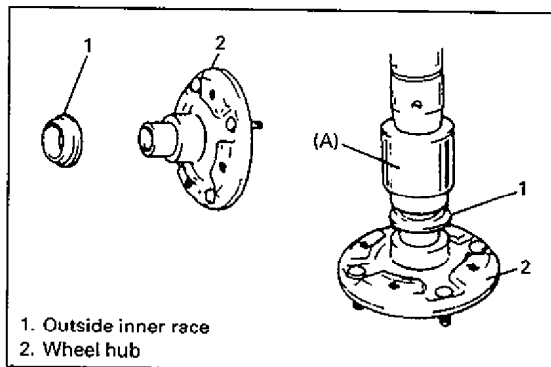
(D): 09925-88210



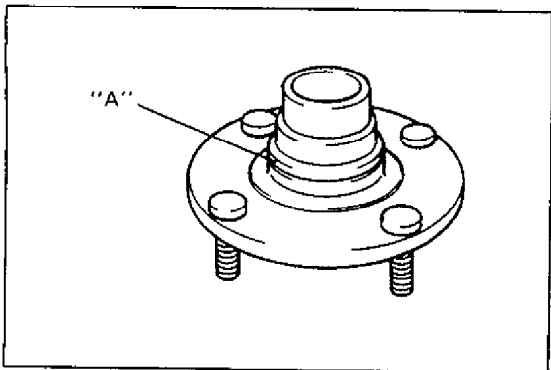
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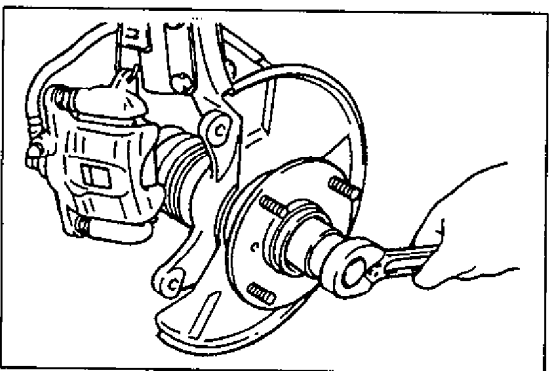
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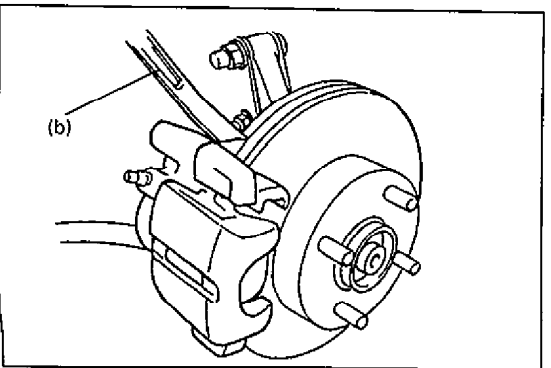
75F00-3D-13-2



75F00-3D-13-3



75F00-3D-13-4



75F00-3D-13-5

INSTALLATION

Install Hub Bolts

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

- 1) Install outside inner race to wheel hub using special tool. Installing direction is as shown.

Special Tool

(A): 09940-53111

NOTE:

When replacing bearing, inner race or outer race, be sure to replace them with new ones as a set.

- 2) Apply grease to bearing, outside inner race and oil seal lip.

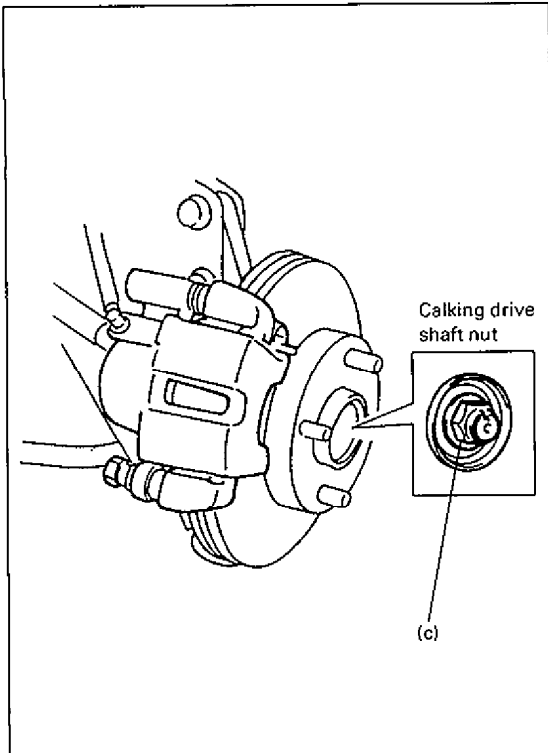
"A": Grease 99000-25010

- 3) Install wheel hub to knuckle by tightening drive shaft nut. Don't tap wheel hub.

- 4) Install brake disc.
- 5) Install brake caliper/caliper carrier.
- 6) Tighten caliper carrier bolts to specified torque.

Tightening Torque

(b): 85 N·m (8.5 kg·m, 61.5 lb·ft)

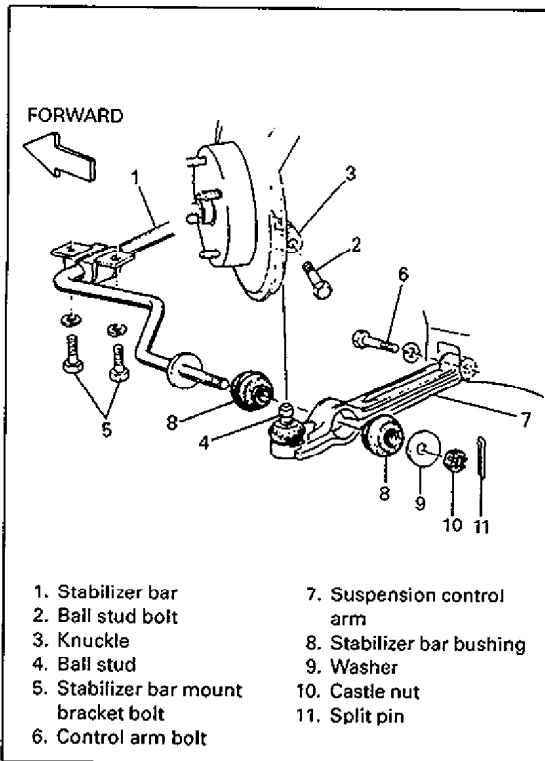


75F00-3D-14-2

- 7) Depress foot brake pedal and hold it there.
Tighten new drive shaft nut to specified torque.

Tightening Torque**(c): 175 N·m (17.5 kg-m, 127.0 lb-ft)**

- 8) Calk drive shaft nut as shown.
- 9) Install wheel and lower hoist.

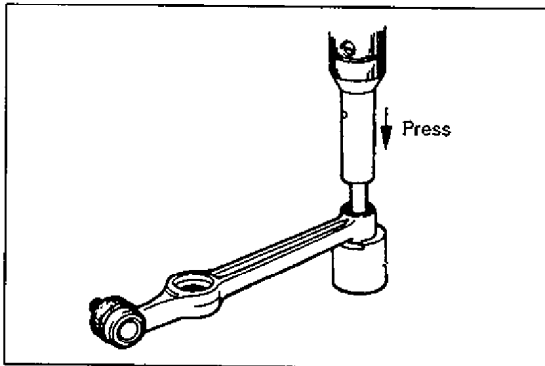


75F00-3D-15-2

SUSPENSION ARM/BUSHING

REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Remove stabilizer bar split pin, castle nut, washer and bushing.
- 3) Remove stabilizer bar mount bracket (right & left) bolts.
- 4) Remove ball stud bolt.
- 5) Remove control arm bolt.
- 6) Remove control arm.

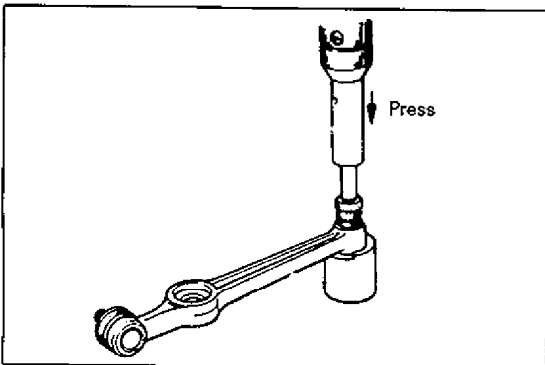


75F00-3D-15-3

- 7) Remove bushing.
Pull out bushing with special tool and oil hydraulic press as shown.

Special Tool

(A): 09943-77910



75F00-3D-15-4

INSTALLATION

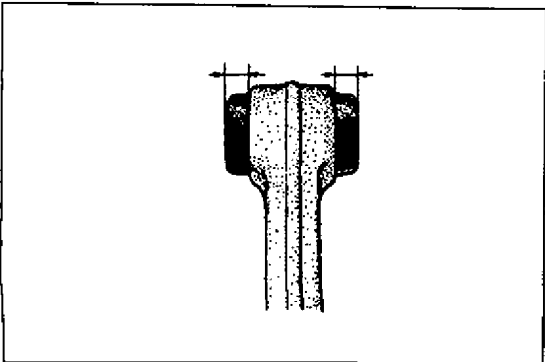
- 1) Install bushing.

Special Tool

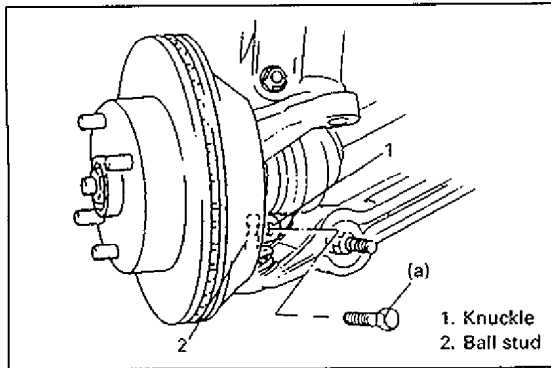
(A): 09943-77910

NOTE:

- Before installing bushing, apply soap water on its circumference to facilitate installation.
- When installed, bush should be equal on the right and left of arm as shown.



75F00-3D-15-5

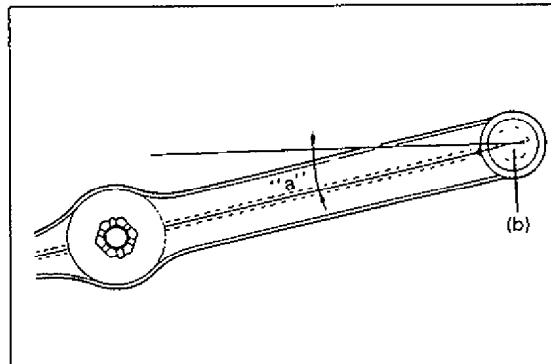


75F00-3D-16-1

- 2) Install ball stud to knuckle. Align ball stud groove with knuckle bolt hole as shown.
Then drive in ball stud bolt from the direction as shown.
Tighten ball stud bolt to specified torque.

Tightening Torque

(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)



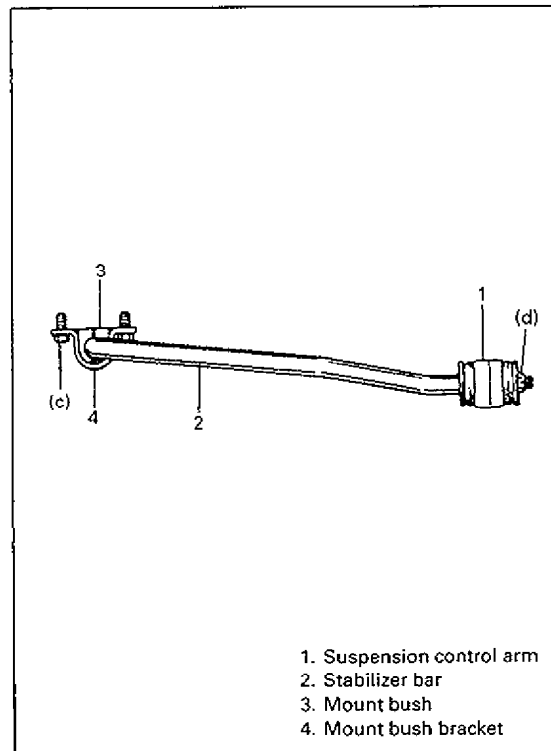
75F00-3D-16-2

- 3) Install control arm to vehicle body and tighten control arm bolt to specified torque at the position where control arm is installed at angle "a" as shown below.

"a": Angle $10^\circ \pm 5^\circ$

Tightening Torque

(b): 60 N·m (6.0 kg-m, 43.5 lb-ft)



75F00-3D-16-4

- 4) Install stabilizer bar to control arm and then bushing, washer and nut to stabilizer bar.
Tighten nut to the extent to be turned by hand.
5) Tighten stabilizer bar mount bracket bolts to specified torque. Before tightening, check if stabilizer bar is properly centered, side-to-side, refer to STABILIZER BAR on page 3D-6.

Tightening torque

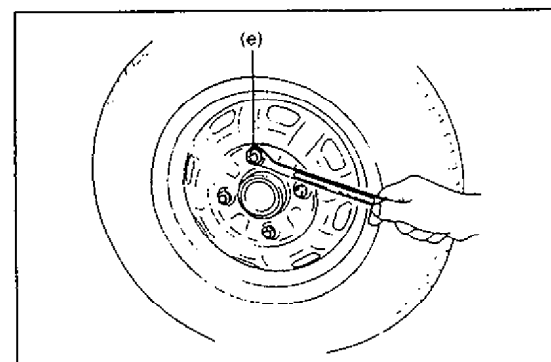
(c): 43 N·m (4.3 kg-m, 31.5 lb-ft)

- 6) Tighten castle nut to specified torque.

Tightening Torque

(d): 65 N·m (6.5 kg-m, 47.0 lb-ft)

- 7) Install split pin.



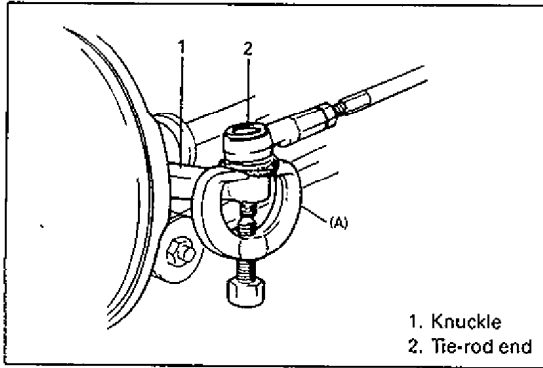
75F00-3D-16-5

- 8) Install wheel and tighten wheel nuts to specified torque.

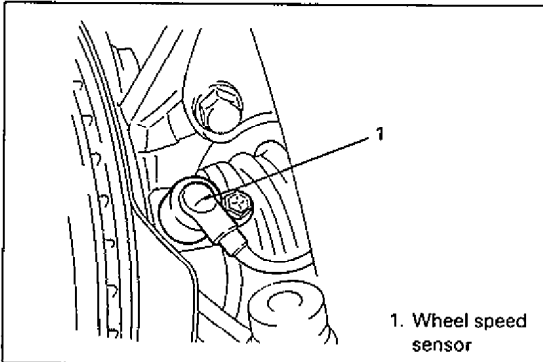
Tightening Torque

(e): 85 N·m (8.5 kg-m, 61.5 lb-ft)

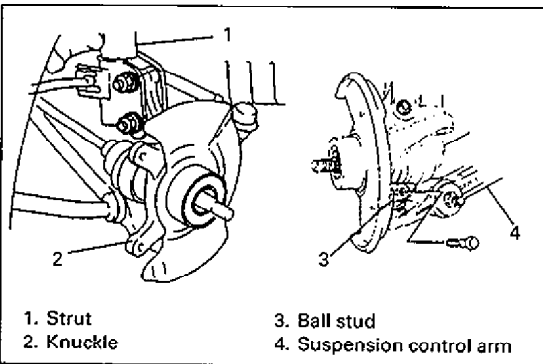
- 9) Lower hoist.
10) Check toe setting, adjust as required.



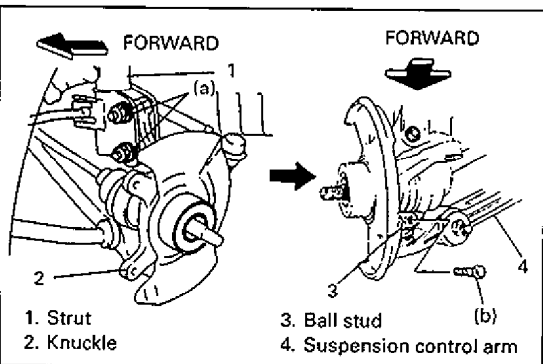
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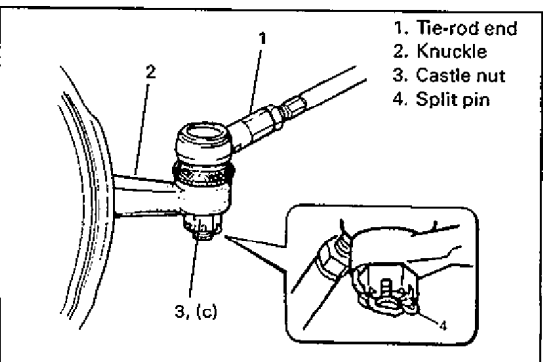
75F00-3D-17-2



75F00-3D-17-3



75F00-3D-17-4



75F00-3D-17-5

KNUCKLE/BEARING

REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Remove wheel hub. Refer to Steps 2) – 7) in WHEEL HUB REMOVAL of this section.
- 3) Disconnect tie-rod end from knuckle with special tool.

Special Tool

(A): 09913-65210

- 4) Remove wheel speed sensor from knuckle (if equipped).

- 5) Remove strut bracket bolts from strut bracket and then ball stud bolt.
- 6) Remove knuckle.

INSTALLATION

- 1) Install knuckle to ball stud on suspension arm and strut bracket. Installing direction of each bolt is as shown. Align knuckle bolt hole with ball stud groove as shown and install ball stud bolt. Tighten each bolt and nuts to specified torque.

Tightening Torque

(a): 90 N·m (9.0 kg·m, 65.0 lb·ft)

(b): 55 N·m (5.5 kg·m, 40.0 lb·ft)

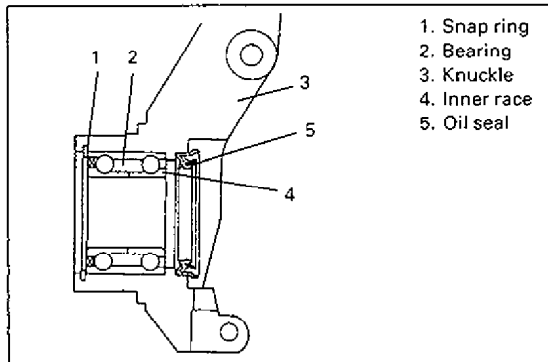
- 2) Install wheel speed sensor (if equipped).
- 3) Connect tie-rod end to knuckle and tighten tie-rod end castle nut to specified torque.
Install split pin.

Tightening Torque

(c): 43 N·m (4.3 kg·m, 31.5 lb·ft)

- 4) For installation procedures following the above, refer to Steps 1) – 9), WHEEL HUB INSTALLATION on this section.

75F00-3D-18-1

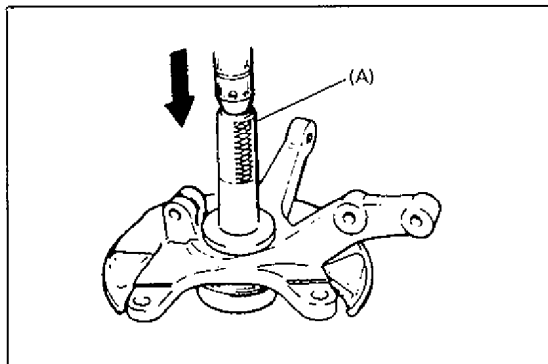


REMOVE OIL SEAL, SNAP RING AND WHEEL BEARING

Once bearing outer race is removed, bearing set (outer race, bearing and inner races) should be replaced with new one.

- Remove oil seal and snap ring.

75F00-3D-18-2

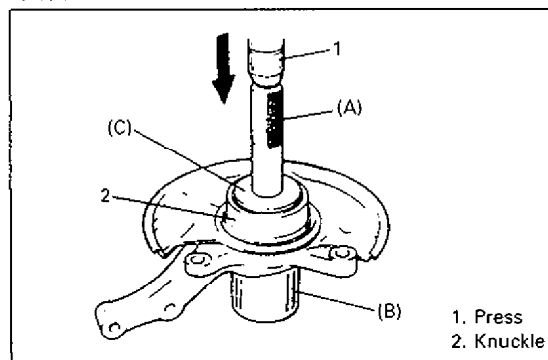


- Remove wheel bearing using special tool and hydraulic press.

Special Tool

(A): 09913-75810

75F00-3D-18-3



INSTALL OIL SEAL, SNAP RING AND WHEEL BEARING

When replacing bearing, inner races or outer race, be sure to replace them with new ones as a set.

- Press-fit bearing using special tools.

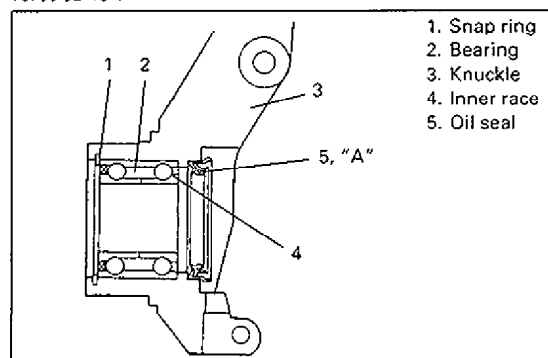
Special Tool

(A): 09924-74510

(B): 09951-18210

(C): 09944-68210

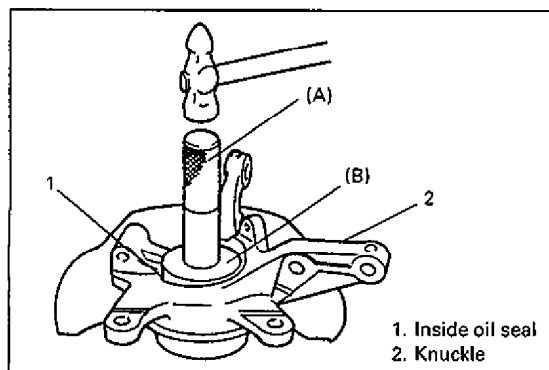
75F00-3D-18-4



- After greasing (lithic grease) oil seal lip, install wheel bearing and snap ring.

"A": Grease 99000-25010

75F00-3D-18-5



75F00-3D-19-1

- Drive in Oil seal until seal is flush with stopped surface of knuckle by using special tool.

NOTE:

When driving in oil seal, be careful not to deform or tilt it or not to cause damage to rubber part.

Special Tool

(A): 09924-74510

(B): 09944-68210

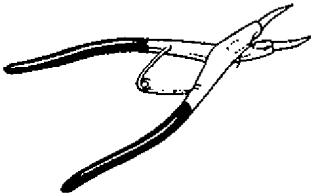
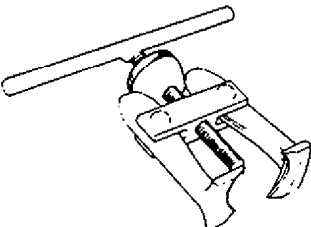
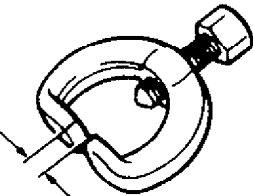
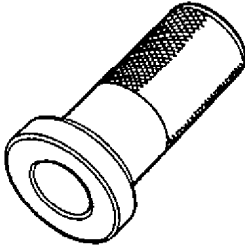
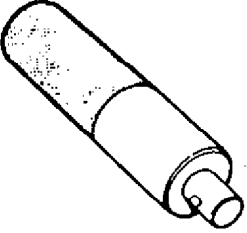
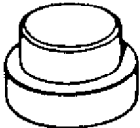
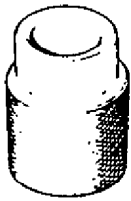
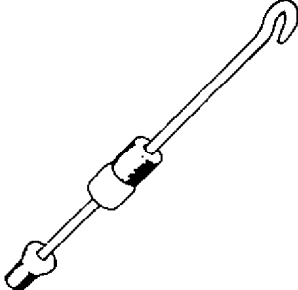
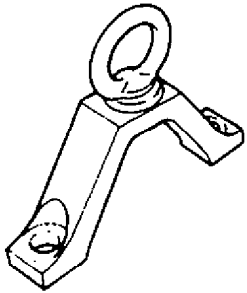
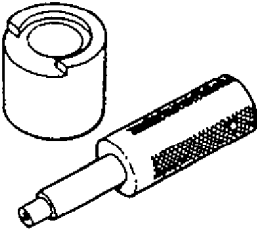
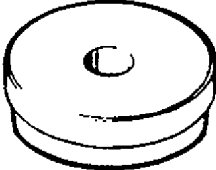
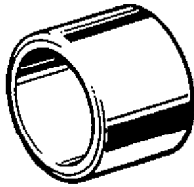
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Strut bracket nut	90	9.0	65.0
Strut nut	50	5.0	36.5
Strut support nut	23	2.3	17.0
Ball stud bolt	55	5.5	40.0
Suspension control arm bolt	60	6.0	43.5
Stabilizer bar mount bracket bolt	43	4.3	31.5
Stabilizer bar castle nut	65	6.5	47.0
Drive shaft nut	175	17.5	12.7
Tie rod end castle nut	43	4.3	31.5
Wheel nut	85	8.5	61.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithic wheel bearing grease	SUZUKI SUPER GREASE (A) (99000-25010)	Wheel bearing oil seal lip

SPECIAL TOOLS

 09900-06108 Snap ring pliers (closing type)	 09913-61110 Bearing puller	 09913-65210 Tie-rod end remover	 09913-75810 Bearing installer
 09924-74510 Bearing installer handle	 09925-88210 Bearing puller attachment	 09940-53111 Bearing installer	 09942-15510 Sliding hammer
 09943-17912 Front wheel hub remover (Brake drum remover)	 09943-77910 Control bush remover	 09944-68210 Bearing & oil seal installer	 09951-18210 Bearing installer support

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.

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Bump Stopper and Spring Upper Seat	3E- 8
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Rear Axle	3E-11
Wheel Bearing and Wheel Stud	3E-16
TIGHTENING TORQUE SPECIFICATIONS	3E-17
REQUIRED SERVICE MATERIAL	3E-17
SPECIAL TOOLS	3E-17

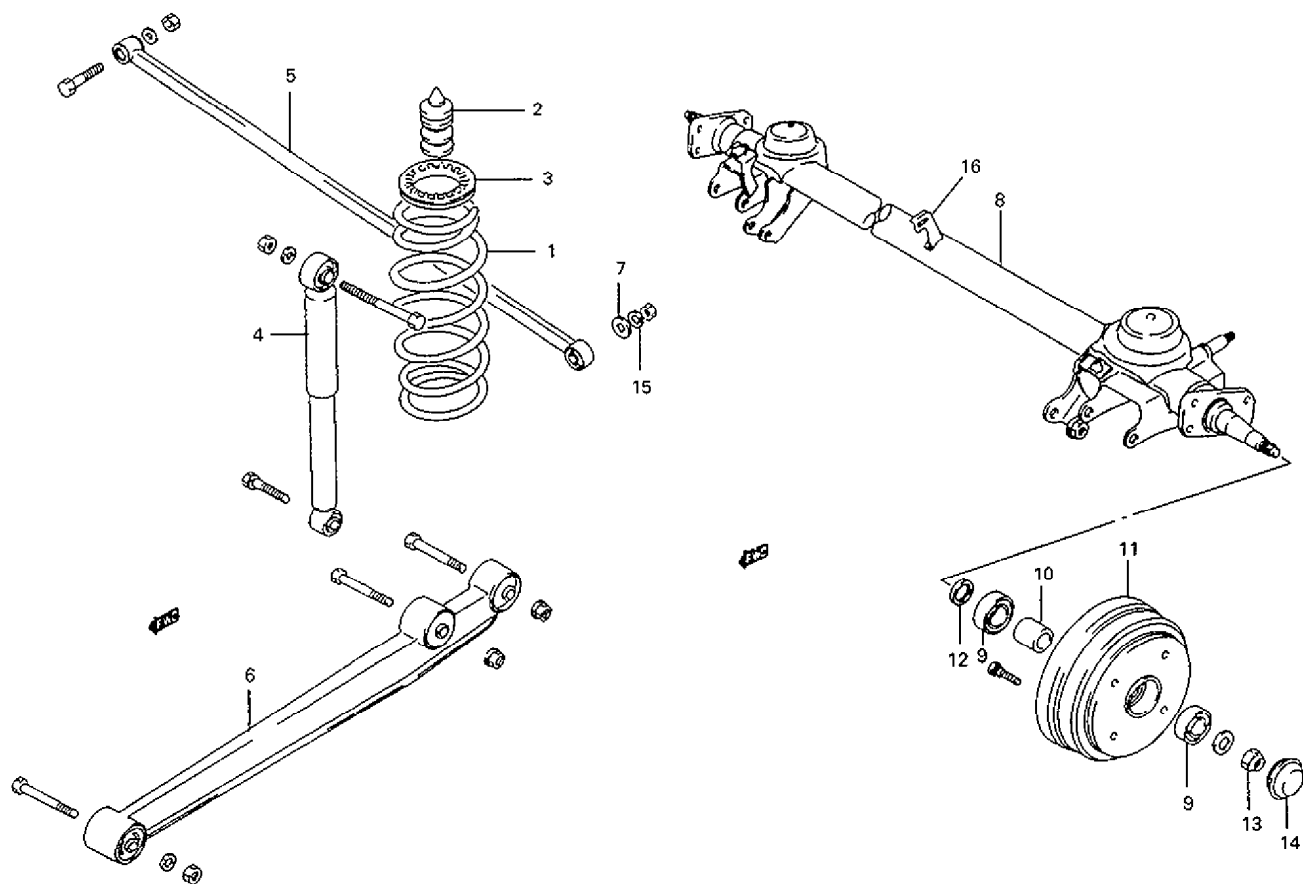
GENERAL DESCRIPTION

Rear suspension is Isolated Trailing Link (I.T.L.) type which consists of coil springs, rear axle, shock absorbers, lateral rod and trailing arms.

The lateral rod is installed to the body and axle by using bushes so as to prevent axle movement in the lateral direction.

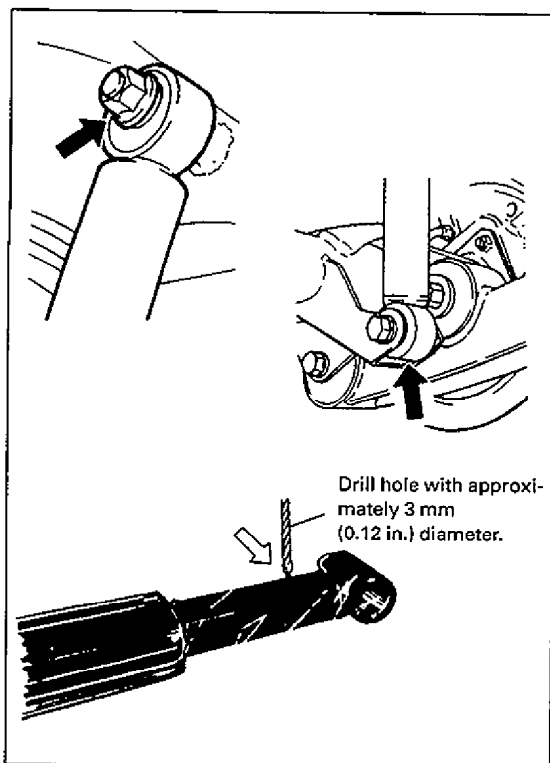
The trailing arms which are connected with the axle are installed to the body by using a bush so that axle moves up and down with the bush as its supporting point.

The shock absorber is installed between the body and axle to absorb up-and-down movement of the vehicle body.



1. Rear coil spring
2. Rear bump stopper
3. Rear spring upper seat
4. Rear shock absorber
5. Lateral rod
6. Trailing arm
7. Lateral rod outer washer

9. Bearing
10. Wheel bearing spacer
11. Brake drum
12. Wheel bearing inner spacer
13. Spindle nut
14. Spring cap
15. Lateral rod washer
16. LSPV bracket (only vehicle with LSPV)



75F00-3E-3-2

INSPECTION

REAR SHOCK ABSORBER

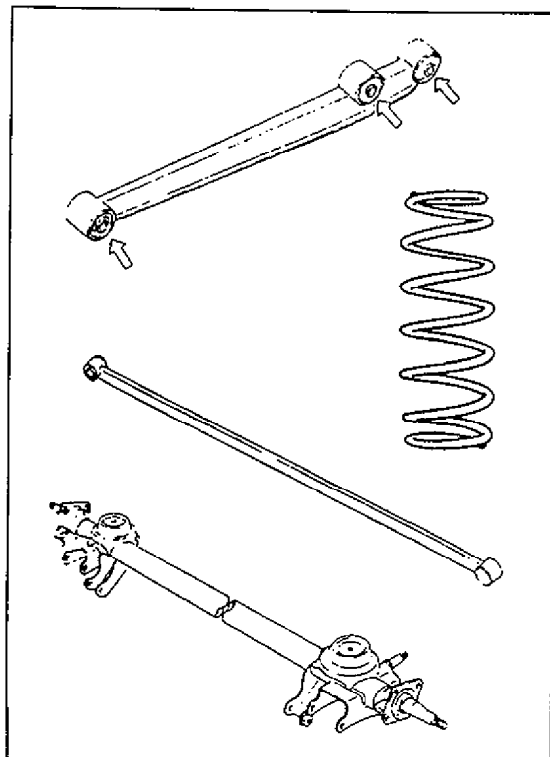
- Inspect for deformation or damage.
- Inspect bushings for wear or damage.
- Inspect for evidence of oil leakage.

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 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 goggles.

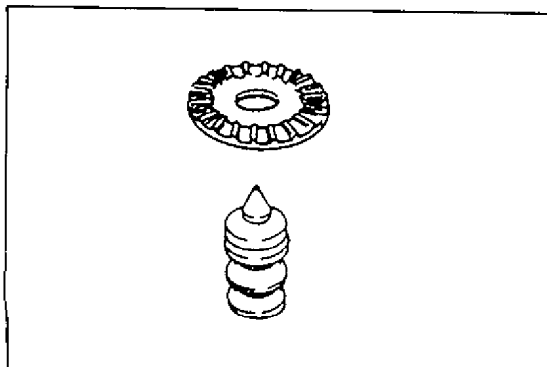


75F00-3E-3-4

TRAILING ARM, LATERAL ROD, REAR AXLE AND COIL SPRING

- Inspect for cracks, deformation or damage.
- Inspect bushing for damage, wear or breakage.

Replace any defective part.



75F00-3E-3-5

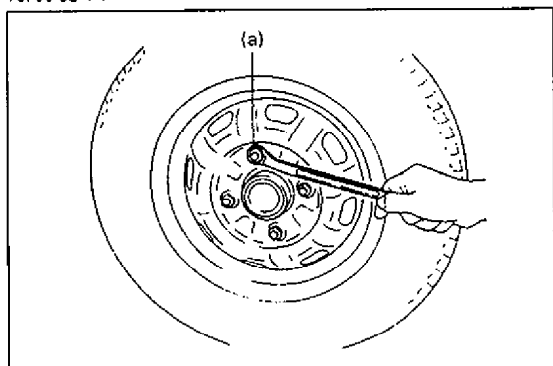
BUMP STOPPER/SPRING UPPER SEAT

- Inspect for cracks, deformation or damage.
- Replace any 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 page 3E-17 of this section.

75F00-3E-4-1



WHEEL DISC, NUT & BEARING

- Inspect each wheel disc for dents, distortion and cracks. A disc in badly damaged condition must be replaced.
- Check wheel nuts for tightness and, as necessary, retighten to specification.

Tightening Torque

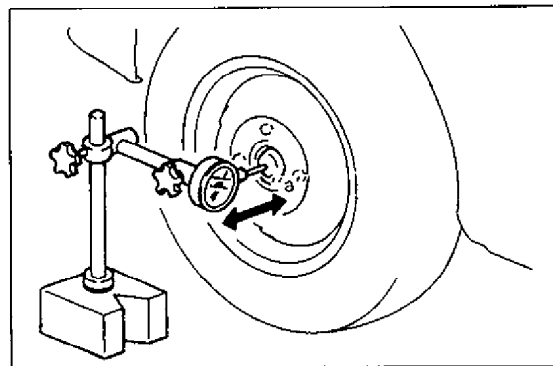
(a): 85 N·m (8.5 kg·m, 61.5 lb·ft)

- Check wheel bearings for wear. When measuring thrust play, apply a dial gauge to spindle cap center.

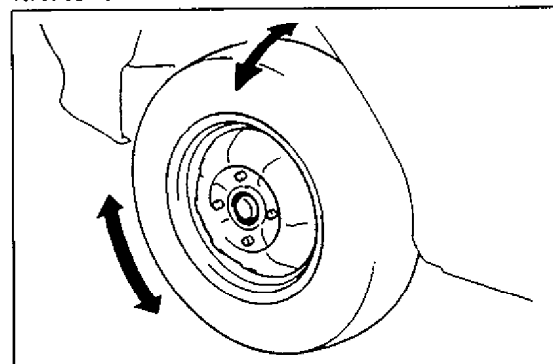
Thrust play limit "a": 0.3 mm (0.012 in.)

When measurement exceeds limit, replace bearing.

75F00-3E-4-2

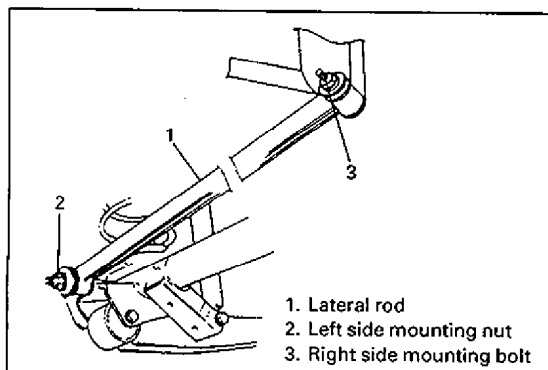


75F00-3E-4-3



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

75F00-3E-4-4



75F00-3E-5-1

ON-VEHICLE SERVICE

LATERAL ROD

REMOVAL

- 1) Hoist vehicle.
- 2) Remove lateral rod mounting nuts.
- 3) Remove lateral rod.

INSTALLATION

- 1) Install lateral rod to rear axle.

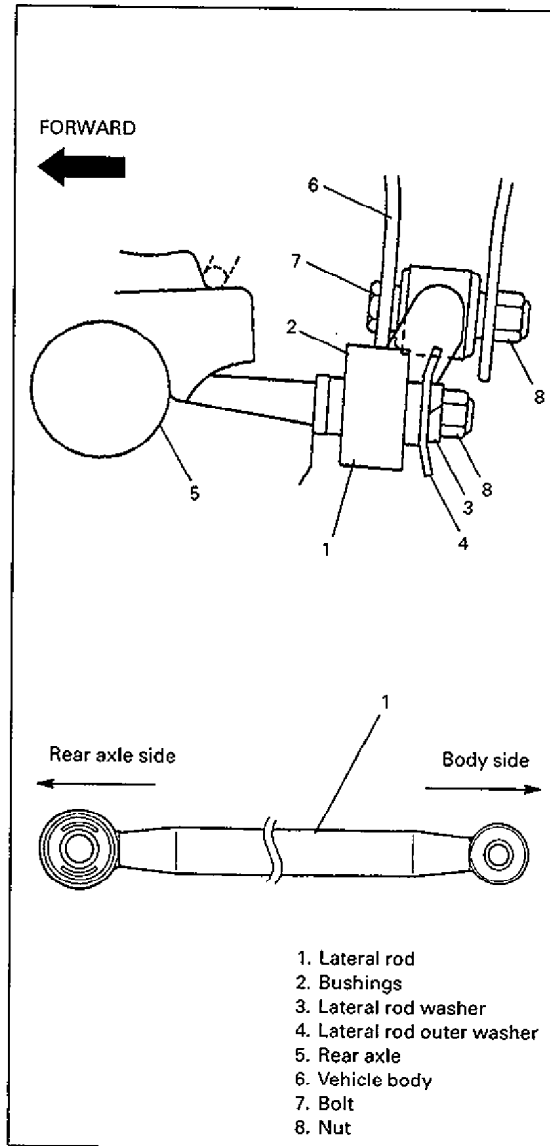
NOTE:

Nut should not be tightened.

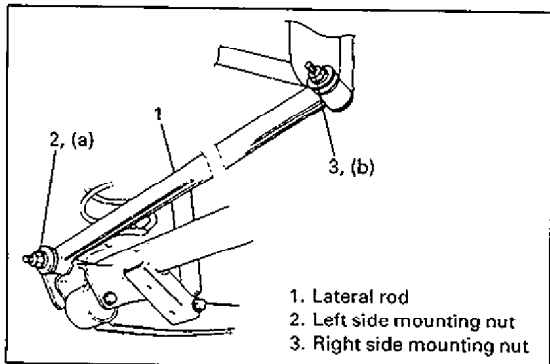
- 2) Install lateral rod to vehicle body, refer to figure for proper installing direction of bolt and washers.

NOTE:

Nut should not be tightened.



75F00-3E-5-4



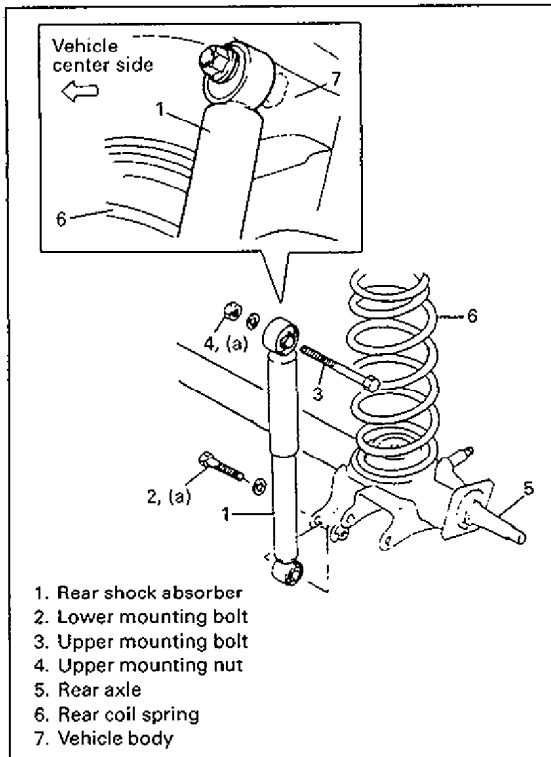
75F00-3E-5-5

- 3) Lower hoist.
- 4) Tighten control rod mounting nuts to specified torque. It is the most desirable to have vehicle off hoist and in non-loaded condition when tightening them.

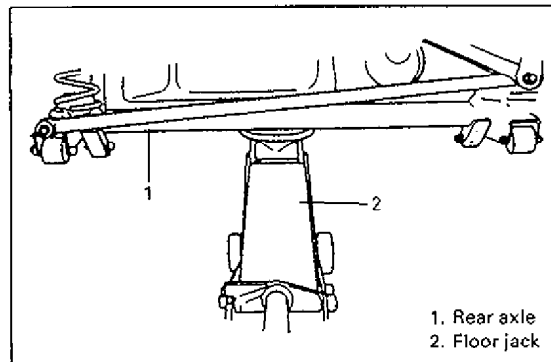
Tightening Torque

(a): 45 N·m (4.5 kg-m, 32.5 lb-ft)

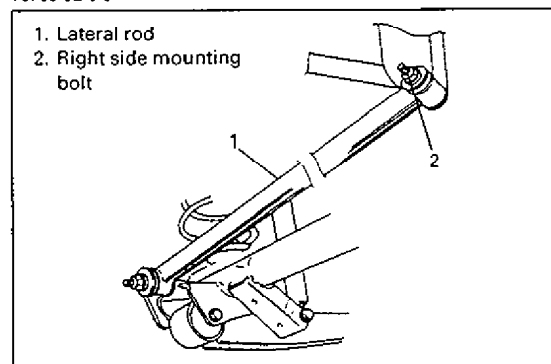
(b): 58 N·m (5.8 kg-m, 42.0 lb-ft)



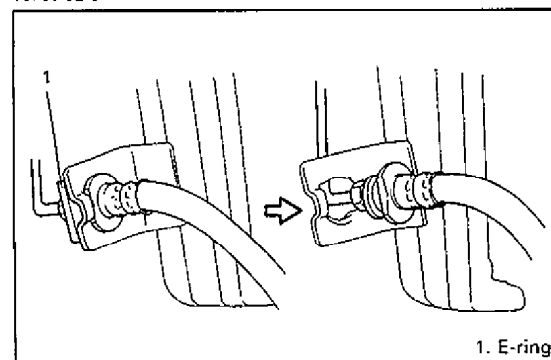
75F00-3E-6-2



75F00-3E-6-3



75F00-3E-6-4



75F00-3E-6-5

REAR SHOCK ABSORBER

REMOVAL

- 1) Hoist vehicle.
- 2) Support rear axle by using floor jack to prevent it from lowering.
- 3) Remove lower mounting bolt.
- 4) Remove upper mounting bolt and nut. Then remove shock absorber.

INSTALLATION

- 1) Install shock absorber, referring to left figure.

NOTE:

Nut and bolt should not be tightened.

- 2) Remove floor jack from rear axle and lower hoist.
- 3) Tighten bolts to specified torque.

Tightening Torque

(a): 58 N·m (5.8 kg-m, 42.0 lb-ft)

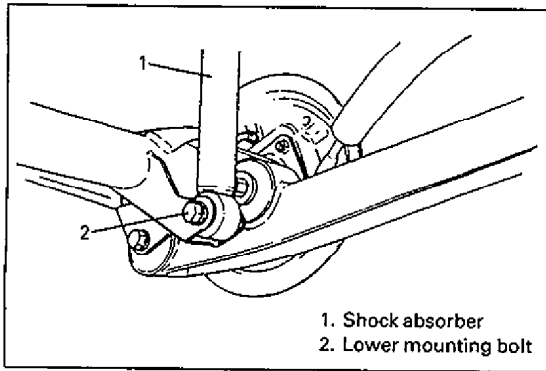
COIL SPRING

REMOVAL

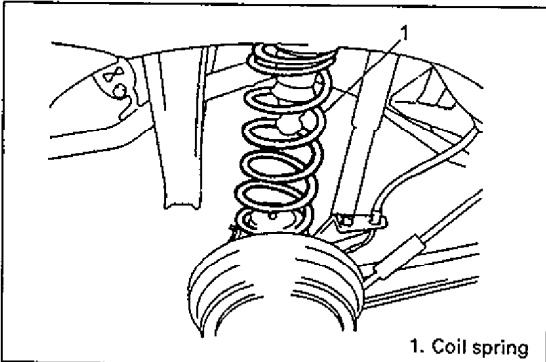
- 1) Hoist vehicle and remove rear wheel (s).
- 2) Support rear axle by using floor jack to prevent it from lowering.

- 3) Remove lateral rod right side mounting bolt and nut.

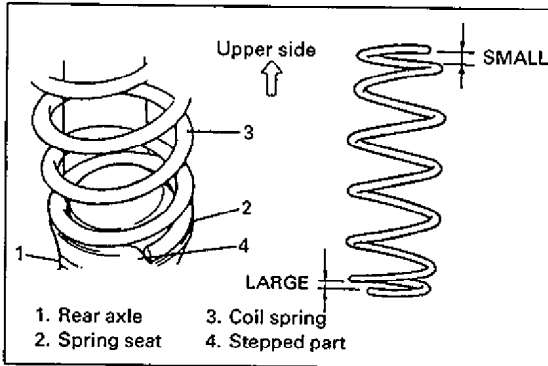
- 4) Remove brake flexible hose E-ring.



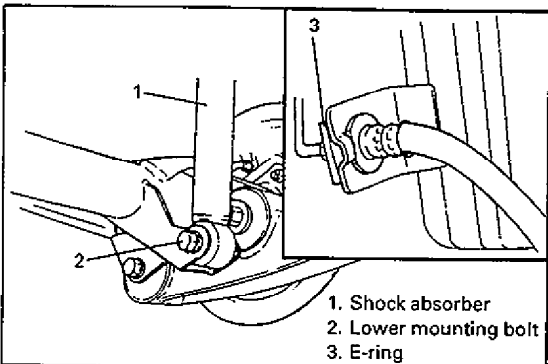
75F00-3E-7-1



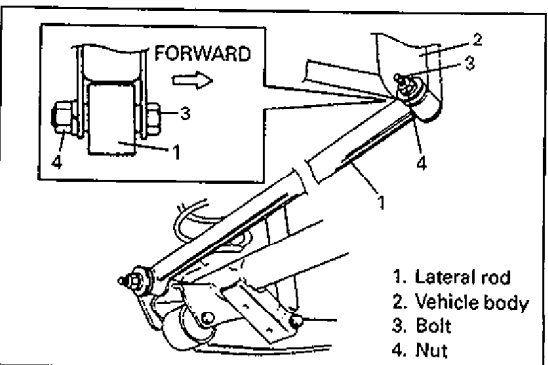
75F00-3E-7-2



75F00-3E-7-3



75F00-3E-7-4



75F00-3E-7-5

5) Remove shock absorber lower mounting bolt.

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

CAUTION:

**Be careful not to let rear axle down too much.
It may cause damage to brake flexible hose.**

7) Remove coil spring.

INSTALLATION

1) Install coil spring with its closed end facing up and open end (with paint marking) down and make sure that its bottom fits in spring seat securely.

CAUTION:

Make spring end meet with stepped part of lower seat as shown.

2) Install shock absorber lower mounting bolt.

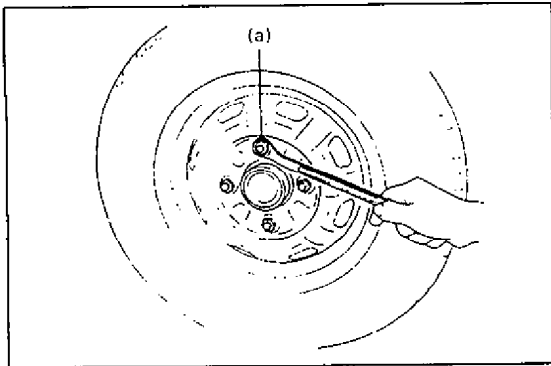
3) Remove floor jack from rear axle.

4) Install brake flexible hose E-ring.

5) Install lateral rod to vehicle body, refer to figure for proper installing direction of bolt.

NOTE:

Nut should not be tightened.

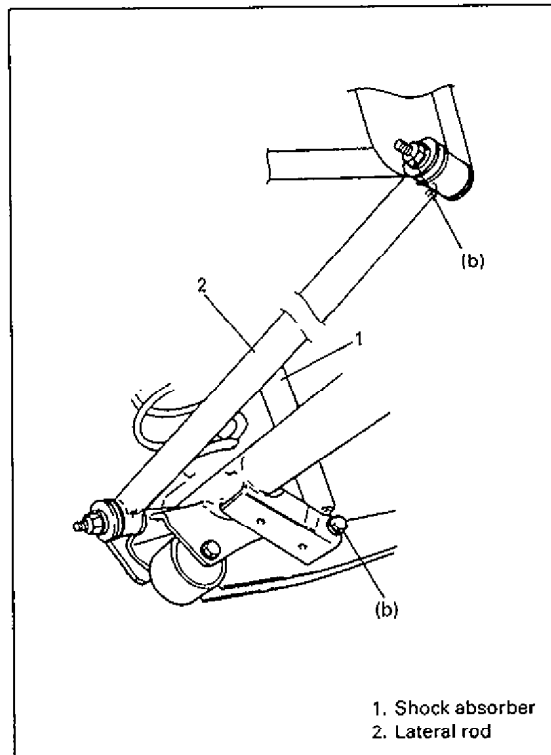


75F00-3E-8-1

- 6) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)



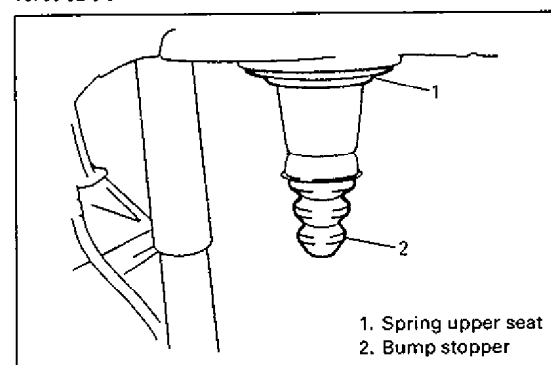
75F00-3E-8-3

- 7) Lower hoist and vehicle in non-loaded condition, tighten absorber lower mounting bolt and lateral rod right mounting nuts to specified torque.

Tightening Torque

(b): 58 N·m (5.8 kg-m, 42.0 lb-ft)

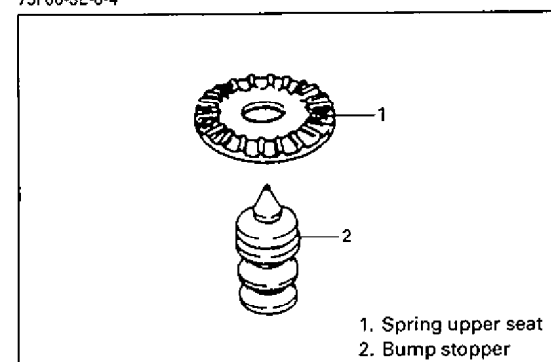
1. Shock absorber
2. Lateral rod



75F00-3E-8-4

BUMP STOPPER AND SPRING UPPER SEAT REMOVAL

- 1) Removal coil spring. For details, refer to steps 1) to 7) of COIL SPRING REMOVAL.
- 2) Remove spring upper seat.
- 3) Remove bump stopper.



75F00-3E-8-5

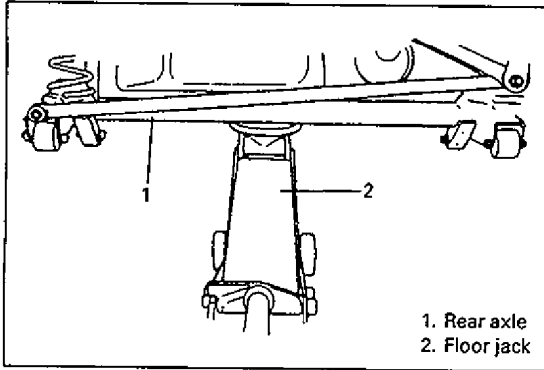
INSTALLATION

- 1) Install bump stopper.

NOTE:

- Before installing bushing, apply soap water on it.
- For proper installing direction of spring upper seat, refer to figure at left.

- 2) Install spring upper seat.
- 3) Install coil spring. For details, refer to steps 1) to 7) of COIL SPRING INSTALLATION.



75F00-3E-9-1

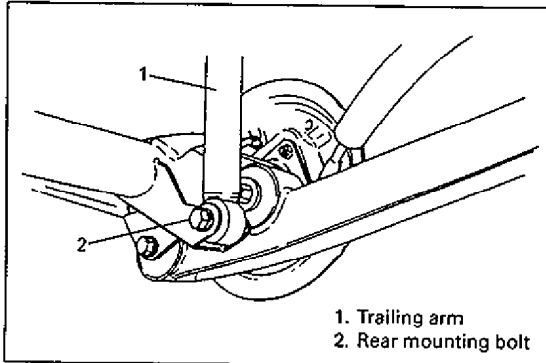
TRAILING ARM

REMOVAL

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

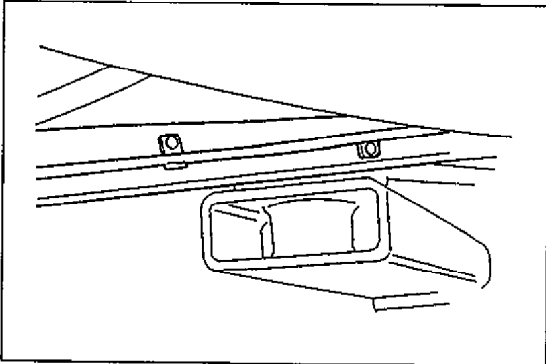
CAUTION:

Never apply floor jack against lateral rod as it may get deformed.



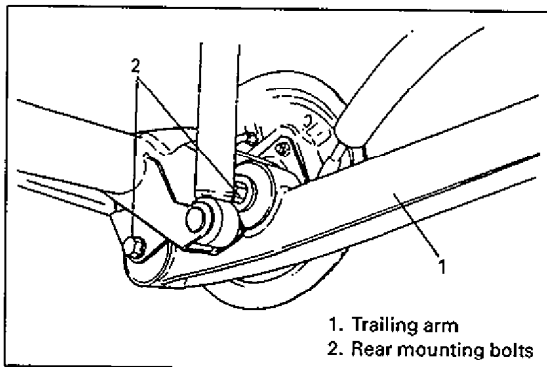
75F00-3E-9-2

- 3) Remove shock absorber lower mounting bolt.



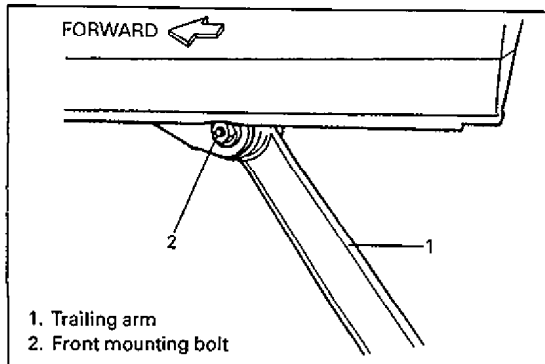
75F00-3E-9-3

- 4) For ABS equipped vehicle, disconnect wheel speed sensor lead wire clamp from trailing arm.



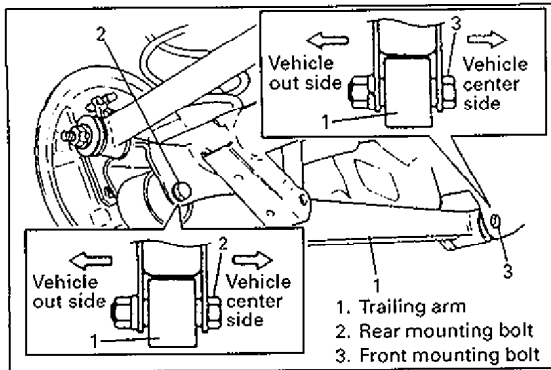
75F00-3E-9-4

- 5) Remove trailing arm rear mounting bolts.

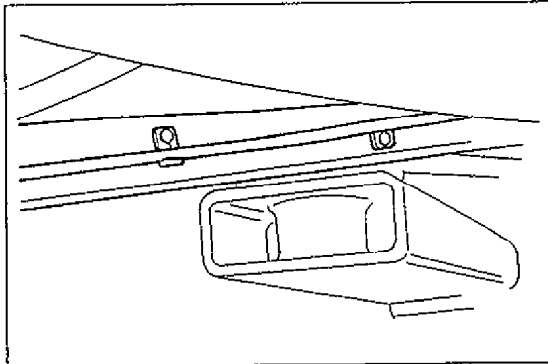


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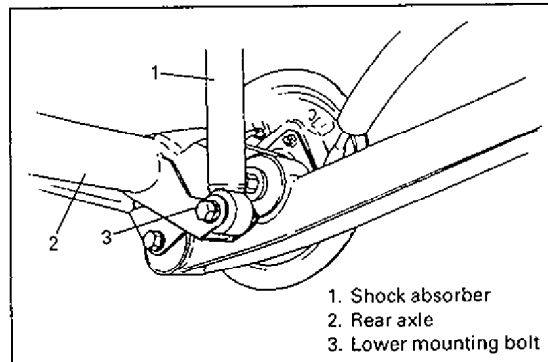
- 6) Remove trailing arm front mounting bolt and then remove trailing arm.



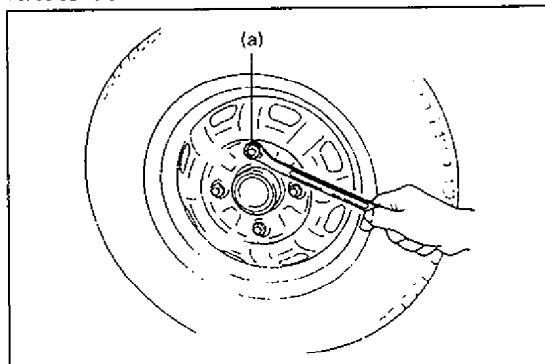
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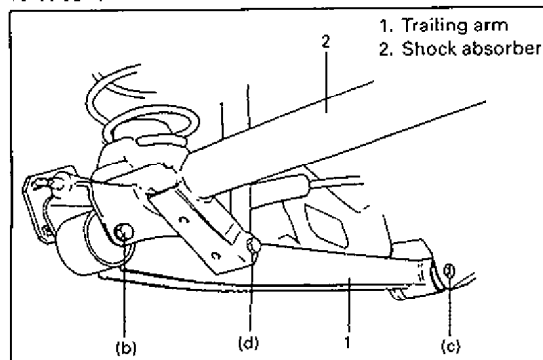
75F00-3E-10-2



75F00-3E-10-3



75F00-3E-10-4



75F00-3E-10-5

INSTALLATION

- 1) Install trailing arm to vehicle body and rear axle, referring to figure for proper installing direction of bolts.

NOTE:

Nuts should not be tightened.

- 2) Install wheel speed sensor lead wire clamp, if equipped.

- 3) Install shock absorber to rear axle.

- 4) Remove floor jack from rear axle.

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

Tightening Torque for wheel nuts

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

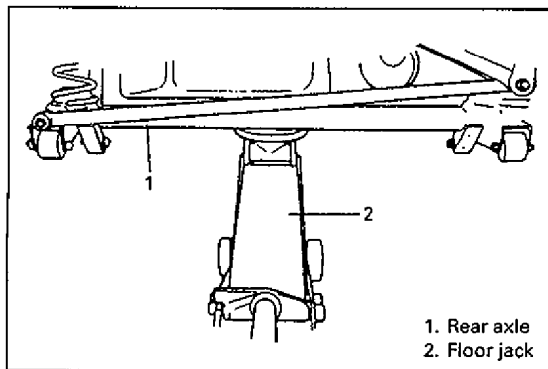
- 6) Lower hoist and vehicle in non loaded condition, tighten trailing arm front rear mounting nuts and shock absorber lower mounting bolt to specified torque.

Tightening Torque

(b): 80 N·m (8.0 kg-m, 58.0 lb-ft)

(c): 80 N·m (8.0 kg-m, 58.0 lb-ft)

(d): 58 N·m (5.8 kg-m, 42.0 lb-ft)

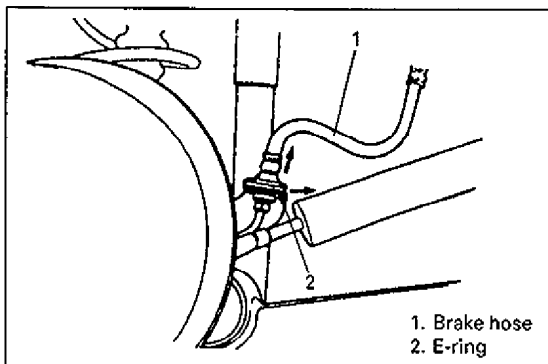


75F00-3E-11-1

REAR AXLE

REMOVAL

- 1) Hoist vehicle and remove rear wheels (right & left).
- 2) Support rear axle by using floor jack.
- 3) Remove rear brake drums (right & left). For details, refer to steps 1) to 6) of BRAKE DRUM REMOVAL of SECTION 5.

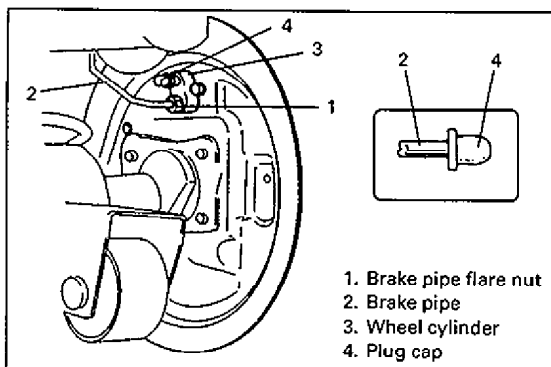


75F00-3E-11-2

- 4) Remove E-ring securing brake hose.

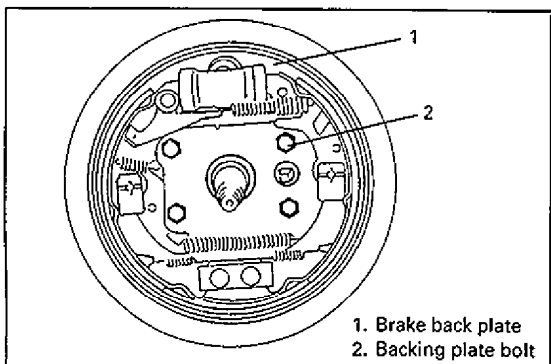
CAUTION:

Do not allow brake fluid to get on painted surfaces.



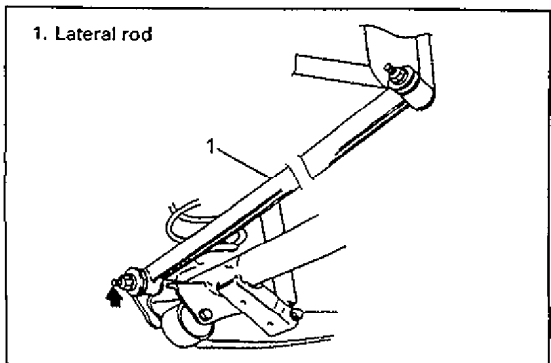
75F00-3E-11-3

- 5) Disconnect brake pipe flare nuts from wheel cylinders (right & left) and put bleeder plug cap onto pipe to prevent fluid from spilling.



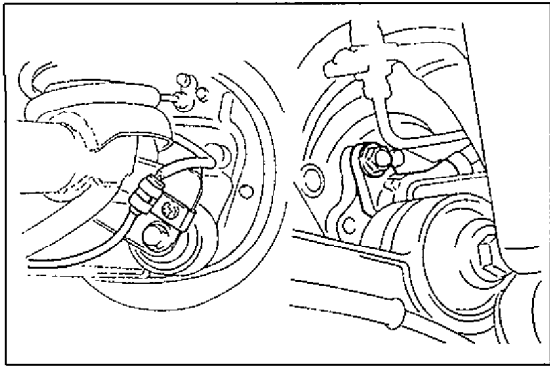
75F00-3E-11-4

- 6) Remove brake back plates (right & left) from rear axle and hang removed brake back plate with a wire hook.



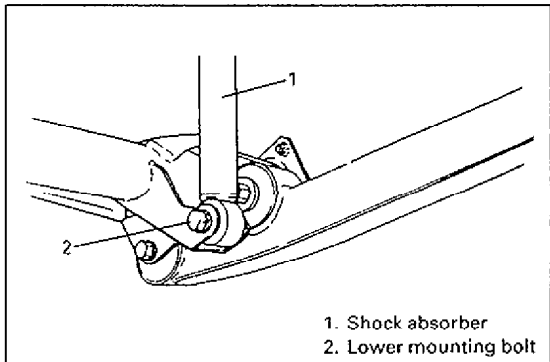
75F00-3E-11-5

- 7) Disconnect lateral rod from rear axle.



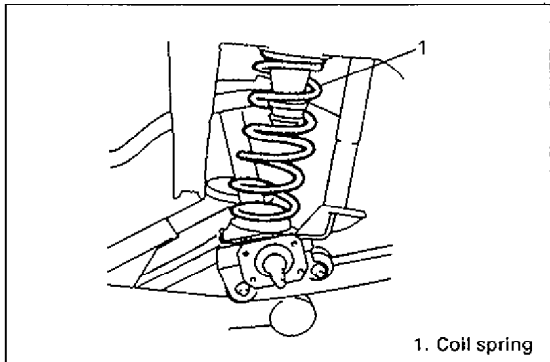
75F00-3E-12-1

- 8) Disconnect wheel speed sensor and lead wire clamps. (if equipped)



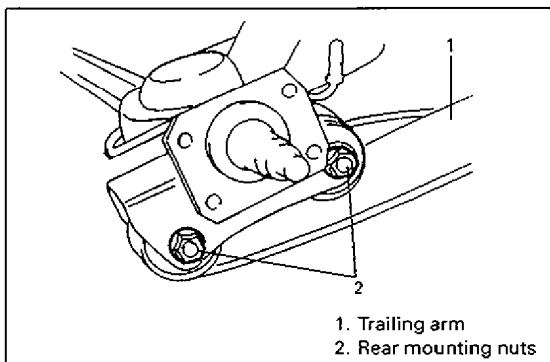
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- 9) Remove shock absorber lower mounting bolts (right & left).



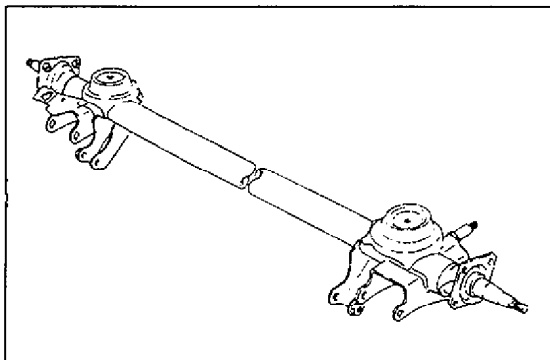
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- 10) Lower rear axle gradually as far down as where coil spring (right & left) can be removed.
11) Remove coil springs (right & left).



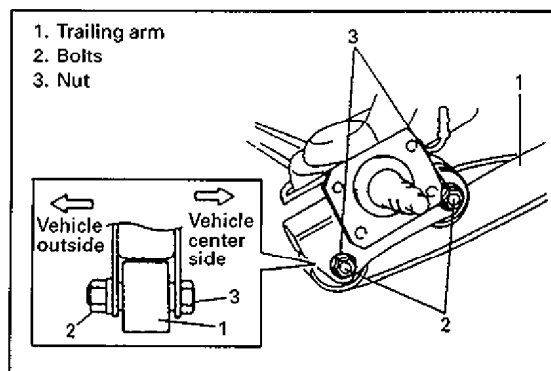
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- 12) Loosen trailing arm rear side mounting nuts but don't remove bolts (right & left).

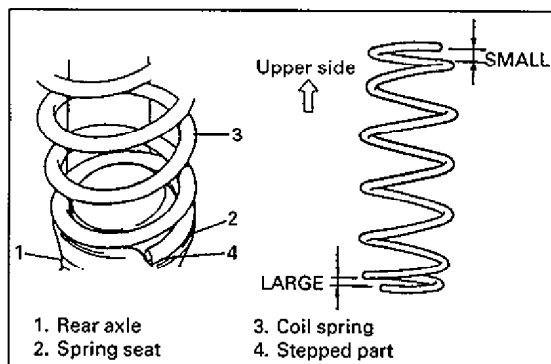


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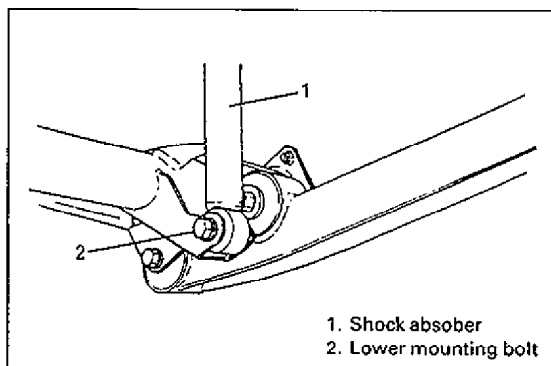
- 13) While supporting rear axle at both ends (right & left), remove trailing arm rear side mounting bolts and then remove rear axle from chassis by lowering floor jack gradually.



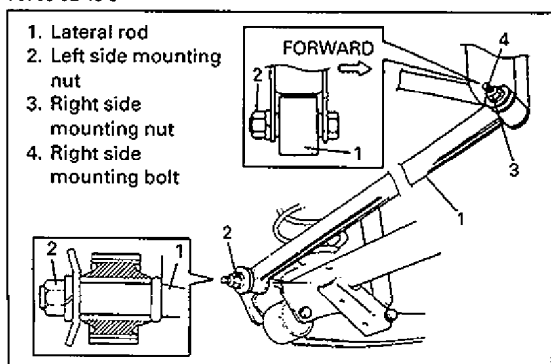
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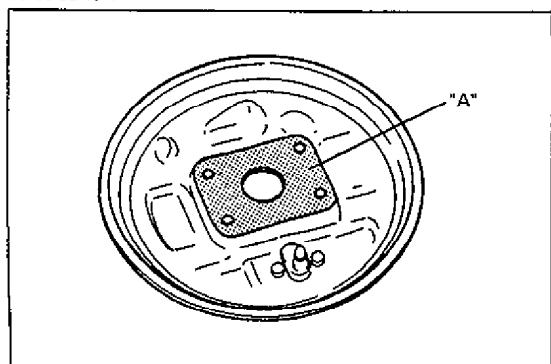
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75F00-3E-13-4



75F00-3E-13-5

INSTALLATION

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

1) Place rear axle on floor jack. Then install trailing arm rear mounting bolts (right & left) in proper direction as shown in figure. At this time, mount nuts but don't tighten them.

2) Install coil springs (right & left) on spring seat of rear axle as shown in figure and then raise rear axle.

NOTE:

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

3) Install shock absorber lower mounting bolts (right & left).

4) Remove floor jack from rear axle.

5) Install lateral rod to rear axle.

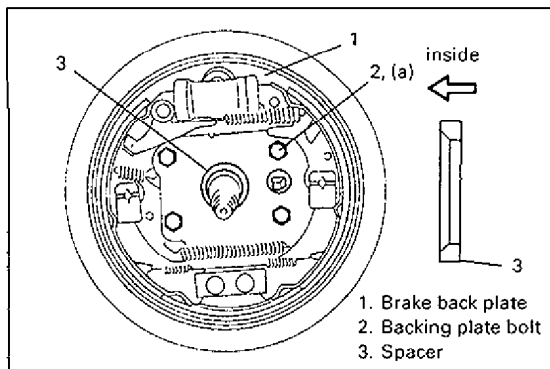
NOTE:

Nut should not be tightened.

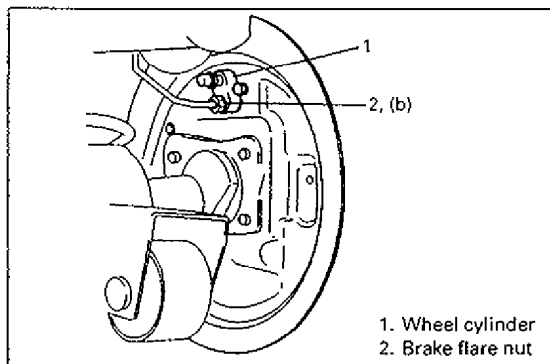
6) Connect wheel speed sensor and lead wire clamps (if equipped).

7) Clean mating surface of rear axle (right & left) with brake back plate and apply water tight sealant as shown in figure.

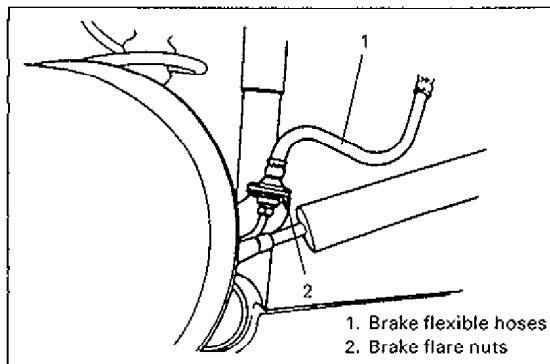
"A": Sealant 99000-31090



75F00-3E-14-1



75F00-3E-14-2



75F00-3E-14-3

- 8) Install brake back plates and tighten back plate bolts to specified torque.
- 9) Install spacer to spindle, installing direction is as shown.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 10) Connect brake pipes to wheel cylinders (right & left) and tighten brake pipe flare nuts to specified torque.

Tightening Torque

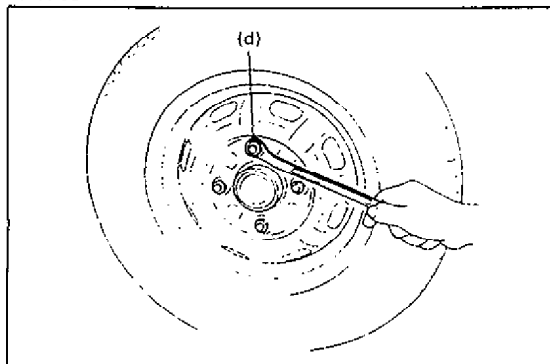
(b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

- 11) Connect brake flexible hoses to bracket on rear axle and secure it with E-rings.

- 12) Install brake drums (right & left). For details, refer to steps 1) to 6) of BRAKE DRUM INSTALLATION.

- 13) Fill reservoir with brake fluid and bleed brake system (For bleeding operation, see SECTION 5.)

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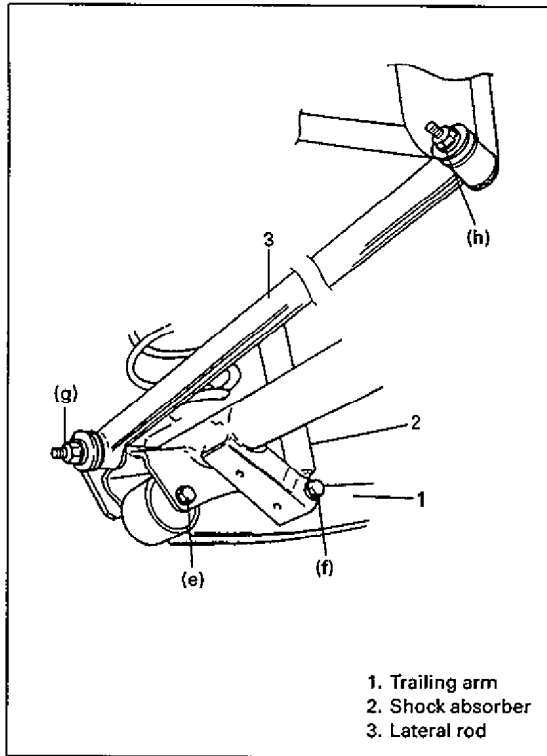
- 14) Install wheel and tighten wheel nuts to specified torque.

Tightening Torque

(d): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- 15) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable (for adjustment, see SECTION 5 of this manual.)
- 16) Tighten parking brake lever cover screw.
- 17) Lower hoist.

75F00-3E-15-1



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- 18) Tighten right and left trailing arm rear mounting nuts and shock absorber lower mounting bolts to specified torque. Tighten lateral rod right and left mounting nuts to specified torque.

NOTE:

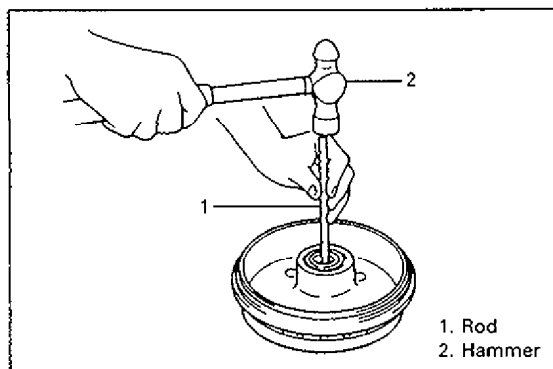
When tightening these nuts and bolts, be sure that vehicle is off hoist and in non loaded condition.

Tightening Torque

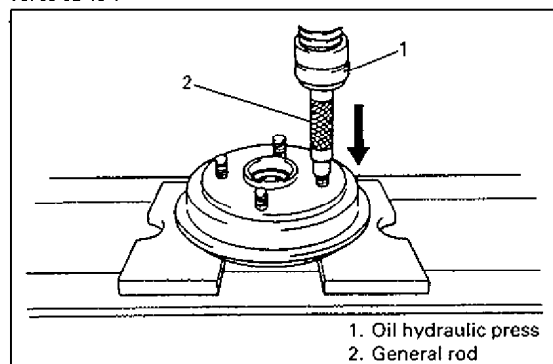
- (e): 80 N·m (8.0 kg-m, 58.0 lb-ft)
(f): 58 N·m (5.8 kg-m, 42.0 lb-ft)
(g): 45 N·m (4.5 kg-m, 32.5 lb-ft)
(h): 58 N·m (5.8 kg-m, 42.0 lb-ft)

- 19) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 20) Perform brake test (foot brake and parking brake).

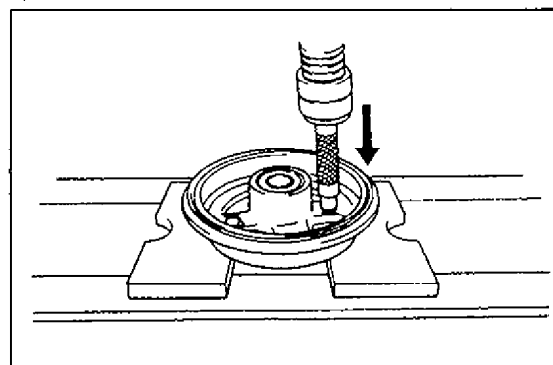
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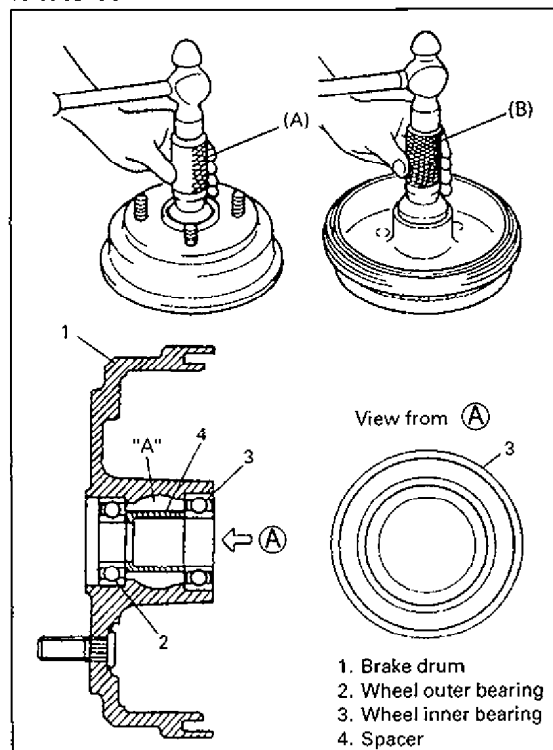
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75F00-3E-16-2



75F00-3E-16-3



75F00-3E-16-5

WHEEL BEARING AND WHEEL STUD

REMOVAL

- 1) Remove rear brake drum. For details, refer to Steps 1) to 6) of REAR BRAKE DRUM REMOVAL of SECTION 5 in this manual.
- 2) Remove wheel bearing (s).
- 3) Remove wheel stud bolt by using hydraulic press.

INSTALLATION

- 1) Insert new stud in drum hole and rotate it slowly to assure serrations are aligned with those made by replaced bolt.

- 2) Install bearing by using special tool.

NOTE:

- Refer to left figure for installing direction of spacer and inner bearing.
- Fill space indicated by "A" in figure with bearing grease as much as 40% of space capacity.

Special Tool

(A): 09913-76010

(B): 09913-75810

"A": Grease 99000-25010

- 3) Install brake drum and wheel. (Refer to Steps 1) to 10) of BRAKE DRUM INSTALLATION of SECTION 5 in this manual.)

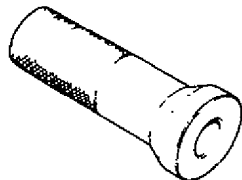
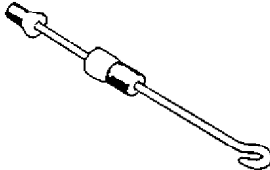
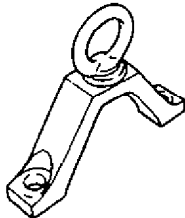
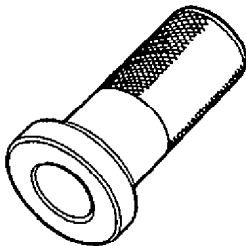
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Lateral rod right side mounting nut	58	5.8	42.0
Lateral rod left side mounting nut	45	4.5	32.5
Shock absorber upper mounting bolt	58	5.8	42.0
Shock absorber lower mounting nut	58	5.8	42.0
Trailing arm front mounting nut	80	8.0	58.0
Trailing arm rear mounting nut	80	8.0	58.0
Brake back plate bolt	23	2.3	17.0
Brake flare nut	16	1.6	11.5
Spindle nut	100	10.0	72.5
Wheel nut	85	8.5	61.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	DOT3	Brake reservoir tank
Water tight sealant	SEALING COMPOUND 366E (99000-31090)	Join seam of rear axle and brake back plate
Lithic wheel bearing grease	SUZUKI SUPER GREASE A (99000-25010)	Wheel bearing

SPECIAL TOOLS

 09913-76010 Rear wheel bearing installer	 09942-15510 Sliding hammer	 09943-17912 Brake drum remover	 09913-75810 Bearing installer
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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.

75F00-3F-1-1

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75F00-3F-1-3

GENERAL DESCRIPTION

TIRES

This vehicle is equipped with following tire.

165/65R13

The tire is of tubeless type. The tire is designed to operate satisfactorily with loads up to the full rated load capacity when inflated to the recommended inflation pressures.

Correct tire pressures and driving habits have an important influence on tire life. Heavy cornering, excessively rapid acceleration, and unnecessary sharp braking increase tire wear.

WHEELS

Standard equipment wheels are the following steel wheel.

13 x 4 1/2 J

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.

75F00-3F-1-5

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

WARNING:

Do not mix different types of tires on the same vehicle such as radial, bias and bias-belted tires except in emergencies, because handling may be seriously affected and may result in loss of control.

It is recommended that new tires be installed in pairs on the same axle. If necessary to replace only one tire, it should be paired with the tire having the most tread, to equalize braking traction.

The metric term for tire inflation pressure is the kilopascal (kPa). Tire pressures is usually printed in both kPa and psi on the Tire Placard.

Metric tire gauges are available from tool suppliers.

The chart, shown left table, converts commonly used inflation pressures from kPa to psi.

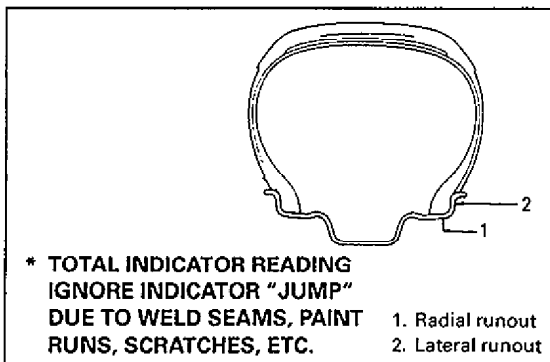
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REPLACEMENT WHEELS

Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, air leak through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in figure below may cause objectional vibrations.

Replacement wheels must be equivalent to the original equipment wheels in load capacity, diameter, rim with offset and mounting configuration. A wheel of improper size or type may affect wheel and bearing life, brake cooling, speedometer/odometer calibration, vehicle ground clearance and tire clearance to body and chassis.

75F00-3F-2-4



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HOW TO MEASURE WHEEL RUNOUT

To measure the wheel runout, it is necessary to use an accurate dial indicator. The tire may be on or off the wheel. The wheel should be installed to the wheel balancer of the like for proper measurement.

Take measurements of both lateral runout and radial runout at both inside and outside of the rim flange. With the dial indicator set in place securely, turn the wheel one full revolution slowly and record every reading of the indicator.

When the measured runout exceeds the specification and correction by the balancer adjustment is impossible, replace the wheel. If the reading is affected by welding, paint or scratch, it should be ignored.

	Radial runout limit	Lateral runout limit
Steel wheel	1.14 mm (0.045 in.)	1.40 mm (0.055 in.)

MAINTENANCE AND MINOR ADJUSTMENTS

WHEEL MAINTENANCE

Wheel repairs that use welding, heating, or peening are not approved. All damaged wheels should be replaced.

WHEEL ATTACHING STUDS

If a broken stud is found, see Section 3E (rear) or Section 3D (front) for Note and Replacement procedure.

MATCHED TIRES AND WHEELS

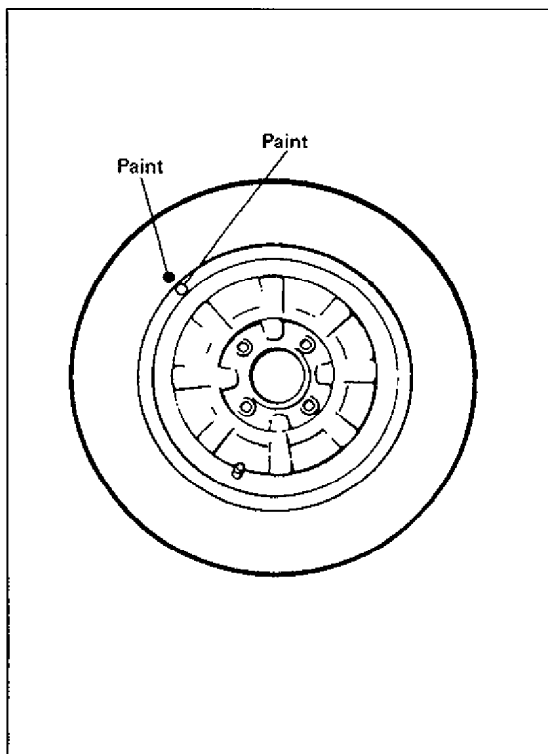
Tires and wheels are matchmounted at the assembly plant. This means that the radially stiffest part of the tire, or "high spot", is matched to the smallest radius or "low spot" of the wheel.

This is done to provide the smoothest possible ride.

The "high spot" of the tire is originally marked by paint dot on the outboard sidewall. This paint dot will eventually wash off the tire.

The "low spot" of the wheel is originally marked by paint dot on the wheel rim-flange. Properly assembled, the wheel rims' paint dot should be aligned with the tires' paint dot as shown in left figure.

Whenever a tire is dismounted from its wheel, it should be remounted 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.



75F00-3F-3-4

INFLATION OF TIRES

The pressure recommended for any model is carefully calculated to give a satisfactory ride, stability, steering, tread wear, tire life and resistance to bruises.

Tire pressure, with tires cold, (after vehicle has set for three hours or more, or driven less than one mile) should be checked monthly or before any extended trip. Set to the specifications on the tire placard located on the left door (right door for right-hand side steering vehicle) lock pillar.

It is normal for tire pressure to increase to 28 kPa (4 psi) when the tires become hot during driving.

Do not bleed or reduce tire pressure after driving. Bleeding reduces the "Cold Inflation Pressure".

Higher than recommended pressure can cause:

1. Hard ride
2. Tire bruising or carcass damage
3. Rapid tread wear at center of tire

Unequal pressure on same axle can cause:

1. Uneven braking
2. Steering lead
3. Reduced handling
4. Swerve on acceleration

Lower than recommended pressure can cause:

1. Tire squeal on turns
2. Hard Steering
3. Rapid and uneven wear on the edges of the tread
4. Tire rim bruises and rupture
5. Tire cord breakage
6. High tire temperature
7. Reduced handling
8. High fuel consumption

Valve caps should be on the valves to keep dust and water out.

75F00-3F-4-3

TIRE PLACARD

The tire placard is located on the left door (right door for right-hand side steering vehicle) lock pillar and should be referred to for tire information.

The placard lists the maximum load, tire size and cold tire pressure where applicable.

NOTE:

Whether rim size and/or maximum load are listed or not depends on regulations of each country.

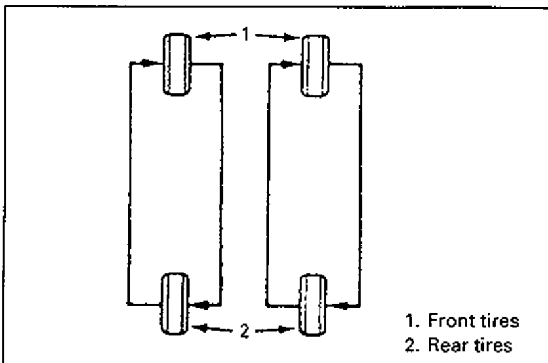
TIRE ROTATION

To equalize wear, rotate tires according to left figure. Radial tires should be rotated at the first 10,000 km (6,000 miles) and after that, tire rotation at least every 6,000 miles is recommended. Set tire pressure.

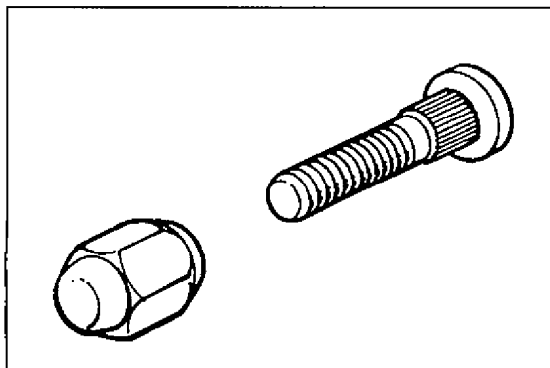
NOTE:

Due to their design, radial tires tend to wear faster in the shoulder area, particularly in front positions. This makes regular rotation especially necessary.

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75F00-3F-4-5



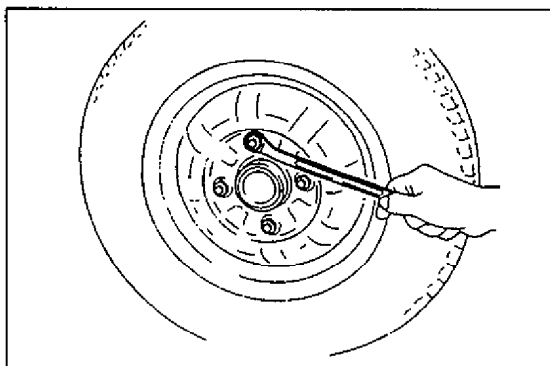
75F00-3F-5-1

ON-VEHICLE SERVICE

SERVICE OPERATIONS

METRIC LUG NUTS AND WHEEL STUDS

All models use metric lug nuts and wheel studs (size: M12 x 1.25).



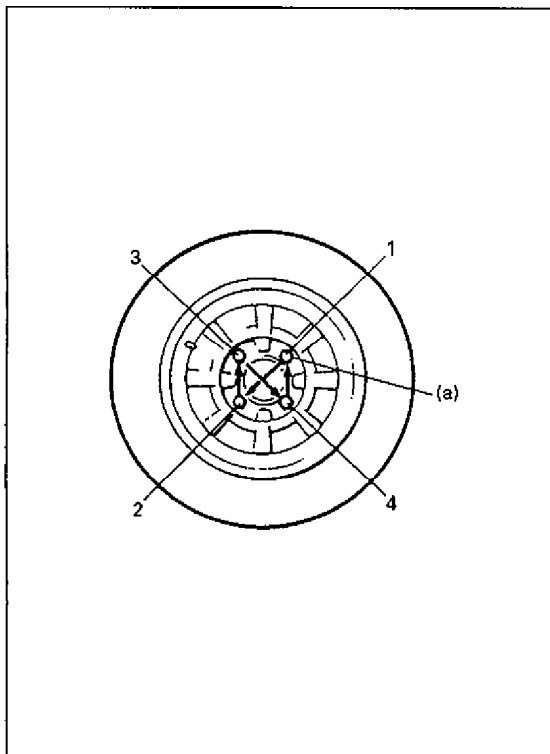
75F00-3F-5-2

WHEEL REMOVAL

- 1) Loosen wheel nuts by approximately 180° (half a rotation).
- 2) Hoist vehicle.
- 3) Remove wheel.

CAUTION:

Never use heat to loosen tight wheel because application of heat to wheel can shorten life of wheel and damage wheel bearings.



75F00-3F-5-4

Wheel nuts must be tightened in sequence and to proper torque to avoid bending wheel or brake disc, left figure.

NOTE:

Before installing wheels, remove any build-up of corrosion on wheel mounting surface and brake disc mounting surface by scraping and wire brushing. Installing wheels without good metal-to-metal contact at mounting surfaces can cause wheel nuts to loosen, which can later allow a wheel to come off while vehicle is moving.

Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

TIRE MOUNTING AND DEMOUNTING

Use a tire changing machine to mount or demount tires. Follow equipment manufacturer's instructions. Do not use hand tools or tire irons alone to change tires as they may damage tire beads or wheel rim.

Rim bead seats should be cleaned with a wire brush or coarse steel wool to remove lubricants, old rubber and light rust. Before mounting or demounting a tire, bead area should be well lubricated with approved tire lubricant.

After mounting, inflate to specified pressure shown on tire placard so that beads are completely seated.

WARNING:

Do not stand over tire when inflating. Bead may break when bead snaps over rim's safety hump and cause serious personal injury.

Do not exceed specified pressure when inflating. If specified pressure will not seat beads, deflate, re-lubricate and reinflate.

Over inflation may cause bead to break and cause serious personal injury.

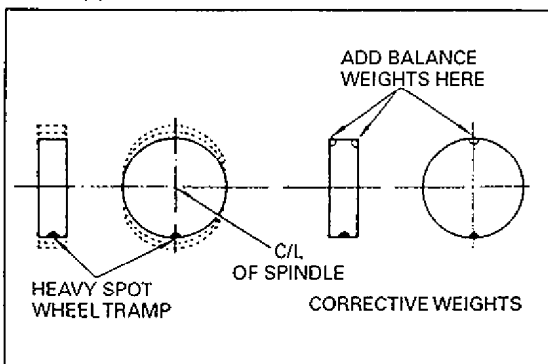
Install valve core and inflate to proper pressure.

75F00-3F-6-2

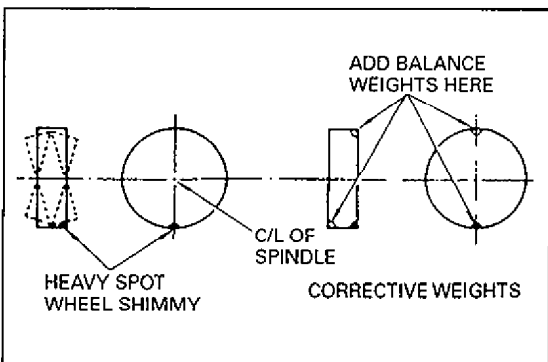
TIRE REPAIR

There are many different materials and techniques on the market to repair tires. As not all of these work on all types of tires, tire manufacturers have published detailed instructions on how and when to repair tires. These instructions can be obtained from each tire manufacturer.

75F00-3F-6-3



75F00-3F-6-4



75F00-3F-6-5

BALANCING WHEELS

There are two types of wheel and tire balance: static and dynamic. Static balance, as shown in left figure, is the equal distribution of weight around the wheel. Wheels that are statically unbalanced cause a bouncing action called tramp. This condition will eventually cause uneven tire wear.

Dynamic balance, as shown in left figure, is the equal distribution of weight on each side of the wheel centerline so that when the tire spins there is no tendency for the assembly to move from side to side. Wheels that are dynamically unbalanced may cause shimmy.

GENERAL BALANCE PROCEDURES

Deposits of mud, etc. must be cleaned from inside of rim.

WARNING:

Stones should be removed from the tread in order to avoid operator injury during spin balancing and to obtain good balance.

Each tire should be inspected for any damage, then balanced according to equipment manufacturer's recommendation.

OFF-VEHICLE BALANCING

Most electronic off-vehicle balancers are more accurate than the on-vehicle spin balancers. They are easy to use and give a dynamic (two plane) balance. Although they do not correct for drum or disc unbalance as does on-vehicle spin balancing, this is overcome by their accuracy, usually to within 1/8 ounce.

ON-VEHICLE BALANCING

On-vehicle balancing methods vary with equipment and tool manufacturers. Be sure to follow each manufacturer's instructions during balancing operation.

WARNING:

Wheel spin should be limited to 35 mph (55 km/h) as indicated on speedometer.

This limit is necessary because speedometer only indicates one-half of actual wheel speed when one drive wheel is spinning and the other drive wheel is stopped.

Unless care is taken in limiting drive wheel spin, spinning wheel can reach excessive speeds. This can result in possible tire disintegration or differential failure, which could cause serious personal injury or extensive vehicle damage.

TIGHTENING TORQUE SPECIFICATIONS

Fastening	Tightening torque		
	N·m	kg·m	lb·ft
Wheel nuts	85	8.5	61.5

SECTION 4A

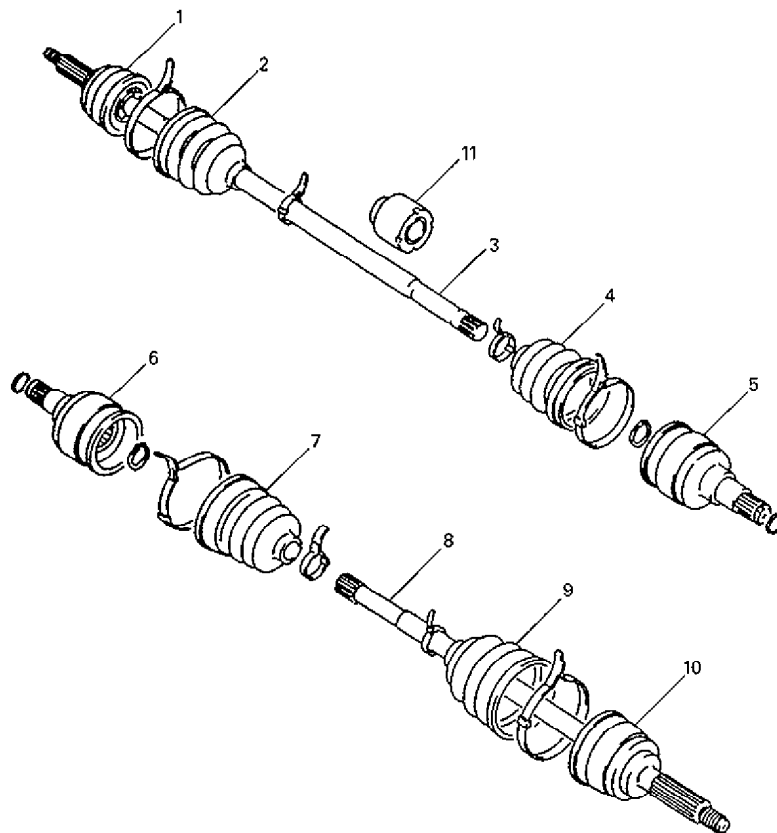
FRONT DRIVE SHAFT

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GENERAL DESCRIPTION

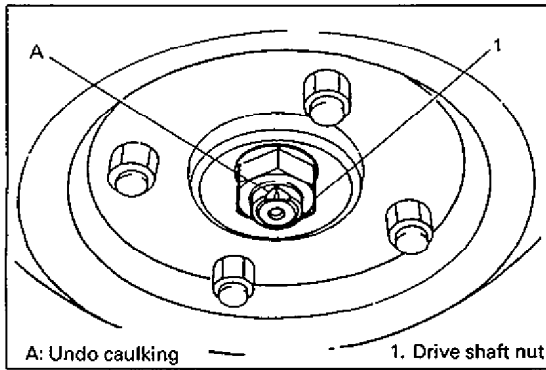
A constant velocity ball joint is used on the wheel side of front drive shaft and a constant velocity tripod joint on the differential side. The drive shaft can slide through the tripod joint in the extension/contraction direction. For left side drive shaft of M/T vehicle, a constant velocity double offset joint (DOJ) is used on the differential side.



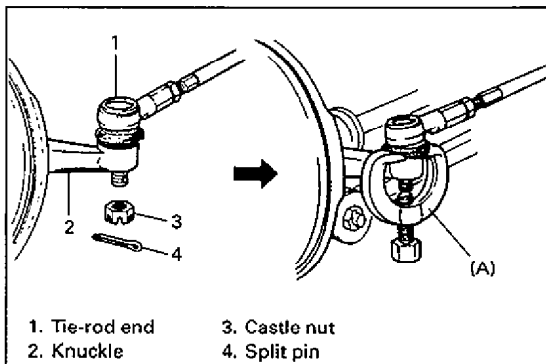
1. Wheel side joint (RH)
(Constant velocity ball joint)
2. Boot
3. Drive shaft (RH)
4. Boot
5. Differential side joint (RH)
(Constant velocity tripod joint)
6. Differential side joint (LH)
(Constant velocity tripod joint/
Constant velocity DOJ)
7. Boot
8. Drive shaft (LH)
9. Boot
10. Wheel side joint (LH)
(Constant velocity ball joint)
11. Damper

DIAGNOSIS

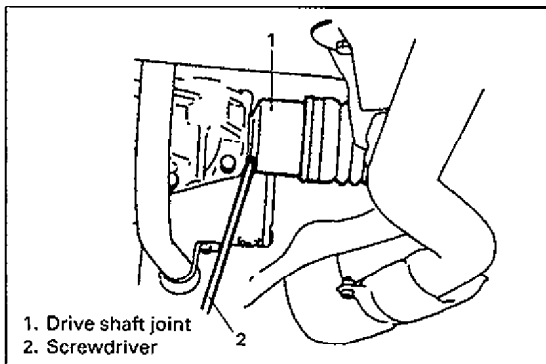
Condition	Possible Cause	Correction
Abnormal Noise	Worn or breakage drive shaft joint	Replace.



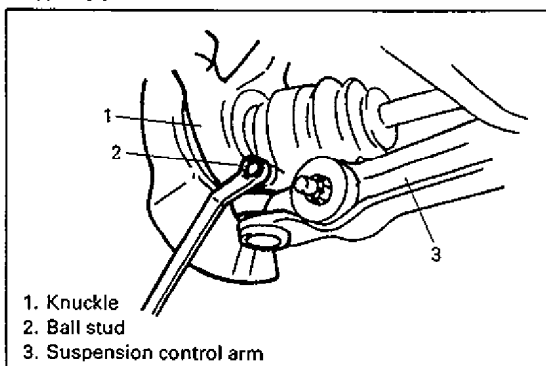
75F00-4A-3-1



75F00-4A-3-2



75F00-4A-3-3



75F00-4A-3-4

ON-VEHICLE SERVICE

REMOVAL

1) Undo caulking and remove drive shaft nut and washer.

2) Hoist vehicle.

3) Remove wheel.

4) Remove tie-rod end split pin and castle nut.

5) Disconnect tie-rod end from steering knuckle by using special tool.

Special Tool

(A): 09913-65210

6) Drain transmission fluid.

7) By using large size screwdrivers, pull out drive shaft joint so as to release snap ring fitting of joint spline at differential side.

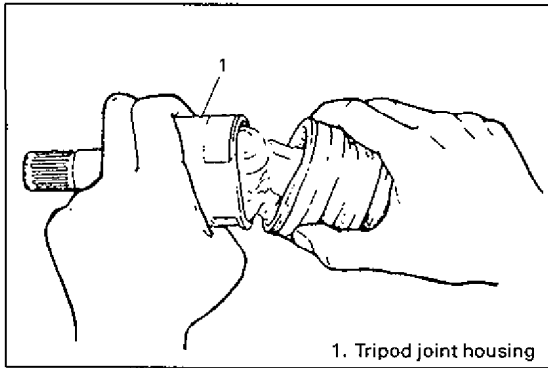
8) Remove two stabilizer mount brackets from vehicle body.

9) Disconnect front suspension control arm ball joint stud from steering knuckle by pushing down stabilizer bar after removing ball joint bolt.

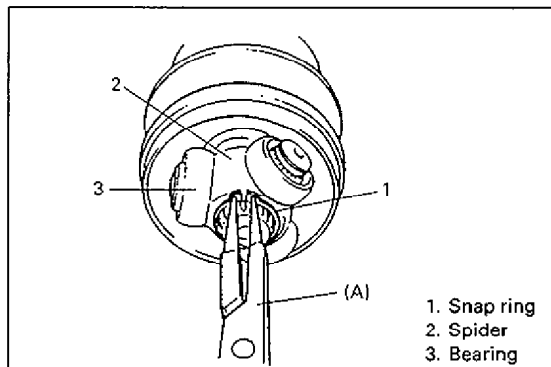
10) Remove drive shaft assembly.

CAUTION:

To prevent breakage of boots, be careful not to bring them into contact with other parts, when removing drive shaft assembly.



75F00-4A-4-1



75F00-4A-4-2

75F00-4A-4-3

75F00-4A-4-4

DISASSEMBLY

For Tripod joint type drive shaft

- 1) Remove differential side boot band, then take out tripod joint housing.

- 2) Remove grease from shaft and take off snap ring by using special tool, then pull out spider from shaft.

Special Tool

(A): 09900-06107

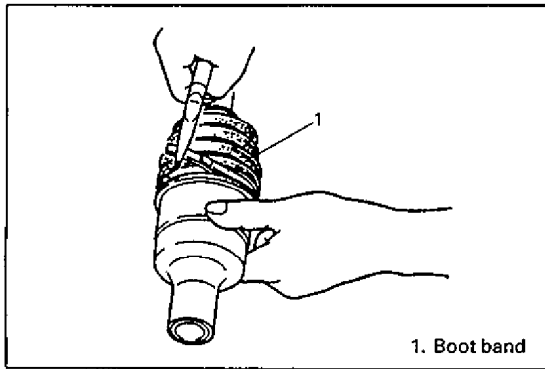
CAUTION:

To prevent needle bearing of joint from being degreased, do not wash it if it is to be reused.

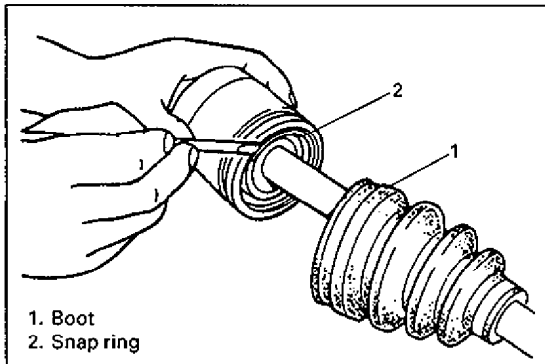
- 3) Remove boot band, then pull out differential side boot from shaft.
- 4) Undo band of dynamic damper, then pull out damper through shaft (Right side).
- 5) Undo boot bands of wheel side joint boot, then pull out boot through shaft.

CAUTION:

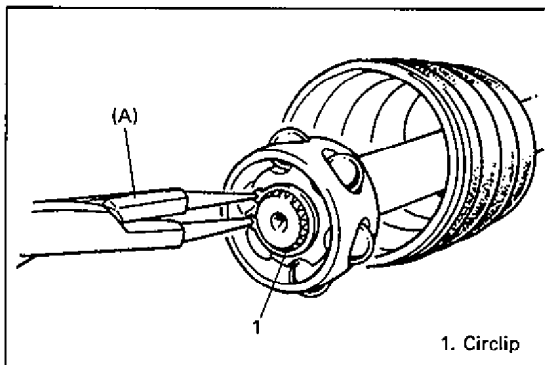
- Disassembly of wheel side joint is not allowed. If noise or damage exists in it, replace it as assembly.
- Do not disassemble tripod joint spider. If any mal-condition is found in it, replace it as differential side joint assembly.



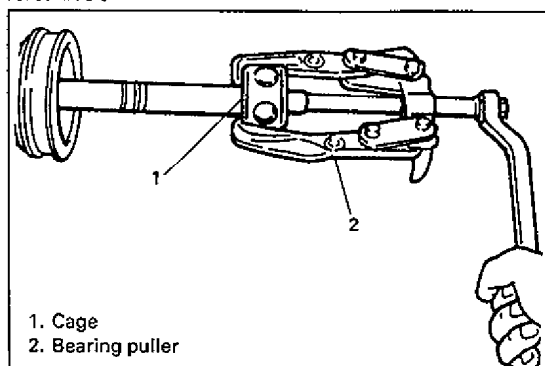
75F00-4A-5-1



75F00-4A-5-2



75F00-4A-5-3



75F00-4A-5-4

For DOJ type drive shaft (Left side of M/T vehicle)

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) Wipe off grease and remove circlip used to fix cage by using special tool (A).

Special Tool

(A): 09900-06107

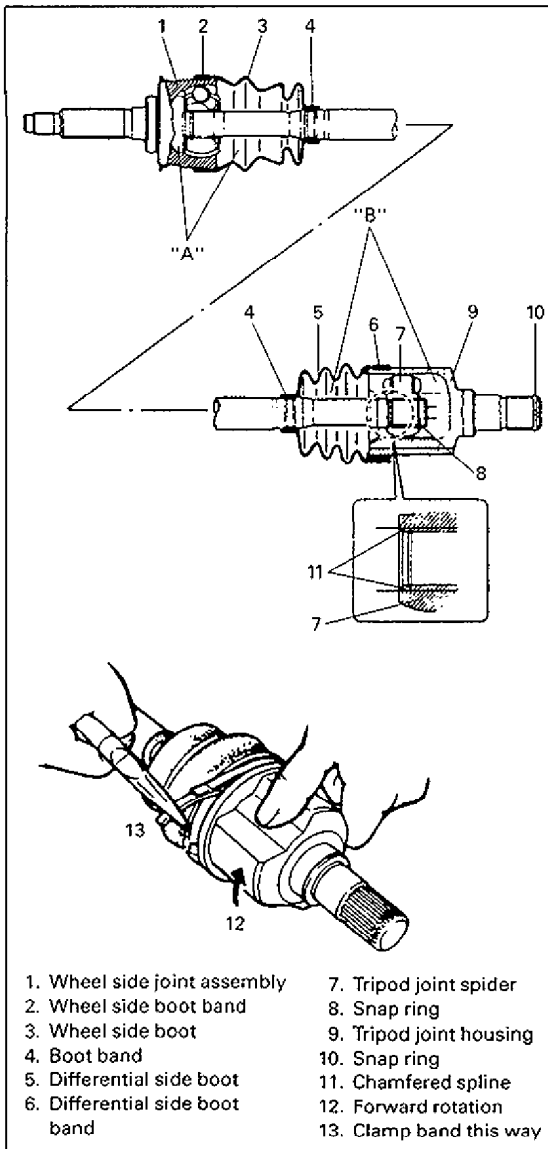
4) Draw away cage by using bearing puller, and remove boot from shaft.

NOTE:

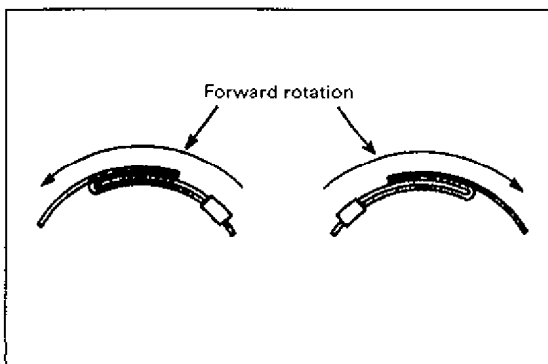
Do not disassemble wheel side joint (outboard joint). If any malfunction is found in any joint, replace it as assembly.

INSPECTION

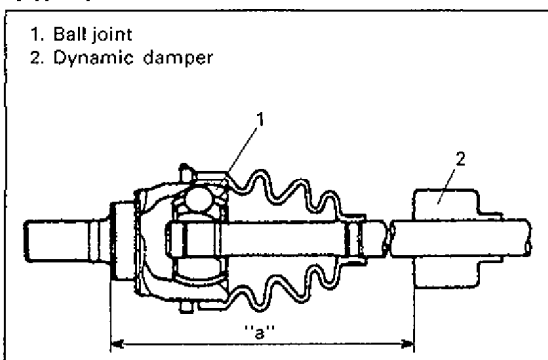
- Check boots for breakage or deterioration. Replace them as necessary.
- Check circlip, snap ring and boot bands for breakage or deformation. Replace as necessary.



75F00-4A-6-3



75F00-4A-6-4



75F00-4A-6-5

ASSEMBLY

For Tripod joint type drive shaft

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly.

Make sure that wheel side joint assembly and tripod joint housing are washed thoroughly and air dried, and boots are cleaned with cloth if they are to be reused.

For A/T vehicle

"A": Black grease (about 60 – 80 gram/2.1 – 2.8 oz)

"B": Yellow grease (about 85 – 105 gram/3.0 – 3.7 oz)

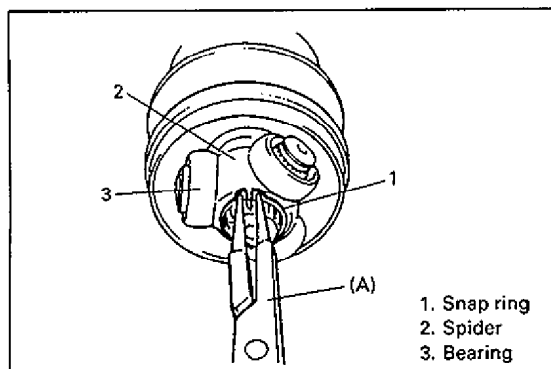
For M/T vehicle

"A": Yellow grease (about 60 – 80 gram/2.1 – 2.8 oz)

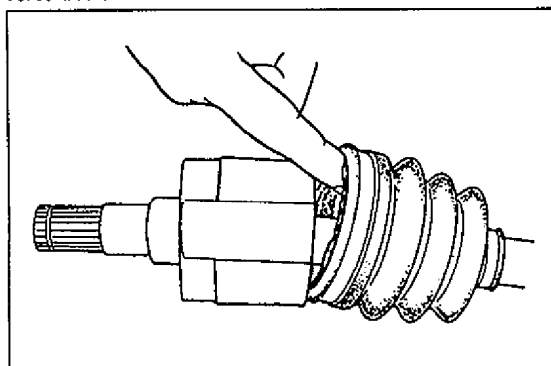
"B": Black grease (about 80 – 100 gram/2.8 – 3.5 oz)

- 1) Wash disassembled parts (except boots). After washing, dry parts completely by blowing air.
- 2) Clean boots with cloth. DO NOT wash boots in degreaser, such as gasoline or kerosene, etc. Washing in degreaser causes deterioration of boot.
- 3) Apply grease to wheel side joint. Use black (yellow for M/T vehicle) grease in tube included in wheel side boot set.
- 4) Install wheel side boot on shaft.
- 5) Fill up boot inside with grease and then fasten boot with bands.
- 6) Install dynamic damper on right side drive shaft according to dimension specified below.

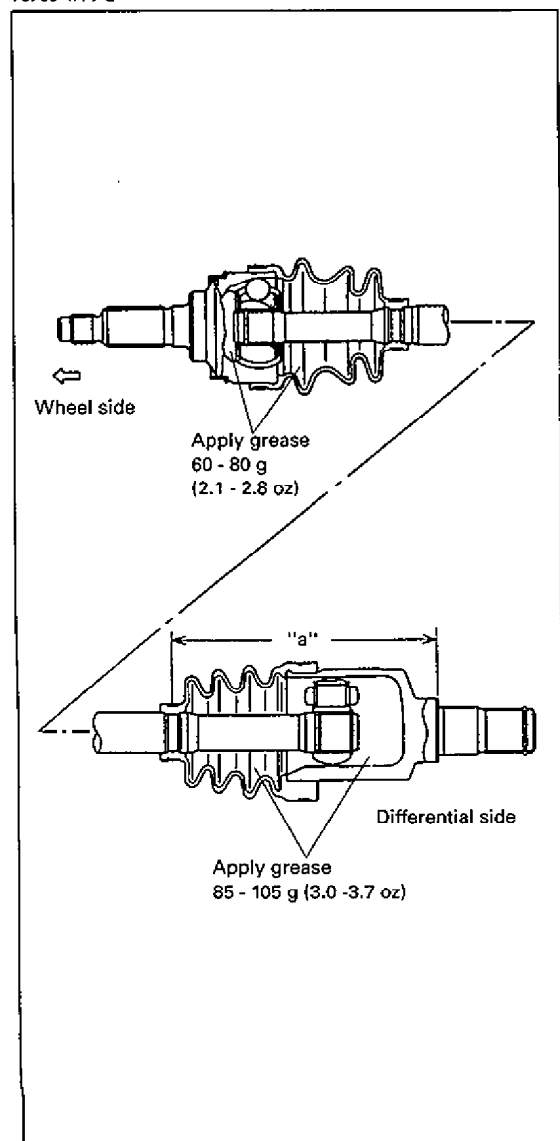
Length "a": 328 – 334 mm (12.9 – 13.1 in.)



75F00-4A-7-1



75F00-4A-7-2



75F00-4A-7-5

- 7) Install differential side boot on shaft.
Apply grease to tripod joint. Use yellow (black for M/T vehicle) grease in tube included in spare parts.
- 8) Install tripod joint spider on shaft, facing its chamfered spline inward (wheel side), then fasten it with snap ring.

Special Tool**(A): 09900-06107**

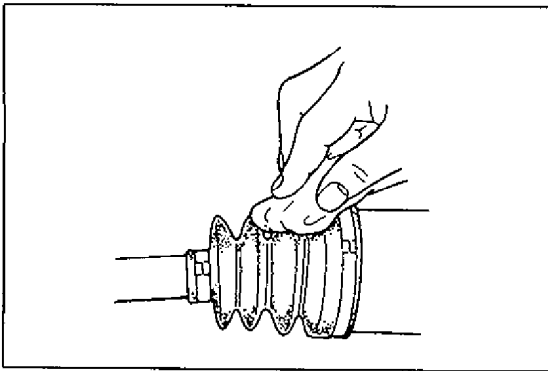
- 9) Apply grease to inside of outer race, then install housing, joint it with boot and fit boot to outer race.
After fitting boot, insert screwdriver into boot on outer race side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

- 10) When fixing boot to outer race with boot band, adjust so that measurements become as indicated below.

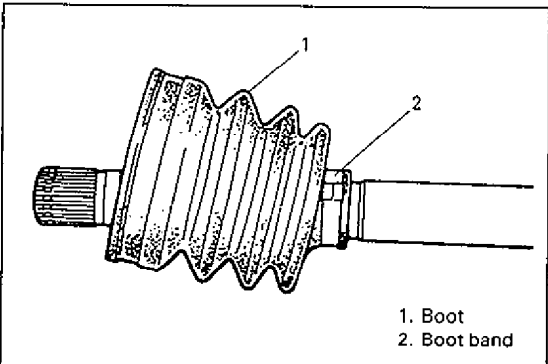
**Length "a": 148 – 158 mm (5.83 – 6.22 in.) MT Vehicle
(Right side)
151 – 161 mm (5.94 – 6.34 in.) AT Vehicle**

CAUTION:

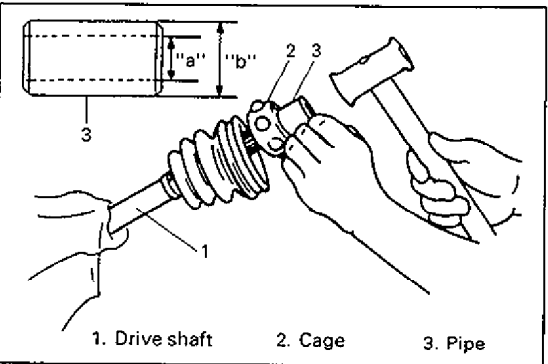
- To prevent any problem caused by washing solution, do not wash joint boots and tripod joint except its housing. Degreasing of those parts with cloth is allowed.
- To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint, i.e. black (yellow for M/T vehicle) grease (80g tube) to wheel side joint and yellow (black for M/T vehicle) one (100 – 105g tube) to tripod joint.
- Bend each boot band against forward rotation.
- Do not squeeze or distort boot when fastening it with bands.
Distorted boot caused by squeezing air may reduce its durability.



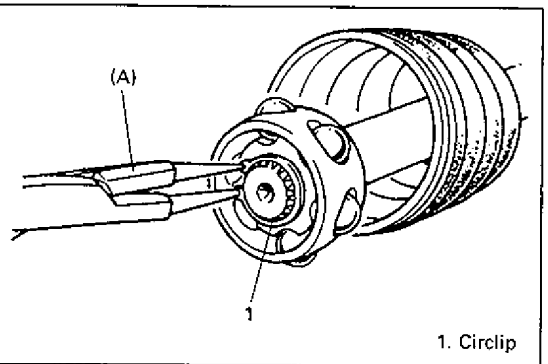
75F00-4A-8-1



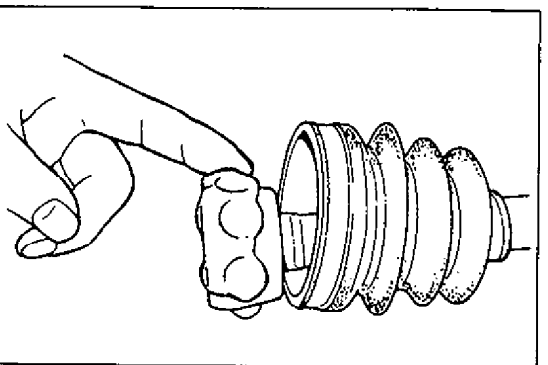
75F00-4A-8-2



75F00-4A-8-3



75F00-4A-8-4



75F00-4A-8-5

For DOJ type drive shaft (Left side of M/T vehicle)

- 1) Wash disassembled parts (except boots). After washing, dry parts completely by blowing air.
- 2) Clean boots with cloth. Do not wash boots in degreaser, such as gasoline or kerosene, etc.
Washing in degreaser causes deterioration of boot.

- 3) Apply grease to wheel side joint. Use yellow grease in tube included in wheel side boot set.
- 4) Install wheel side boot on shaft, fill up boot inside with grease and then fasten boot with band.

- 5) Driver in the cage by using a pipe whose inner diameter is 23 mm (0.906 in.) or more and outer diameter is 32 mm (1.260 in.) or less.

Diameter "a": 22.5 mm (0.886 in.) or more

Diameter "b": 30.0 mm (1.181 in.) or less

CAUTION:

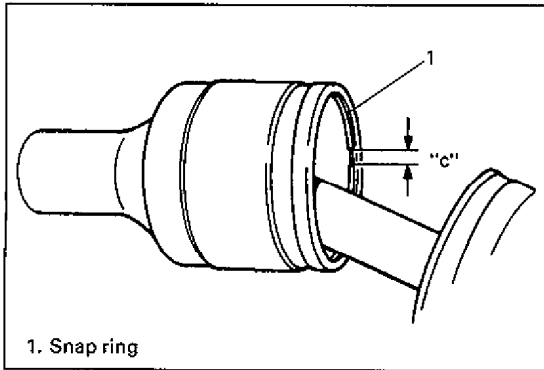
Install cage directing smaller outside diameter side to wheel side.

- 6) Install circlip by using special tool (A).

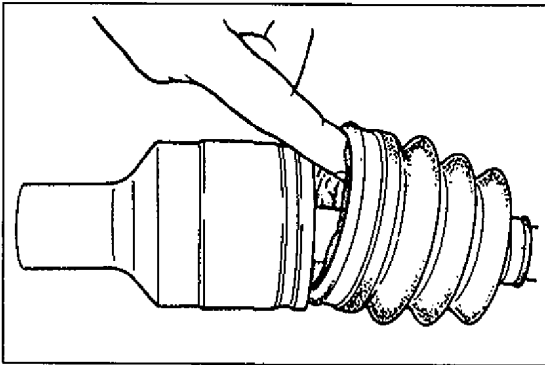
Special Tool

(A): 09900-06107

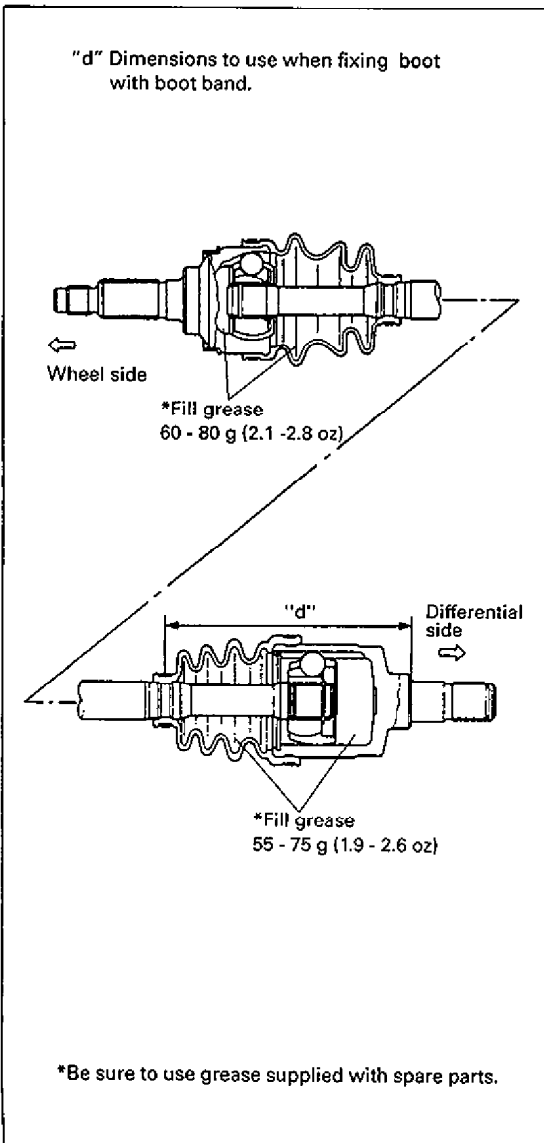
- 7) Apply grease to entire surface of cage.
Use black grease in tube included in spare parts.



75F00-4A-9-1



75F00-4A-9-2



75F00-4A-9-5

- 8) Insert cage into outer race and fit snap ring into groove of outer race.

CAUTION:

Position opening of snap ring "c" so that it will not be lined up with a ball.

- 9) Apply grease to inside of outer race, and fit boot to outer race.

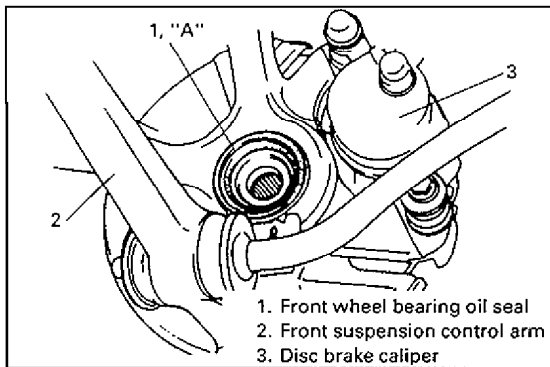
After fitting boot, insert screwdriver into boot on outer race side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.

- 10) When fixing boot band, adjust so that measurements "d" become as indicated in figure.

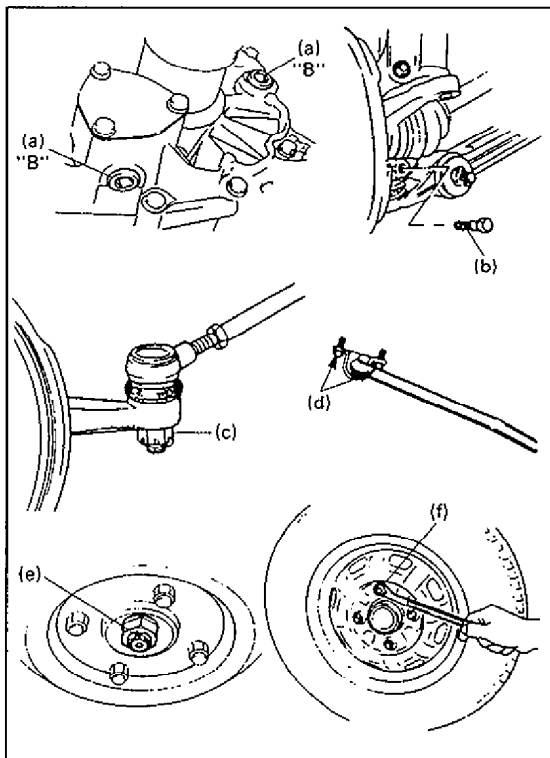
Length "d": 139.5 - 149.5 mm (5.49 - 5.89 in.)

CAUTION:

- To prevent any problem caused by washing solution, do not wash joint boots. Degreasing of those parts with cloth is allowed.
- To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint, i.e. yellow grease (80g tube) to wheel side joint and black one (75g tube) to DOJ.
- Bend each boot band against forward rotation.
- Do not squeeze or distort boot when fastening it with bands.
Distorted boot caused by squeezing air may reduce its durability.



75F00-4A-10-1



75F00-4A-10-3

INSTALLATION

Install drive shaft assembly by reversing removal procedure and noting following points.

- Clean front wheel bearing oil seal and then apply grease. Replace it if required.

"A": Grease 99000-25010

- Install wheel side joint to steering knuckle first and then tripod joint to differential side.
- Tighten each bolt and nut to the specified torque.

Tightening Torque

- (a): 21 N·m (2.1 kg-m, 15.5 lb-ft)
 (b): 55 N·m (5.5 kg-m, 40.0 lb-ft)
 (c): 43 N·m (4.3 kg-m, 31.5 lb-ft)
 (d): 43 N·m (4.3 kg-m, 31.5 lb-ft)
 (e): 175 N·m (17.5 kg-m, 127.0 lb-ft)
 (f): 85 N·m (8.5 kg-m, 61.5 lb-ft)

- Apply sealant to drain plug for manual transmission.

"B": Sealant 99000-31110

- Fill transmission with oil as specified. (Refer to SECTION 7A.)

CAUTION:

- To avoid excessive expansion of boot and consequential disconnection of joint in boot, do not pull tripod joint housing.
- Protect oil seals and boots from any damage, preventing them from unnecessary contact while installing drive shaft.
- Do not hit joint boot with hammer. Inserting joint only by hands is allowed.
- Make sure that differential side joint is inserted fully and its snap ring is seated as it was.

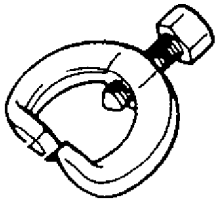
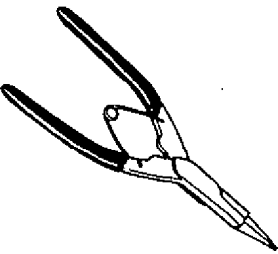
TIGHTENING TORQUE SPECIFICATIONS

Fastener	Tightening torque		
	N·m	kg-m	lb-ft
Oil drain plug	21	2.1	15.5
Oil hole plug	21	2.1	15.5
Ball joint stud bolt and nut	55	5.5	40.0
Tie-rod end castle nut	43	4.3	31.5
Stabilizer mount bracket bolt	43	4.3	31.5
Drive shaft nut	175	17.5	127.0
Wheel nut	85	8.5	61.5

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	Oil drain plug for manual transmission

SPECIAL TOOLS

 09913-65210 Tie-rod end remover	 09900-06107 Snap ring pliers (Open type)
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SECTION 5

BRAKES

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and two in rear).

The master cylinder is a tandem master cylinder. The brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right & rear left brakes and the other connects front left & rear right brakes.

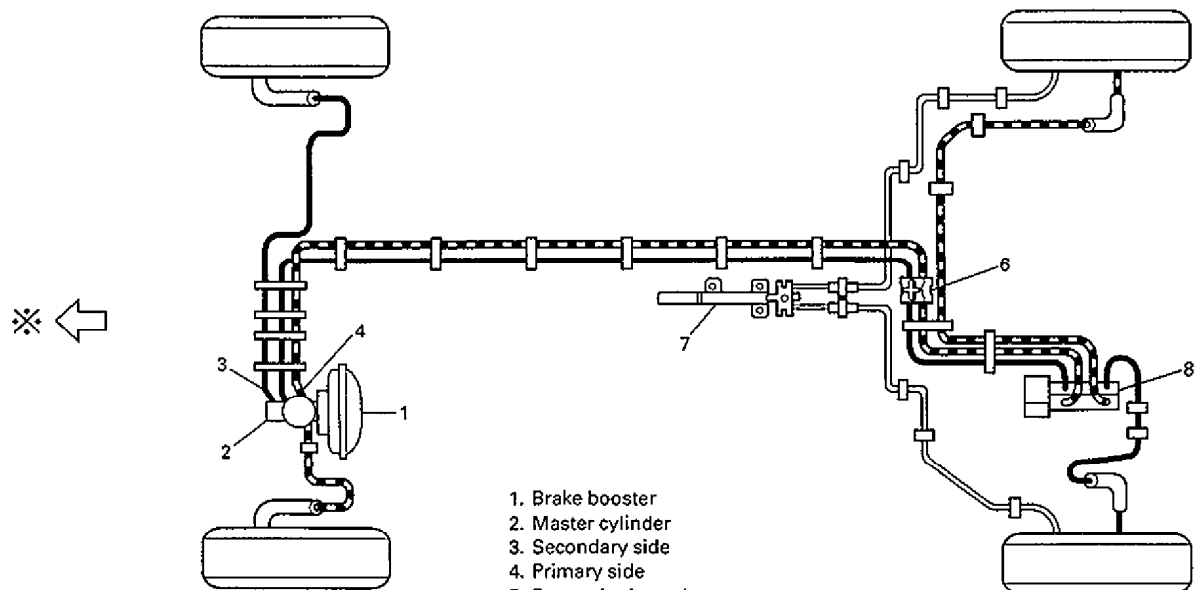
The proportioning valve (P valve) or the load sensing proportioning valve (LSPV) is included in these circuits between the master cylinder and rear wheels. In brake system of this model, the disc brake type is used of the front wheel brake and a drum brake type (leading/trailing shoes) for the rear wheel 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.

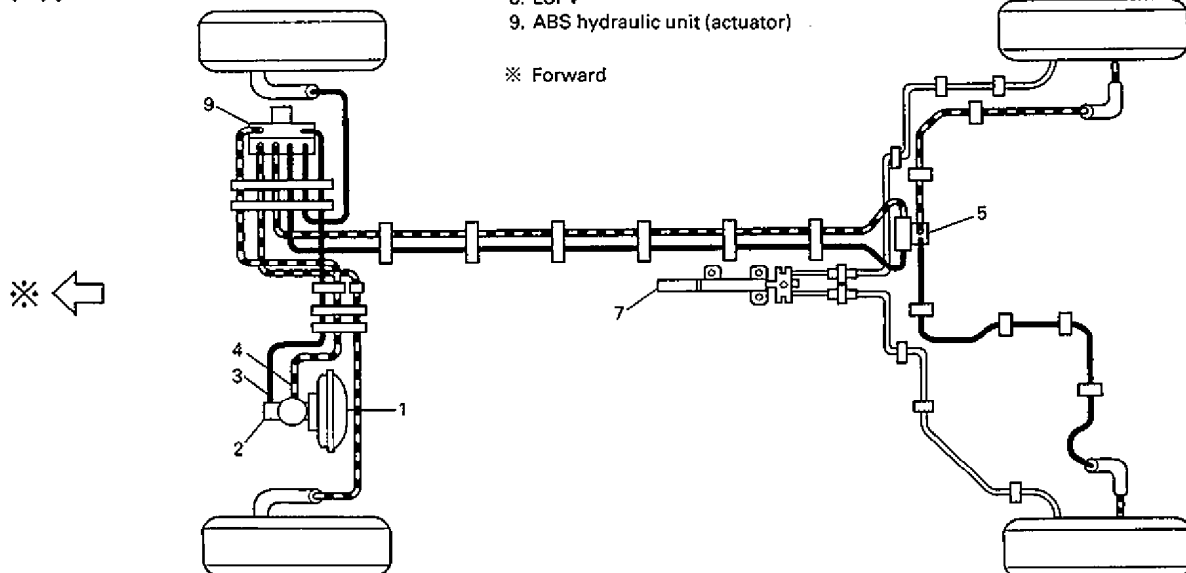
NOTE:

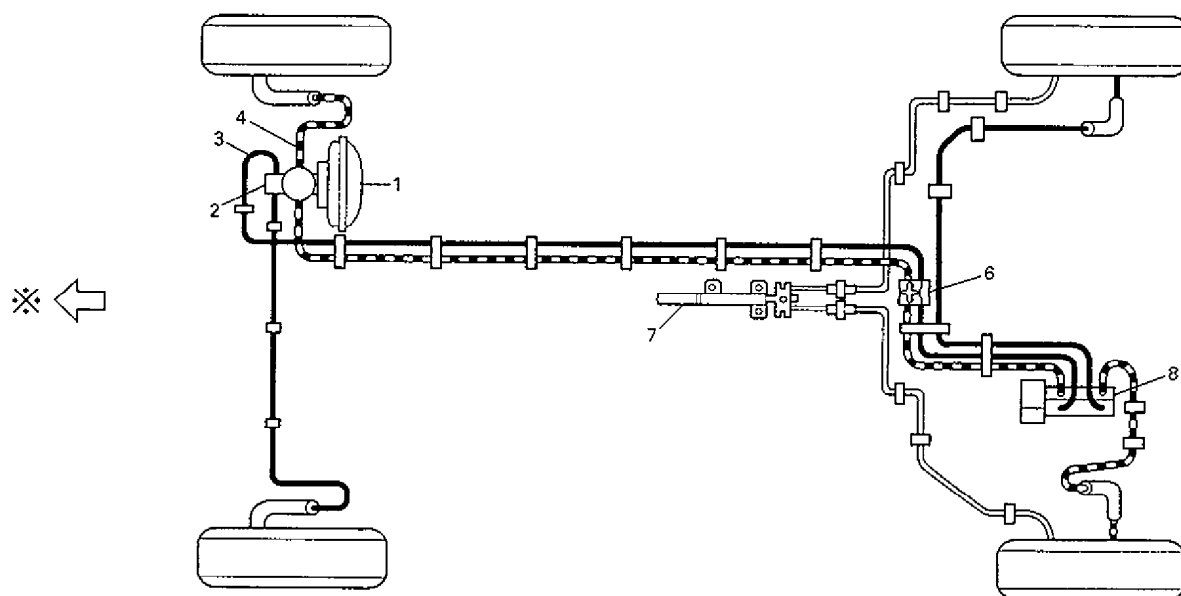
"P" valve in circuit diagram is installed on vehicle which is equipped with ABS and "LSPV" is installed on vehicle not equipped with ABS.

For left-hand steering vehicles not equipped with ABS (Antilock Brake System)



For left-hand steering vehicles equipped with ABS

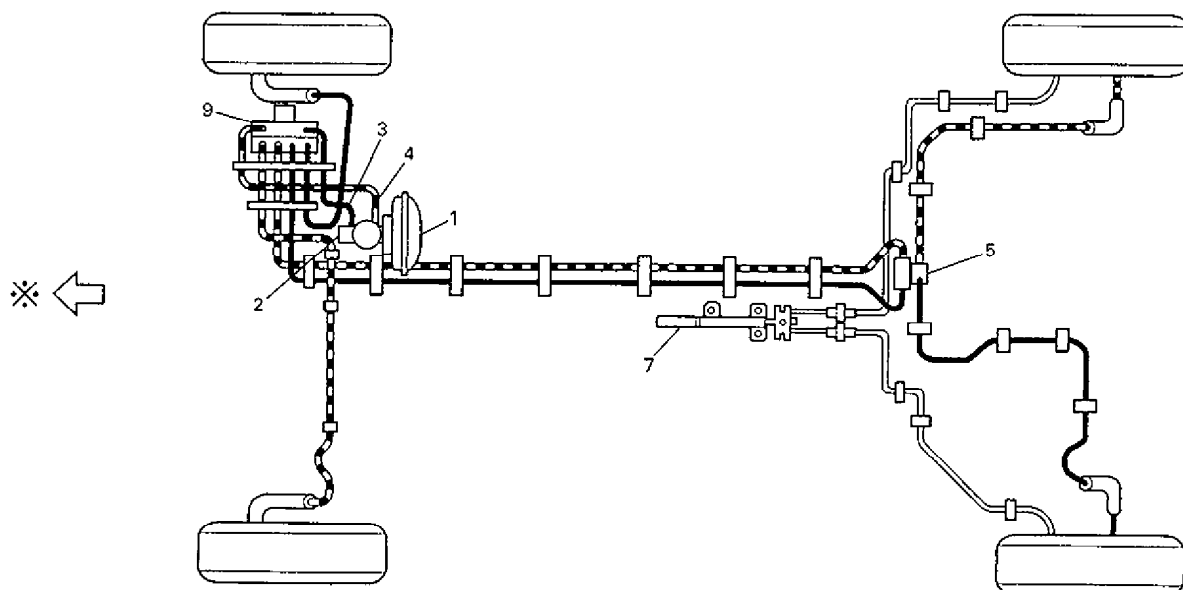


For right-hand steering vehicles not equipped with ABS (Antilock Brake System)

1. Brake booster
2. Master cylinder
3. Secondary side
4. Primary side
5. Proportioning valve
6. 4-way joint
7. Parking brake lever
8. LSPV
9. ABS hydraulic unit (actuator)

For right-hand steering vehicles equipped with ABS

※ Forward



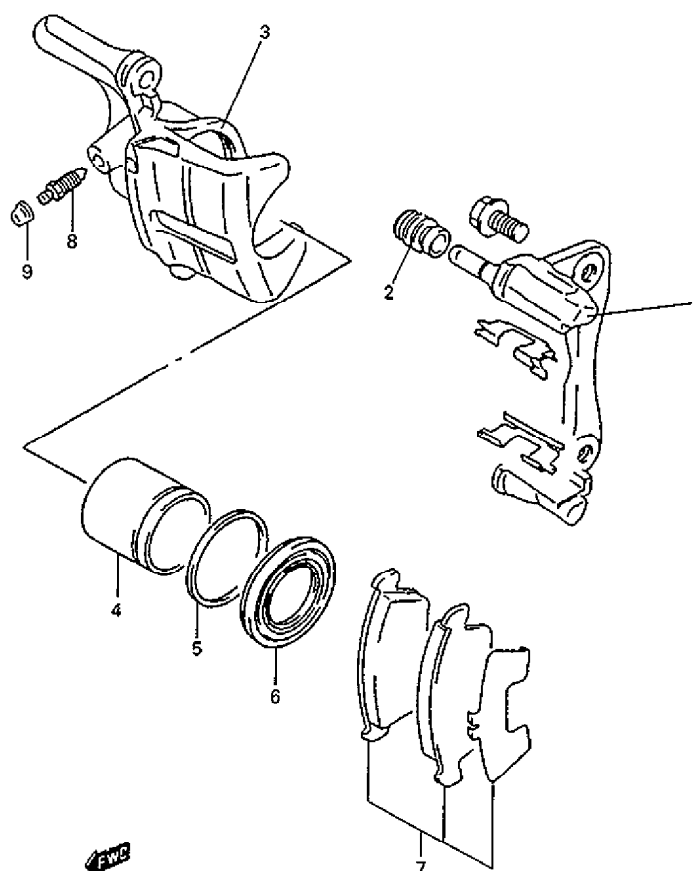
FRONT DISC BRAKE CALIPER ASSEMBLY

GENERAL DESCRIPTION

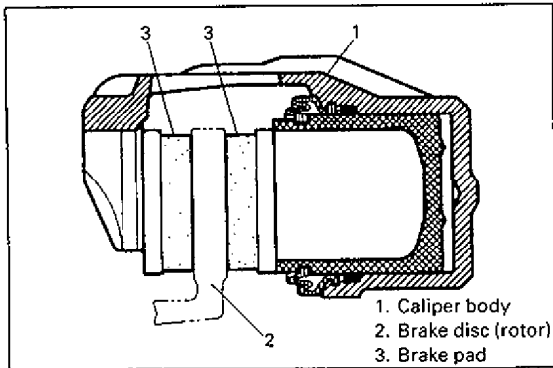
This caliper has a single bore. Hydraulic force, created by applying force to the brake pedal, is converted by the caliper to friction. The hydraulic force acts equally against the piston and the bottom of the caliper bore to move the piston outward and to move (slide) the caliper inward, resulting in a clamping action on the disc. This clamping action forces the pads (linings) against the disc, creating friction to stop the vehicle. For details, refer to OPERATION in the next page.

NOTE:

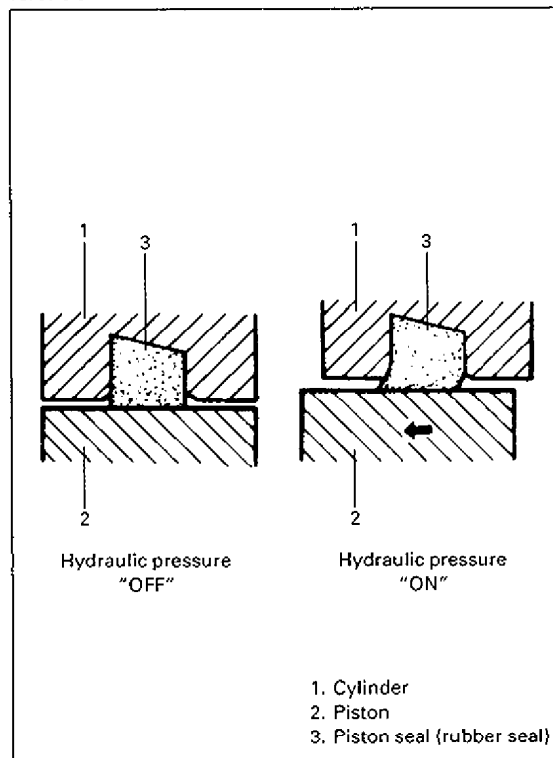
Lubricate parts as specified. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any component is removed or line disconnected, bleed the brake system. Replace pads in axle sets only. The torque values specified are for dry, unlubricated fasteners.



1. Brake caliper carrier
2. Boot
3. Caliper
4. Disc brake piston
5. Piston seal
6. Cylinder boot
7. Brake pad
8. Bleeder Plug
9. Bleeder plug cap



75F00-5-6-1



75F00-5-6-3

Caliper OPERATION

Clearance correction

When oil pressure is applied to the piston, the piston moves forward. The rubber seal, which exerts considerable pressure against the piston, moves with the cylinder. However, as a part of the rubber seal has been fixed into a groove in the cylinder, the shape of the rubber seal is distorted toward internal end of the cylinder, as shown in left figure. When pressure is taken off from the foot brake pedal and fluid pressure is released from the piston, a restoring force is generated at the seal and pushes the piston back.

As the pads wear away and the clearance between the disc and pads becomes larger, the piston moves a larger distance. The seal then could change in shape further but, since the end of the seal is fixed into the groove in the cylinder, the distortion is limited to the same amount as previously described. The piston moves further to cover the distance of clearance. The piston returns by the same distance and the rubber seal recovers its shape as described above and thus the clearance between the disc and pads is maintained in adjustment.

REAR DRUM BRAKE ASSEMBLY

GENERAL DESCRIPTION

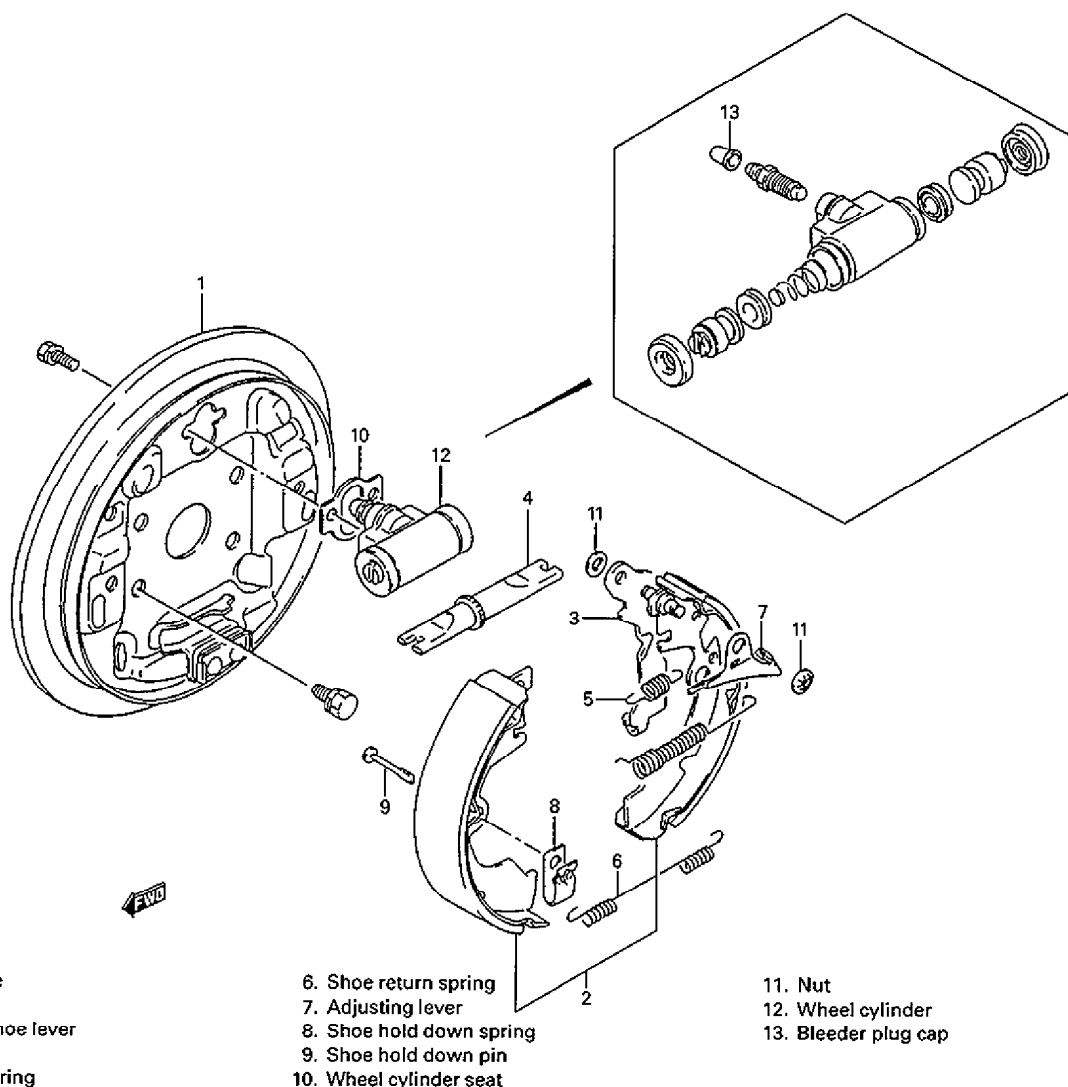
The drum brake assembly has a self shoe clearance adjusting system so that drum-to-shoe clearance is maintained appropriate at all times. For details, refer to OPERATION in the next page.

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.



75F00-5-7-4

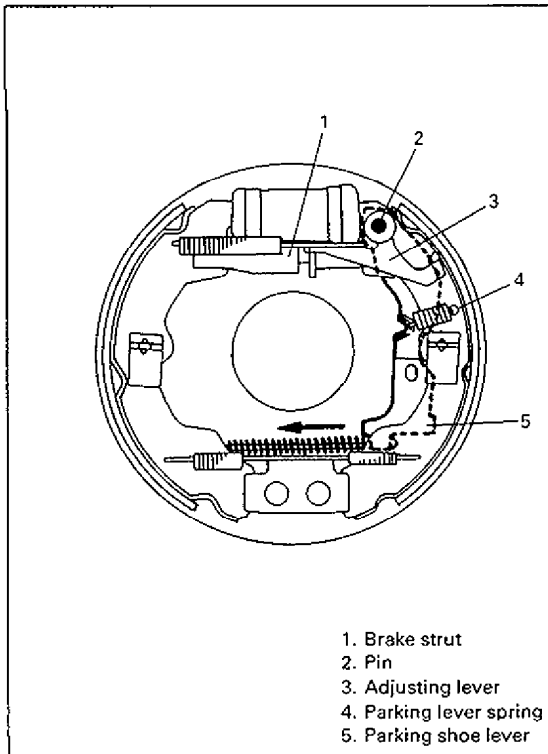
Rear Brake OPERATION

With the general drum brake type, when the brake pedal is depressed, two pistons in the wheel cylinder force the brake shoes outward, restraining the turn of the drum.

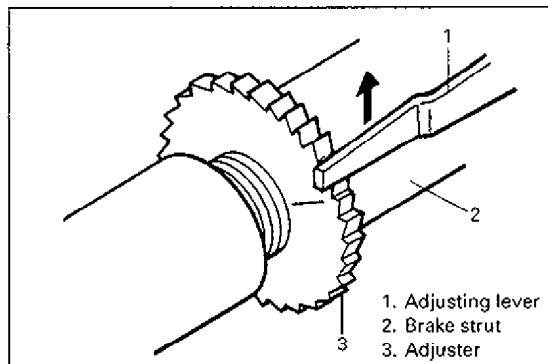
The more the brake shoes get worn, the longer distance the pistons must move. As a result, the brake pedal travel increases. Then the shoe clearance must be adjusted by the shoe adjusting screws. Thus periodical adjustment is required for the drum brake type in general.

This rear brake is provided with a self-adjusting system which automatically adjusts the shoe-to-drum clearance (pedal-to-wall clearance) caused by such brake shoe wear.

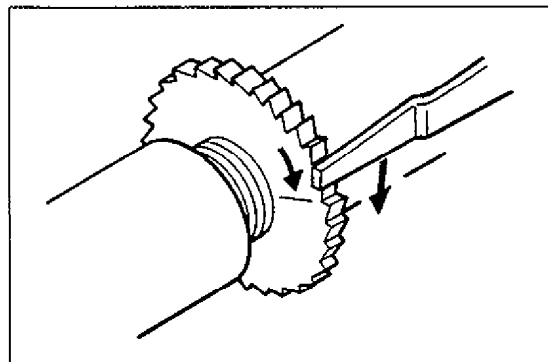
75F00-5-7-5



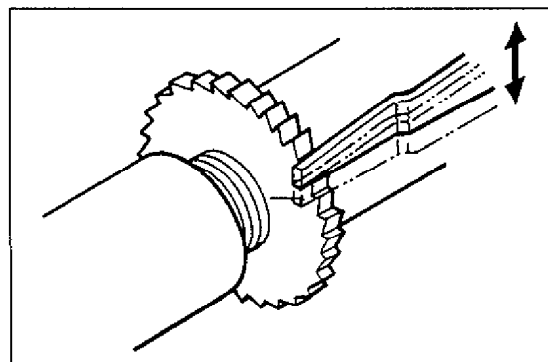
75F00-5-8-2



75F00-5-8-3



75F00-5-8-4



75F00-5-8-5

Clearance correction

The self shoe clearance adjusting system consists of brake strut, adjusting lever, parking lever, etc.

The brake strut adjusts brake shoe position when brake pedal is not depressed and its length varies according to rotation of the adjuster.

Pulling the parking brake lever causes the parking lever to be pulled and the adjusting lever to move with the pin as a supporting point and to go over teeth of the adjuster.

When the parking brake lever is released, the spring force of the parking shoe lever causes the adjusting lever to move down and the adjuster of the brake strut to turn.

When adjuster turns, the strut is lengthened and the brake shoe stop position changes.

As a result, the clearance between the shoe and the drum reduces.

In this way, whenever the parking brake lever is operated, the clearance is adjusted automatically.

If the clearance between shoe and the drum is within the standard value, even when the parking brake lever is pulled, the adjusting lever does not move so much as to go over teeth of the adjuster.

Thus, no adjustment is made in this case.

MASTER CYLINDER ASSEMBLY

GENERAL DESCRIPTION

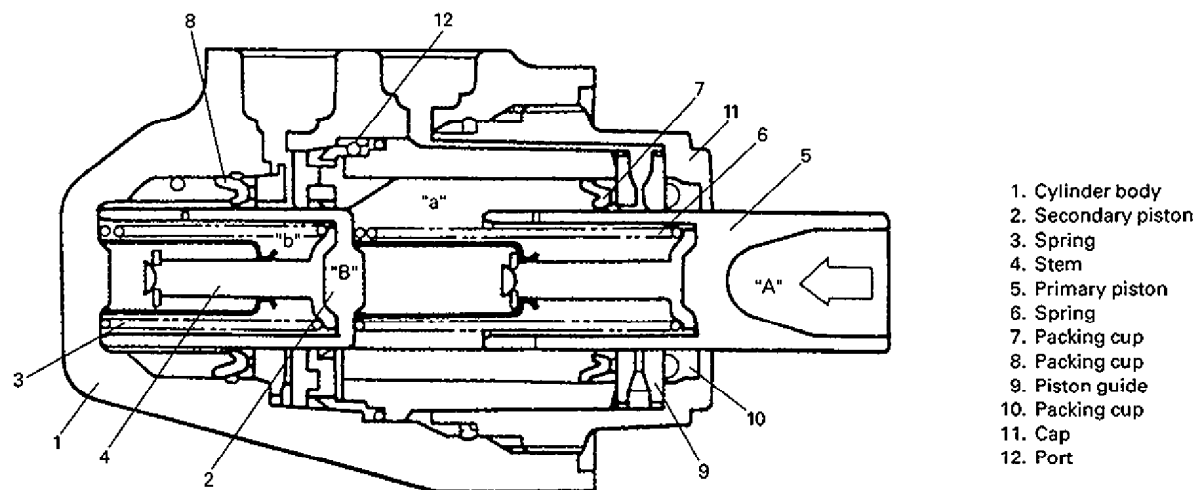
The master cylinder has two pistons and three piston cups. Its hydraulic pressure is produced in the primary ("a" in the figure below) and secondary ("b") chambers. The hydraulic pressure produced in the primary chamber ("a") acts on the left (for right-hand steering vehicle without ABS, right) front wheel brake and right (for right-hand steering vehicle without ABS, left) rear wheel brake.

Also, the hydraulic pressure produced in the secondary chamber ("b") acts on the right (for right-hand steering vehicle without ABS, left) front wheel brake and left (for right-hand steering vehicle without ABS, right) rear wheel brake.

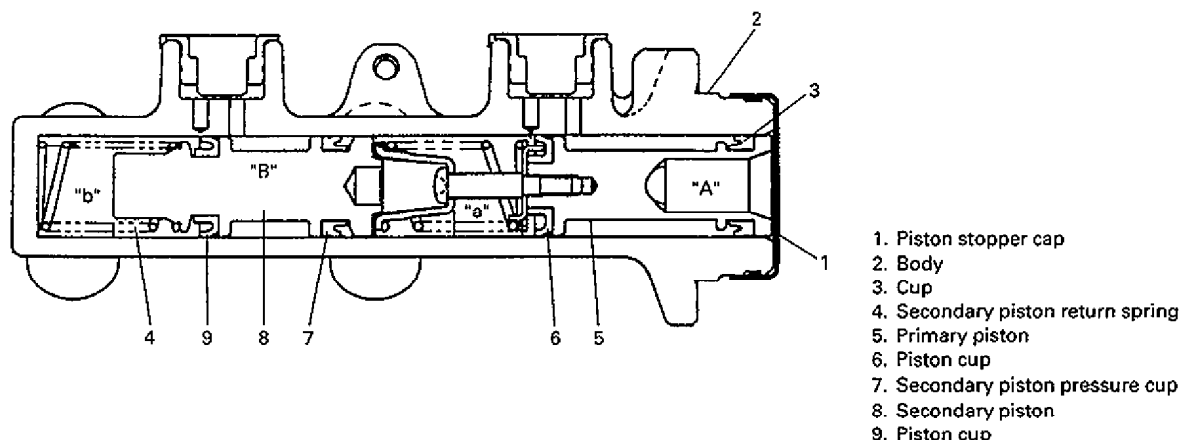
CAUTION:

- Note that master cylinder assembly installed on right-hand steering vehicle cannot be disassembled. If any faulty condition is found, replace it as an assembly.
- 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.

For right-hand steering vehicle



For left-hand steering vehicle



BOOSTER ASSEMBLY

GENERAL DESCRIPTION

The booster is located between the master cylinder and the brake pedal. It is so designed that the force created when the brake pedal is depressed is mechanically increased combined with the engine vacuum. Its operation is as follows.

CAUTION:

When and after removing booster, never drop or deform it.

WARNING:

Never disassemble brake booster assembly. If it is found faulty, replace it with new assembly.

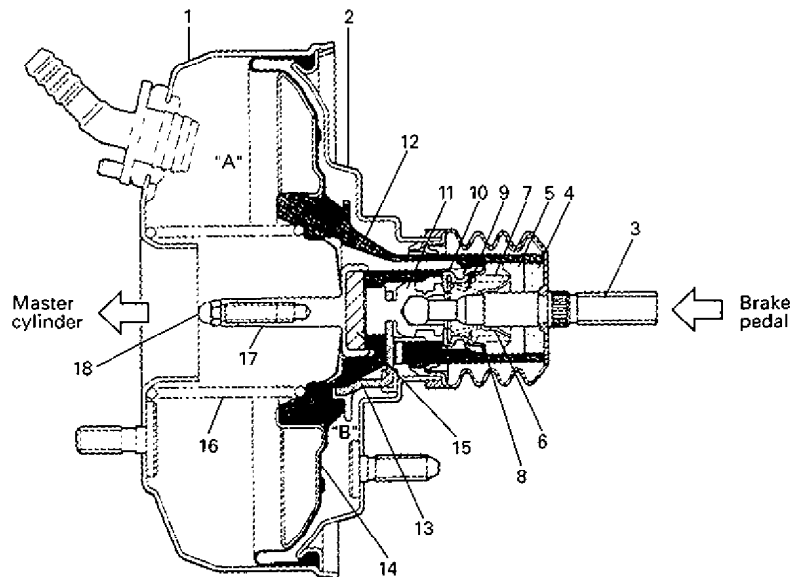
CAUTION:

The torque values specified are for dry, unlubricated fasteners. If any hydraulic component is removed or brake line disconnected, bleed the brake system.

OPERATION

When the brake pedal is depressed, the force is transmitted to the piston of the master cylinder through the valve operating rod, booster air valve, reaction disc and piston rod. At the same time, the force of the booster piston developed due to the pressure difference between the two chambers "A" and "B" in the figure below is added to it. Therefore, a small brake pedal depressing force is made into a strong push to the master cylinder push rod to produce high hydraulic pressure.

Should any of the vacuum related parts in the booster be faulty, the brake force is not increased. Even then, however, the brake depressing force is transmitted to the valve operating rod, booster air valve, valve stopper key and booster piston in that order, to push the master cylinder push rod. Thus, the braking operation itself will not fail.



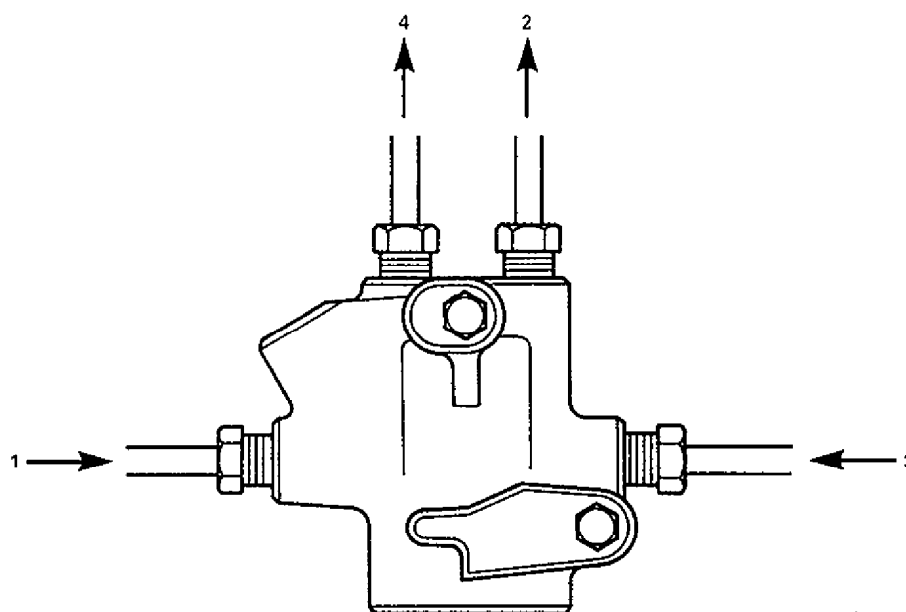
1. Booster No.1 body
2. Booster No.2 body
3. Valve operating rod
4. Air cleaner element
5. Air cleaner separator
6. Air valve spring retainer
7. Air valve return spring
8. Control valve spring retainer
9. Control valve spring
10. Booster control valve
11. Booster air valve
12. Booster piston
13. Valve stopper key
14. Booster diaphragm
15. Reaction disc
16. Booster piston return spring
17. Booster piston rod
18. Booster rod adjust screw

PROPORTIONING VALVE

The proportioning valve is included within the brake circuit which connects the master cylinder and the wheel brakes. It is installed on floor panel and controls the hydraulic pressure applied to the rear wheel brakes after predetermined pressure has been reached.

CAUTION:

Never disassemble proportioning valve. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.



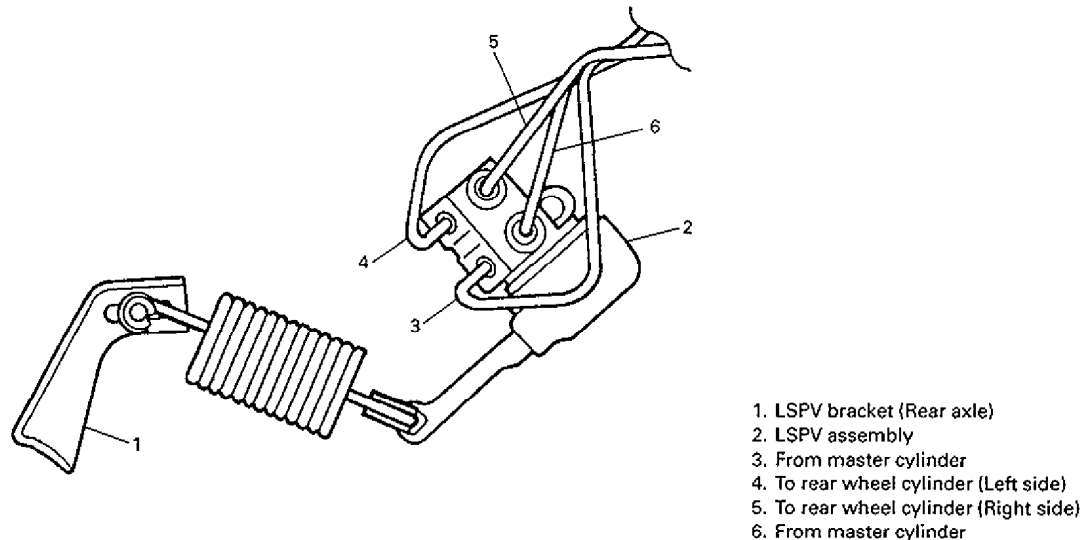
1. From master cylinder (Primary) and ABS hydraulic unit
2. To right rear wheel cylinder
3. From master cylinder (Secondary) and ABS hydraulic unit
4. To left rear wheel cylinder

LSPV (Load Sensing Proportioning Valve) ASSEMBLY

As shown below, LSPV is included within the brake circuit which connects the master cylinder and the rear wheel brake. It controls the hydraulic pressure applied to the rear wheel brake according to the loaded state of the vehicle (or weight of the load), whereby preventing the rear wheels from getting locked prematurely. Also, LSPV has a sensor and such a structure as to control hydraulic pressure through its 2 systems (right and left rear brakes).

CAUTION:

Never disassemble LSPV. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.



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CONSTRUCTION

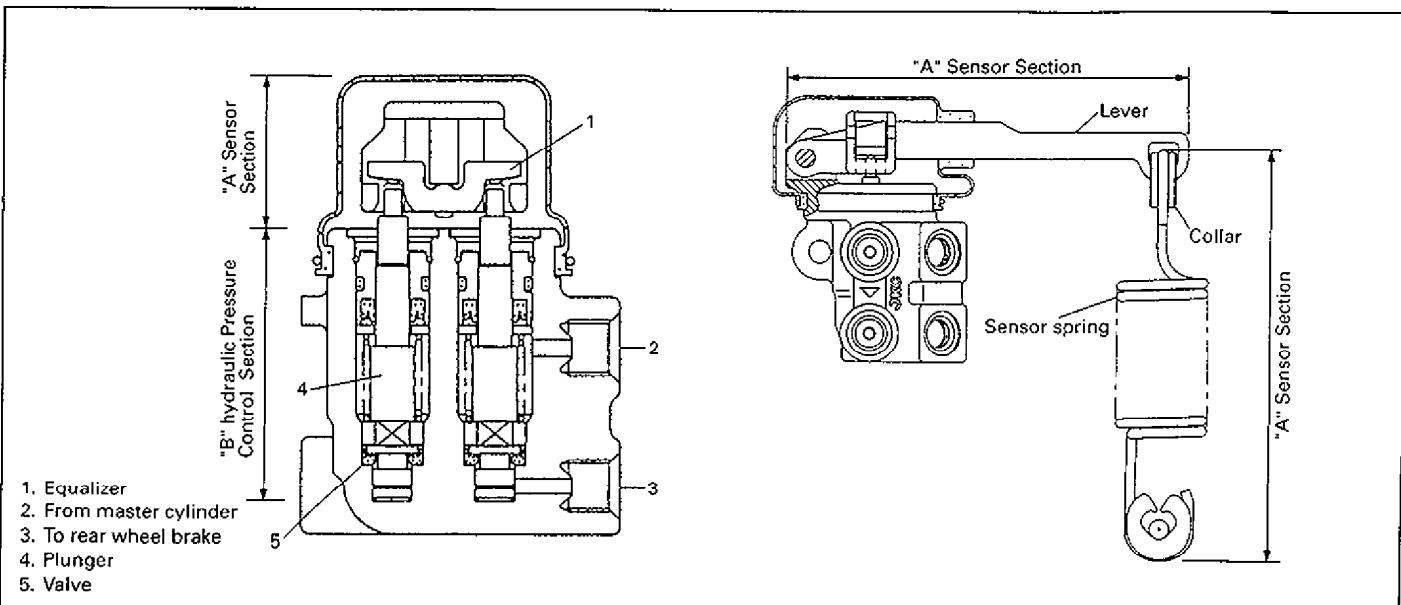
The LSPV components are grounded into 2 sections as follows.

"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 convert it into the load.

"B": Hydraulic pressure control section

Included in this section are a plunger and valve mechanism to execute proportional control.



75F00-5-12-5

OPERATION

LSPV is installed to the vehicle body, with the end of the lever at its top connected to the control rod of the rear suspension by way of the sensor spring and the LSPV stay.

When some load is placed on the vehicle, the distance between the rear axle of the rear suspension and the vehicle body (chassis) (i.e. coil spring height) changes, whereby the sensor spring length also changes. As the sensor spring length changes, the force affecting the plunger in LSPV by way of the lever changes so that the hydraulic characteristic suitable for the load weight becomes available.

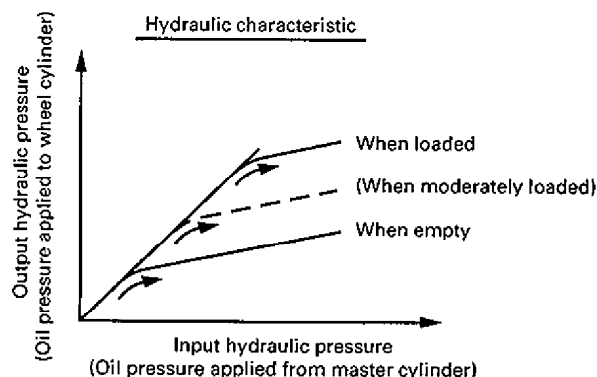
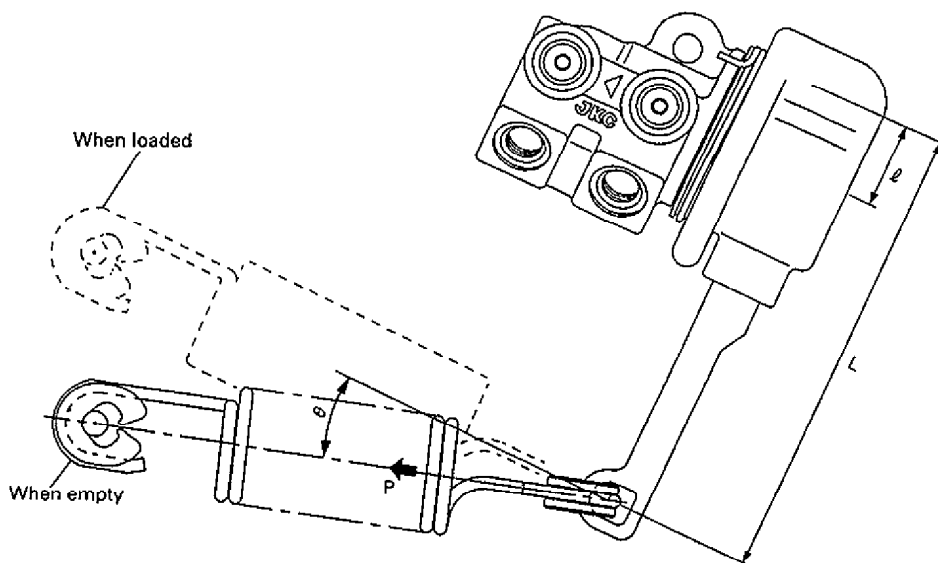
When empty

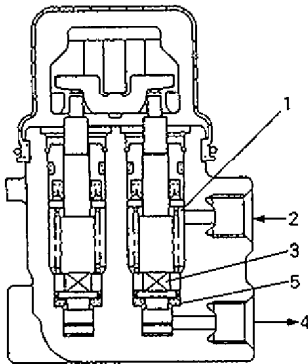
As the sensor spring is pulled by comparatively weak force, the force applied to the plunger is also small and the hydraulic characteristic takes a low bend point as shown in the graph below.

When loaded

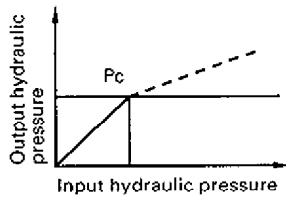
As the sensor spring is pulled by comparatively strong force, a larger force is applied to the plunger so that the hydraulic characteristic takes a higher bend point in the graph below.

The relationship between the force applied to the plunger and the bend point in the hydraulic characteristic graph is described under "2. Operation of hydraulic pressure control section" on the following page.





1. Incoming chamber
2. Supply port
3. Plunger outer passage
4. Discharge port
5. Valve inner passage



1. Operation of sensor section

One end of the sensor spring is installed to the rear suspension rear axle and the other end to the LSPV lever. The spring power P is applied to the plunger by way of the lever.

The force on the plunger then is expressed as

$$2F = \frac{L}{\ell} P \cos \theta$$

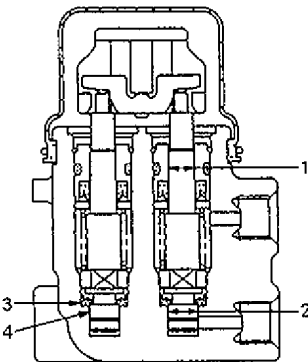
2. Operation of hydraulic pressure control section

1) Operation from the inoperative state till the incoming hydraulic pressure (fluid pressure from the master cylinder) reaches the bend point P_c in the graph.

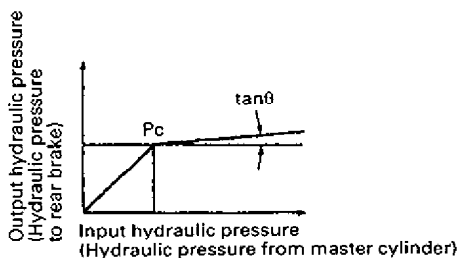
As the valve is open during this stage, the hydraulic pressure supplied through the supply port passes through the incoming chamber, plunger outer passage, valve inner passage and outgoing chamber, and it is discharged out of the discharge port without being controlled.

2) As the incoming hydraulic pressure increases, the force applied to the plunger grows stronger than the sensor spring power and moves the plunger and as a result, the valve closes the fluid passage. The hydraulic pressure then is represented by the bend point P_c in the graph.

As the incoming hydraulic pressure rises even higher, the passage between the plunger seat and valve opens due to the difference between larger and smaller diameter sectional areas of the plunger and the outgoing hydraulic pressure rises a little. At the same time as the rise in outgoing hydraulic pressure, the force to close the plunger increases again to close the passage between the plunger seat and valve. In this way, through repetition of the operation as described above, the outgoing hydraulic pressure is increased and decreased at a certain rate to the incoming hydraulic pressure. Also, the force applied to the right and left plungers is made almost uniform by the equalizer which deflects as necessary.



1. Smaller diameter sectional area of plunger (S_b)
2. Larger diameter sectional area of plunger (S_a)
3. Valve
4. Plunger seat



Reference:

The bend point P_c and gradient $\tan \theta$ are obtained by using the following formulas.

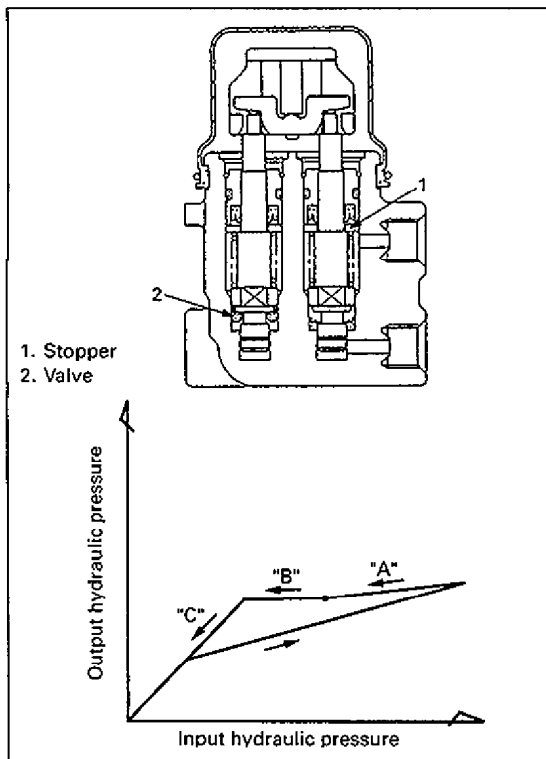
$$P_c = \frac{F + f}{S_b} \quad \tan \theta = \frac{S_a - S_b}{S_a}$$

F : Force from sensor spring

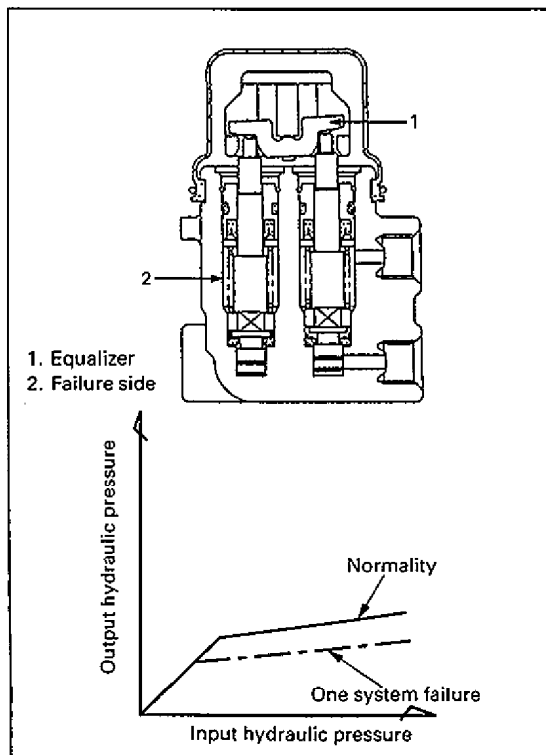
f : Force from plunger spring

S_a : Large diameter sectional area of plunger

S_b : Smaller diameter sectional area of plunger



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75F00-5-15-4

3) As the incoming hydraulic pressure reduces, the plunger moves backward till it contacts the stopper, and such plunger movement cause the fluid amount on discharge port to reduce, thereby the outgoing hydraulic pressure reduces ("A" in the graph).

As the incoming hydraulic pressure reduces further, the plunger remains in contact with the stopper and the outgoing hydraulic pressure becomes constant ("B" in the graph).

When the incoming hydraulic pressure lowers than the outgoing one, the valve is pushed by the outgoing hydraulic pressure. As a result, the state of plunger changes from as shown by the plunger at the right in the left figure to that at the left and the incoming hydraulic pressure becomes equal to the outgoing one ("C" in the graph). Further decrease in the incoming hydraulic pressure allows the sensor spring to move the plunger to its initial position.

3. Operation when one system fails

If one of two systems fails, the equalizer tilts and the sensor spring force reduces but as the plunger of the other system alone supports the sensor spring force, the bend point in the hydraulic characteristic graph becomes lower than usual as shown in left figure.

DIAGNOSIS

ROAD TESTING BRAKES

Brakes should be tested on dry, clean, smooth and reasonably level roadway which is not crowned. Road test brakes by making brake applications with both light and heavy pedal forces at various speeds to determine if the vehicle stops evenly and effectively.

Also drive vehicle to see if it leads to one side or the other without brake application. If it does, check the tire pressure, front end alignment and front suspension attachments for looseness. See diagnosis chart for other causes.

BRAKE FLUID LEAKS

Check the master cylinder fluid levels. While a slight drop in reservoir level does result from normal lining wear, an abnormally low level indicates a leak in the system. In such a case, check the entire brake system for leakage. If even a slight evidence of leakage is noted, the cause should be corrected or defective parts should be replaced.

SUBSTANDARD OR CONTAMINATED BRAKE FLUID

Improper brake fluid, mineral oil or water in the fluid may cause the brake fluid to boil or the rubber components in the hydraulic system to deteriorate.

If primary piston cups are swollen, then rubber parts have deteriorated. This deterioration may also be evidenced by swollen wheel cylinder piston cups on the drum brake wheels.

If deterioration of rubber is evident, disassemble all hydraulic parts and wash with alcohol. Dry these parts with compressed air before assembly to keep alcohol out of the system. Replace all rubber parts in the system, including hoses. Also, when working on the brake mechanisms, check for fluid on the linings. If excessive fluid is found, replace the pads.

If master cylinder piston seals are satisfactory, check for leakage or excessive heat conditions. If condition is not found, drain fluid, flush with brake fluid, refill and bleed system.

The system must be flushed if there is any doubt as to the grade of fluid in the system or if fluid has been used which contained parts that have been subjected to contaminated fluid.

BRAKE DIAGNOSIS TABLE

Condition	Possible Cause	Correction
Not enough braking force	• Brake oil leakage from brake lines. • Brake disc or pads stained with oil. • Overheated brakes. • Poor contact of shoes on brake drum. • Brake shoes linings stained with oil or wet with water. • Badly worn brake pad linings. • Defective wheel cylinders. • Malfunctioning caliper assembly. • Air in system. • Maladjusted sensor spring length of LSPV (If equipped). • Broken sensor spring of LSPV (If equipped). • Defective collar of LSPV (If equipped) • Malfunctioning ABS (Anti-lock Brake System) (If equipped)	Locate leaking point and repair. Clean or replace. Determine cause and repair. Repair for proper contact. Replace. Replace. Repair or replace. Repair or replace. Bleed system. Check or adjust. Replace. Replace. Check system referring to DIAGNOSIS of Section 5E2.

BRAKE DIAGNOSIS TABLE

Condition	Possible Cause	Correction
Brake pull (Brakes not working in unison)	• Pad linings and/or shoe linings are wet with water or stained with oil in some brakes. • Drum-to-shoe clearance out of adjustment in some brakes. (Malfunctioning auto adjusting mechanism) • Disc and/or drum is out of round in some brakes. • Wheel tires are inflated unequally. • Malfunctioning wheel cylinders. • Disturbed front end alignment. • Unmatched tires on same axle. • Restricted brake pipes or hoses. • Malfunctioning caliper assembly. • Loose suspension parts. • Loose calipers.	Replace. Check for inoperative auto adjusting mechanism. Replace. Inflate equally. Repair or replace. Adjust as prescribed. Tires with approximately the same amount of tread should be used on the same axle. Check for soft hoses and damaged lines. Replace with new hoses and new double-walled steel brake tubing. Check for stuck or sluggish pistons and proper lubrication of caliper slide bush. Caliper should slide. Check all suspension mountings. Check and torque bolts to specifications.
Noise (high pitched squeak without brake applied)	• Front lining worn out.	Replace linings.
Rear brake locked prematurely (For vehicle equipped with LSPV)	• Maladjusted sensor spring length of LSPV. • Malfunctioning LSPV assembly.	Check or adjust. Replace assembly.
Brake locked (For vehicle equipped with ABS)	• Malfunctioning ABS (Anti-lock Brake System).	Check system referring to DIAGNOSIS of Section 5E2.

BRAKE DIAGNOSIS TABLE

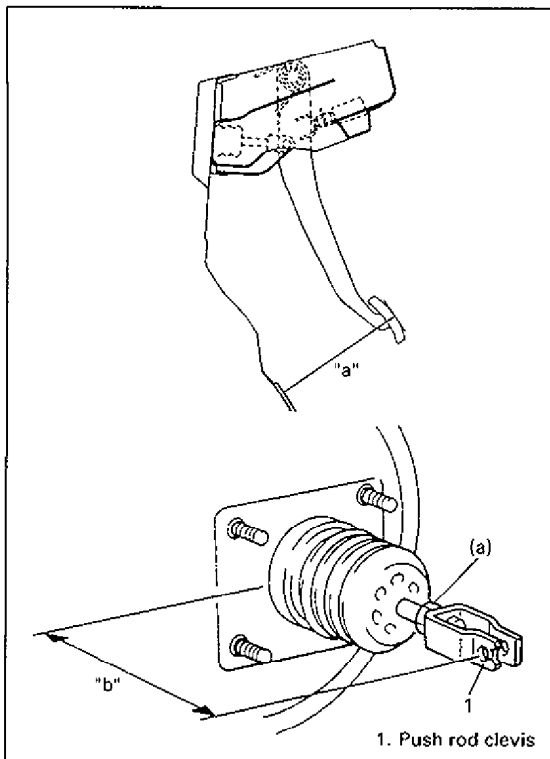
Condition	Possible Cause	Correction
Excessive pedal travel (Pedal stroke too large)	• Partial brake system failure. • Insufficient fluid in master cylinder reservoirs. • Air in system (pedal soft/spongy). • Rear brake system not adjusted (malfunctioning auto adjusting mechanism). • Bent brake shoes. • Worn rear brake shoes.	Check brake systems and repair as necessary. Fill reservoirs with approved brake fluid. Check for leaks and air in brake systems. Check warning light. Bleed system if required. Bleed system. Repair auto adjusting mechanism. Adjust rear brakes. Replace brake shoes. Replace brake shoes.
Dragging brakes (A very light drag is present in all brakes immediately after pedal is released)	• Master cylinder pistons not returning correctly. • Restricted brake pipes or hoses. • Incorrect parking brake adjustment on rear brakes. • Weakened or broken return springs in the brake. • Sluggish parking-brake cables or linkage. • Wheel cylinder or caliper piston sticking. • Badly worn piston seal in the caliper. • Malfunctioning ABS (Anti-lock Brake System).	Repair master cylinder. Check for soft hoses or damaged pipes and replace with new hoses and/or new double-walled steel brake piping. Check and adjust to correct specifications. Replace. Repair or replace. Repair as necessary. Replace piston seal. Check system referring to DIAGNOSIS of Section 5E2.
Pedal pulsation (Pedal pulsates when depressed for braking.)	• Damaged or loose wheel bearings. • Distorted steering knuckle or rear wheel spindle. • Excessive disc lateral runout. • Parallelism not within specifications. • Rear drums out of round.	Replace wheel bearings. Replace knuckle or rear wheel spindle. Check per instructions. If not within specifications, replace or machine the disc. Check per instructions. If not within specifications, replace or machine the disc. Check runout. Repair or replace drum as necessary.

BRAKE DIAGNOSIS TABLE

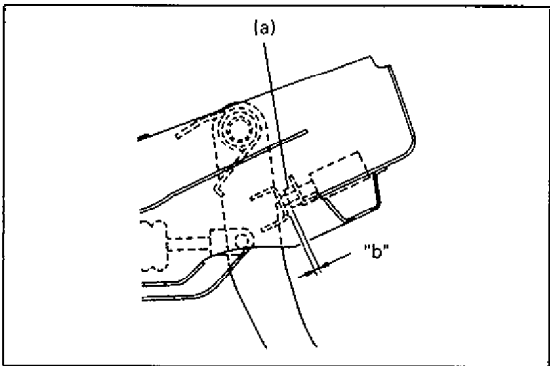
Condition	Possible Cause	Correction
Braking noise	● Glazed shoe linings, or foreign matters stuck to linings. ● Worn or distorted shoe linings. ● Loose front wheel bearings. ● Distorted backing plates or loose mounting bolts.	Repair or replace shoe linings. Replace shoe linings (or pads). Replace wheel bearing. Replace or retighten securing bolts.
Brake warning lamp turns on after engine start	● Parking brake applied. ● Insufficient amount of brake fluid. ● Brake fluid leaking from brake line. ● Brake warning lamp circuit faulty. ● Malfunctioning ABS (Anti-lock Brake System) (If equipped).	Release parking brake and check that brake warning lamp turns off. Add brake fluid. Investigate leaky point, correct it and add brake fluid. Repair circuit. Check system referring to DIAGNOSIS of Section 5E2.
Brake warning lamp 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 lamp fails to turn on even when parking brake is applied	● Brake warning light circuit faulty.	Replace bulb or repair circuit.
ABS warning lamp turns on after engine start (If equipped)	● Malfunctioning ABS (Anti-lock Brake System).	Check system referring to DIAGNOSIS of Section 5E2.
ABS warning lamp turns on when brake is applied (If equipped)	● Malfunctioning ABS (Anti-lock Brake System).	Check system referring to DIAGNOSIS of Section 5E2.

NOTE:

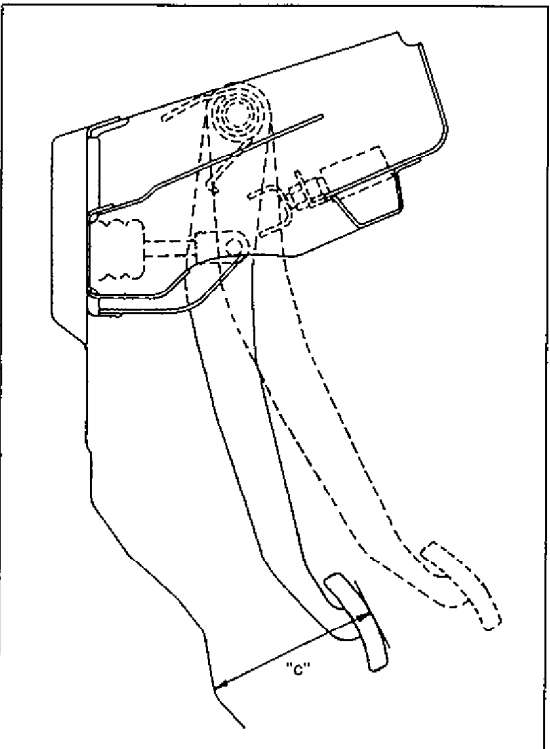
When ABS warning lamp is flashing, investigate faulty point and repair it, referring to "Diagnosis" in Section 5E2.



75F00-5-20-2



75F00-5-20-3



75F00-5-20-5

ON-VEHICLE SERVICE

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 asphalt sheet : 170 mm (6.69 in.) For LH vehicle

: 175 mm (6.89 in.) For RH vehicle

- 1) Check measurement between booster mounting surface and center of clevis pin hole. When booster push rod clevis has been reinstalled, it is important that the measurement is adjusted.

Length "b": 95.5 – 96.5 mm (3.76 – 3.80 in.)

Tightening Torque

(a): 19 N·m (1.9 kg·m, 14.0 lb·ft)

- 2) Check stop light switch position. Adjust it if it is out of specification.

STOP LIGHT SWITCH ADJUSTMENT

Adjustment should be made as follows when installing switch. Pull up brake pedal toward you and while holding it there, adjust switch position so that clearance between end of thread and brake pedal is specified. Then tighten lock nut to specified torque.

Clearance "b": 2.0 – 2.5 mm (0.08 – 0.10 in.)

Tightening Torque

(a): 7.5 N·m (0.75 kg·m, 5.5 lb·ft)

EXCESSIVE PEDAL TRAVEL CHECK

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

Clearance "c": Over 115 mm (4.53 in.) For LH vehicle

Over 90 mm (3.54 in.) For RH vehicle

- 4) If clearance "c" is less than specification, the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines.

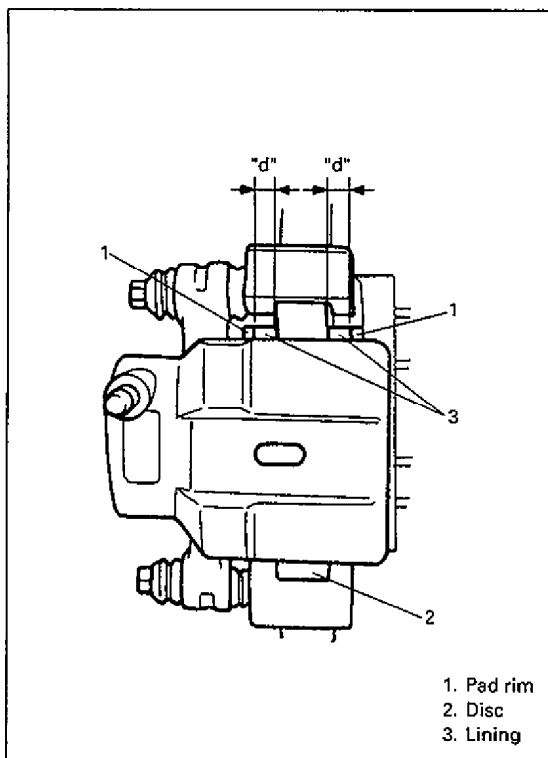
Should clearance "c" remain less than specification even after replacement of brake shoes and bleeding of system, other possible but infrequent cause is malfunction of rear brake shoe adjusters or booster push rod length out of adjustment.

- See page 5-24 for bleeding brake system.
- Remove brake drums for adjuster inspection. (See page 5-39.) If defective, correct or replace.

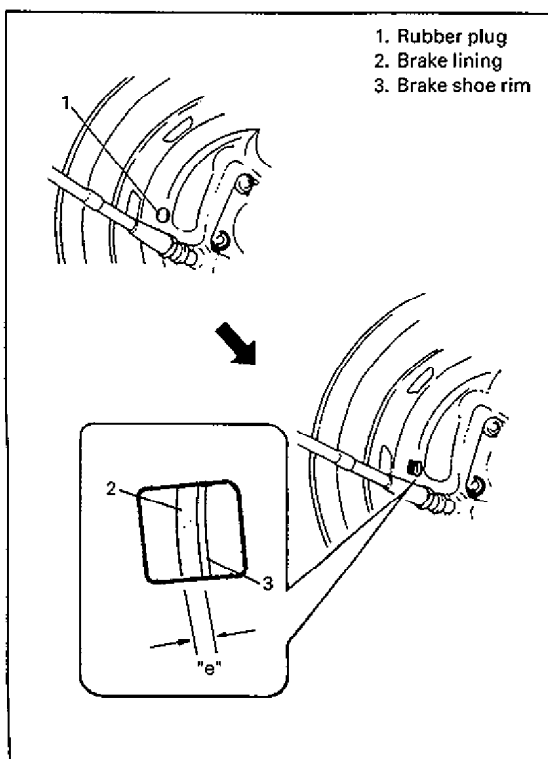
FRONT BRAKE DISC INSPECTION

Refer to page 5-33 of this section for inspection point and procedure.

75F00-5-21-1



75F00-5-21-3



75F00-5-21-5

FRONT BRAKE PAD LINING INSPECTION

Inspect pad linings periodically according to maintenance schedule whenever wheels are removed (for tire rotation or other reason). Take a look through each end (or hole) of caliper and check lining thickness of outside and inside pads. If lining is worn and its thickness ("d" in figure) is less than limit, all pads must be replaced at the same time.

Thickness "d"

Service limit: 1.0 mm (0.04 in.)

REAR BRAKE SHOE INSPECTION

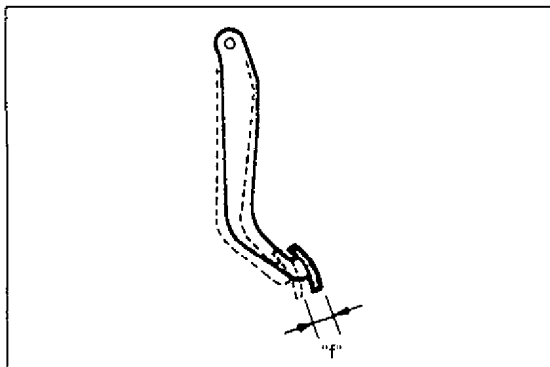
Inspection should be carried out on following points after brake pedal travel (pedal to wall clearance) check, even when pedal travel is normal.

Amount of brake shoe wear can be checked as follows.

- 1) Hoist vehicle.
- 2) Remove rubber plug from brake back plate.
- 3) Through hole of back plate, visually check for thickness of brake shoe lining. If lining thickness "e" is found less than limit, replace all shoes with new ones at the same time.

Thickness "e"

Service limit: 1.0 mm (0.04 in.)



75F00-5-22-1

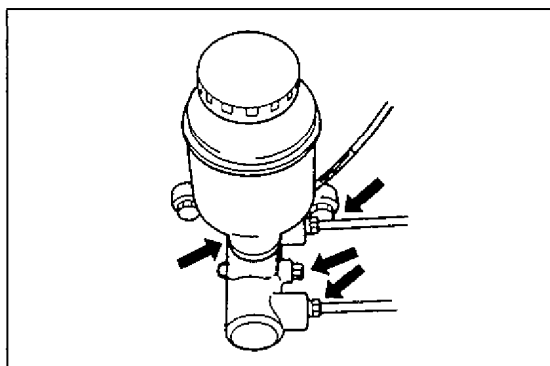
BRAKE PEDAL PLAY INSPECTION

Pedal play should be within specification below.

If out of specification, check stop light switch for proper installation position and adjust if necessary.

Also check pedal shaft bolt and master cylinder pin installation for looseness and replace if defective.

Pedal play "f": 1 – 8 mm (0.04 – 0.31 in.)



75F00-5-22-2

MASTER CYLINDER INSPECTION

Check for cracked master cylinder casting or brake fluid around the master cylinder. Leaks are indicated only if there is at least a drop of fluid. A damp condition is not normal.

REAR DRUM BRAKE SHOE ADJUSTMENT

Rear brake has self-adjusting mechanism but it does require adjustment for proper drum to shoe clearance when brake shoe has been replaced or brake drum has been removed for some other service.

Adjustment is automatically accomplished by pulling parking brake lever 3 to 5 times with approximately 20kg (44 lbs) load after all parts are installed.

Then check brake drum for dragging and brake system for proper performance. After lowering vehicle from hoist, brake test should be performed.

PARKING BRAKE INSPECTION AND ADJUSTMENT

a) Inspection

Hold center of parking brake lever grip and pull it up with 20 to 25 kg (44 to 55 lbs) force.

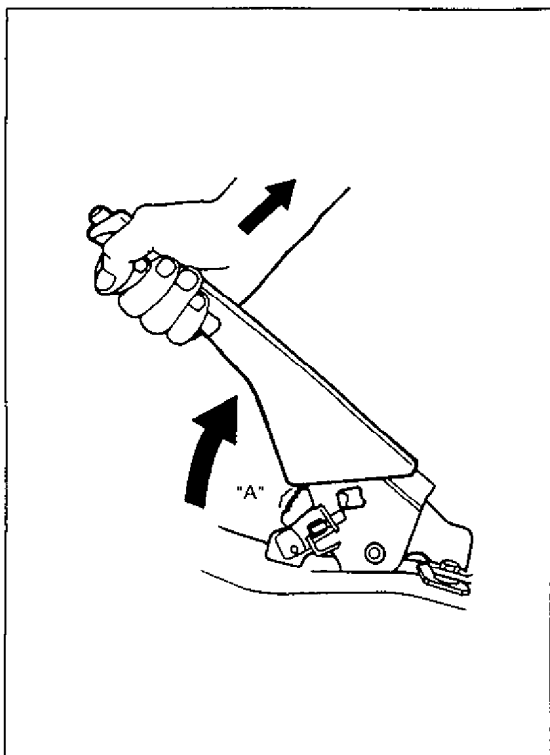
With parking brake lever pulled up as above, count ratchet notches in "A" as shown in figure.

There should be 3 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 level without pressing its button.

One click sound corresponds to one notch.

75F00-5-22-3



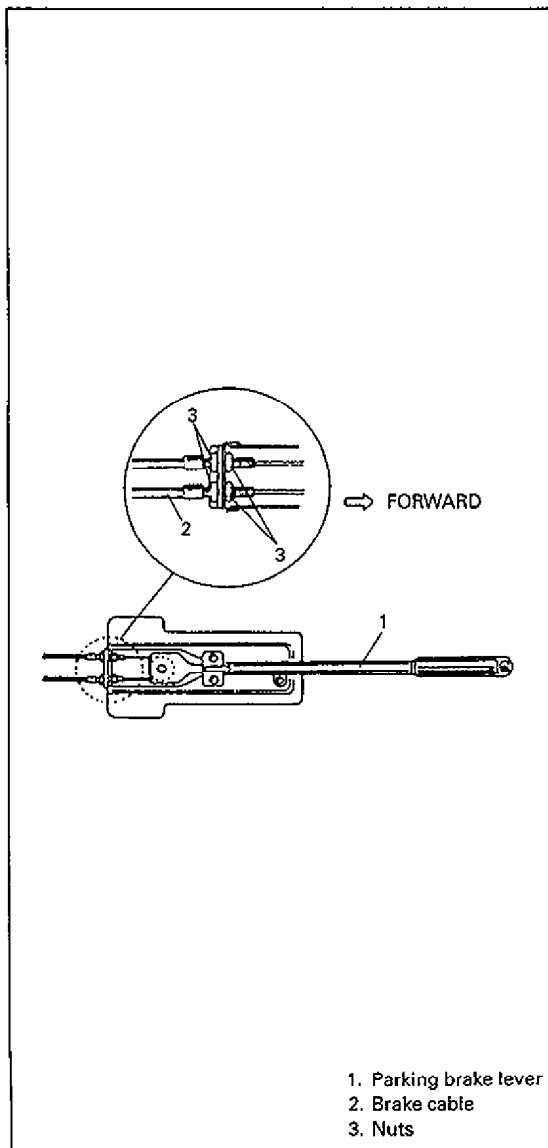
75F00-5-22-5

If number of notches is out of specification, adjust cable by referring to adjustment procedure described on the following step b) so as to obtain specified parking brake stroke.

NOTE:

Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking brake lever.

75F00-5-23-1



75F00-5-23-4

b) Adjustment

NOTE:

Make sure for following conditions before cable adjustment.

- No air is trapped in brake system.
- Brake pedal travel is proper.
- Brake pedal has been depressed a few times with about 30 kg (66 lbs) load.
- Parking brake lever has been pulled up a few times with about 20 kg force.
- Rear brake shoes are not worn beyond limit.

After confirming that above 5 conditions are all satisfied, adjust parking brake lever stroke by loosening or tightening self locking nut (3 in left figure).

NOTE:

Check brake drum for dragging after adjustment.

Parking brake stroke: when lever is pulled up at 20 kg (44 lbs)	Within 3 – 7 notches
---	----------------------

FLUSHING BRAKE HYDRAULIC SYSTEM

It is recommended that entire hydraulic system be thoroughly flushed with clean brake fluid whenever new parts are installed in hydraulic system.

Periodical change of brake fluid is also recommended.

BLEEDING BRAKES

CAUTION:

Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

Bleeding operation is necessary to remove air whenever it entered hydraulic brake system.

Hydraulic lines of brake system are based on the diagonal split system. When a brake pipe or hose was disconnected at the wheel, bleeding operation must be performed at both ends of the line of the removed pipe or hose. When any joint part of the master cylinder or other joint part between the master cylinder and each brake (wheel) was removed, the hydraulic brake system must be bled at all 4 wheel brakes.

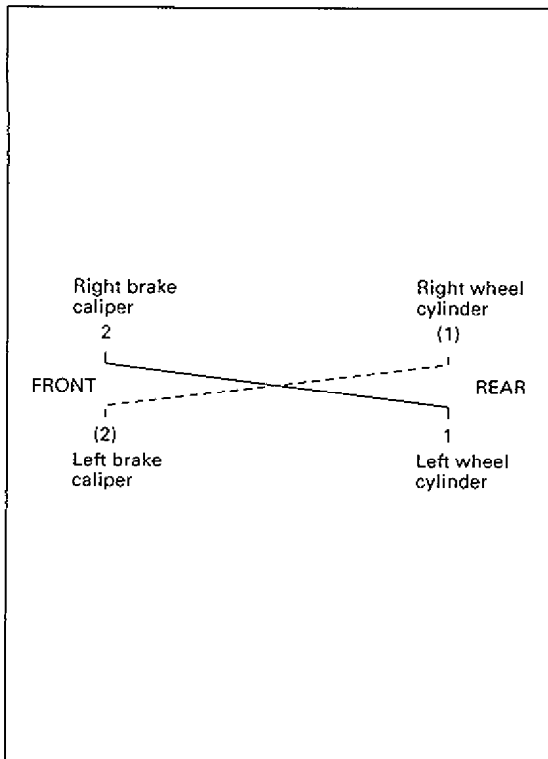
NOTE:

Perform bleeding operation starting with wheel cylinder farthest from master cylinder and then at front caliper of the same brake line. Do the same on the other brake line.

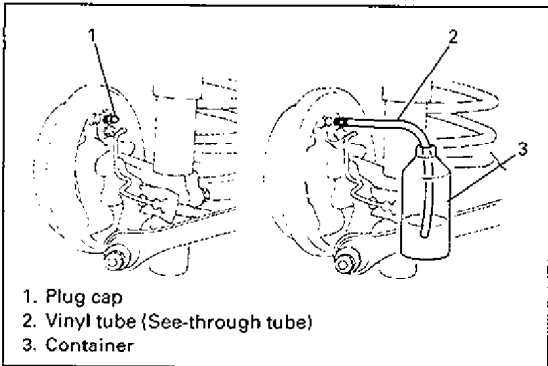
- 1) Fill master cylinder reservoir with brake fluid and keep at least one-half full of fluid during bleeding operation.
- 2) Remove bleeder plug cap.
Attach a vinyl tube to bleeder plug, and insert the other end into container.

- 3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one-half turn.

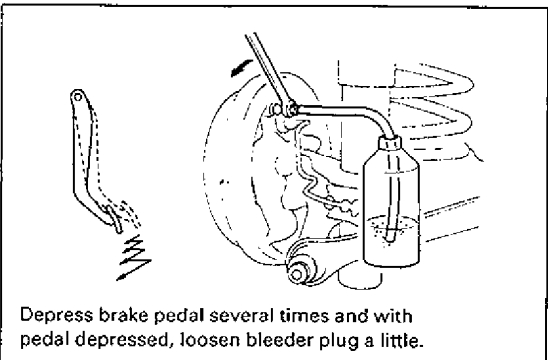
- 4) When fluid pressure in the cylinder is almost depleted, retighten bleeder plug.
- 5) Repeat this operation until there are no more air bubbles in hydraulic line.



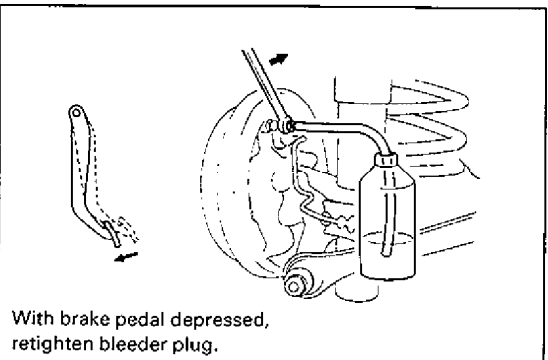
75F00-5-24-2



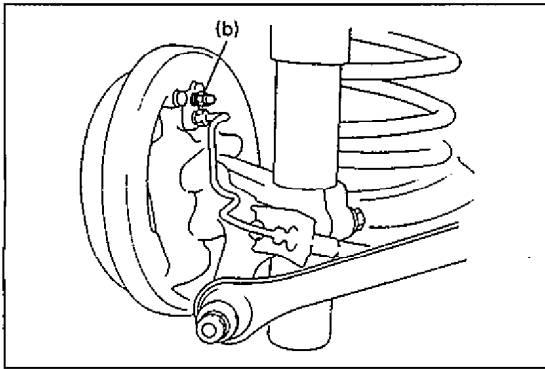
75F00-5-24-3



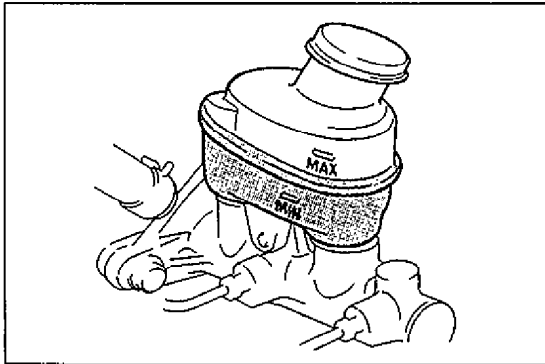
75F00-5-24-4



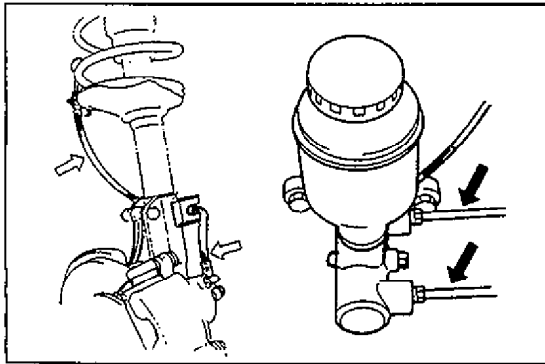
75F00-5-24-5



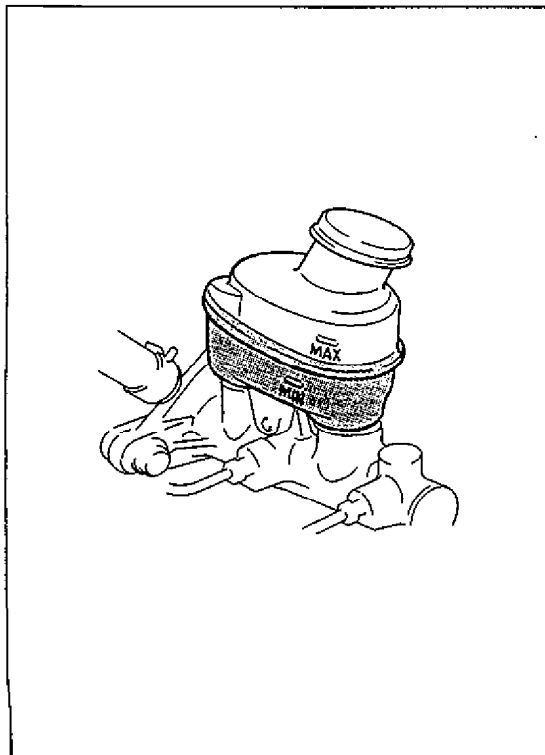
75F00-5-25-1



75F00-5-25-2



75F00-5-25-3



75F00-5-25-5

- 6) When bubbles stop, depress and hold brake pedal and tighten bleeder plug.

Tightening Torque

- (b): 8 N·m (0.8 kg-m, 6.0 lb-ft) For Rear brake
11 N·m (1.1 kg-m, 8.0 lb-ft) For Front brake

- 7) Then attach bleeder plug cap.
8) After completing bleeding operation, apply fluid pressure to pipe line and check for leakage.
9) Replenish fluid into reservoir up to specified level.
10) Check brake pedal for "sponginess". If found spongy, repeat entire procedure of bleeding.

BRAKE HOSE AND PIPE INSPECTION

The brake hose assembly should be checked for road hazard damage, for cracks and chafing of the outer cover, for leaks and blisters. A light and mirror may be needed for an adequate inspection. If any of the above conditions are observed on the brake hose, it is necessary to replace it.

Inspect the pipe for damage, cracks, dents and corrosion. If any defect is found, replace it.

BRAKE FLUID LEVEL INSPECTION

Be sure to use particular brake fluid either as indicated on reservoir cap of that vehicle or recommended in owner's manual which comes along with that vehicle.

Use of any other fluid is strictly prohibited.

Fluid level should be between MIN and MAX lines marked on reservoir.

When warning light lights sometimes during driving, replenish fluid to MAX line.

When fluid decreases quickly, inspect brake system for leakage. Correct leaky points and then refill to specified level.

CAUTION:

Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic brake system and water mixed into brake fluid will lower fluid boiling point. Keep all fluid containers capped to prevent contamination.

REPAIR

FRONT BRAKE HOSE/PIPE

- 1) Raise and support vehicle properly. Remove tire and wheel.

This operation is not necessary when removing pipes connecting master cylinder and P valve.

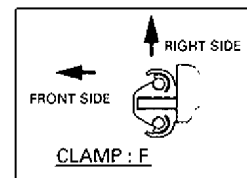
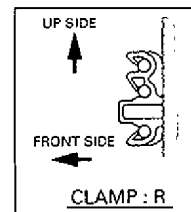
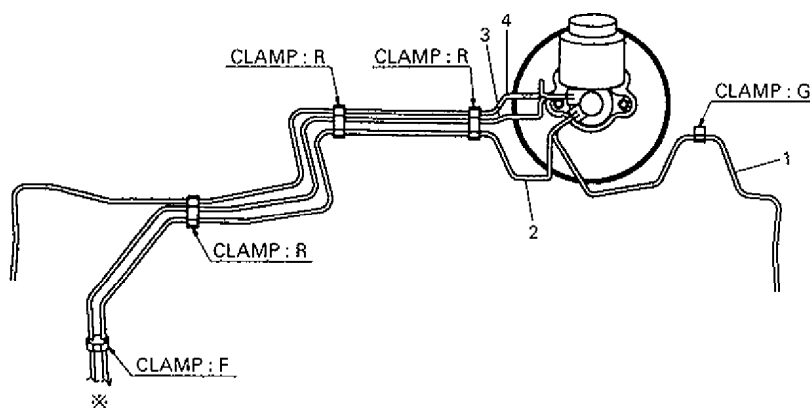
- 2) Clean dirt and foreign material from both flexible hose end and pipe end fittings. Remove brake flexible hose or pipe.

- 3) Reverse brake flexible hose installation procedure.

For installation, make sure that steering wheel is in straightforward position and flexible hose has not twist or kink. Check to make sure that flexible 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.

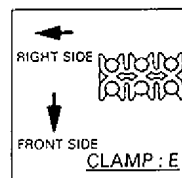
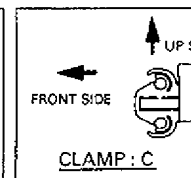
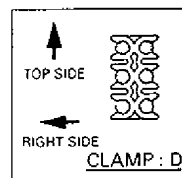
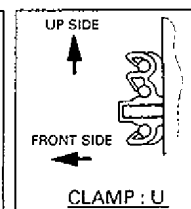
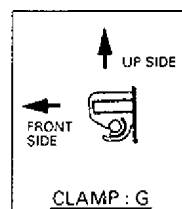
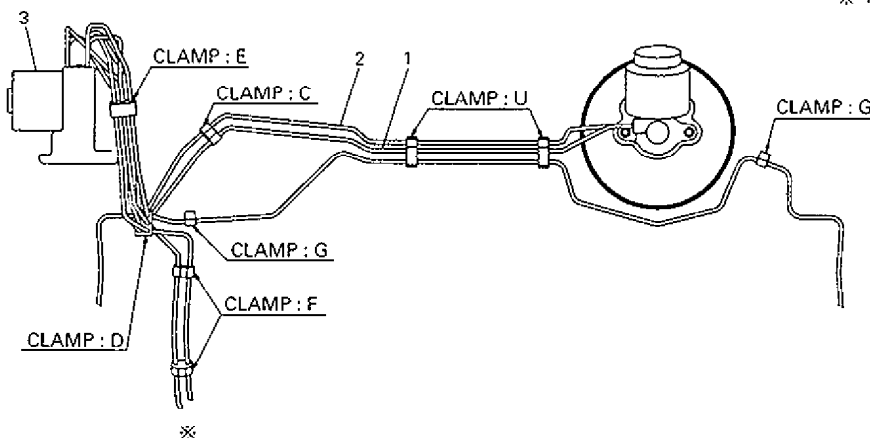
- 4) Perform brake test and check installed part for fluid leakage.

For left-hand steering vehicle not equipped with ABS



1. From Master Cylinder Primary to Right Caliper
 2. From Master Cylinder Secondary to 4-way Joint (Left)
 3. From Master Cylinder Primary to 4-way Joint (Right)
 4. From Master Cylinder Secondary to Left Caliper
- ※ To Rear Brake Pipe

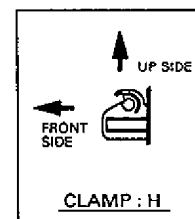
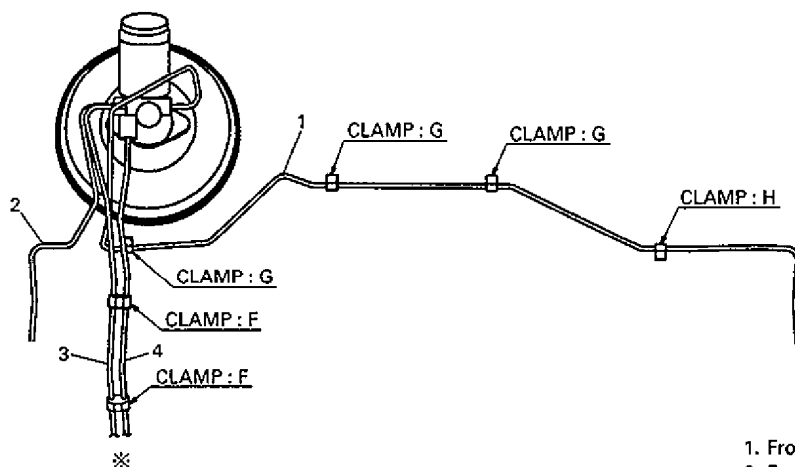
For left-hand steering vehicle equipped with ABS



	N-m	kg-m	lb-ft
Tightening torque for brake flare nut	16	1.6	11.5
Tightening torque for bleeder plug	11	1.1	8.0

1. From Master Cylinder Secondary to H.U.
 2. From Master Cylinder Primary to H.U.
 3. Hydraulic Unit (H.U.)
- ※ To Rear Brake Pipe

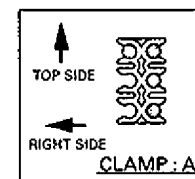
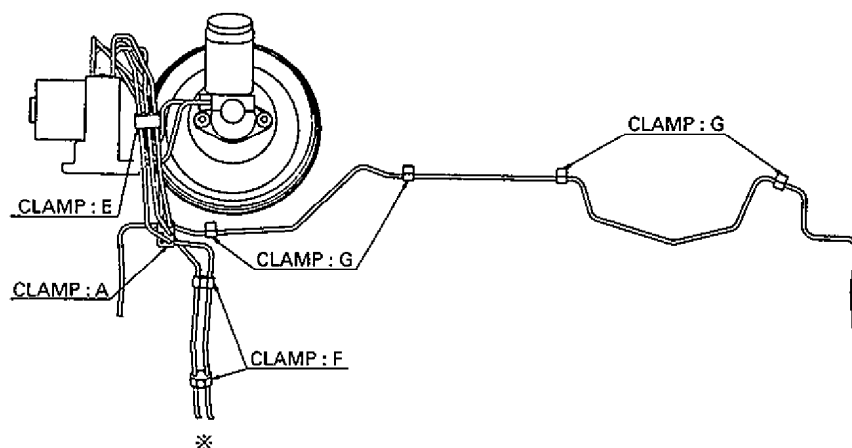
For right-hand steering vehicle not equipped with ABS



For clamps F and G,
refer to previous page

1. From Master Cylinder Secondary to Left Caliper
 2. From Master Cylinder Primary to Right Caliper
 3. From Master Cylinder Secondary to 4-way Joint (Right)
 4. From Master Cylinder Primary to 4-way Joint (Left)
- ※ To Rear Brake Pipe

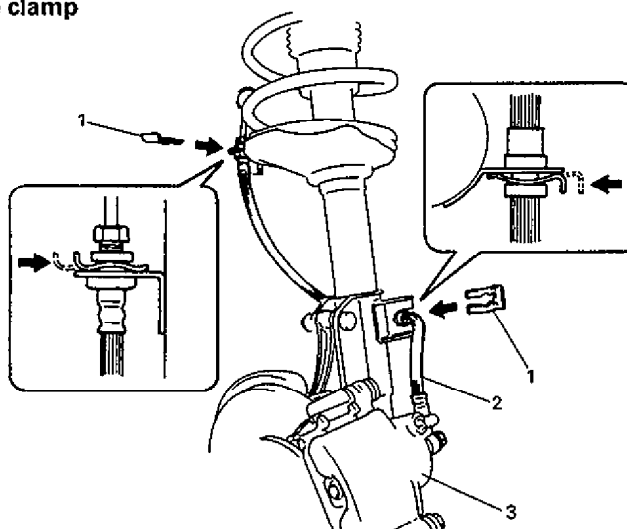
For right-hand steering vehicle equipped with ABS



For clamps E, G and F,
refer to previous page

※ To Rear Brake Pipe

For front brake flexible hose clamp



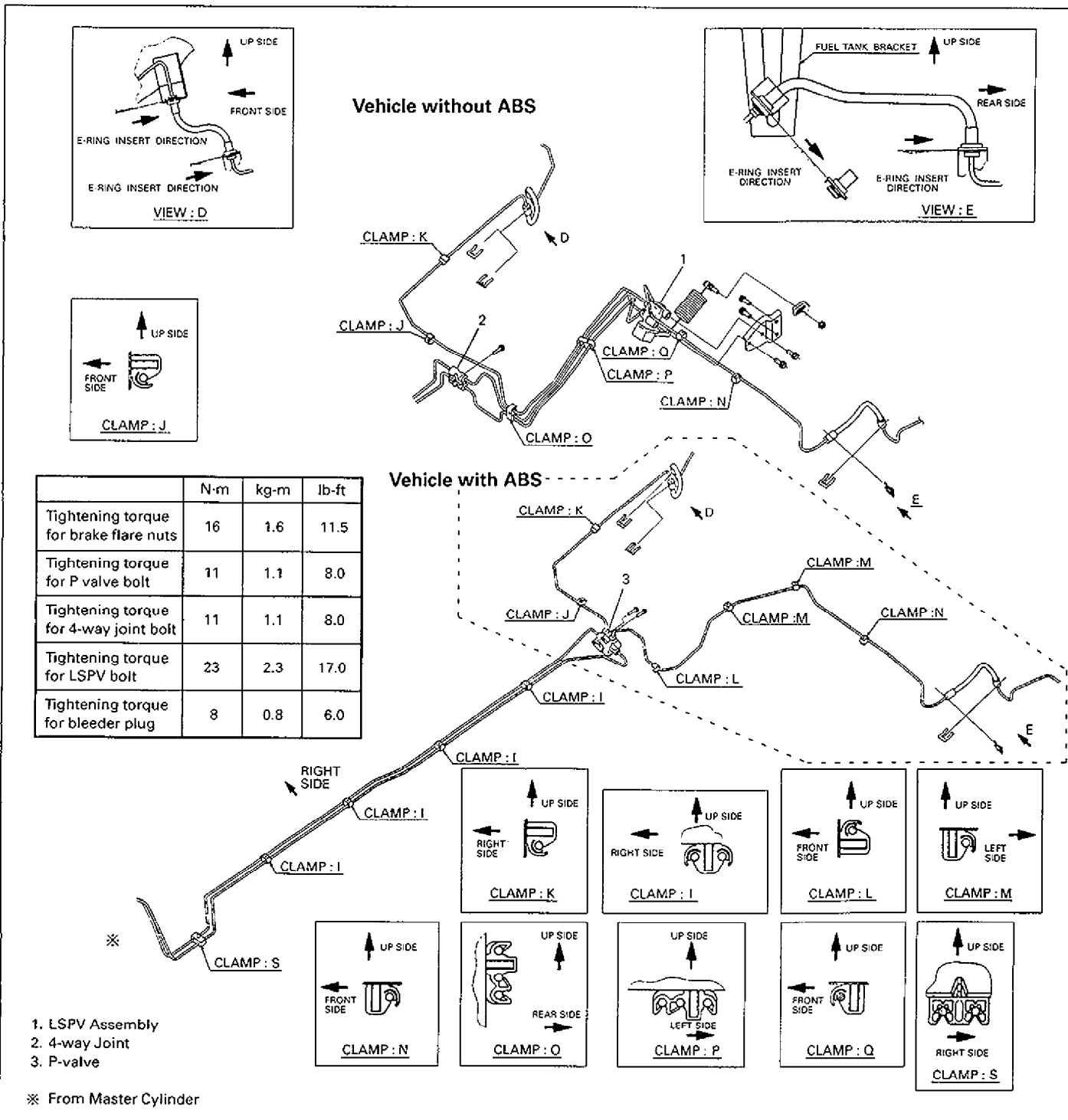
1. E-ring
2. Flexible hose
3. Brake caliper

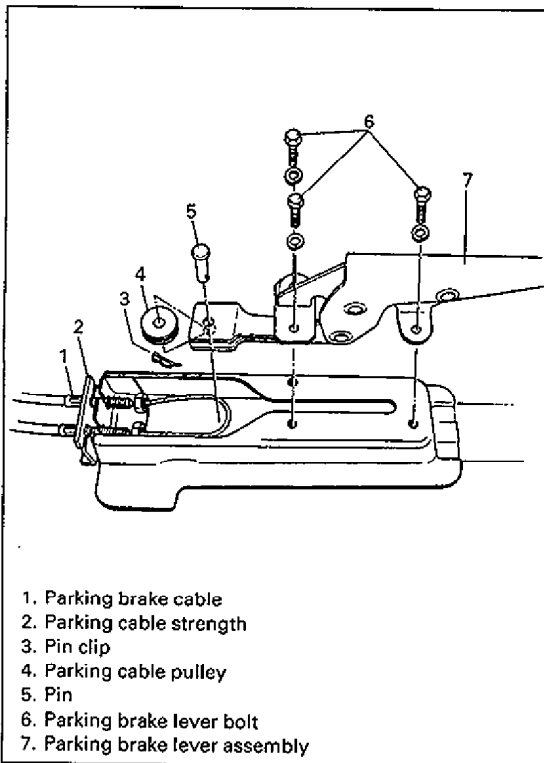
REAR BRAKE HOSE/PIPE

- 1) Raise and support vehicle properly. Remove tire and wheel.
- 2) Clean dirt and foreign material from both flexible hose end and pipe end fittings. Remove brake flexible hose or pipe.
- 3) Reverse brake flexible hose installation procedure. Fill and maintain brake fluid level in reservoir. Bleed brake system.
- 4) Perform brake test and check each installed part for fluid leakage.

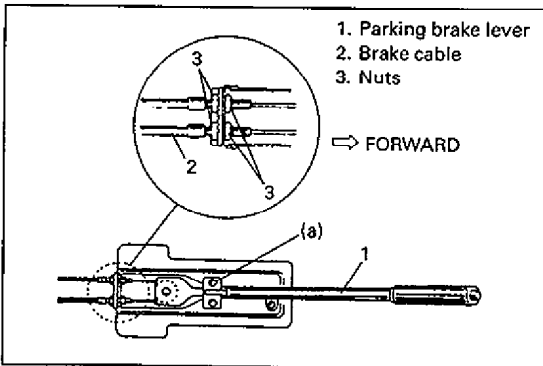
PRECAUTION FOR INSTALLATION

- Never reuse protector nut once removed. Be sure to use a new one.
- Install clamps properly referring to figure below and tighten bolts.
- When installing hose, make sure that it has no twist or kink.





75F00-5-29-2



75F00-5-29-3

PARKING BRAKE LEVER

REMOVAL

- 1) Remove parking brake lever cover.
- 2) Disconnect lead wire of parking brake switch at coupler.

NOTE:

Don't disassemble parking brake lever switch. It must be removed and installed as a complete switch assembly.

- 3) Loosen parking brake cable locking nuts.
- 4) Remove parking brake lever bolts.
- 5) Remove pin clip and cable pulley from parking brake lever body, and brake lever assembly from cable.

INSTALLATION

- 1) Install in reverse order of steps 2) to 7) of REMOVAL.

Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

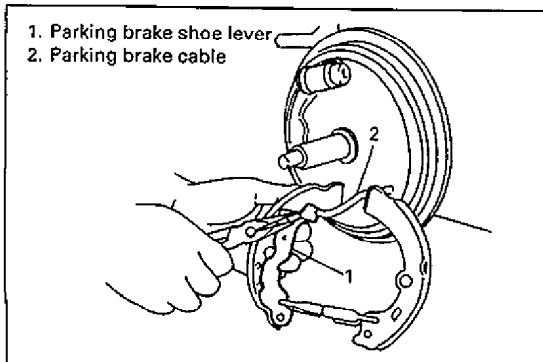
- 2) Adjust parking brake lever. Refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in this section.
- 3) Check rear brakes for dragging and brake system for proper performance.
- 4) Install parking brake lever cover.

PARKING BRAKE CABLE

REMOVAL

- 1) Remove brake drum. (Refer to steps 1) to 6) of BRAKE DRUM REMOVAL of this section.)

75F00-5-29-4



75F00-5-29-5

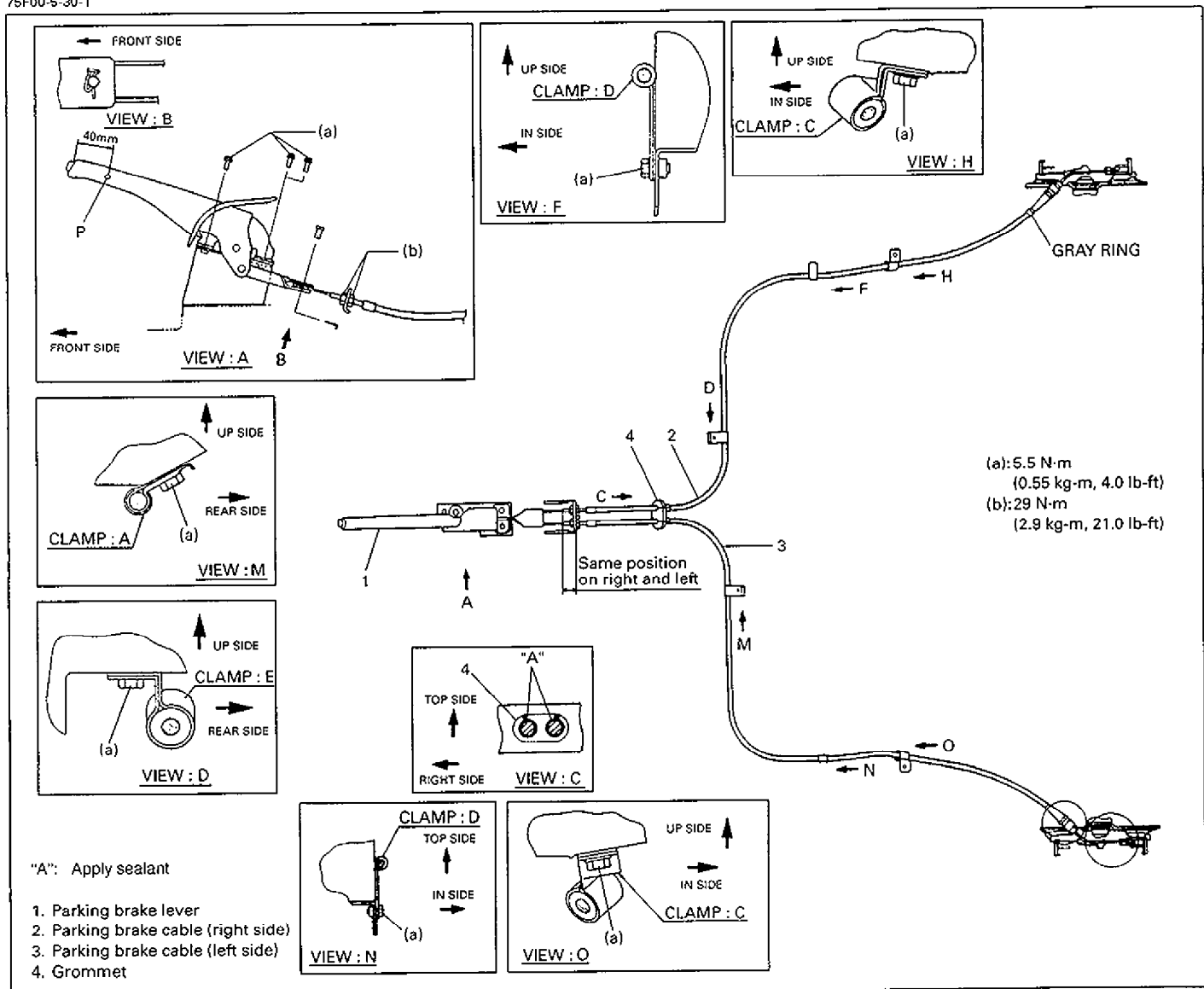
- 2) Disconnect parking brake cable from brake shoe lever. (Refer to step 2) & 4) of BRAKE SHOE REMOVAL of this section.)
- 3) Disconnect brake cable from brake back plate. (Refer to step 4) of BRAKE BACK PLATE REMOVAL.)

NOTE:

When it is necessary to remove both right and left parking brake cable, repeat above steps 1) to 3) on right and left wheels.

- 4) Remove cable from parking brake lever. (Refer to steps 1) to 5) of PARKING BRAKE LEVER REMOVAL.)
- 5) Remove cable from vehicle body.

75F00-5-30-1



75F00-5-30-4

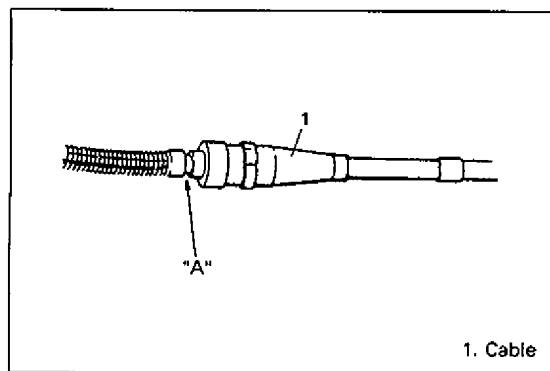
INSTALLATION

- 1) Apply sealant to inside of grommet at indicated position in figure.

"A" : Sealant 99000-31090

- 2) Install parking brake cable so that its gray ring side comes to the right.
- 3) Connect cable to parking brake lever. (Refer to step 1) of BRAKE LEVER INSTALLATION of this section, page 5-29.) Don't make lever adjustment at this point yet.

75F00-30-5



75F00-5-31-1

- 4) Apply water tight sealant "A" around cable at indicated position in figure and connect it to back plate with clip.

"A" : Sealant 99000-31090

- 5) Connect cable to brake shoe lever and install brake shoes to back plate. (Refer to steps 1) to 2) of BRAKE SHOE INSTALLATION of this section.)
- 6) Install brake drum. (Refer to steps 1) to 6) of BRAKE DRUM INSTALLATION of this section.)

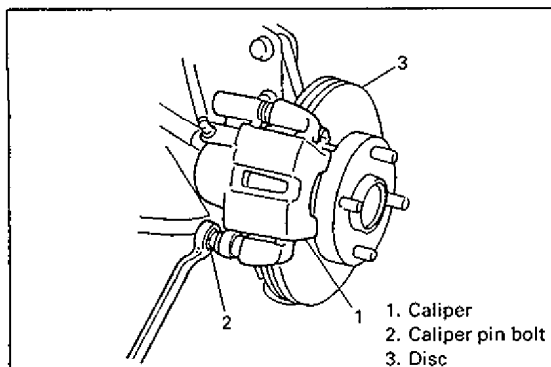
NOTE:

Above steps 3) to 5) must be performed on both right and left wheels.

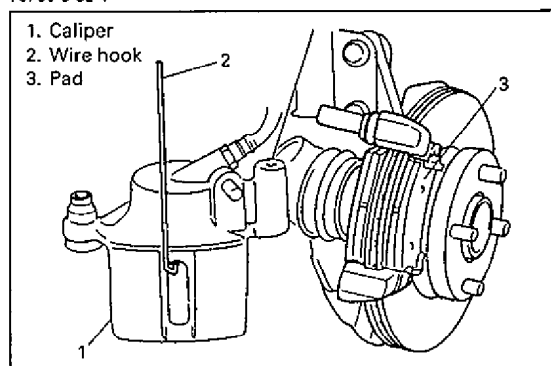
- 7) Clamp cable securely referring to figure.
- 8) Upon completion of installation, adjust cable.
(Refer to PARKING BRAKE INSPECTION AND ADJUSTMENT of this section, page 5-22.)

Then check brake drum for dragging and brake system for proper performance. After removing vehicle from hoist, brake test should be performed.

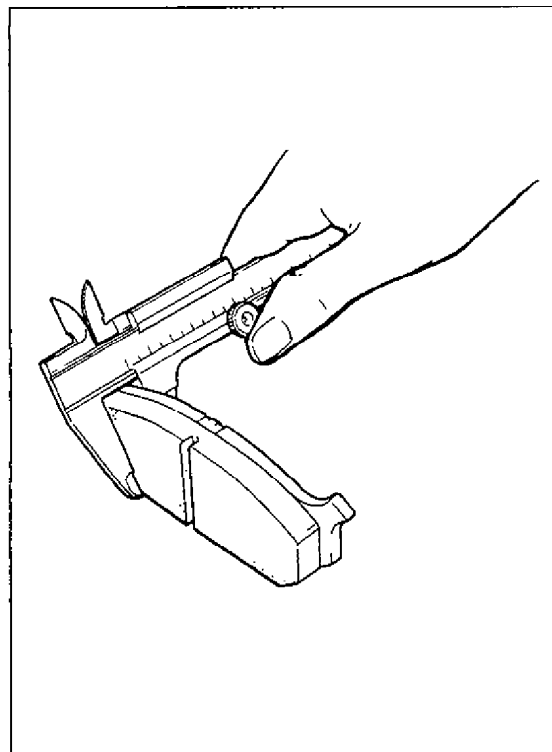
75F00-5-31-3



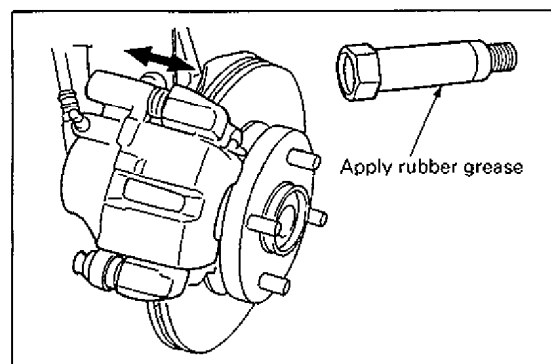
75F00-5-32-1



75F00-5-32-2



75F00-5-32-4



75F00-5-32-5

BRAKE PAD

REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Remove caliper pin bolt.

- 3) Remove caliper from caliper carrier.

NOTE:

Hang removed caliper with a wire hook or the like so as to prevent brake flexible hose from bending and twisting excessively or being pulled.

Don't operate brake pedal with pads removed.

- 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 + pad rim)

Standard : 15 mm (0.59 in.)

Limit : 6 mm (0.24 in.)

NOTE:

When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.

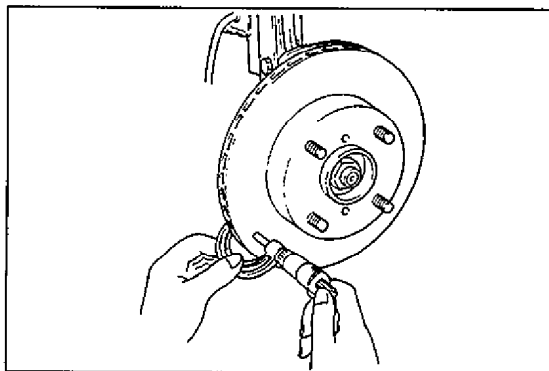
Cylinder Slide Guide Pin

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 one whose viscosity is less affected by such low temperature as -40°C (-40°F).

Bush Dust Boot and Pin Slide Bush

Check boot and bush for breakage, crack and damage. If defective, replace



75F00-5-33-1

Brake Disc

Check disc surface for scratches in wearing parts.

Scratches on disc surface noticed at the time of specified inspection or replacement are normal and disc is not defective unless they are serious.

But when there are deep scratches or scratches all over disc surface, replace it. When only one side is scratched, polish and correct that side.

Disc thickness

Standard : 17.0 mm (0.67 in.)

Limit : 15.0 mm (0.59 in.)

Use wheel nuts to hold the disc securely against the hub, then mount a dial indicator as shown.

To measure deflection of disc, take measurement at 2 points on its periphery and center with dial gauge while rotating it.

Limit on disc deflection: 0.15 mm (0.006 in.)

Special Tool

(A): 09900-20606

(B): 09900-20701

NOTE:

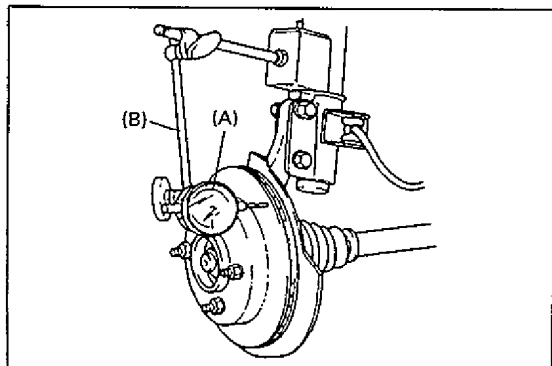
Check front wheel bearing for looseness before measurement.

INSTALLATION

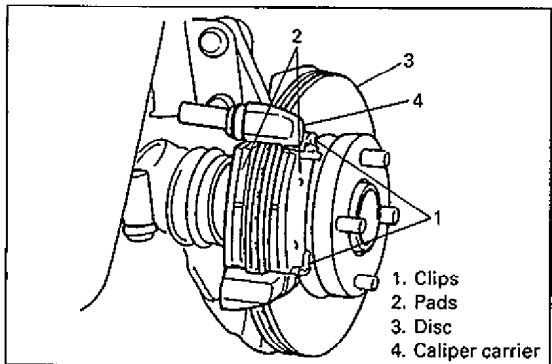
NOTE:

See NOTE at the beginning of this section.

1) Install pad clips and pads.



75F00-5-33-2



75F00-5-33-3

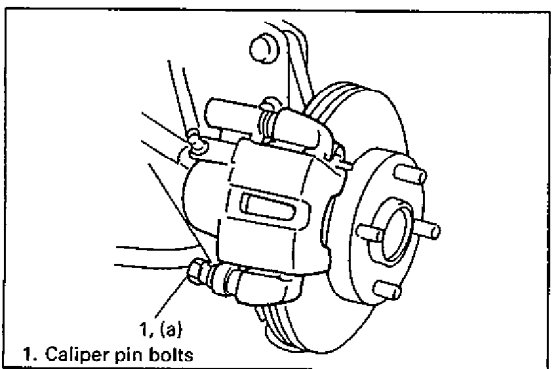
2) Install caliper and torque caliper pin bolt to specification.

NOTE:

Make sure that boots are fit into groove securely.

Tightening Torque

(a): 34 N·m (3.4 kg-m, 25.0 lb-ft)



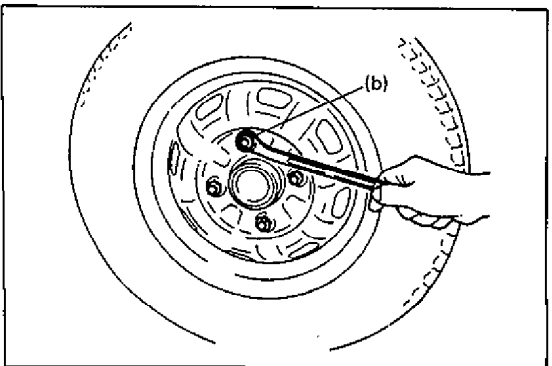
75F00-5-33-4

3) Torque front wheel nuts to specification.

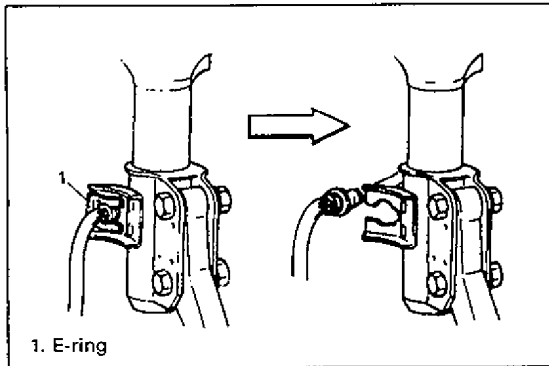
Tightening Torque

(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

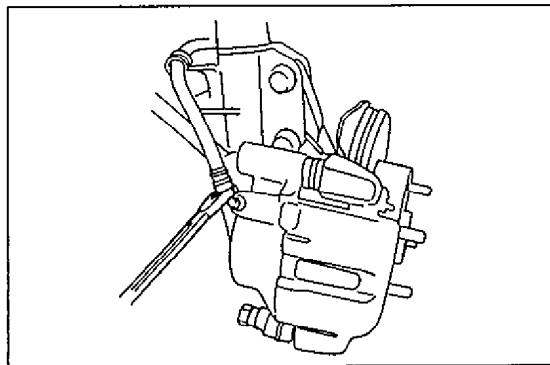
4) Upon completion of installation, perform brake test.



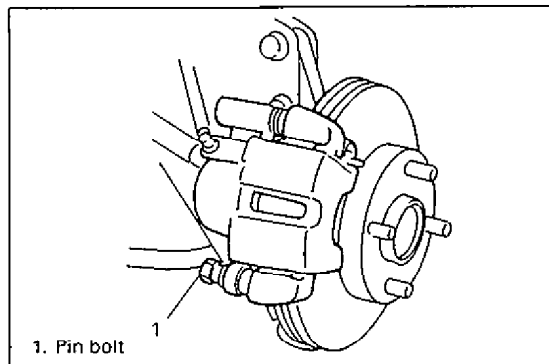
75F00-5-33-5



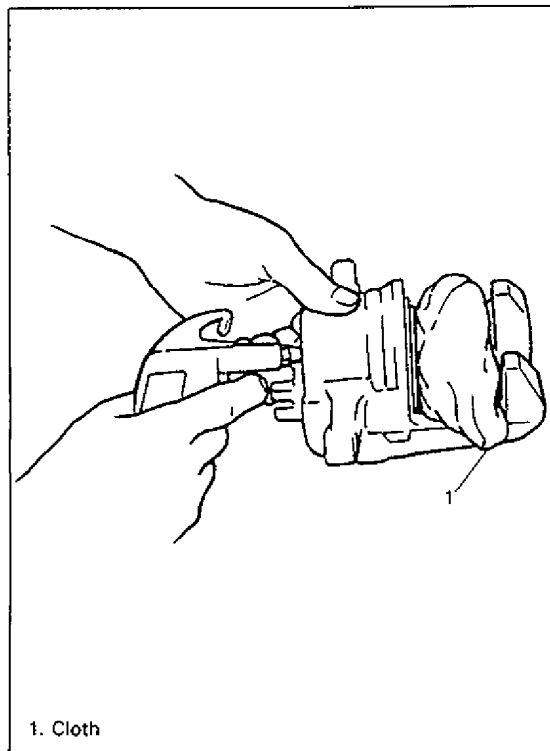
75F00-5-34-1



75F00-5-34-2



75F00-5-34-3



75F00-5-34-5

CALIPER ASSEMBLY

REMOVAL

- 1) Hoist vehicle and remove wheel.
- 2) Remove E-ring.

- 3) Loosen flexible hose joint bolt a little at caliper.

CAUTION:

Be careful not to twist flexible hose while loosening the bolt.

- 4) Remove caliper pin bolt.
- 5) Remove caliper from carrier.
- 6) Disconnect flexible hose from caliper using care not to twist it. As this will allow fluid to flow out of flexible hose, have a container ready beforehand.

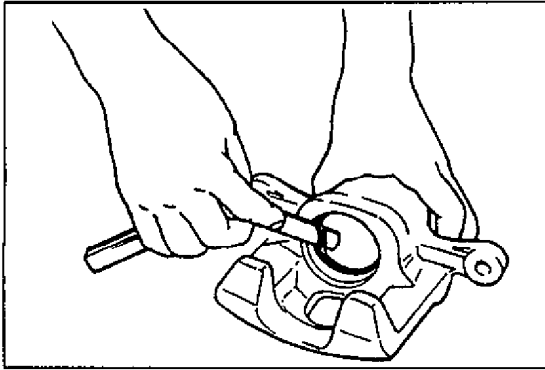
DISASSEMBLY

Before disassembly, clean all around caliper with brake fluid.

- 1) 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.

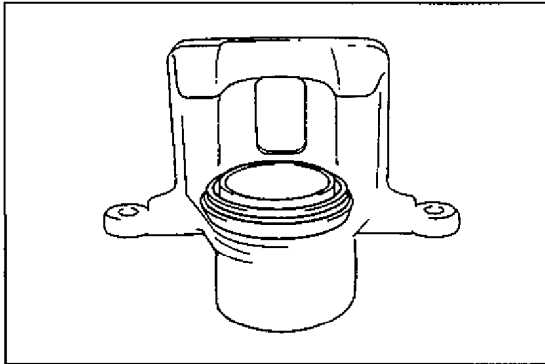


75F00-5-35-1

- 2) Remove piston seal using a thin blade like a thickness gauge, etc.

CAUTION:

Be careful not to damage inside (bore side) of cylinder.

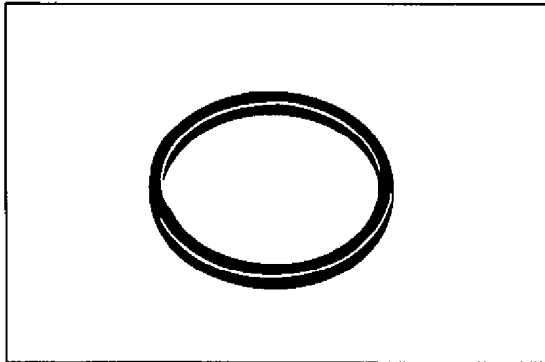


75F00-5-35-2

INSPECTION

Cylinder Boot

Check boots for breakage, crack and damage. If defective, replace.



75F00-5-35-3

Piston Seal

Excessive or uneven wear of pad lining may indicate unsmooth return of the piston. In such a case, replace rubber seal.

ASSEMBLY

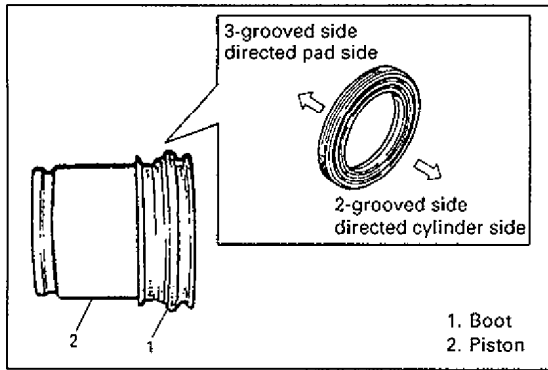
Reassemble front brake in reverse order of disassembly, noting the following points.

CAUTION:

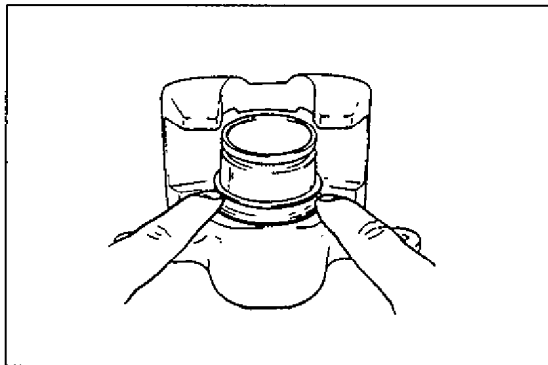
- Wash each part cleanly before installation in the same fluid as the one used in master cylinder reservoir.
- Never use other fluid or thinner.
- Before installing piston and piston seal to cylinder, apply fluid to them.
- After reassembling brake lines, bleed air from them.

Piston Seal

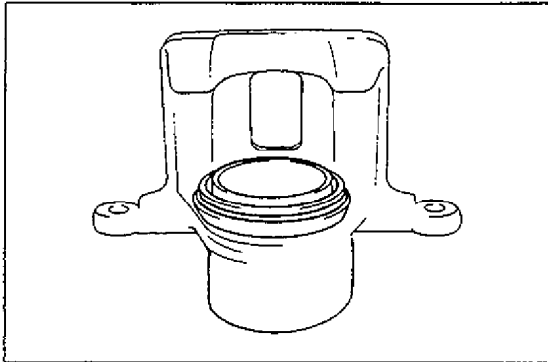
Piston seal is used to seal piston and cylinder and to adjust clearance between pad and disc. Replace with a new one at every overhaul. Fit piston seal into groove in cylinder taking care not to twist it.



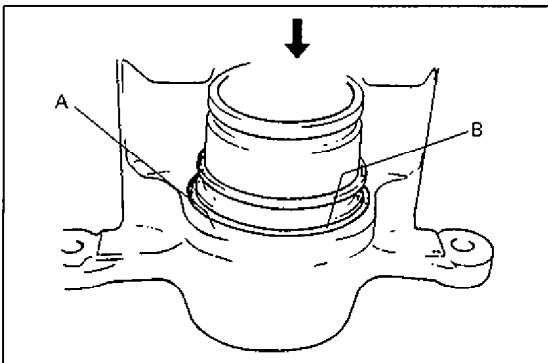
75F00-5-36-1



75F00-5-36-2



75F00-5-36-3



75F00-5-36-4

Piston and Boot

1) Before inserting piston into cylinder, install boot onto piston as shown.

2) Fit boot as it is in figure into boot groove in cylinder with fingers.

3) Insert piston into cylinder by hand and fit boot in boot groove in piston.

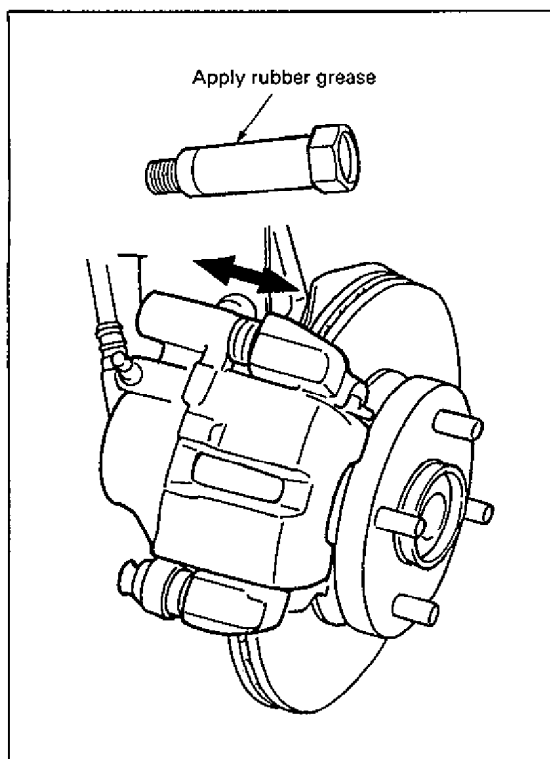
4) To confirm that boot is fitted in its groove in cylinder properly, pull piston out of cylinder a little but do not take it all out.

NOTE:

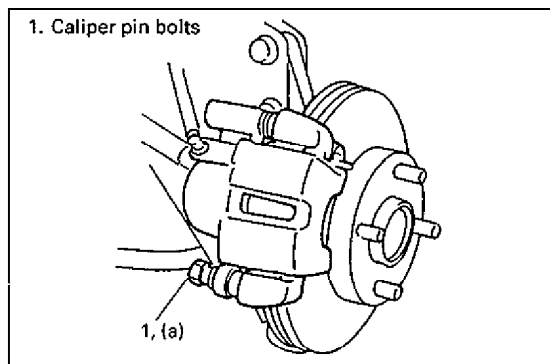
Boot's face B should be at the same level from cylinder's face A all around.

5) Insert piston into cylinder by hand.

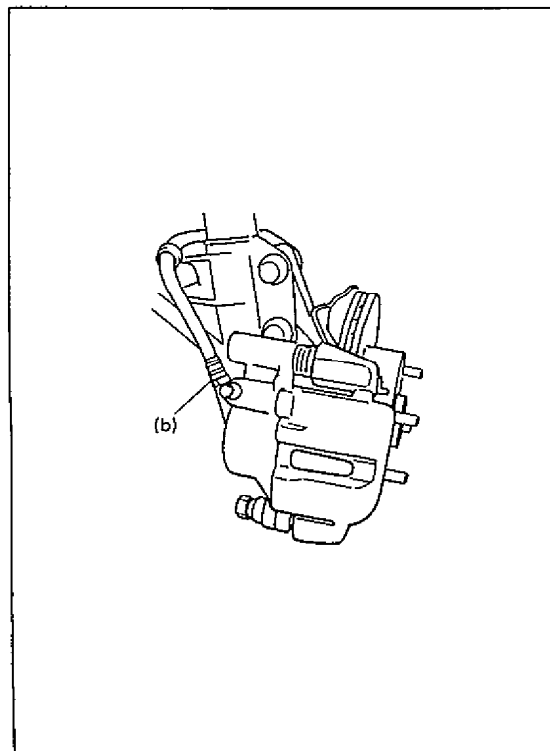
6) Install boot set ring securely.



75F00-5-37-2



75F00-5-37-3



75F00-5-37-5

Caliper

Before installing caliper (cylinder body) to carrier, check to ensure that caliper can be moved smoothly in thrust direction.

NOTE:

Where temperature gets as low as -30°C (-22°F) in cold weather, use rubber grease whose viscosity varies very little even at -40°C (-40°F).

INSTALLATION

- 1) Connect caliper to flexible hose.
- 2) Apply grease to caliper pin, then install caliper to caliper carrier.
- 3) Torque caliper pin bolt to specification.

NOTE:

Make sure that boots are fit into groove securely.

Tightening Torque

(a): 34 N·m (3.4 kg-m, 24.5 lb-ft)

- 4) Torque flexible hose joint bolt to specification.

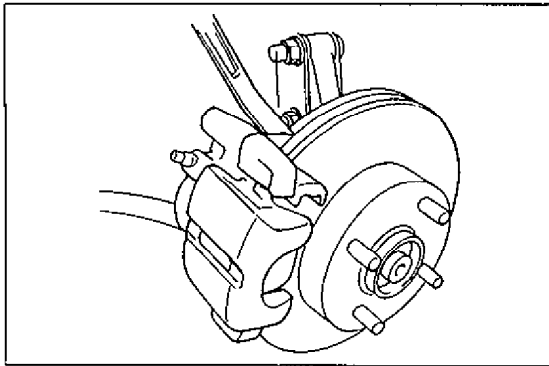
Tightening Torque

(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

WARNING:

Make sure that flexible hose is not twisted when tightening joint bolt. If it is twisted, reconnect it using care not to twist it.

- 5) Install E-ring to strut securely.
- 6) Lower hoist.
- 7) Torque wheel nuts to specification.
- 8) After completing installation, fill reservoir with brake fluid and bleed air from brake system. Perform brake test and check each installed part for oil leakage.



75F00-5-38-1

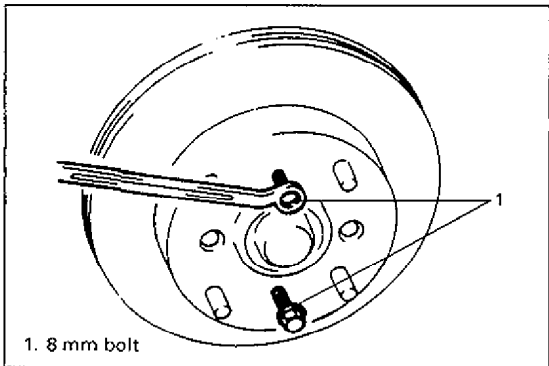
BRAKE DISC

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.



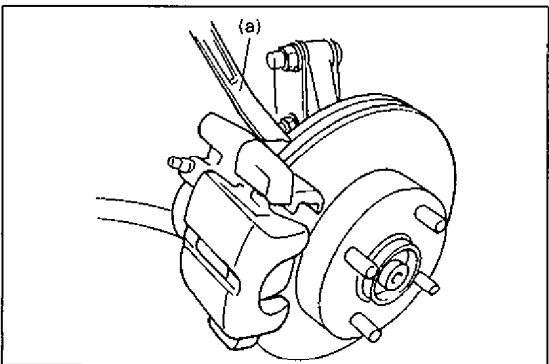
75F00-5-38-2

- 3) Pull brake disc off by using 8 mm bolts (2 pcs).

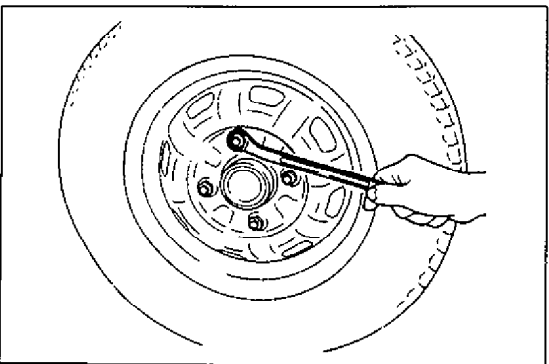
INSPECTION

Refer to BRAKE PAD INSPECTION

75F00-5-38-3



75F00-5-38-4



75F00-5-38-5

INSTALLATION

NOTE:

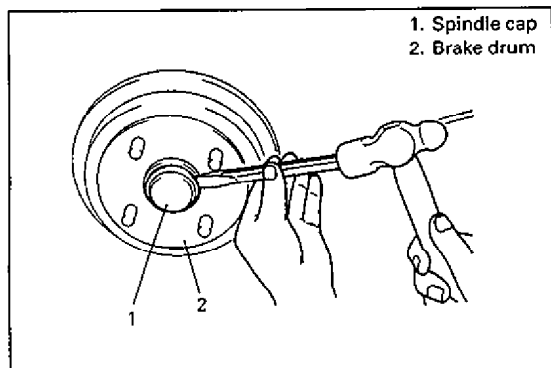
See NOTE at the beginning of this section.

- 1) Install disc to wheel hub.
- 2) Install caliper assembly to steering knuckle.
- 3) Torque caliper carrier bolts to specification.

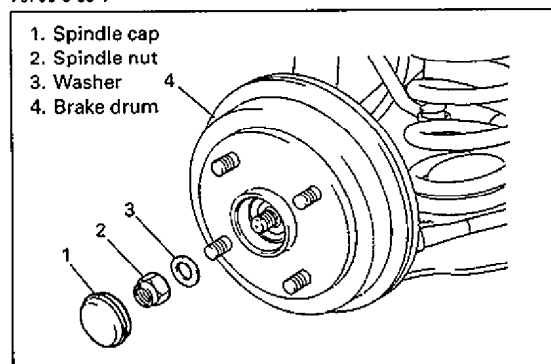
Tightening Torque

(a): 85 N·m (8.5 kg-m, 61.5 lb-ft)

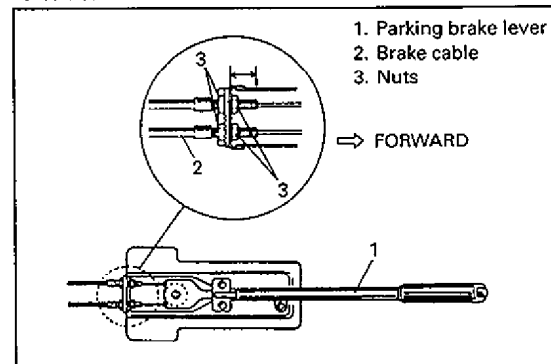
- 4) Torque front wheel nuts to specification. (Refer to page 5-42.)
- 5) Upon completion of installation, perform brake test.



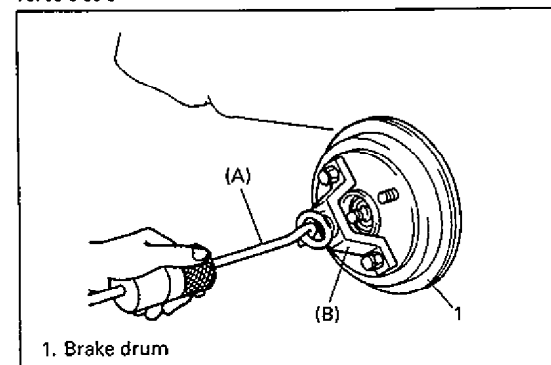
75F00-5-39-1



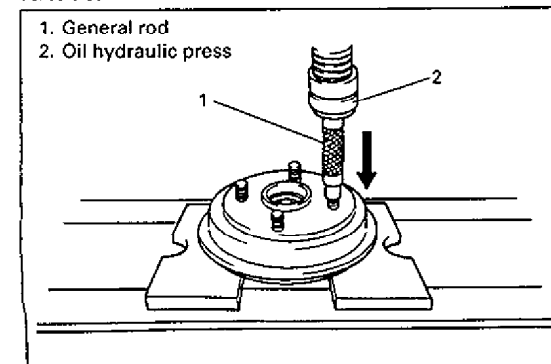
75F00-5-39-2



75F00-5-39-3



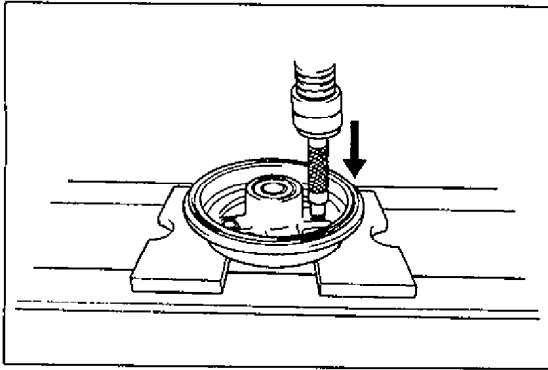
75F00-5-39-4



75F00-5-39-5

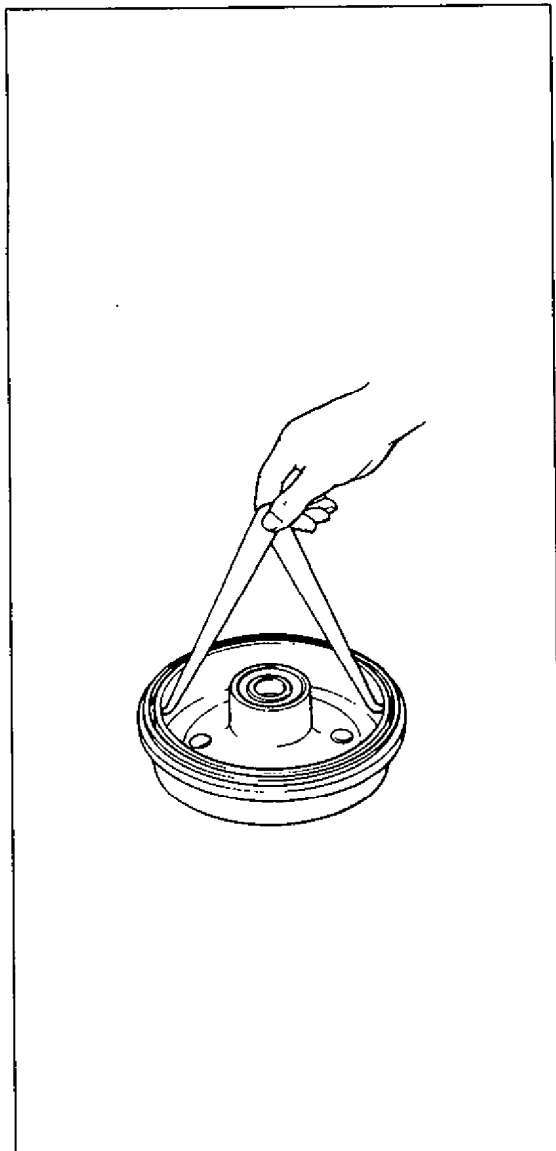
BRAKE DRUM REMOVAL

- 1) Hoist vehicle and remove wheel.
 - 2) Remove spindle cap as shown (by hammering lightly at 3 locations around it so as not to deform or cause damage to seating part of cap).
 - 3) Uncalk spindle nut, remove spindle nut and washer.
 - 4) Release parking brake lever.
 - 5) Loosen parking brake cable locking nuts.
 - 6) Pull brake drum off by using special tools.
- Special Tool**
(A): 09942-15510
(B): 09943-17912
- 7) Remove wheel stud bolt by using hydraulic press.



75F00-5-40-1

- 8) Insert new stud in drum hole and rotate it slowly to assure serrations are aligned with those made by replaced bolt.



75F00-5-41-3

INSPECTION

Brake Drum

Inspect drum for cleanliness. Check wear of its braking surface by measuring its inside diameter.

Brake drum ID

Standard : 180 mm (7.09 in.)

Service limit : 182 mm (7.16 in.)

Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.

Cracked, Scored, or Grooved Drum

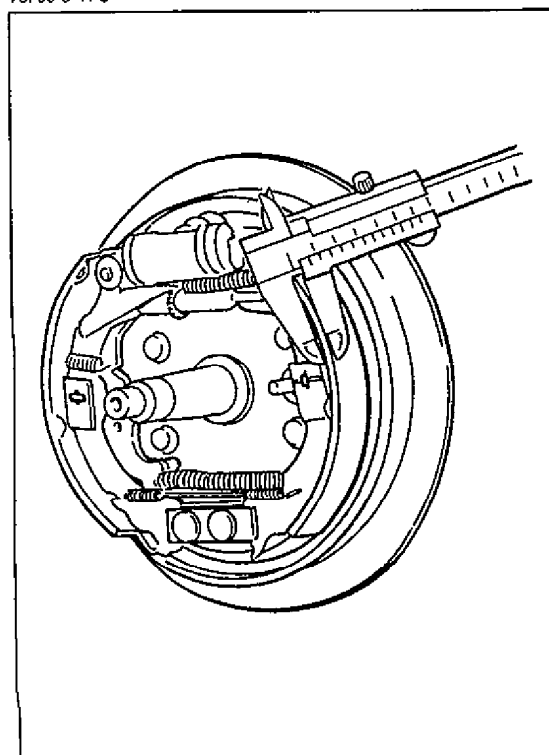
A cracked drum is unsafe for further service and must be replaced. Do not attempt to weld a cracked drum.

Smooth up any slight scores. Heavy or extensive scoring will cause excessive brake lining wear and it will probably be necessary to resurface drum braking surface.

If brake linings are slightly worn and drum is grooved, drum should be polished with fine emery cloth but should not be turned.

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.



75F00-5-41-5

Brake Shoe

Where lining is worn out beyond service limit, replace shoe.

Brake lining thickness (lining + shoe rim)

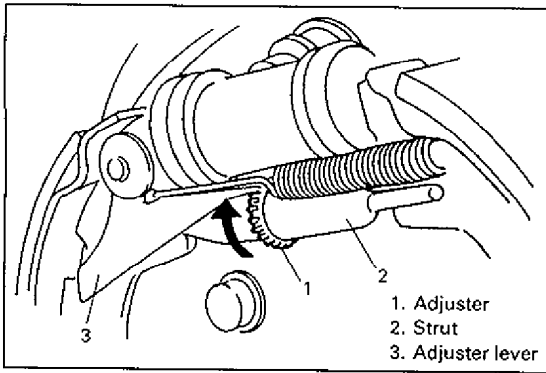
Standard : 5.5 mm (0.22 in.)

Service limit : 2.6 mm (0.10 in.)

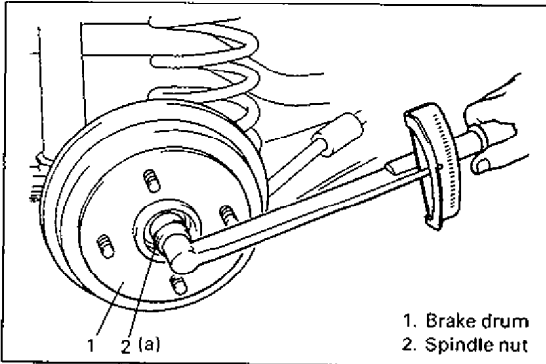
If one of brake linings is worn to service limit, all linings must be replaced at the same time.

CAUTION:

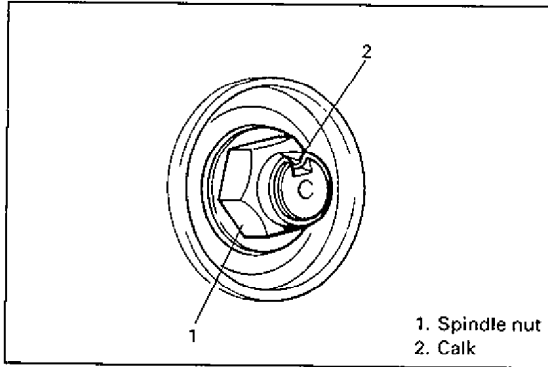
Never polish lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage drum. When it is required to correct lining, replace it with a new one.



75F00-5-42-1



75F00-5-42-2



75F00-5-42-3

INSTALLATION

NOTE:

See NOTE at the beginning of this section.

- 1) Before installing brake drum, to maximize brake shoe-to-drum clearance, turn strut adjuster to the direction shown in figure.

- 2) Install brake drum after making sure that inside of brake drum and brake shoes are free from dirt and oil.
- 3) Install washer and new spindle nut.
- 4) Tighten spindle nut to specified torque.

Tightening Torque

(a): 100 N·m (10.0 kg-m, 72.5 lb-ft)

- 5) Calk spindle nut.
- 6) Install spindle cap.

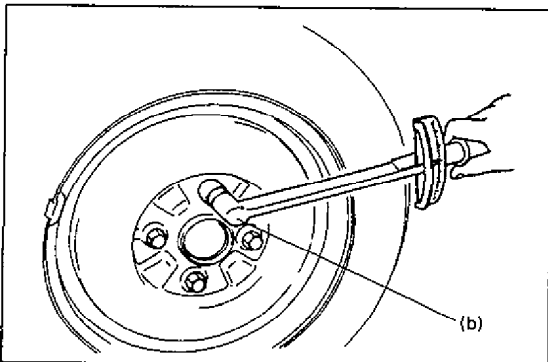
NOTE:

- When installing spindle cap, hammer lightly several locations on the collar of cap until collar comes closely into contact with brake drum.
- If fitting part of cap is deformed or damaged or if it is fitted loosely, replace with new one.

- 7) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.

Adjust parking brake cable. (For adjustment, see page 5-22.)

75F00-5-42-4



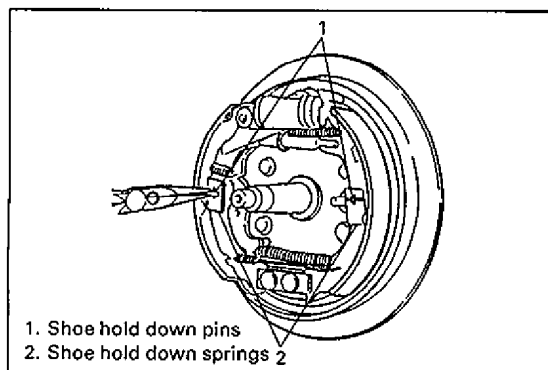
75F00-5-42-5

- 8) Install wheel and tighten wheel nuts so specified torque.

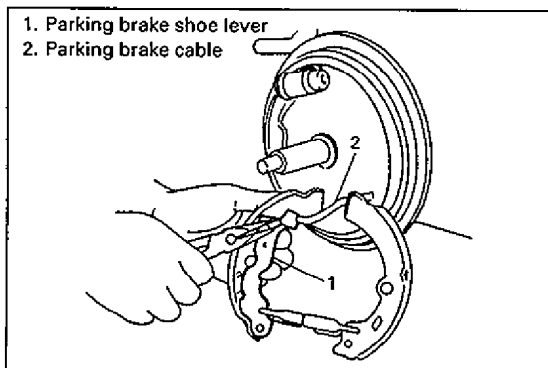
Tightening Torque

(b): 85 N·m (8.5 kg-m, 61.5 lb-ft)

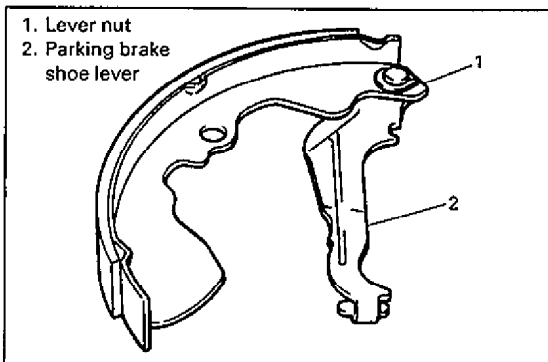
- 9) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).



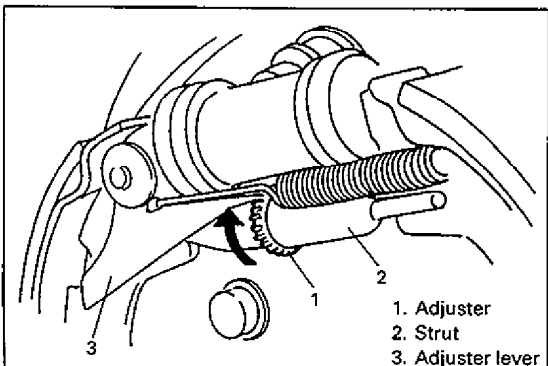
75F00-5-43-1



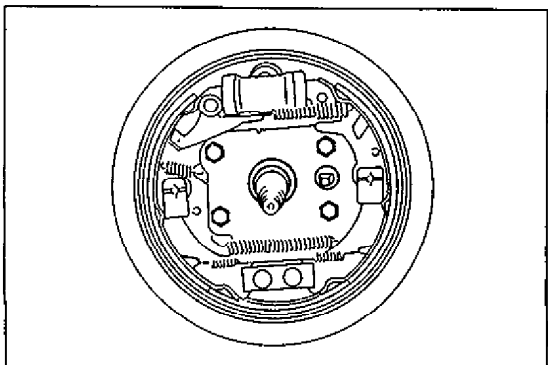
75F00-5-43-2



75F00-5-43-3



75F00-5-43-4



75F00-5-43-5

BRAKE SHOE

REMOVAL

- 1) Perform steps 1) to 6) of BRAKE DRUM REMOVAL.
- 2) Remove shoe hold down springs by turning shoe hold down pins as shown.
- 3) Remove brake shoes.
- 4) Disconnect parking brake shoe lever from parking brake cable.
- 5) Remove strut and springs.
- 6) Remove parking brake shoe lever from shoe rim.

INSPECTION

Brake Strut and Adjusting Lever

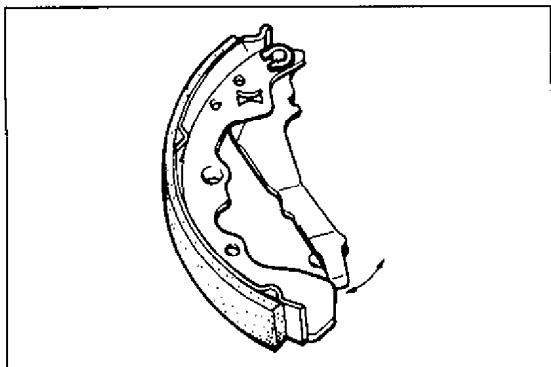
Inspect ratchet of strut and adjusting lever for wear or damage.

Check thread of strut for sticking and corrosion.

Springs

Inspect for damage, corrosion or weakening.

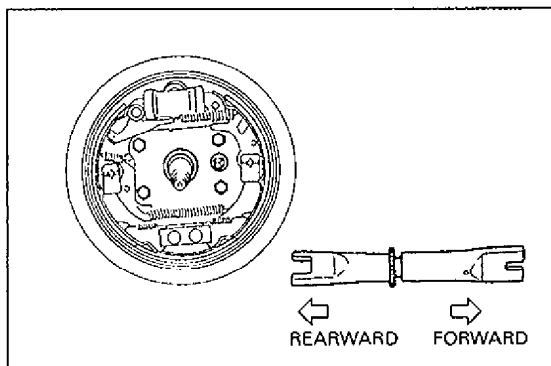
Inspect each part with arrow for rust. If found defective, replace.



75F00-5-44-1

Parking Shoe Lever

Inspect brake shoe lever for smooth movement along shoe rim. If defective, correct or replace.



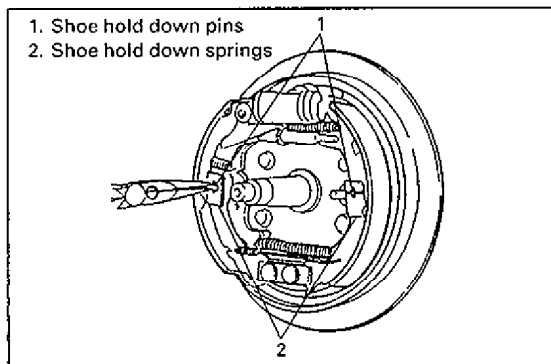
75F00-5-44-2

INSTALLATION

1) Assemble parts as shown in reverse order of removal.

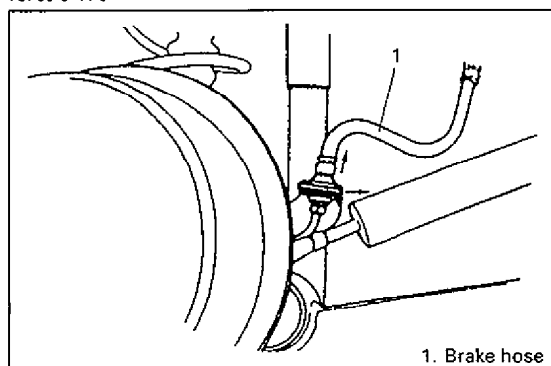
NOTE:

Removed lever nut should be replaced with new one.



75F00-5-44-3

- 2) Install shoe hold down springs by pushing them down in place and turning hold down pins.
- 3) For procedure hereafter, refer to steps 1) to 10) of BRAKE DRUM INSTALLATION.

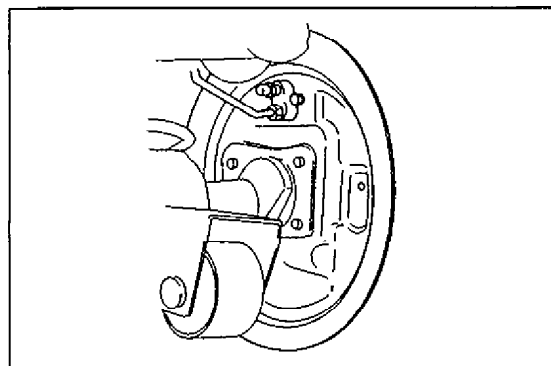


75F00-5-44-4

WHEEL CYLINDER

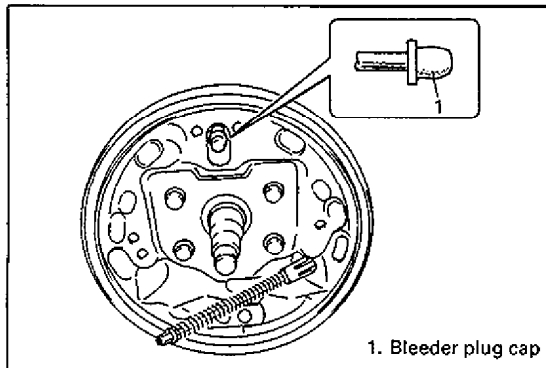
REMOVAL

- 1) Perform steps 1) to 6) of brake drum REMOVAL.
- 2) Perform steps 2) to 4) of brake shoe REMOVAL.
- 3) Remove E-ring from bracket.

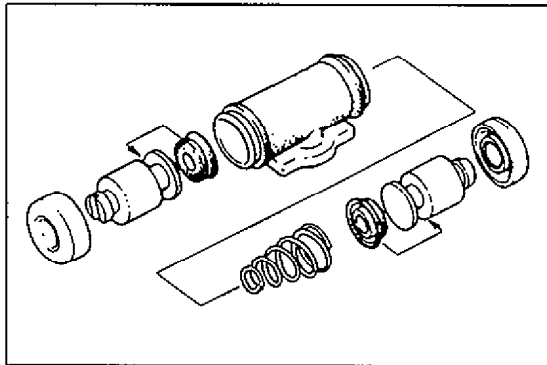


75F00-5-44-5

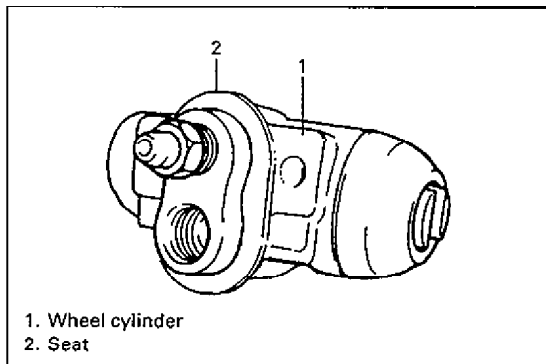
- 4) Loosen brake pipe flare nut but only within the extent that fluid does not leak.



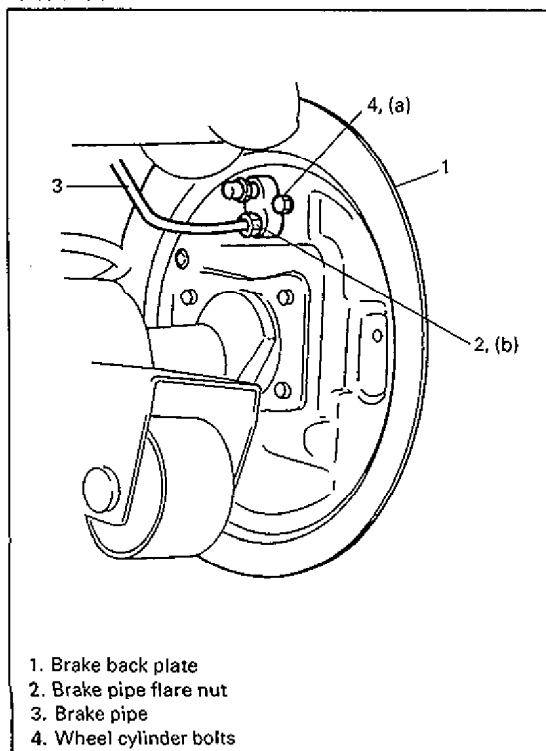
75F00-5-45-1



75F00-5-45-2



75F00-5-45-3



1. Brake back plate
2. Brake pipe flare nut
3. Brake pipe
4. Wheel cylinder bolts

75F00-5-45-5

- 5) Remove wheel cylinder mounting bolts. Disconnect brake pipe from wheel cylinder and put 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.

INSTALLATION

- 1) Install seat to wheel cylinder. Then take off bleeder plug cap from brake pipe and connect pipe to wheel cylinder just enough to prevent fluid from leaking.

- 2) Tighten wheel cylinder to brake back plate to specified torque.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 3) Torque flare nut of brake pipe which was connected in step 1) to specification.

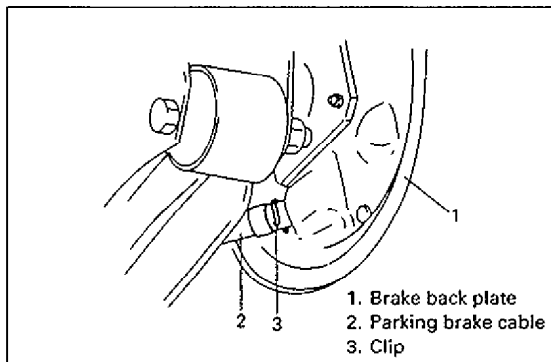
Tightening Torque

(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

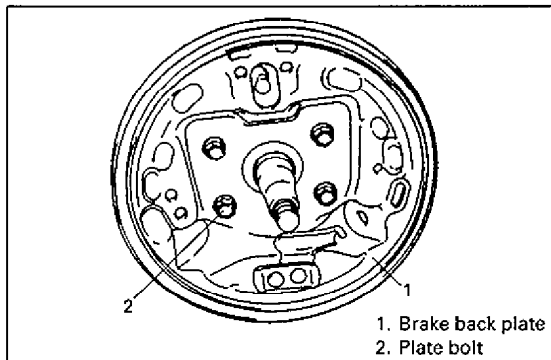
- 4) Install bleeder plug cap taken off from pipe back to bleeder plug.

- 5) Install brake shoes, referring to steps 1) and 2) of its INSTALLATION on page 5-44.
- 6) Install brake drum. (Refer to steps 1) to 6) of its INSTALLATION on page 5-42 of this section.
- 7) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, see page 5-24.)
- 8) Upon completion of all jobs, pull parking brake lever with about 20 kg (44 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.
Adjust parking brake cable. (For adjustment, see page 5-22.)
- 9) Tighten parking brake lever cover screw.
- 10) Install wheel and tighten wheel nuts to specified torque. (Refer to p.5-42.)
- 11) Check to ensure that brake drum is free from dragging and proper braking is obtained. Then remove vehicle from hoist and perform brake test (foot brake and parking brake).
- 12) Check each installed part for oil leakage.

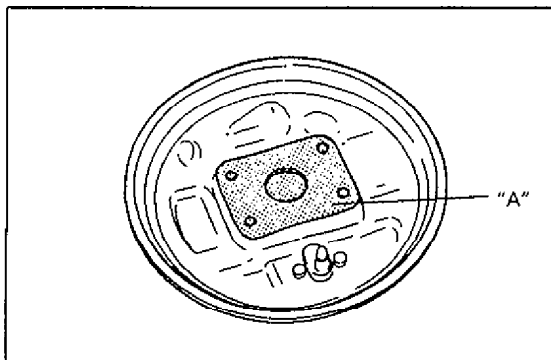
75F00-5-46-2



75F00-5-46-3



75F00-5-46-4



75F00-5-46-5

BRAKE BACK PLATE REMOVAL

- 1) Perform steps 1) to 6) of brake drum REMOVAL on page 5-39.
- 2) Perform steps 2) to 4) of brake shoe REMOVAL on page 5-43.
- 3) Perform steps 3) to 5) of wheel cylinder REMOVAL on page 5-44 and 45.
- 4) Remove parking brake cable securing clip and disconnect brake cable from brake back plate.
- 5) Remove brake back plate.

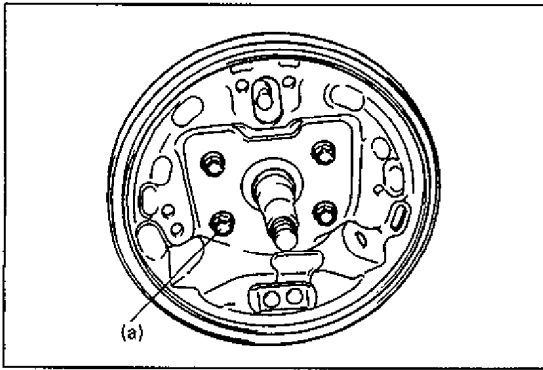
INSTALLATION

- 1) Apply water tight sealant to mating surfaces of brake back plate and rear axle.

"A": Sealant 99000-31090

NOTE:

In case of vehicle equipped with ABS, do not apply sealant around hole for wheel speed sensor.

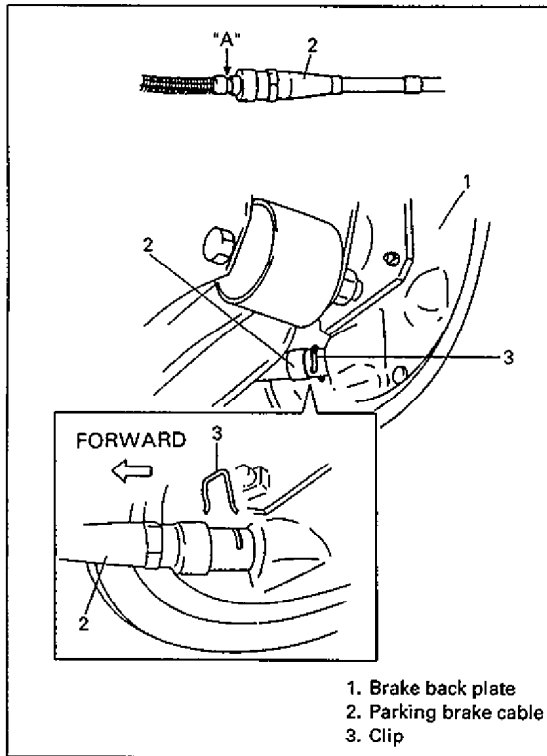


75F00-5-47-1

- 2) Install brake back plate and tighten back plate bolts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



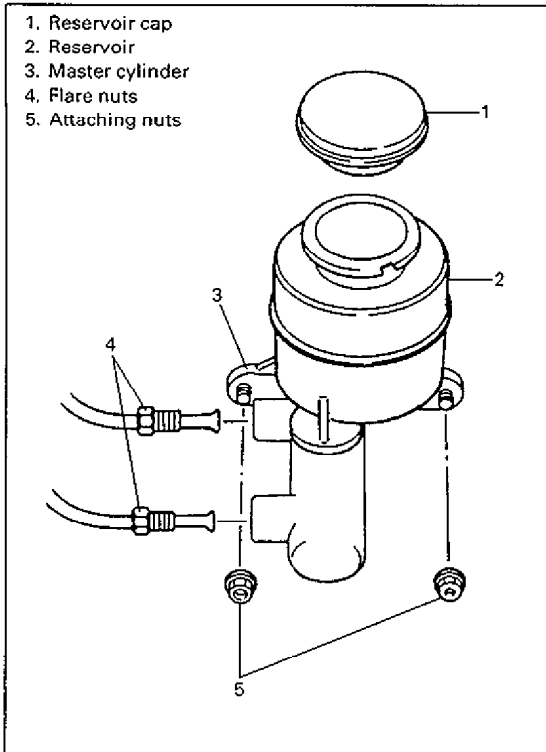
75F00-5-47-3

- 3) Apply water tight sealant where plate and cable contact, and run parking brake cable through brake back plate and secure it with clip.

"A": Sealant 99000-31090

- 4) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut to specified torque. (Refer to steps 1) to 4) of WHEEL CYLINDER INSTALLATION of this section.)
- 5) For procedure hereafter, refer to steps 5) to 12) of WHEEL CYLINDER INSTALLATION of this section.

75F00-5-47-4



75F00-5-48-2

MASTER CYLINDER ASSEMBLY

REMOVAL

- 1) Disconnect negative and positive cable at battery, and remove battery. (Left-hand steering vehicle)
- 2) Disconnect reservoir lead wire and coupler.
- 3) Clean around reservoir cap and take out fluid with syringe or such.
- 4) Disconnect brake pipes from master cylinder.

CAUTION:

Do not allow brake fluid to get on painted surfaces.

- 5) Remove two attaching nuts.
- 6) Remove master cylinder.

DISASSEMBLY (For left-hand steering vehicle)

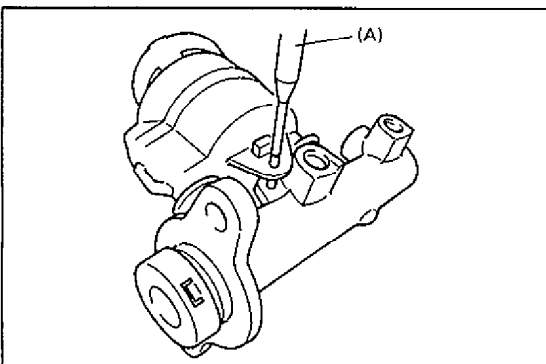
CAUTION:

- Brake master cylinder of right-hand steering vehicle cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir tank and replace it in cylinder.
- Don't make any flaws and hit marks on the piston, on which vacuum seal slides.

WARNING:

Brake master cylinder of right-hand steering vehicle cannot be disassembled. When any part of it other than primary piston as described in CAUTION above has been disassembled, or when anything faulty is found in it, it must be replaced as an assembly.

75F00-5-48-4



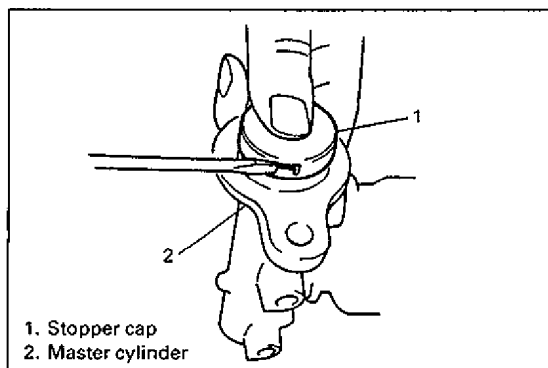
75F00-5-48-5

- 1) Remove reservoir pin that fixes cylinder body and reservoir by using special tool.

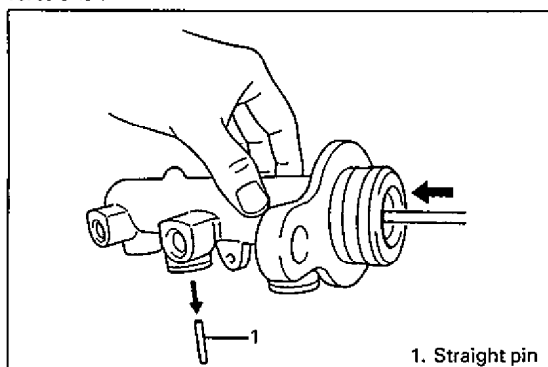
Special Tool

(A): 09922-89810

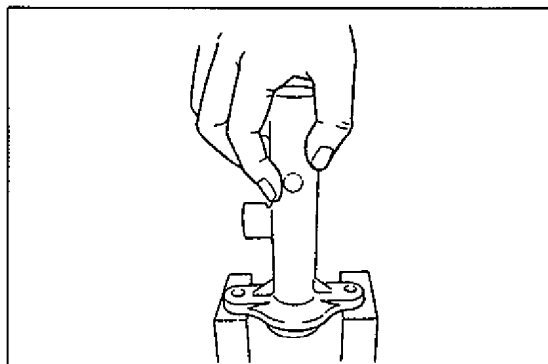
- 2) Remove reservoir and 2 gromets.



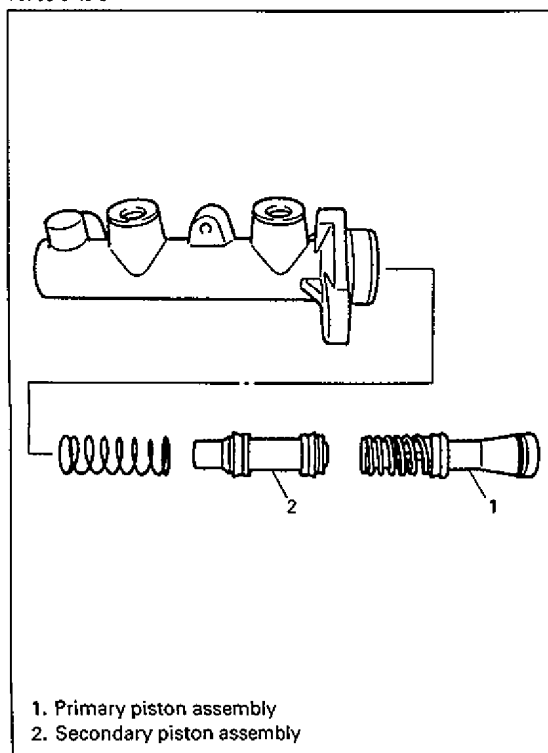
75F00-5-49-1



75F00-5-49-2



75F00-5-49-3



75F00-5-49-5

3) Insert a flat head screwdriver under each claw of stopper cap, straighten it and remove stopper cap. As piston in master cylinder may jump out at this time, be sure to hold stopper cap.

4) Using Philips type screwdriver wound with protection tape, push in piston and remove straight pin while directing reservoir installation section downward.

NOTE:

Place shop cloth on table so that pin will not be damaged or get lost.

5) Pull out primary piston assembly straight so as not to cause any damage to inside of cylinder wall.

6) 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.

INSPECTION

Inspect all disassembled parts for wear or damage, and replace parts if necessary.

NOTE:

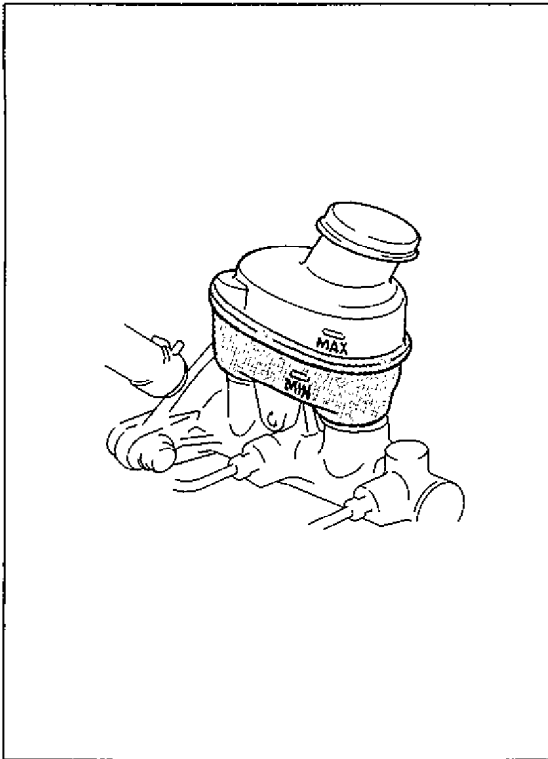
- Wash disassembled parts with brake fluid.
- Do not reuse piston assembly.

Inspect master cylinder bore for scoring or corrosion. It is best to replace corroded cylinder. Corrosion can be identified as pits or excessive roughness.

NOTE:

Polishing bore of master cylinder with cast aluminum body with anything abrasive is prohibited, as damage to cylinder bore may occur.

Rinse cylinder in clean brake fluid. Shake excess rinsing fluid from cylinder. Do not use a cloth to dry cylinder, as lint from cloth cannot be kept from cylinder bore surfaces.



75F00-5-50-2

CAUTION:

Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use container which has been used for mineral oil or which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in hydraulic brake system and water will mix with brake fluid, lowering fluid boiling point. Keep all fluid containers capped to prevent contamination.

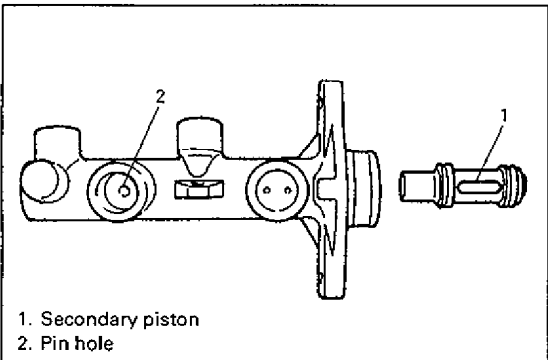
Fluid to fill reservoir with is indicated on reservoir cap of that vehicle with embossed letters or in owner's manual supplied with it.

Add fluid up to MAX line.

ASSEMBLY**CAUTION:**

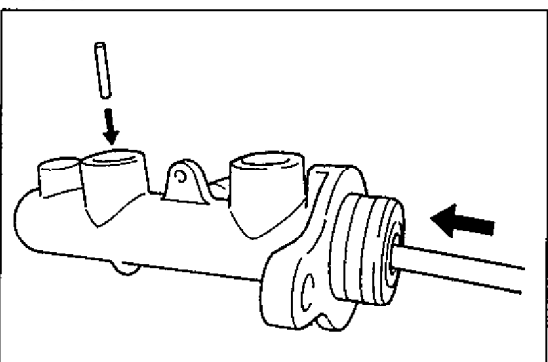
- Never use any mineral oil such as kerosene oil and gasoline when washing and assembling parts.
- Check inside of cylinder wall, pistons and cup seals are free from any foreign objects such as dust and dirt and use care not to cause any damage with a tool during assembly.
- Do not drop parts. Do not use any part which has been dropped.

75F00-5-50-3



1. Secondary piston
2. Pin hole

75F00-5-50-4



75F00-5-50-5

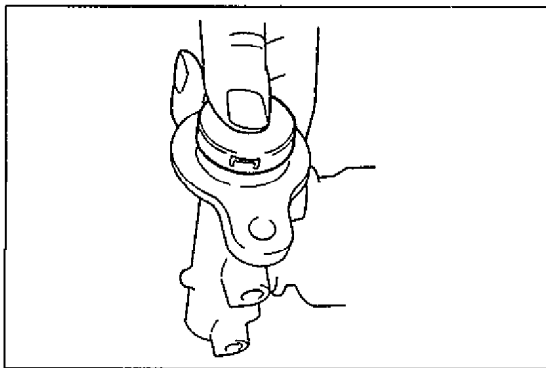
- 1) Apply brake fluid to inside of cylinder and contact surface of piston ass'y and insert secondary piston ass'y into cylinder body.

Be sure to install piston cup in correct installation direction and straight into cylinder so that it is not caught.

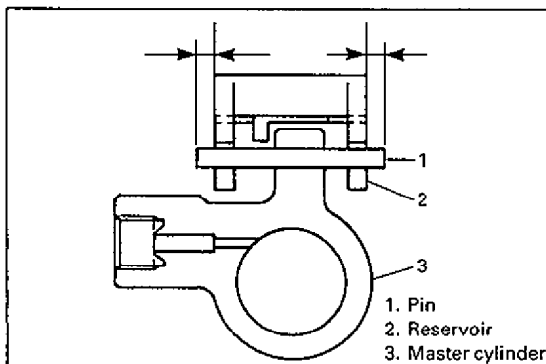
Align center direction of secondary piston with axial direction of straight pin.

- 2) Using Philips type screwdriver wound with protection tape, push in piston and install straight pin through port in reservoir installation section.

Check that straight pin and piston are installed securely.



75F00-5-51-1



75F00-5-51-2

3) Install stopper cap.

While holding piston with a new stopper cap, push it in as far as groove in cylinder and check that claw of stopper cap is caught in cylinder groove securely.

Be sure to use a new stopper cap.

4) Apply thin coat of brake fluid to all around new grommets (2pcs.) and install them to cylinder body, then install reservoir.

5) 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 booster piston rod length with special tool (See page 5-53).

1) Install master cylinder as shown and torque attaching nuts to specification.

Tightening Torque

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

2) Attach hydraulic lines and torque flare nuts to specification.

Tightening Torque

(b): 16 N·m (1.6 kg-m, 12.0 lb-ft)

3) Connect reservoir lead wire.

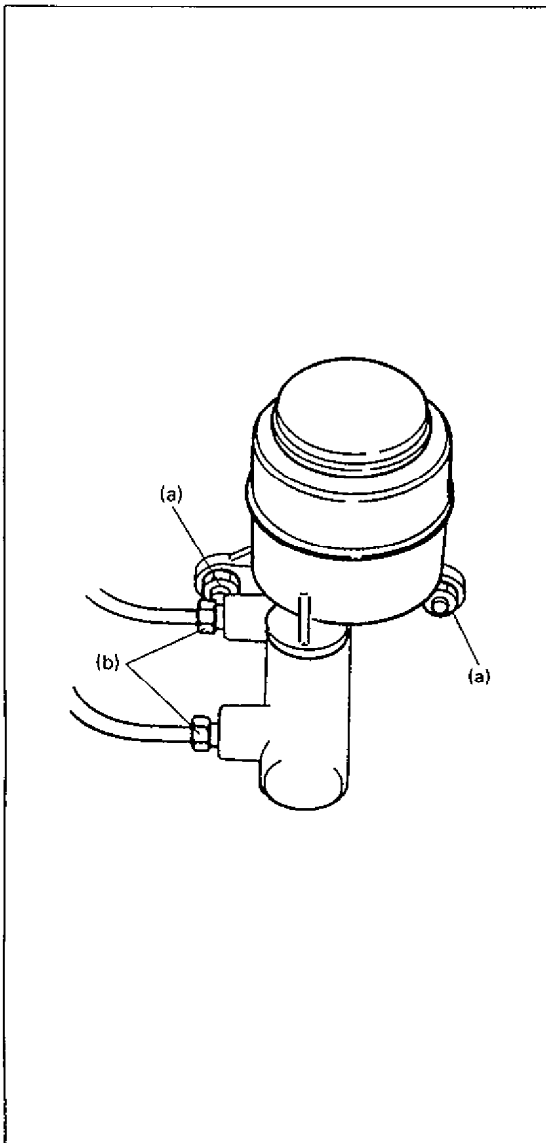
4) Fill reservoir with specified brake fluid.

5) Install battery, connect positive cable and negative cable at battery.

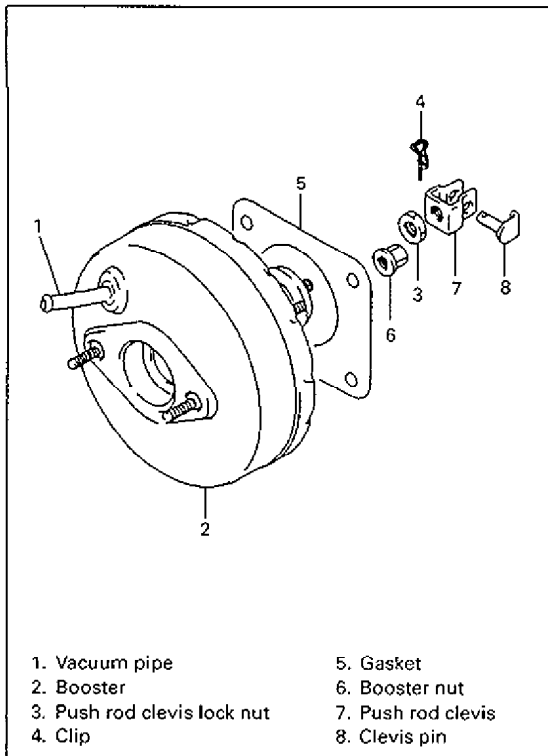
NOTE:

- Body and battery cable should not interfere with each other.
- After tightening + terminal, be sure to put cap onto it securely.

6) After installing, check brake pedal play and bleed air from system (See pages 5-22, 5-24 and 5-25).



75F00-5-51-5



75F00-5-52-2

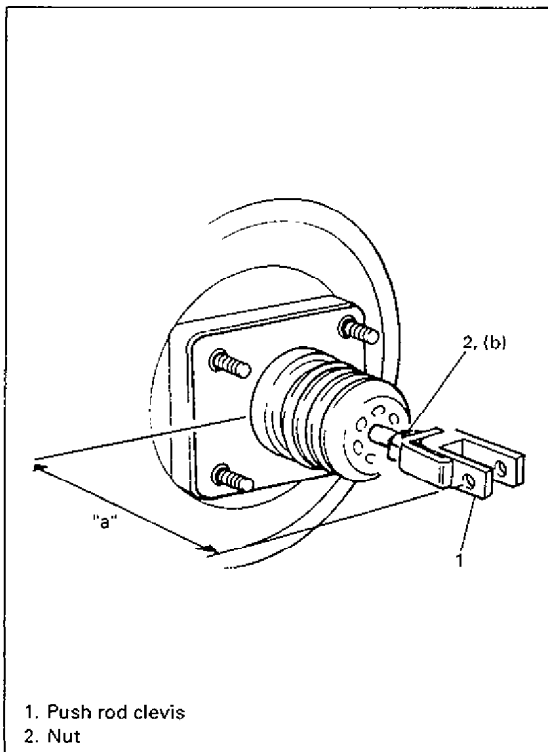
BRAKE BOOSTER

REMOVAL

- 1) Remove master cylinder assembly, referring to steps 1) to 5) of its REMOVAL on page 5-48.
- 2) Disconnect vacuum hose from 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 faulty condition is found, replace it with new one.



75F00-5-52-4

INSPECTION AND ADJUSTMENT

Push Rod Clevis Length

Check that dimension "a" as shown is within 95.5 – 96.5 mm (3.76 – 3.80 in.) and torque nut to specification.

NOTE:

Dimension "a" does not include thickness of gasket.

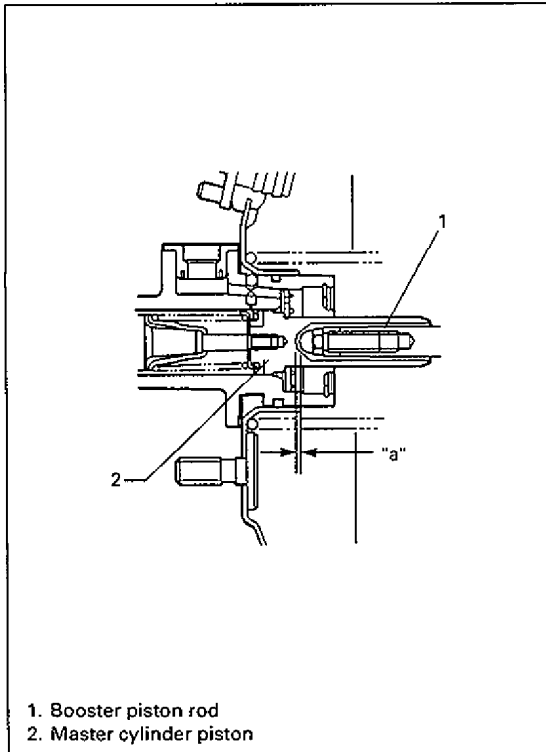
Dimension "a": 95.5 – 96.5 mm (3.76 – 3.80 in.)

Tightening Torque

(b): 19 N·m 1.9 kg-m, 14.0 lb-ft)

NOTE:

Whenever booster was removed, make sure to check clearance between piston rod and master cylinder piston. (For details, refer to page 5-53.)

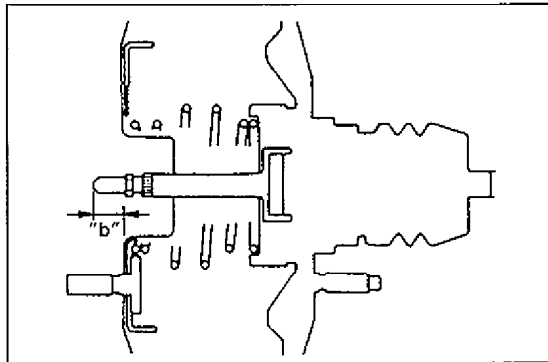


75F00-5-53-2

Booster Piston Rod and Master Cylinder Piston Clearance

The length of booster piston rod is adjusted to provide specified clearance "a" between piston rod end and master cylinder piston.

- Before measuring clearance, push piston rod several times so as to make sure reaction disc is in place.
- Keep inside of booster at atmospheric pressure for measurement.
- Remove piston (push) rod seal from booster, if equipped.



75F00-5-53-3

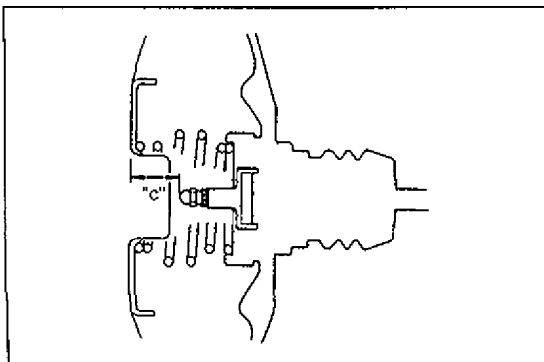
For Left-hand Steering Vehicle

- 1) Measure length of piston rod, i.e. distance between piston rod and mating surface of booster-to-master cylinder.

Length of piston rod "b": 9.80 – 10.1 mm (0.39 – 0.40 in.)

- 2) If measurement is out of specified value, adjust depth by turning adjusting screw of piston rod.

75F00-5-53-4

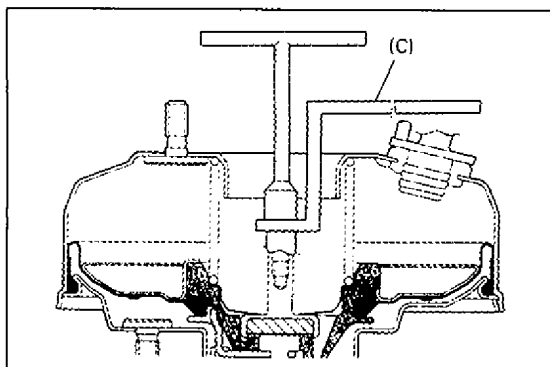


75F00-5-53-5

For Right-hand Steering Vehicle

- 1) Remove piston rod seal from booster.
- 2) Measure depth of piston rod, i.e. distance between piston rod and mating surface of booster-to-master cylinder.

Depth of piston rod "c": 29.7 – 29.9 mm (1.17 – 1.18 in.)



75F00-5-54-1

- 3) If measurement is out of specified value, adjust depth by turning adjusting screw of piston rod.

Special Tool

(C): 09952-16020

INSTALLATION

NOTE:

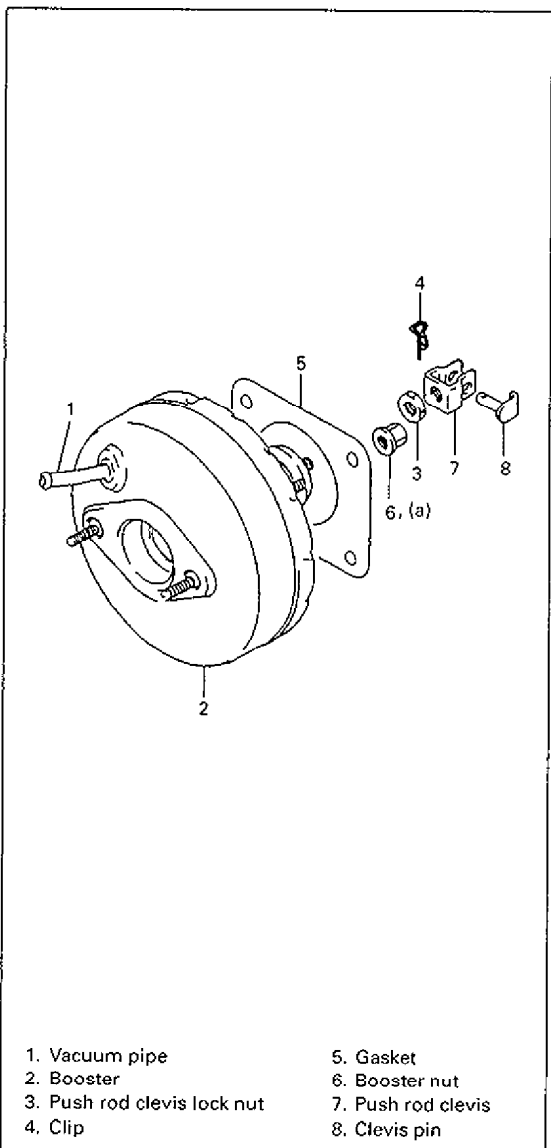
- See NOTE at the beginning of this section.
- Adjust clearance between booster piston rod and master cylinder piston with special tool. (See page 5-53.)
- Check length of push rod clevis. (See page 5-52.)

- 1) Install booster to dash panel as shown. Then connect booster push rod clevis to pedal arm with clevis pin and clip.
- 2) Torque booster attaching nuts to specification.

Tightening Torque

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

- 3) Install master cylinder to booster and torque booster nuts to specification. (Refer to MASTER CYLINDER ASSEMBLY INSTALLATION of this section.)
- 4) Connect brake pipes and torque flare nuts to specification. (See page 5-37.)
- 5) Connect booster vacuum hose.
- 6) Connect reservoir lead wire at coupler.
- 7) Fill reservoir with specified fluid.
- 8) Bleed air from brake system. (See air bleeding section, pages 5-24 and 5-25.)
- 9) After installing, check pedal height and play. (See pages 5-20 and 5-22.)
- 10) Perform brake test and check each installed part for fluid leakage.



- | | |
|-----------------------------|--------------------|
| 1. Vacuum pipe | 5. Gasket |
| 2. Booster | 6. Booster nut |
| 3. Push rod clevis lock nut | 7. Push rod clevis |
| 4. Clip | 8. Clevis pin |

75F00-5-54-4

INSPECT BOOSTER OPERATION

There are two ways to perform this inspection, with and without a tester. Ordinarily, it is possible to roughly determine its condition without using a tester.

75F00-5-55-1

NOTE:

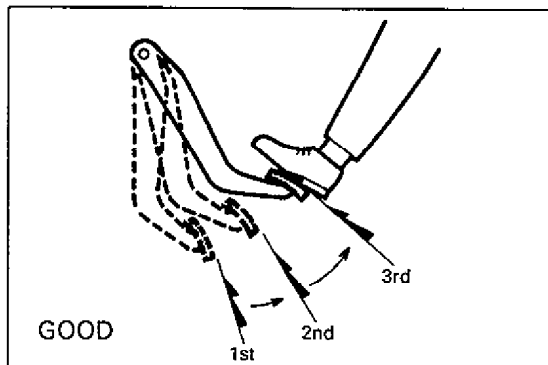
For this check, make sure that no air is in hydraulic line.

INSPECTION WITHOUT TESTER

Check Air Tightness

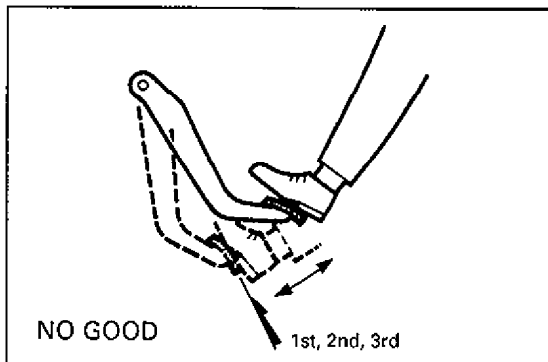
- 1) Start engine.
- 2) Stop engine after running for 1 to 2 minutes.

75F00-5-55-2



- 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.

75F00-5-55-3



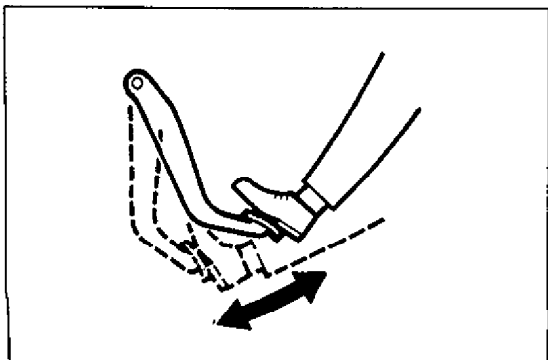
- 4) If pedal travel doesn't change, air tightness isn't obtained.

NOTE:

If defective, inspect vacuum lines and sealing parts, and replace any faulty part.

When this has been done, repeat the entire test.

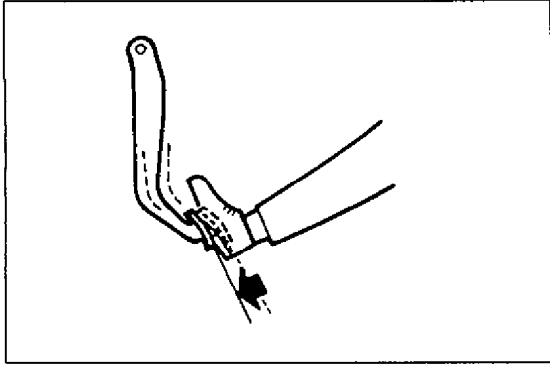
75F00-5-55-4



Check Operation

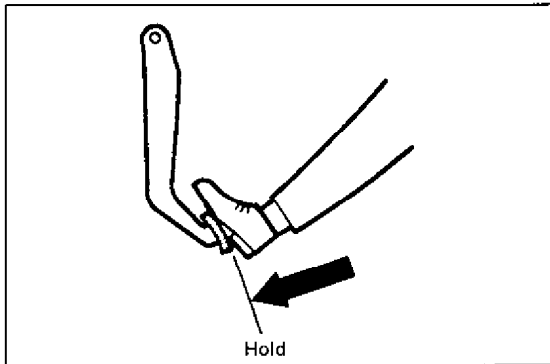
- 1) With engine stopped, depress brake pedal several times with the same load and make sure that pedal travel doesn't change.

75F00-5-55-5



75F00-5-56-1

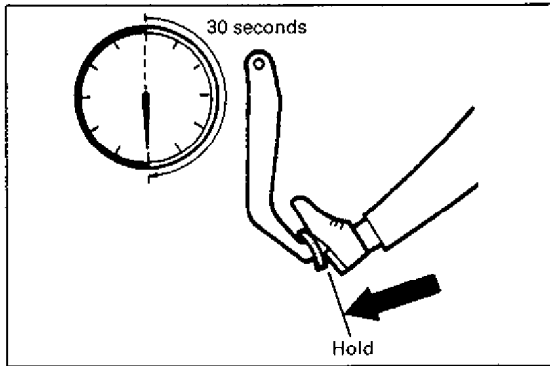
- 2) Start engine while depressing brake pedal. If pedal travel increases a little, operation is satisfactory. But no change in pedal travel indicates malfunction.



75F00-5-56-2

Check Air Tightness Under Load

- 1) With engine running, depress brake pedal. Then stop engine while holding brake pedal depressed.



75F00-5-56-3

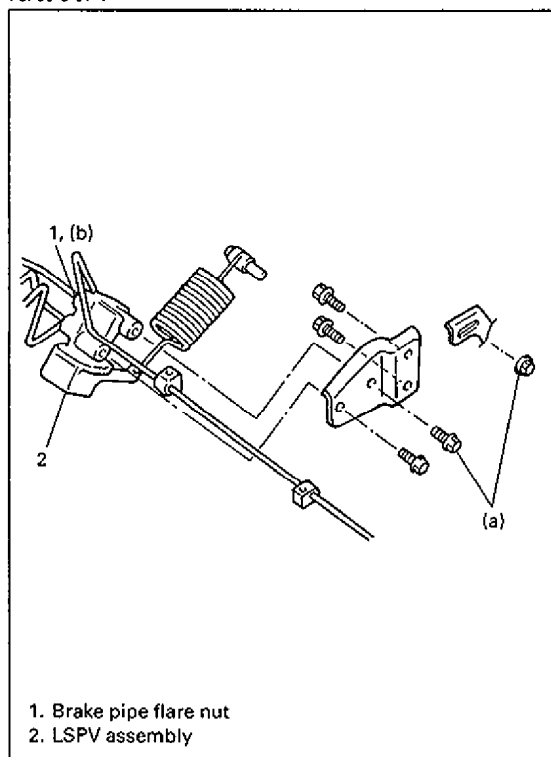
- 2) Hold brake pedal depressed for 30 seconds. If pedal height does not change, condition is good. But it isn't if pedal rises.

LSPV (Load Sensing Proportioning Valve)

CAUTION:

- LSPV assembly must not be disassembled.
Replace with new one if found defective.

75F00-5-57-1



75F00-5-57-3

INSTALLATION

If LSPV assembly has been removed, reinstall it according to following procedure.

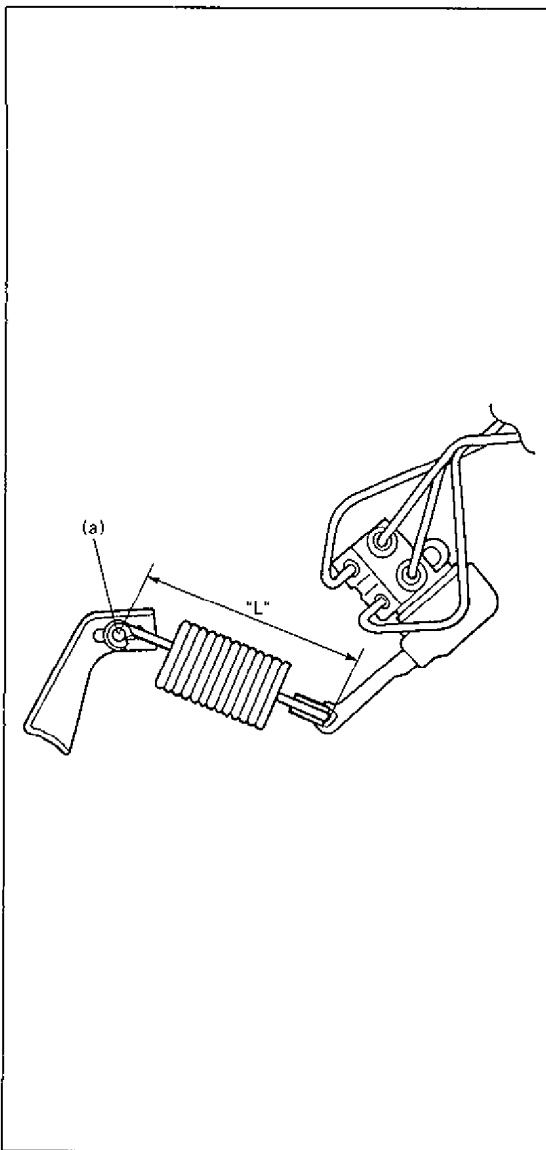
- 1) Apply multi-purpose grease to upper and lower joint of coil spring.
- 2) Torque each bolt and nut to specification as indicated respectively in figure left.

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)

- 3) Upon completion of installation, fill reservoir tank with specified fluid and bleed air from brake system.
- 4) After bleeding air, check that LSPV is installed properly, referring to following INSPECTION & ADJUSTMENT.



75F00-5-58-3

INSPECTION & ADJUSTMENT

Confirm the following before inspection and adjustment.

- Fuel tank is filled with fuel fully.
- Vehicle is equipped with spare tire, tools, jack and jack handle.
- Vehicle is free from any other load.

With vehicle in above conditions;

- 1) Place it on level floor.
- 2) Push up LSPV lever with finger till it stops and measure length of coil spring ("L" in figure) as it is pulled.
- 3) Spring length "L" should be the value specified below.

Spring length "L"	174.8 mm (6.882 in.)
-------------------	-------------------------

- 4) If it isn't, adjust it to specification by changing bolt (a) tightening 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:

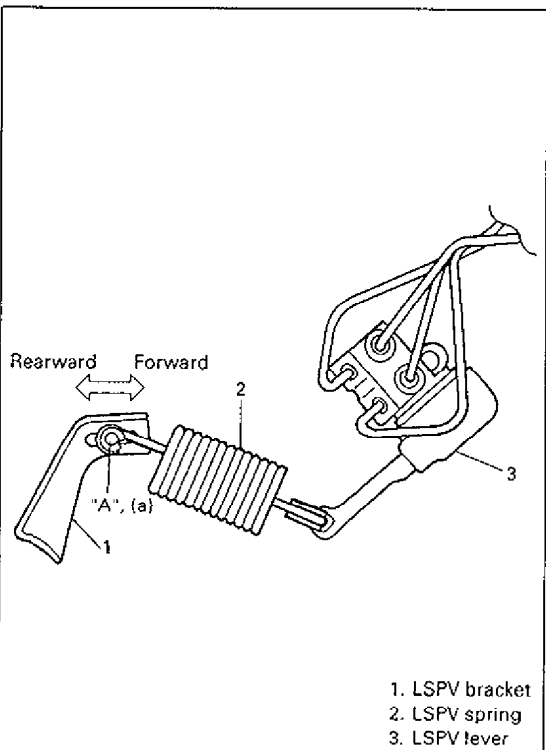
Check to make sure that LSPV body and brake pipe joints are free from fluid leakage. Replace defective parts, if any.

- 5) If rear brake pressure is not within specification, adjust it by changing bolt "A" tightening position as follows.

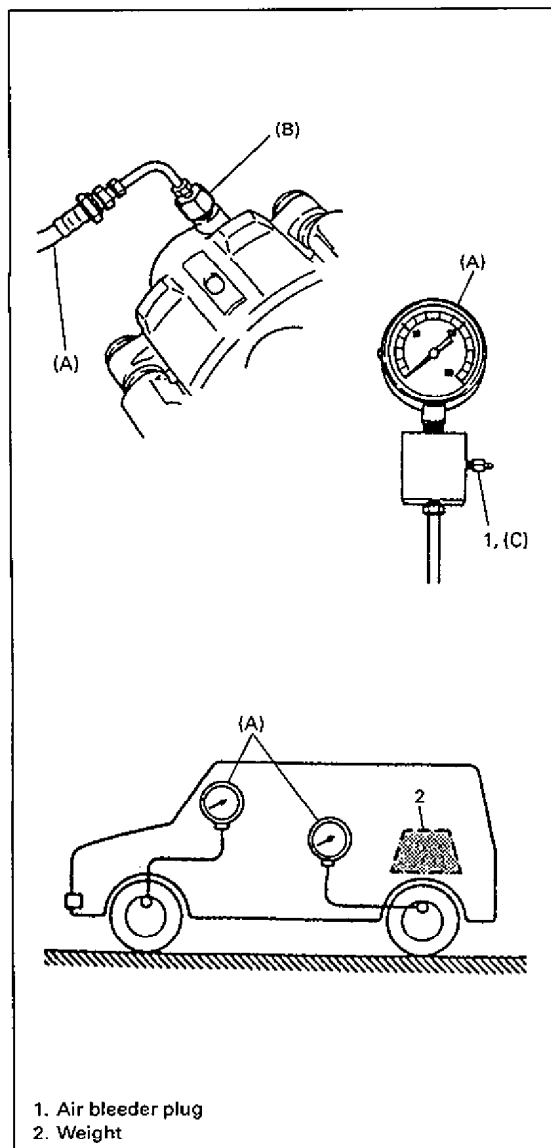
Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- If rear brake pressure is higher than specification, move bolt "A" forward and if it is lower, rearward.
 - Repeat steps 3) and 5) until rear brake pressure is within specification.
 - After adjustment, be sure to torque nut to specification.
- 6) Upper completion of fluid pressure test, bleed brake system and perform brake test.



75F00-5-58-5



75F00-5-59-3

FLUID PRESSURE TEST

Test procedure for LSPV assembly is as follows.

Before testing, confirm the following.

- Fuel tank is filled with fuel fully.
 - Vehicle is equipped with spare tire, tools, jack and jack handle.
- 1) Place vehicle on level floor and set 100 kg (221 lbs) weight slowly on axle housing center.
 - 2) Install special tool to front and rear brake.

NOTE:

Pressure gauge should be connected to bleeder plug hole of front (left side brake) and rear (right side brake).

After testing front left side and rear right side, test front right side and rear left side in the same way.

Special Tool

Front brake

(A): 09956-02310

Rear brake

(A): 09956-02310

(B): 09952-36310 (Fluid pressure gauge attachment)

(C): 55473-82030 (Bleeder plug (10 mm) as a spare part)

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

Front brake	Rear brake
7,500 kPa	4,500 – 6,000 kPa
75 kg/cm ²	45 – 60 kg/cm ²
1067 psi	140 – 853 psi

As done above, apply 100 kg/cm² pressure to front brake and check that rear brake pressure then is within specification as given below.

Front brake	Rear brake
12,500 kPa	5,500 – 7,000 kPa
125 kg/cm ²	55 – 70 kg/cm ²
1778 psi	782 – 995 psi

75F00-5-59-5

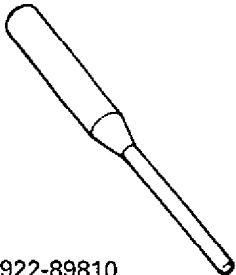
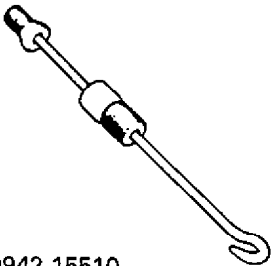
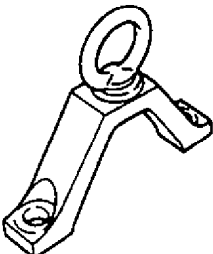
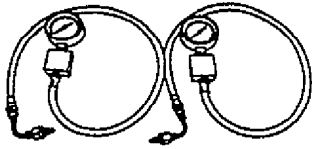
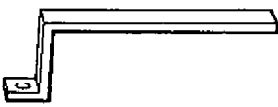
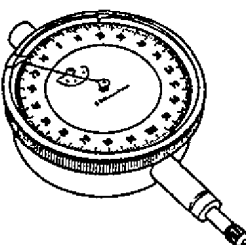
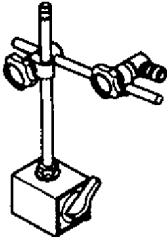
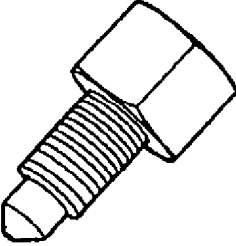
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	kg-m	lb-ft
Brake caliper pin bolt		34	3.4	25.0
Brake caliper carrier bolt		85	8.5	61.5
Front brake flexible hose joint bolt		16	1.6	11.5
Rear brake bolt (Brake back plate bolt)		23	2.3	17.0
Master cylinder nut or booster nut		13	1.3	9.5
Brake pipe 4-way joint bolt		11	1.1	8.0
Proportioning valve bolt				
Brake pipe flare nut		16	1.6	11.5
Brake pedal shaft nut		23	2.3	17.0
Rear spindle nut		100	10.0	72.5
Brake bleeder plug	(Front caliper)	11	1.1	8.0
	(Rear cylinder)	8	0.8	6.0
Wheel nut		85	8.5	61.5
Wheel cylinder bolt		10	1.0	7.5
Parking brake lever bolt		5.5	0.55	4.0
LSPV bolt		23	2.3	17.0
LSPV nut				

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir tank cap or described in owner's manual of vehicle	- To fill master cylinder reservoir. - To clean and apply to inner parts of master cylinder caliper 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 knuckle. - To apply to mating surfaces of brake back plate and parking brake cable - To apply to cut in gromet and where it contacts with parking cable

SPECIAL TOOLS

 09922-89810 Pin remover	 09942-15510 Sliding hammer	 09943-17912 Brake drum remover (Front wheel hub remover)	 09950-78210 Flare nut wrench (10 mm)
 09956-02310 Fluid pressure gauge	 09952-16020 Booster piston rod adjuster	 09900-20606 Dial gauge	 09900-20701 Magnetic stand
 09952-36310 Fluid pressure gauge			

SECTION 5E2

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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 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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SPECIAL TOOLS	5E2-55

GENERAL DESCRIPTION

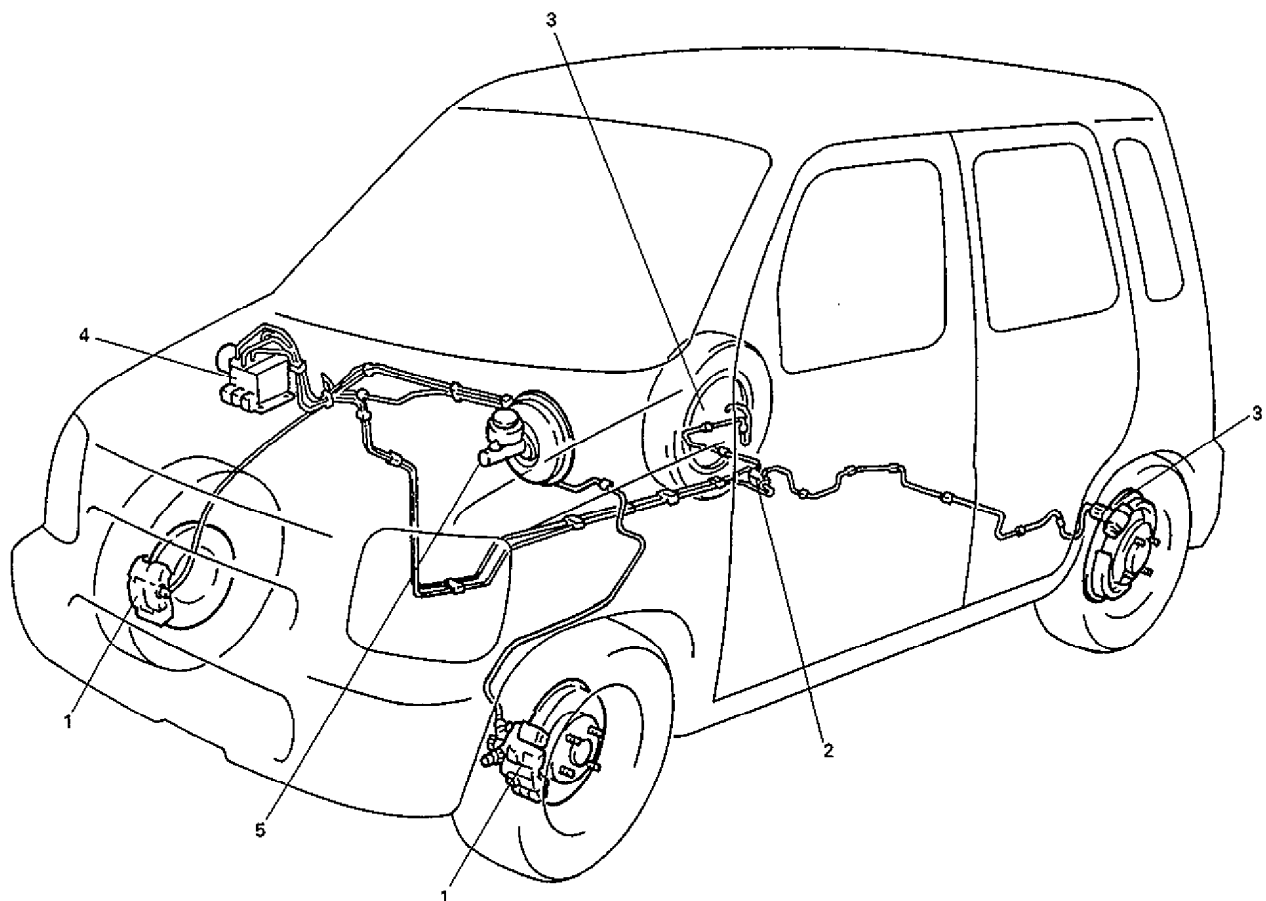
The ABS (Antilock Brake System) is a system to prevent each wheel to lock during hard braking or braking on a slippery road by controlling the fluid pressure from master cylinder to each brake (either brake caliper or wheel cylinder).

The ABS of this vehicle monitors all four wheels (four sensors) and controls all four wheels when the system is active.

The component parts of this ABS includes following parts in addition to those of the conventional brake system.

- Wheel speed sensor senses revolution speed of each wheel and sends outputs to ABS control module.
- ABS control module 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 operates according to signal from ABS control module and controls 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 supplies power to pump motor in ABS hydraulic unit.
- "ABS" warning lamp lights to inform abnormality when system fails to operate properly.

LH steering vehicle shown

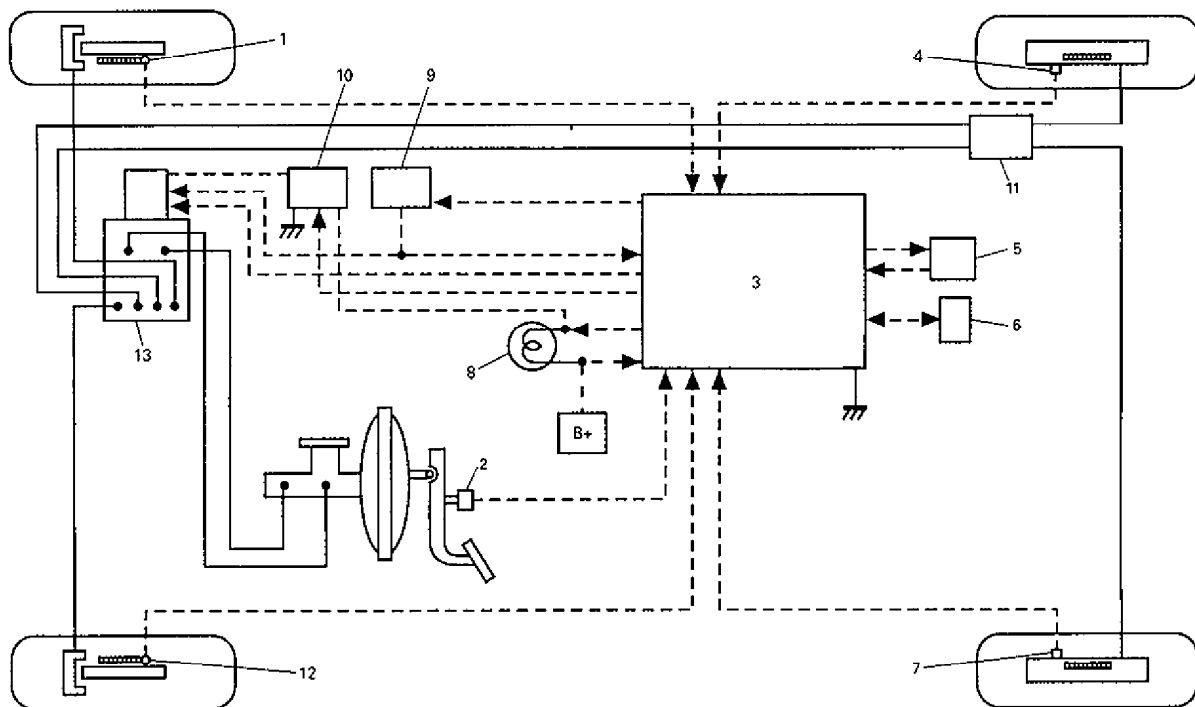


1. Front disc brake
2. Proportioning valve

3. Rear drum brake
4. ABS hydraulic unit

5. Brake master cylinder

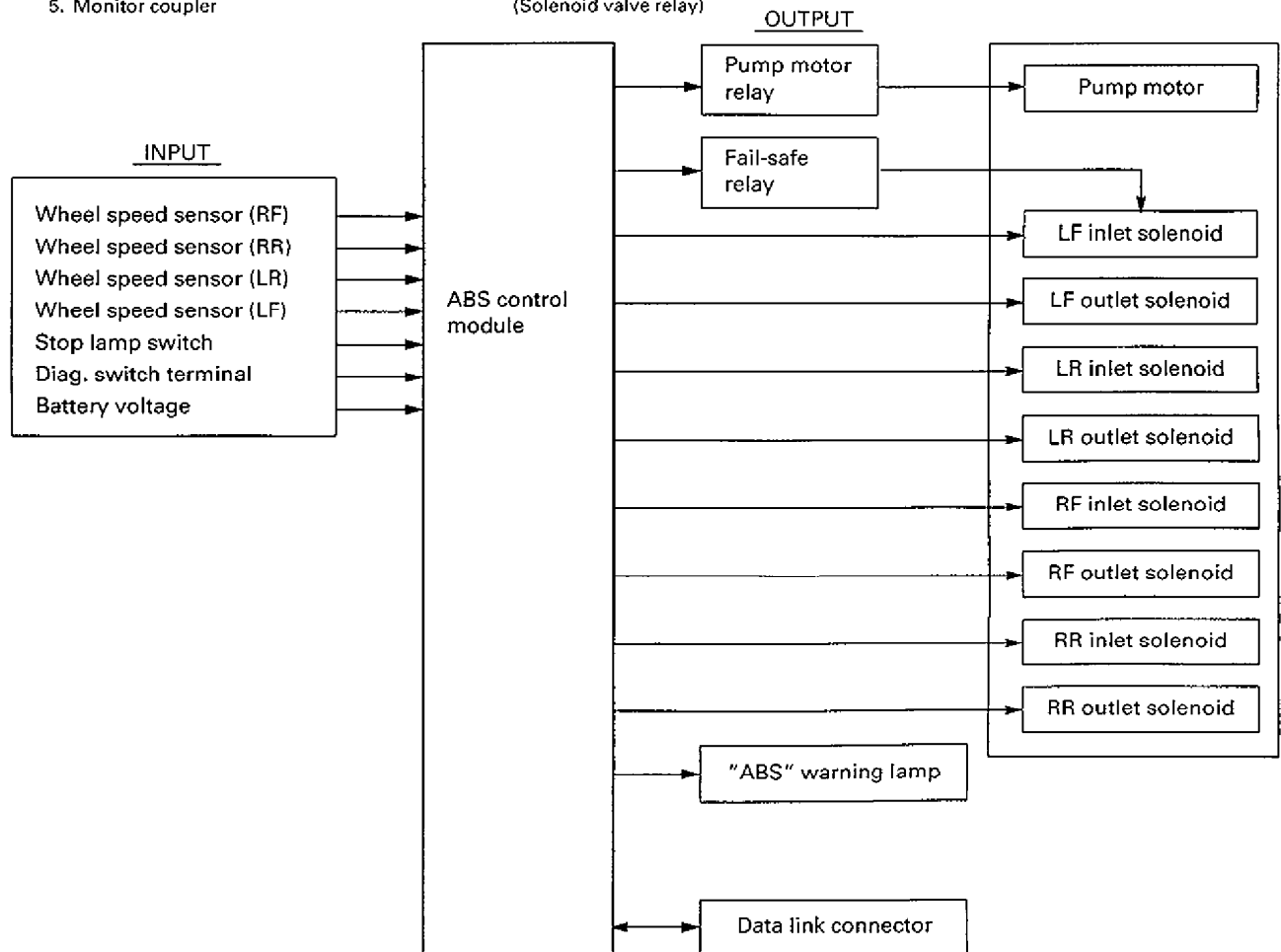
SYSTEM SCHEMATIC



1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. ABS control module
4. Wheel speed sensor (Right-rear)
5. Monitor coupler

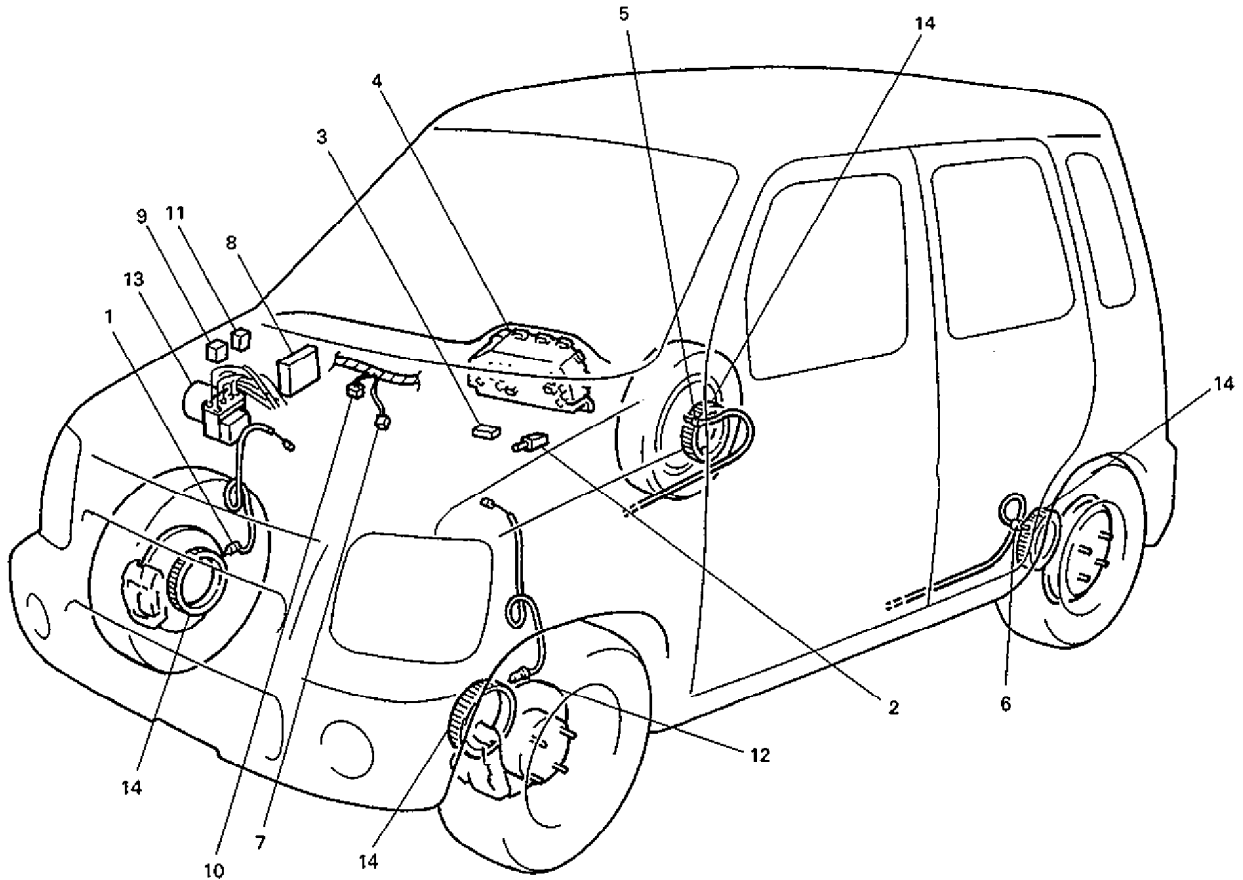
6. Data link connector
7. Wheel speed sensor (Left-rear)
8. "ABS" warning lamp
9. ABS pump motor relay
10. ABS fail-safe relay (Solenoid valve relay)

11. Proportioning valve
12. Wheel speed sensor (Left-front)
13. ABS hydraulic unit



ABS COMPONENT PARTS LOCATION

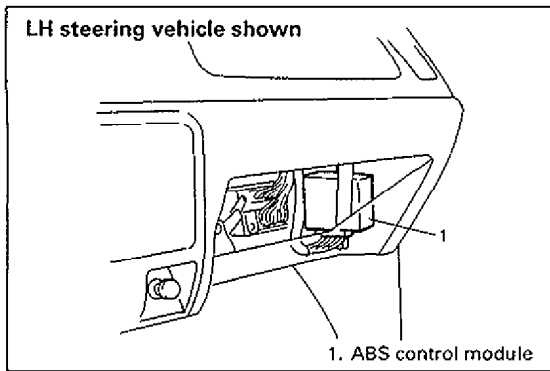
LH steering vehicle shown



1. Wheel speed sensor (Right-front)
2. Stop lamp switch
3. Data link connector
4. "ABS" warning lamp (in instrument panel)
5. Wheel speed sensor (Right-rear)

6. Wheel speed sensor (Left-rear)
7. Diode
8. ABS control module
9. ABS fail-safe relay (Solenoid valve relay)
10. Monitor coupler
11. ABS pump motor relay

12. Wheel speed sensor (Left-front)
13. ABS hydraulic unit
14. Wheel speed sensor rotor (ring)



75F00-5E2-6-1

ABS CONTROL MODULE

ABS control module is installed on passenger side dash side panel.

Its main function is to control ABS hydraulic unit to prevent the wheel from getting locked during braking but it also has a self-diagnosis function and fail-safe function.

Hydraulic Unit Control (Wheel Speed Control)

ABS control module monitors the speed of each of four wheels, deceleration speed of each four wheels and the vehicle deceleration speed through signals from four wheel speed sensors and outputs control signal to each solenoid valve of the hydraulic unit to prevent it from getting locked. Also, it operates the pump motor all the time while the anti-lock control function is working.

75F00-5E2-6-2

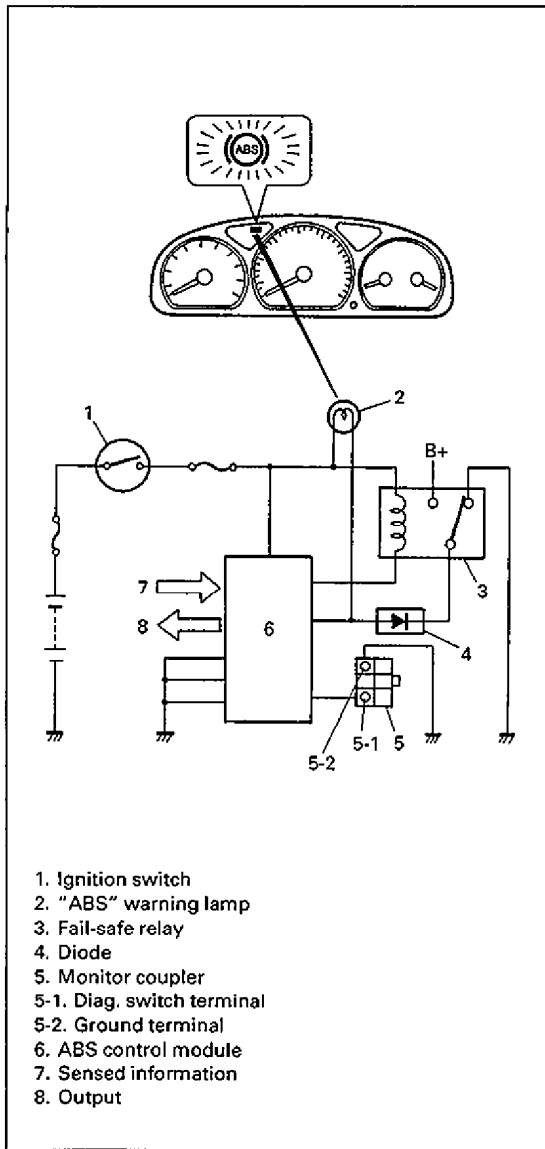
Self-Diagnosis Function

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.

75F00-5E2-6-3

- 1) When ignition switch is turned ON, "ABS" warning 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.

75F00-5E2-6-4



75F00-5E2-7-3

- 3) When an abnormality in the system is detected, "ABS" warning lamp lights and the area where that abnormality lies is stored in the memory in ABS control module.
- 4) When Diag. switch terminal of monitor coupler is grounded, and ABS diode removed, the abnormal area is output as DTC.

SYSTEM CONDITION		DIAGNOSIS SWITCH TERMINAL	"ABS" WARNING LAMP
In good condition at present	No trouble in the past	Open	OFF
		Grounded	DTC 12
	Trouble occurred in the past	Open	OFF
		Grounded	History DTC
Abnormality exists at present	No trouble in the past	Open	ON
		Grounded	Current DTC
	Trouble occurred in the past	Open	ON
		Grounded	Current and history DTC

NOTE:

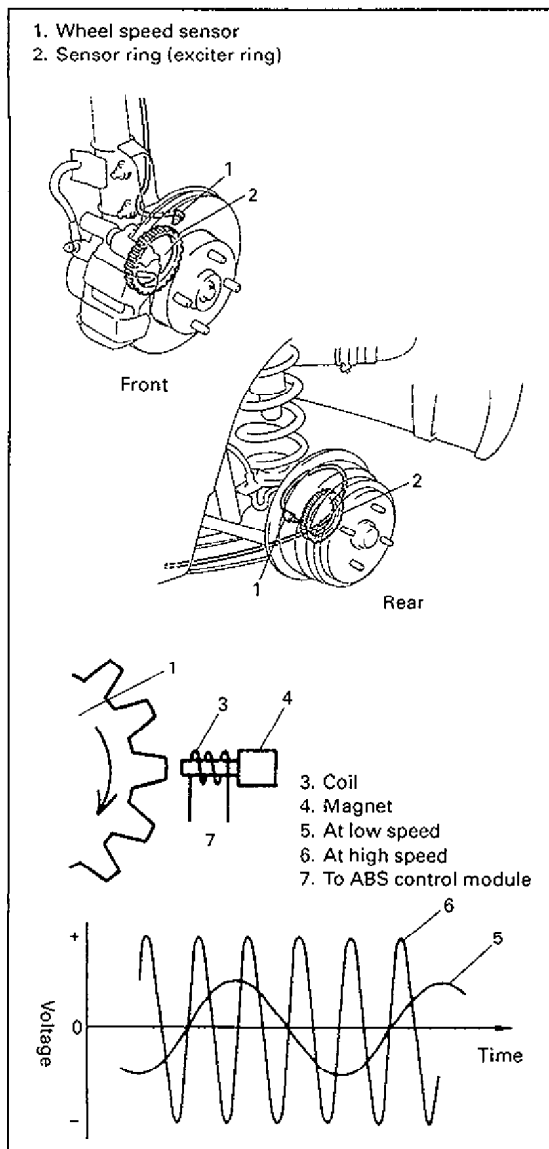
The current code and the history code are displayed without any classification.

Removing "RADIO" fuse in fusebox of J/B for 10 seconds or longer, all DTCs stored in the memory of ABS control module will be cleared.

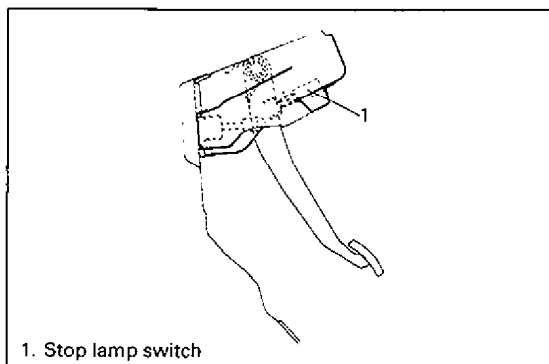
Fail-Safe Function

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 without ABS.

75F00-5E2-7-4



75F00-5E2-8-3



75F00-5E2-8-4

WHEEL SPEED SENSOR AND RING

The wheel speed sensor, consisting of a magnet and a coil, is installed to each of the knuckles of four wheels. The sensor ring (exciter ring) is installed to each of the right and left drive shaft at its outside joint as well as to the right and left rear brake drums. A specified amount of clearance (air gap) is provided between the sensor and ring for their installation. When the ring with serration (tooth) turns, the magnetic flux emitted from the magnet of the speed sensor varies and an alternate current voltage occurs in the coil. As the frequency of this alternate current voltage varies in proportion with the revolution speed of wheels, each wheel speed is detected from it.

NOTE:

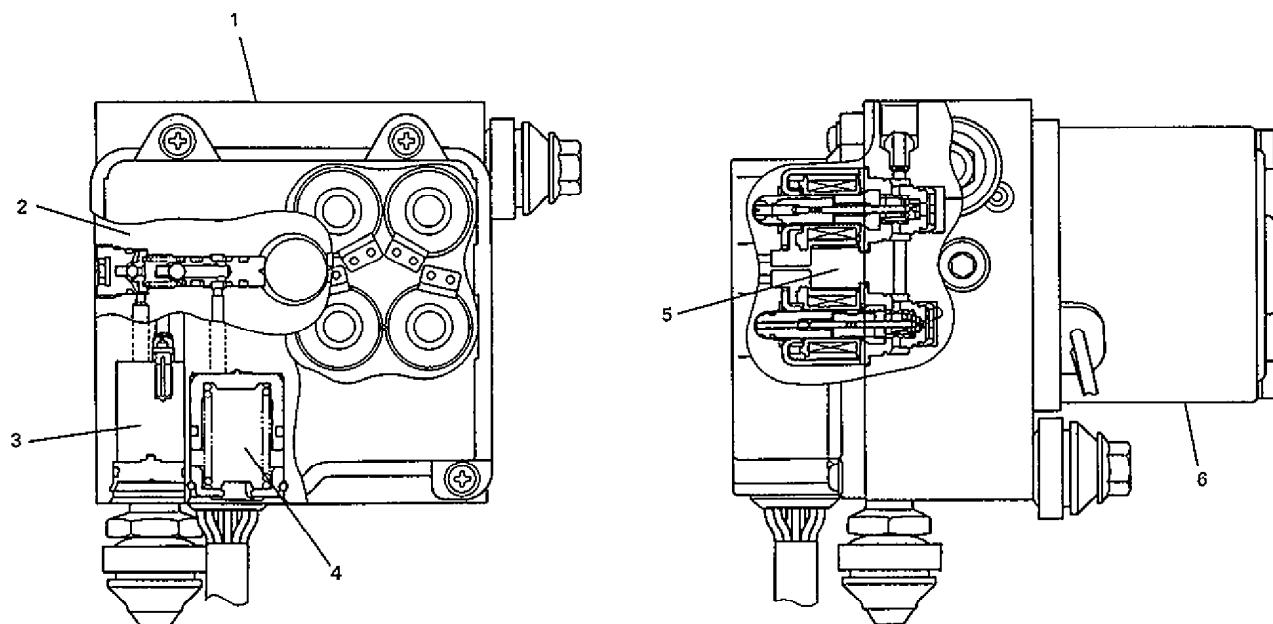
- Clearance between the sensor and the ring cannot be adjusted.
- Do not remove front sensor ring from drive shaft joint.
- Never reuse rear sensor ring once removed from brake drum.

STOP LAMP SWITCH

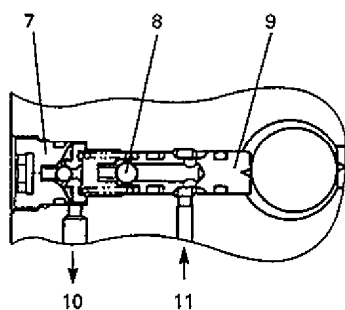
The switch turns ON when the brake pedal is depressed. The ABS control module uses this signal as one of the signals for ABS hydraulic operation check.

ABS HYDRAULIC UNIT

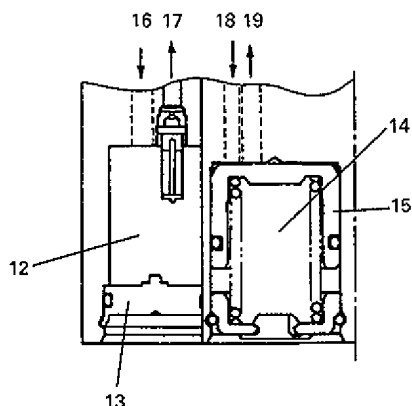
The ABS hydraulic unit consists of solenoid valves, reservoirs, pumps, pump motor, etc. Based on signals from the ABS control module, it controls the fluid pressure applied to the wheel cylinder of each brake.



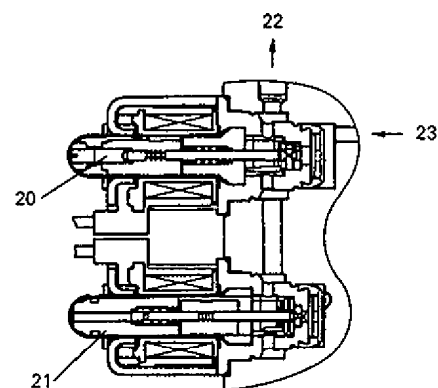
Pump



Low Pressure Accumulator & Damping Chamber



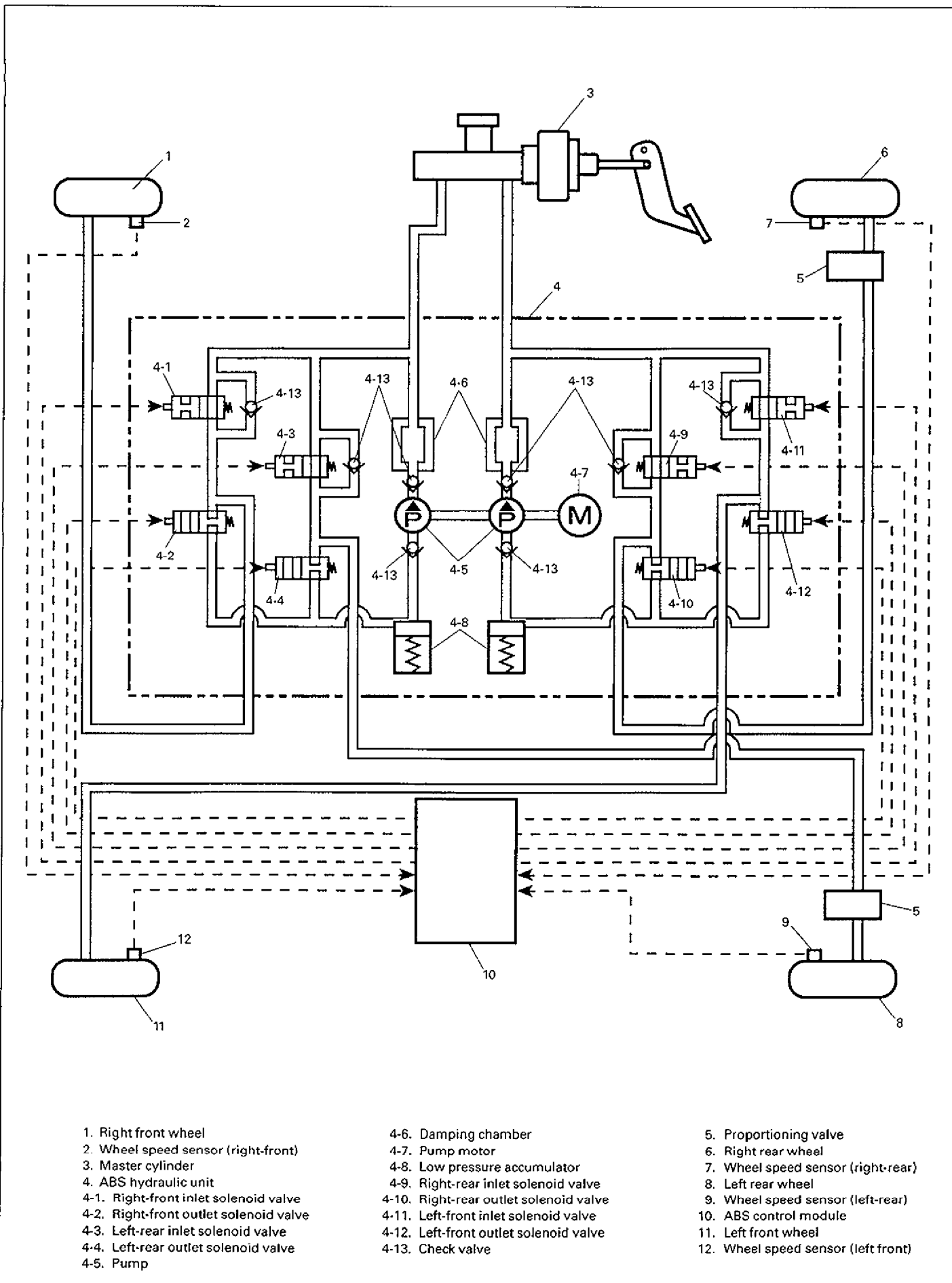
Inlet & Outlet Solenoid Valve



1. ABS hydraulic unit
2. Pump
3. Damping chamber
4. Low pressure accumulator
5. Inlet & outlet solenoid valve
6. ABS motor
7. Outlet valve
8. Inlet valve
9. Piston
10. To damping chamber
11. From low pressure accumulator
12. Damping chamber

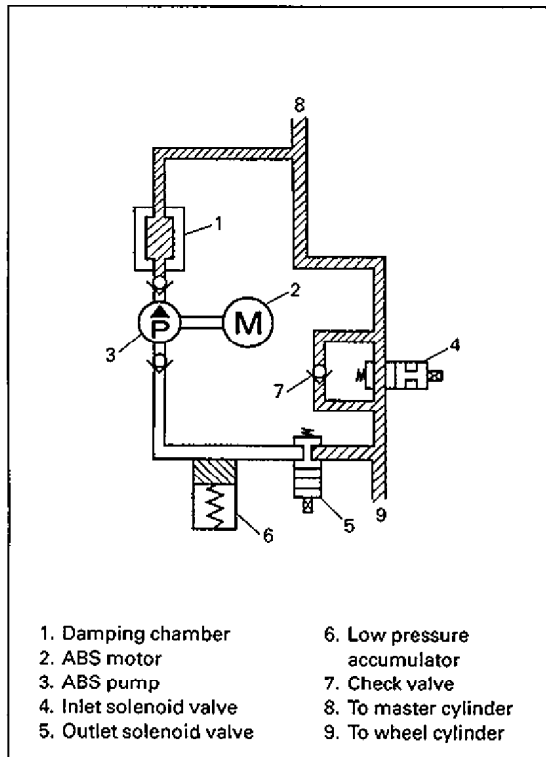
13. Plug
14. Low pressure accumulator
15. Low pressure accumulator piston
16. From pump
17. To master cylinder
18. From outlet solenoid valve
19. To pump
20. Inlet solenoid valve
21. Outlet solenoid valve
22. To wheel cylinder (or caliper)
23. From master cylinder

SYSTEM OPERATION

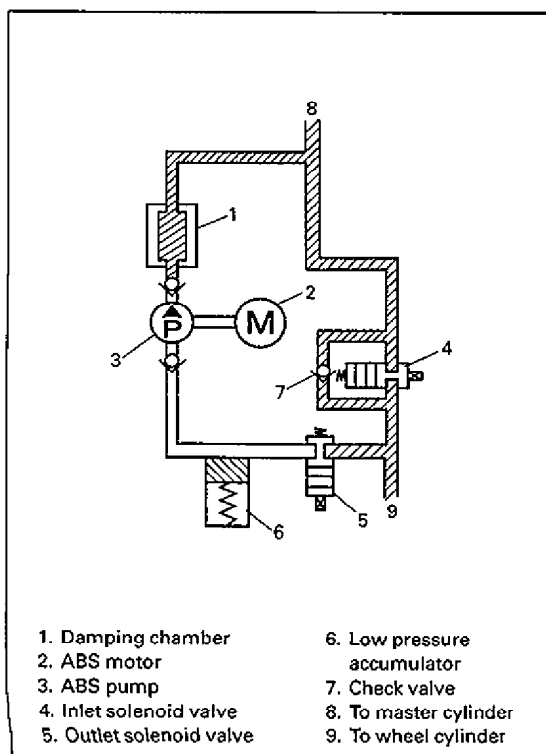


All four wheels, right-front, left-front, right-rear and left-rear, are subject to anti-lock control of this ABS. The following description of operation, however, describes only one of four wheels which are controlled independently and it is applicable to other three wheels.

75F00-5E2-11-1



75F00-5E2-11-3



75F00-5E2-11-5

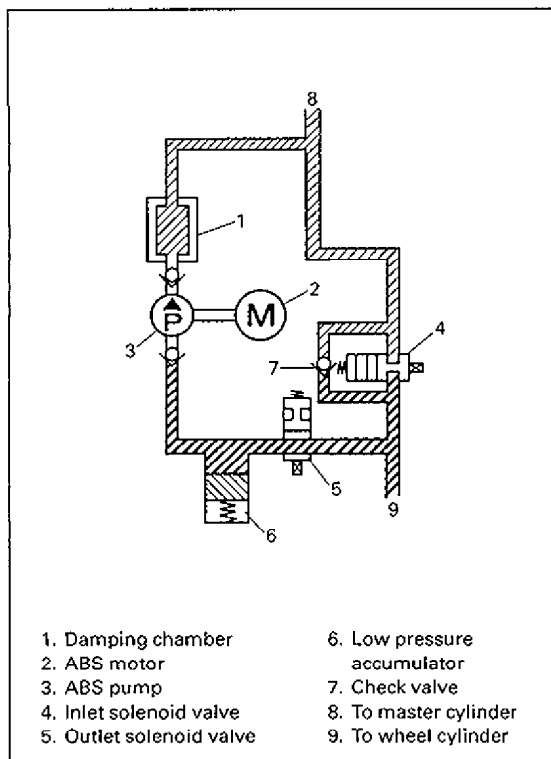
When ABS is not operating (Increased pressure mode)

When brake pedal is depressed the brake fluid from master cylinder passes inlet solenoid valve and sent directly to wheel cylinder.

When the force to the brake pedal is reduced, the brake fluid passes inlet solenoid valve and check valve, then returns to the master cylinder.

When ABS is operating (Hold pressure mode)

When electrical signal is sent to the inlet solenoid valve, the valve actuates and shuts the oil way to the master cylinder. Then the pressure in the wheel cylinder is held constant.



75F00-5E2-12-2

When ABS is operating (Reduced pressure mode)

Reduced pressure action

When an electrical signal is sent to the outlet solenoid valve, the valve actuates. The brake fluid in the wheel cylinder is sent to the low pressure accumulator and the pressure in the wheel cylinder goes down, so does the braking force. The pump pumps out the brake fluid in the low pressure accumulator and send high pressured brake fluid to the master cylinder side.

Damping Chamber

During hard braking, the ABS pump sends the brake fluid in low pressure accumulator to master cylinder, the "kick-back" is felt thru the brake pedal.

The damping chamber is to reduce the "kick-back" during reduced pressure mode when hard braking.

75F00-5E2-12-3

DIAGNOSIS

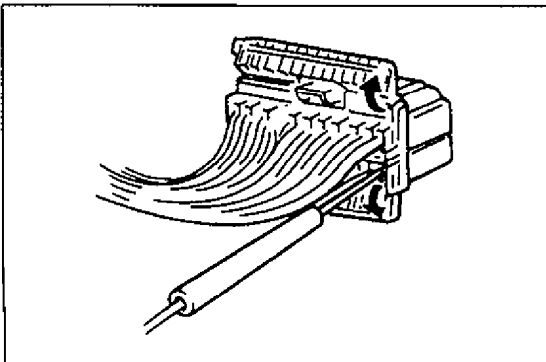
To ensure that the trouble diagnosis is done accurately and smoothly, observe "Precautions in Diagnosing Troubles" and follow "ABS Diagnostic Flow Table".

75F00-5E2-13-1

PRECAUTION IN DIAGNOSING TROUBLES

- If the vehicles was operated in any of the following ways, "ABS" warning lamp may light momentarily but this does not indicate anything abnormal in ABS.
 - The vehicle was driven with parking brake pulled.
 - The vehicle was driven with brake dragging.
 - The vehicle was stuck in mud, sand, etc.
 - Wheel spin occurred while driving.
 - Wheel(s) was rotated while the vehicle was jacked up.
- Be sure to read "Precautions for Electronic Circuit Service" in Section 0A before inspection and observe what is written there.
- Be sure to use the trouble diagnosis procedure as described in the flow table. Failure to follow the flow table may result in incorrect diagnosis. (Some other diag. trouble code may be stored by mistake in the memory of ABS control module during inspection.)

75F00-5E2-13-3



75F00-5E2-13-4

- When connecting a probe of ohmmeter or voltmeter to each terminal of ABS control module connector, be sure to connect it from wire harness side of connector.

ABS DIAGNOSTIC FLOW TABLE

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

STEP	ACTION	YES	NO
1	Perform customer complaint analysis, problem symptom confirmation and diagnostic trouble code check record and clearance. Is there any trouble code?	Go to Step 2.	Go to Step 5.
2	Perform driving test. Is trouble symptom identified?	Go to Step 3.	Go to Step 6.
3	Check diagnostic trouble code. Is it malfunction code?	Go to Step 4.	Go to Step 5.
4	Inspect and repair referring to applicable diagnostic trouble code table in this section. Then perform final confirmation test after clearing diagnostic trouble code. Is trouble recur?	Go to Step 7.	END.
5	Inspect and repair referring to DIAGNOSIS in Section 5. Then perform final confirmation test after clearing diagnostic trouble code. Is trouble recur?	Go to Step 7.	END.
6	Check for intermittent problems referring to INTERMITTENT AND POOR CONNECTION in Section 0A and related circuit of trouble code recorded in Step 3. Then perform final confirmation test after clearing diagnostic trouble code. Is trouble recur?	Go to Step 7.	END.
7	Perform diagnostic trouble code check record and clearance. Is there any trouble code?	Go to Step 4.	Go to Step 5.

1. CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such a 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 locks 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: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other_____ • Road surface condition: Paved road/rough road/snow-covered road/other_____ • Chain equipment:
Environmental Condition	• Weather: fair/cloudy/rain/snow/other_____ • Temperature: °F (°C)
Diagnostic Trouble Code	• First check: Normal code/malfunction code () • Second check after test drive: Normal code/malfunction code ()

2. PROBLEM SYMPTOM CONFIRMATION

Check if what the customer claimed in Step 1 is actually found in the vehicle and if the symptom is found, determine whether it is identified as a failure. (This step should be shared with the customer if possible.) When "ABS" warning lamp is not operating correctly, proceed to "Diagnostic Flow Chart-A, B or C".

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

Perform "Diagnostic Trouble Code Check" in p. 5E2-17 or 5E2-18, record it and then clear it referring to p. 5E2-18.

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 4 to check ABS control module for proper self-diagnosis function.

If the malfunction DTC which was once displayed and then cleared can be detected (indicated) again when ignition switch is turned ON, proceed to Step 5.

4. 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 5.

5. DIAGNOSTIC TROUBLE CODE CHECK

Recheck diagnostic trouble code referring to p. 5E2-17 or p. 5E2-18.

6. DIAGNOSTIC TROUBLE CODE FLOW TABLE

According to Diagnostic Flow Table for the diagnostic trouble code confirmed in Step 5, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ABS control module or other part and repair or replace faulty parts.

7. "DIAGNOSIS" IN SECTION 5

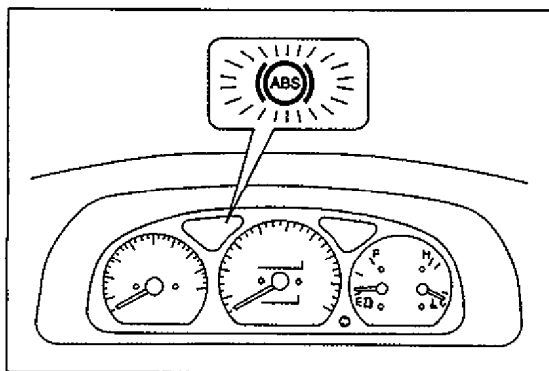
Check the parts or system suspected as a possible cause referring to "Diagnosis" in Section 5 and based on symptoms appearing on the vehicle (symptoms obtained through Step 1, 2 and 4) and repair or replace faulty parts, if any.

8. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to INTERMITTENT TROUBLE in Section 0A and related circuit of trouble code recorded in Step 3.

9. FINAL CONFIRMATION TEST

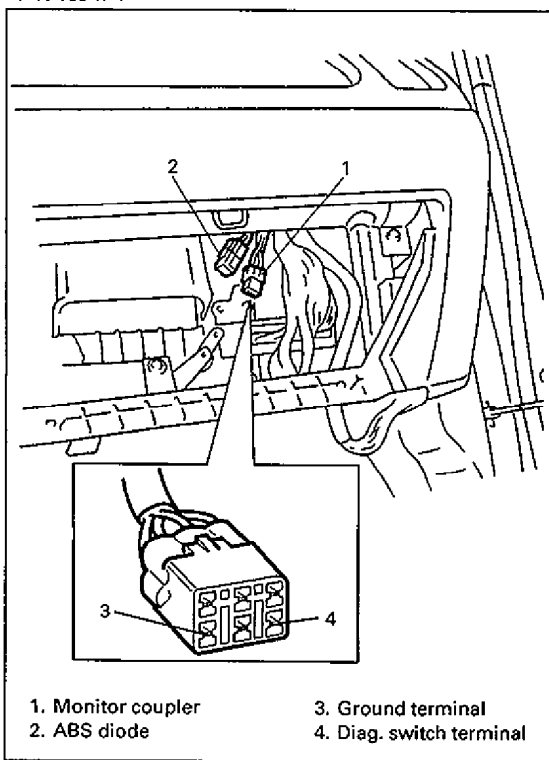
Confirm that the problem symptom has gone and the ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that a normal code is indicated.



75F00-5E2-17-1

"ABS" WARNING LAMP CHECK

Turn ignition switch ON and check that "ABS" warning lamp comes ON for about 2 seconds and then goes OFF. If any faulty condition is found, advance to Diagnostic Flow Table-A, B or C.



75F00-5E2-17-3

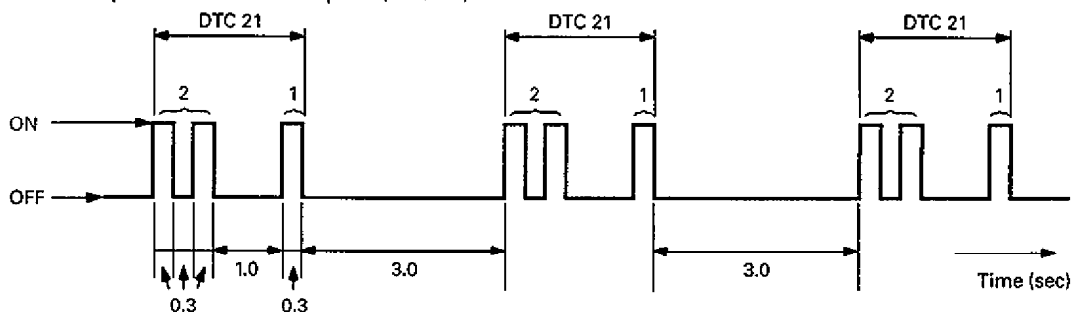
DIAGNOSTIC TROUBLE CODE (DTC) CHECK (USING "ABS" WARNING LAMP)

- 1) Test drive vehicle at 40 km/h for more than a minute.
- 2) Stop vehicle and while IG switch ON, ground diagnosis switch terminal of monitor coupler (behind glove box) with service wire. Then remove ABS diode.
- 3) Read the flashing "ABS" warning lamp which represents DTC as shown in example below and write it down. When more than 2 DTCs are stored in memory, 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)

"ABS" warning lamp



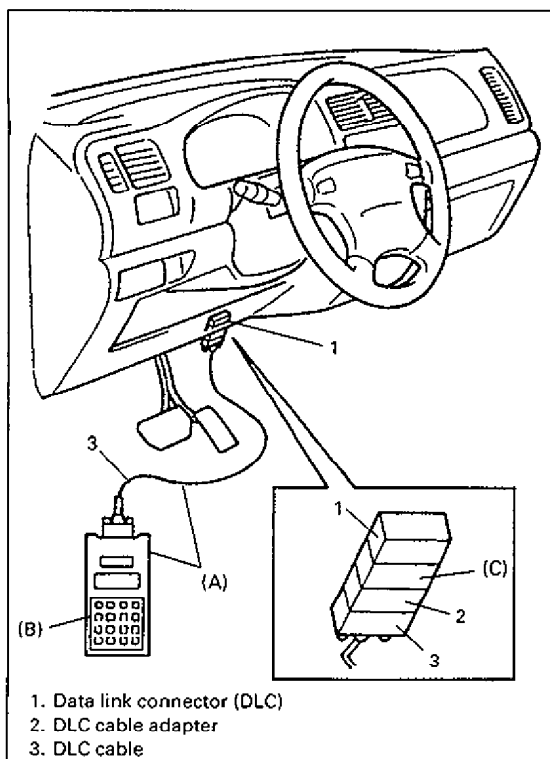
75F00-5E2-17-4

NOTE:

"ABS" warning lamp indicates only following DTCs, DTC 12 which means that no malfunction DTC is stored and history DTC which indicates history trouble area. When there is current trouble, "ABS" warning lamp remains ON and therefore DTC is not indicated.

- 4) After completing the check, turn ignition switch off, disconnect service wire from monitor coupler, and install ABS diode.

75F00-5E2-17-5



75F00-5E2-18-2

DTC CHECK (USING SCAN TOOL, TECH-1)

- 1) Test drive vehicle at 40 km/h for more than a minute.
- 2) Stop vehicle and while IG switch ON, set cartridge for ABS to Tech-1, connect Tech-1 to data link connector (DLC).

Special Tool

(A): 09931-76011 (Tech-1, scan tool)

(B): 09932- 66020-001 (Cartridge for ABS, English)

09932-66020-003 (Cartridge for ABS, German)

09932-66020-004 (Cartridge for ABS, French)

(C): 09931-96020 16/12 pin DLC adapter

- 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.

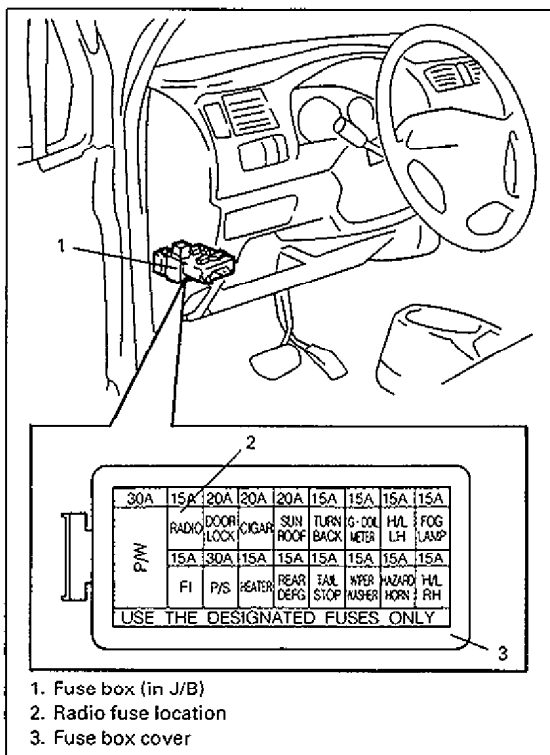
HOW TO CLEAR DIAGNOSTIC TROUBLE CODE (DTC)

All DTCs can be cleared only by performing following steps.

- 1) Turn ignition switch OFF.
- 2) Remove "RADIO" fuse in the fuse box of J/B for more than 10 seconds.
- 3) Reinstall "RADIO" fuse.
- 4) Perform "DTC check" and confirm that normal DTC (DTC 12) is displayed and not malfunction DTC.

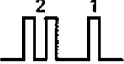
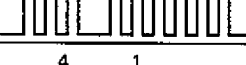
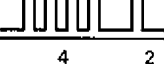
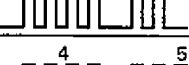
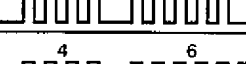
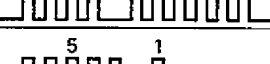
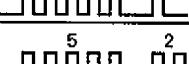
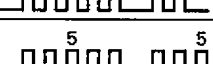
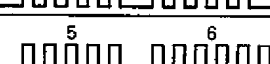
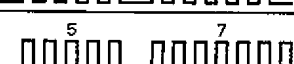
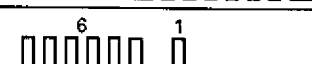
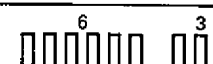
NOTE:

It is also possible to clear DTC by using Tech-1. Refer to Cartridge Manual for procedure to clear DTC.

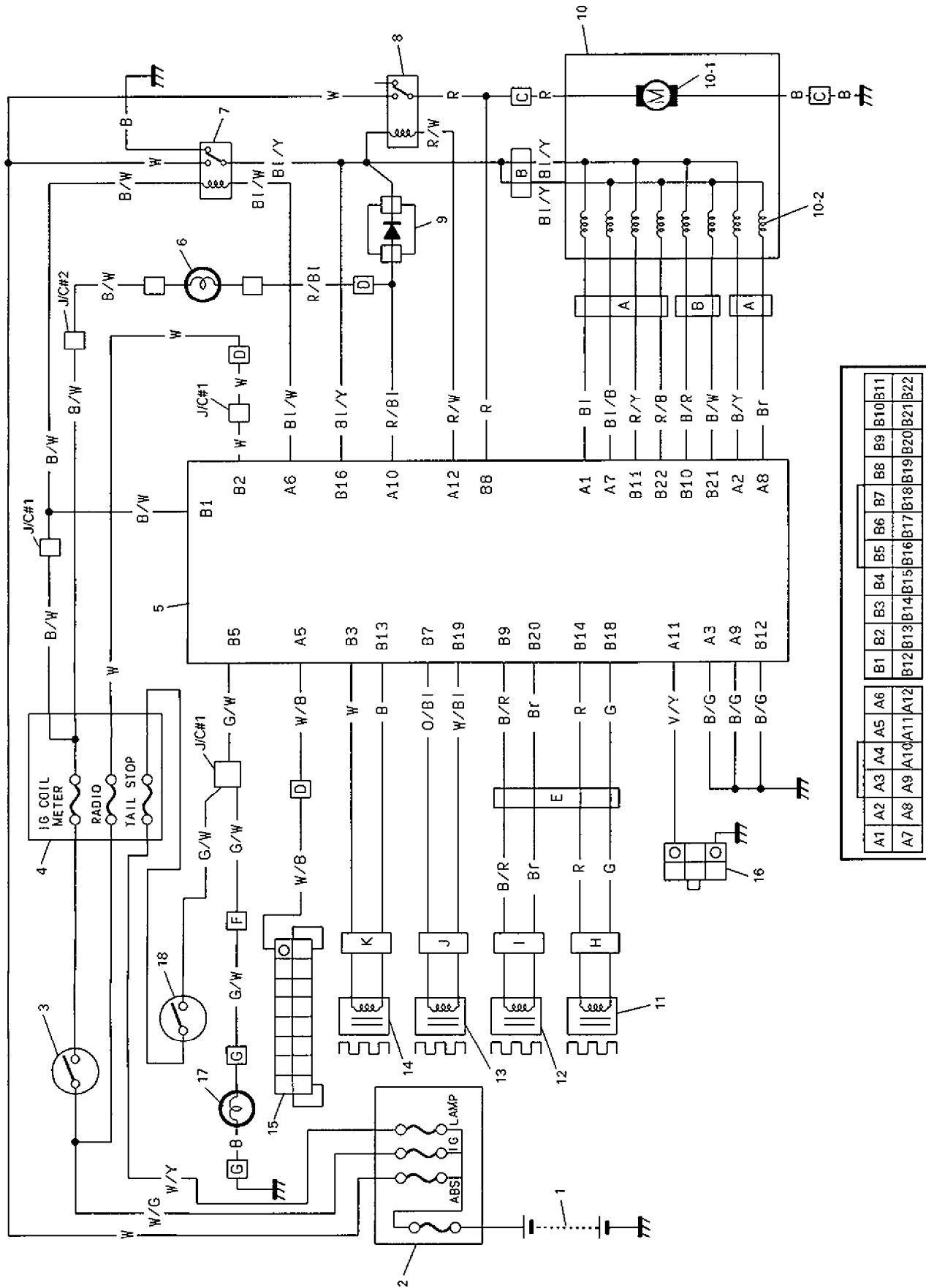


75F00-5E2-18-4

DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC	ABS warning light flashing pattern	DIAGNOSTIC ITEMS	
12		Normal	
15		ABS control module	
21		RF	Wheel speed sensor circuit
25		LF	
31		RR	
35		LR	
22		RF	Wheel speed sensor circuit or sensor ring
26		LF	
32		RR	
36		LR	
41		RF	Inlet solenoid valve circuit
42			Outlet solenoid valve circuit
45		LF	Inlet solenoid valve circuit
46			Outlet solenoid valve circuit
51		RR	Inlet solenoid valve circuit
52			Outlet solenoid valve circuit
55		LR	Inlet solenoid valve circuit
56			Outlet solenoid valve circuit
57		Power source	
61		ABS pump motor and/or motor relay circuit	
63		Fail safe-relay circuit	
71		ABS control module	

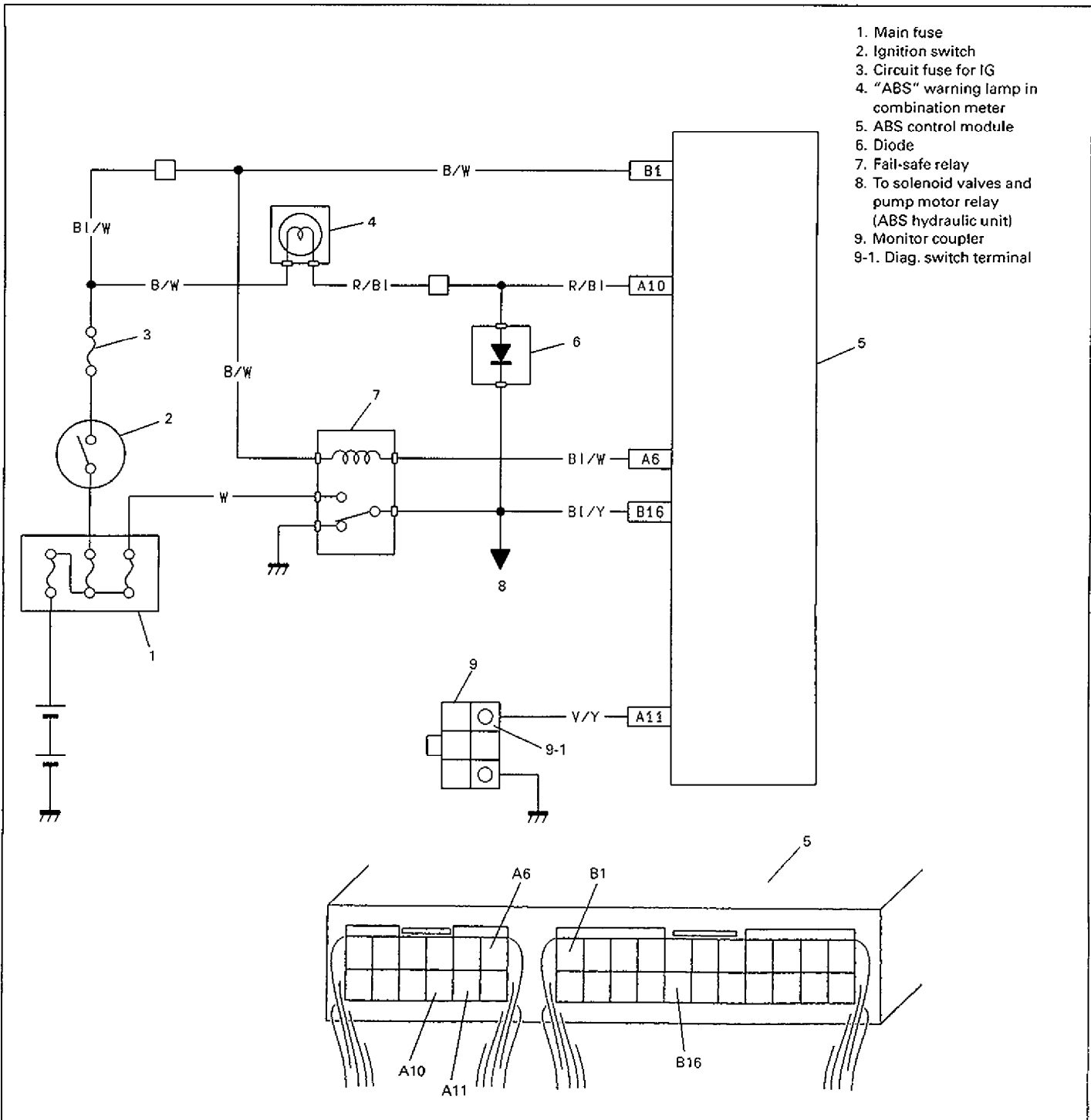
SYSTEM CIRCUIT



TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
A1	Inlet solenoid valve (left-front)	B1	Ignition switch
A2	Inlet solenoid valve (right-rear)	B2	Backup power supply
A3	Ground1	B3	Wheel speed sensor (+) (left-front)
A4	-	B4	-
A5	Data link connector	B5	Stop light switch
A6	ABS fail-safe relay	B6	-
A7	Outlet solenoid valve (left-front)	B7	Wheel speed sensor (+) (right-front)
A8	Outlet solenoid valve (right-rear)	B8	ABS motor voltage monitor
A9	Ground2	B9	Wheel speed sensor (+) (left-rear)
A10	"ABS" warning lamp	B10	Inlet solenoid valve (left-rear)
A11	Diagnosis switch	B11	Inlet solenoid valve (right-front)
A12	ABS pump motor relay	B12	Ground3
		B13	Wheel speed sensor (-) (left-front)
		B14	Wheel speed sensor (+) (right-rear)
		B15	-
		B16	ABS solenoid valve voltage monitor
		B17	-
		B18	Wheel speed sensor (-) (right-rear)
		B19	Wheel speed sensor (-) (right-front)
		B20	Wheel speed sensor (-) (left-rear)
		B21	Outlet solenoid valve (left-rear)
		B22	Outlet solenoid valve (right-front)

Wire color

1. Battery
 2. Main fuses
 3. Ignition switch
 4. Circuit fuses
 5. ABS control module
 6. "ABS" warning lamp
 7. ABS fail-safe relay
 (Solenoid valve relay)
 8. ABS pump motor relay
 9. Diode
 10. ABS hydraulic unit
 10-1. Pump motor
 10-2. Solenoid valves
 11. Right-rear wheel speed sensor
 12. Left-front wheel speed sensor
 13. Right-front wheel speed sensor
 14. Left-front wheel speed sensor
 15. Data link connector
 16. Monitor coupler
 17. Stop lamp
 18. Stop lamp switch
 A ~K: Connector
- B : Black
 B/G : Black/Green
 B/R : Black/Red
 B/W : Black/White
 B/Y : Black/Yellow
 BI : Blue
 BI/B : Blue/Black
 BI/Y : Blue/Yellow
 BI/W : Blue/White
 Br : Brown
 G : Green
 G/W : Green/White
 O/BI : Orange/Blue
 R : Red
 R/B : Red/Black
 R/BI : Red/Blue
 R/W : Red/White
 R/Y : Red/Yellow
 V/Y : Violet/Yellow
 W : White
 W/B : White/Black
 W/BI : White/Blue
 W/G : White/Green
 W/Y : White/Yellow

TABLE-A "ABS" WARNING LAMP CIRCUIT CHECK-LAMP DOES NOT COME "ON" AT IGNITION SWITCH ON

75F00-5E2-23-4

CIRCUIT DESCRIPTION

Operation (ON/OFF) of the "ABS" warning lamp is controlled by the ABS control module and the fail-safe relay. When the ignition switch is turned ON, the ABS control module switches the contact point of the fail-safe relay from the lamp circuit side (relay OFF) to the hydraulic unit circuit side (relay ON).

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 (It operates "initial check" in this 2 seconds) and then turns it OFF. If an abnormality in the system is detected, the lamp is turned ON by both ABS control module and fail-safe relay. Also, it is turned ON by the fail-safe relay when the connector of the ABS control module was disconnected.

75F00-5E2-22-5

TABLE-A "ABS" WARNING LAMP CIRCUIT CHECK-LAMP DOES NOT COME "ON" AT IGNITION SWITCH ON

INSPECTION

STEP	ACTION	YES	NO
1	Check connection of ABS diode and ABS control module harness couplers. Are they connected correctly?	Go to Step 2.	Connect them securely.
2	1) Turn IG switch ON 2) Do other warning lamps come ON?	Go to Step 3.	Go to Step 4.
3	1) Remove combination meter. 2) Is light bulb of ABS warning lamp in good condition?	"R/BI" circuit open or poor connection to combination meter at terminal "R/BI".	Replace light bulb.
4	Is IG fuse in good condition?	Open in "B/W" wire to combination meter or poor connection.	Repair and replace.

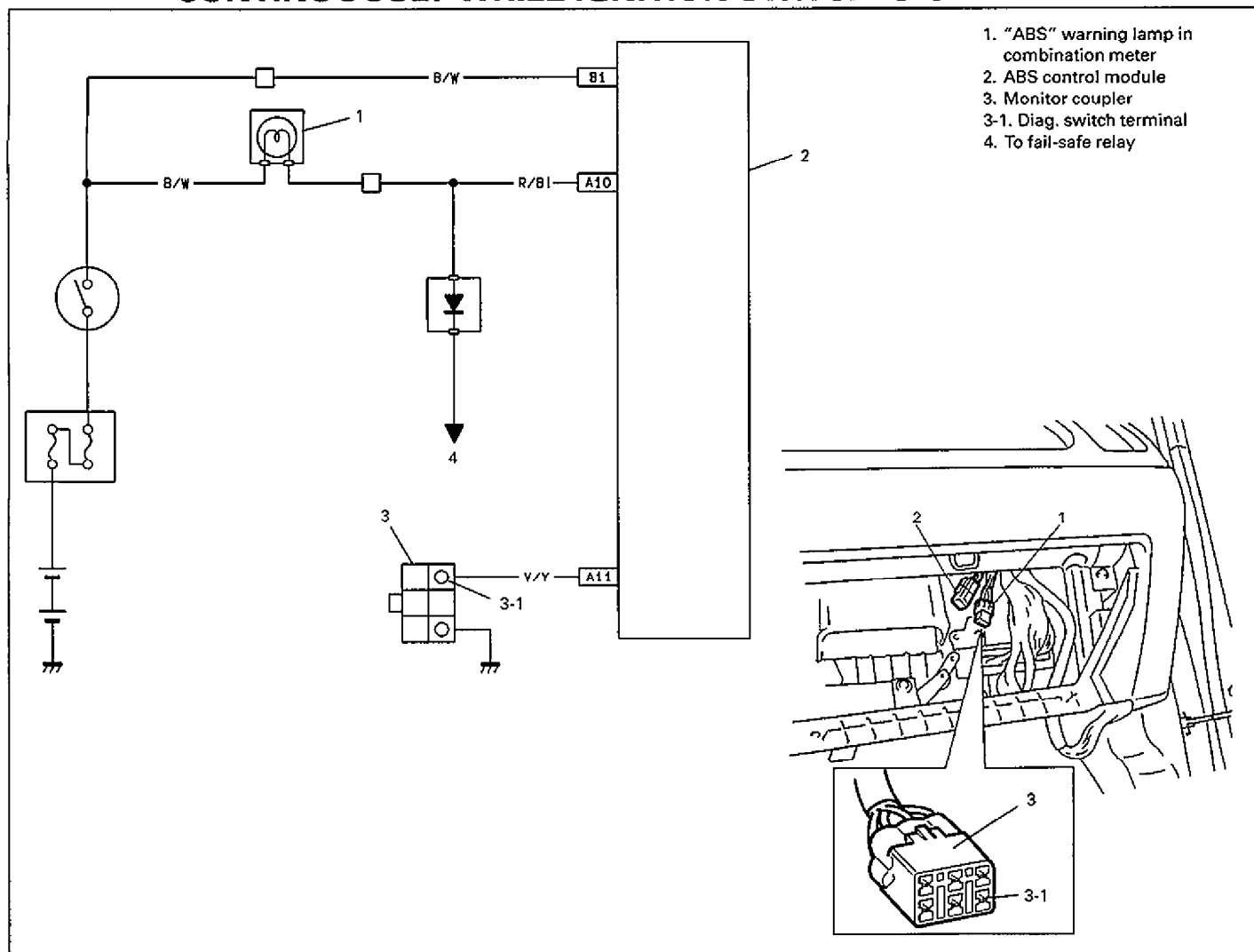
75F00-5E2-23-2

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?	Go to Step 2 of ABS Diagnostic Flow Table in this section.	Go to Step 2.
2	1) Turn IG switch OFF. 2) Disconnect ABS control module connectors, then disconnect 13pin connector from combination meter. 3) Measure resistance from module connector terminal "A10" to body ground. Is it infinity?	Substitute a known-good ABS control module and recheck.	R/BI wire shorted to ground.

TABLE-C "ABS" WARNING LAMP CIRCUIT CHECK-THE LAMP FLASHES CONTINUOUSLY WHILE IGNITION SWITCH IS ON

75F00-5E2-25-3

CIRCUIT DESCRIPTION

When the diag. switch terminal is shorted or connected to the ground with the ignition switch ON and ABS diode removed, the diagnostic 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 and/or current malfunction DTC is indicated by flashing of the lamp.

INSPECTION

STEP	ACTION	YES	NO
1	Is diagnostic switch terminal connected to ground via service wire and ABS diode removed?	Go to Step 2.	Substitute a known-good ABS control module and recheck.
2	1) Turn IG switch ON. 2) Does flashing of ABS warning lamp indicates DTC?	Go to Step 2 of ABS Diagnostic Flow Table in this section.	Substitute a known-good ABS control module and recheck.

75F00-5E2-25-5

DTC 15 – ABS CONTROL MODULE

DESCRIPTION

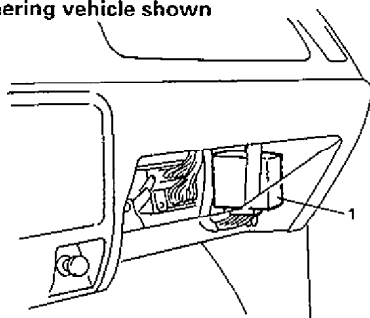
2WD vehicle is not equipped with a G sensor. When an ABS control module for 4WD vehicle is installed to the 2WD vehicle, this DTC is set as G sensor signal is not inputted.

INSPECTION

STEP	ACTION	YES	NO
1	Substitute a known-good ABS control module for 2WD vehicle and recheck. (Figure 1)	–	–

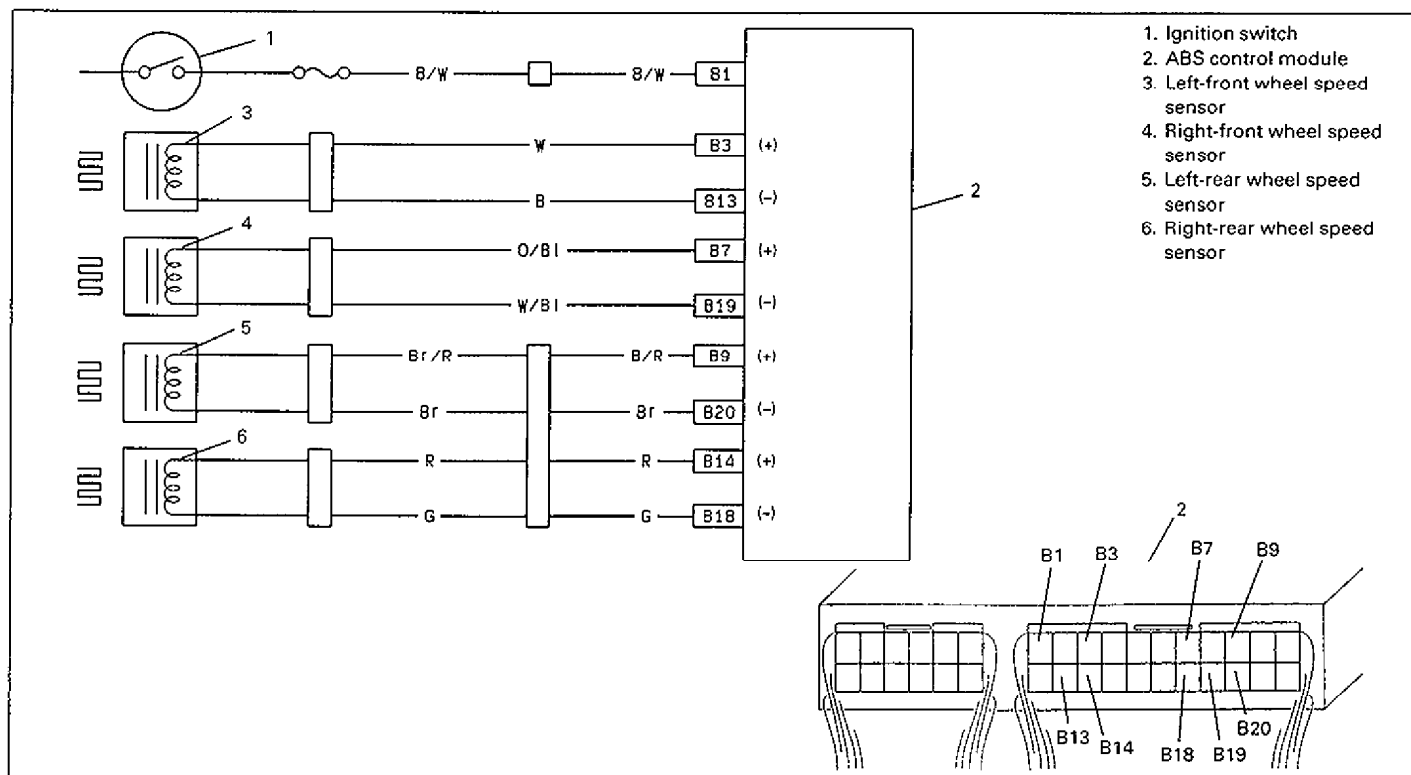
Figure1

LH steering vehicle shown



1. ABS control module

BLANK

DTC 21, 22 – RIGHT-FRONT WHEEL SPEED SENSOR CIRCUIT OR SENSOR RING**25, 26 – LEFT-FRONT WHEEL SPEED SENSOR CIRCUIT OR SENSOR RING****31, 32 – RIGHT-REAR WHEEL SPEED SENSOR CIRCUIT OR SENSOR RING****35, 36 – LEFT-REAR WHEEL SPEED SENSOR CIRCUIT OR SENSOR RING**

75F00-5E2-28-3

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:

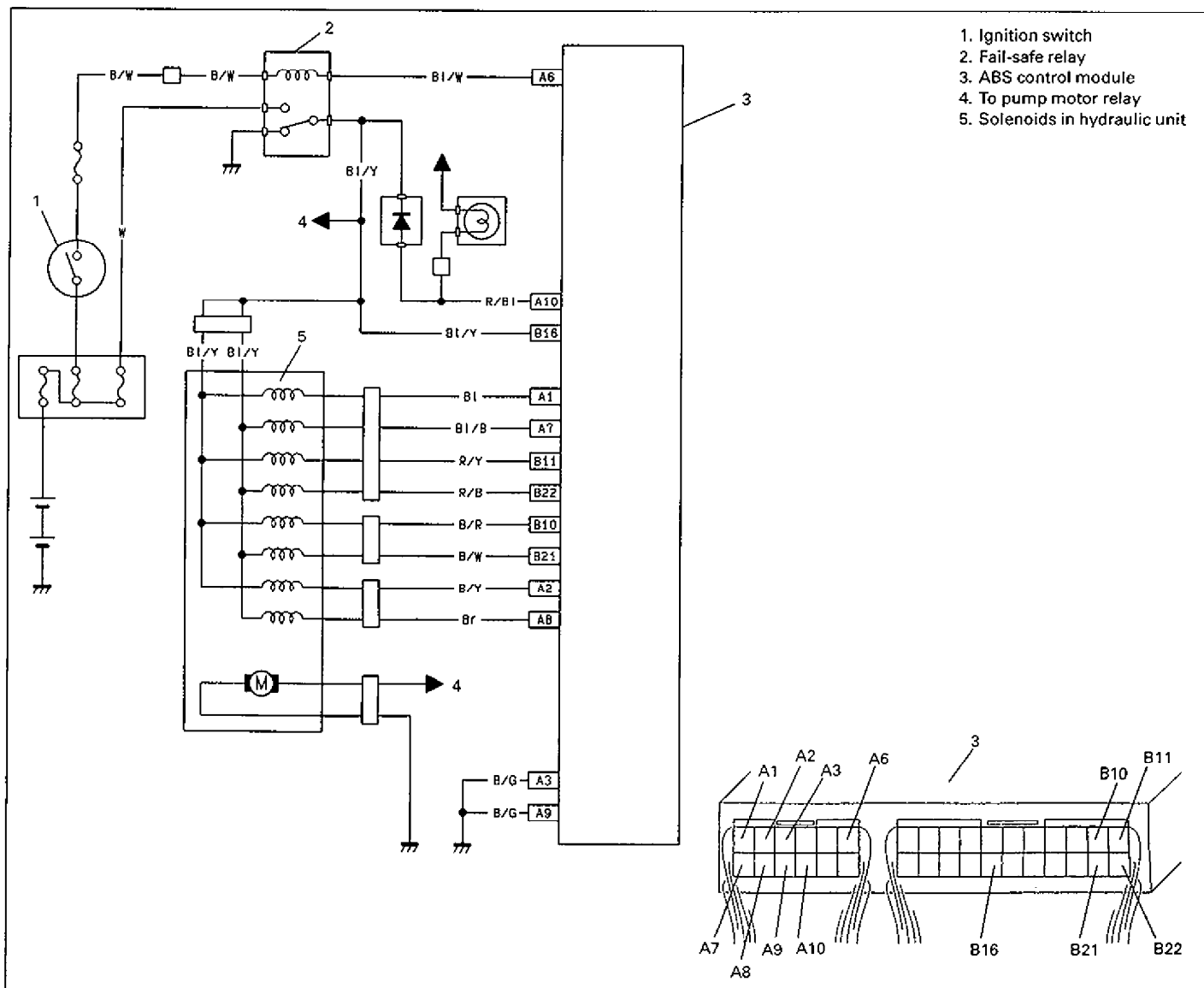
When the vehicle was operated in any of the following ways, one of these DTCs may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in 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.

DTC 21, 22, 25, 26, 31, 32, 35 OR 36**INSPECTION**

STEP	ACTION	YES	NO
1	1) Disconnect applicable ABS wheel speed sensor coupler with IG switch OFF. 2) Measure the resistance between terminals of the ABS wheel speed sensor side coupler. Is it 1.3-1.5k Ω (at 20°C, 68°F)?	Go to Step 2.	Replace ABS wheel speed sensor assembly.
2	1) Turn IG switch OFF. 2) Disconnect ABS control module connector. 3) Check for proper connection to ABS control module at each sensor terminal. 4) If OK, then turn IG switch ON and measure voltage between sensor positive terminal of module connector and body ground. Is it 0V?	Go to Step 3.	ABS wheel speed sensor positive circuit shorted to power.
3	1) Turn IG switch OFF. 2) Connect ABS wheel sensor coupler. 3) Measure resistance between ABS wheel speed 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 applicable ABS wheel speed sensor. 2) Check sensor for damage or foreign material attached. Is it in good condition?	Go to Step 5.	Clean, repair or replace.
5	Check visually through ABS wheel speed sensor installation hole (for front wheels) or remove rear drum (for rear wheels) and check for the following: • Rotor serration (teeth) neither missing nor damaged. • No foreign material being attached. • Rotor not being eccentric. • Wheel bearing free from excessive play. Are they in good condition?	Go to Step 6.	Clean, repair or replace.
6	1) Install ABS wheel sensor to knuckle. 2) Tighten sensor bolt to specified torque and check that there is no clearance between sensor and knuckle. Is it OK?	Go to Step 7.	Replace ABS wheel speed sensor.
7	Referring to FRONT WHEEL SPEED SENSOR REFERENCE in this section, check output voltage or waveform obtained?	Substitute a known-good ABS control module and recheck.	Replace sensor and recheck.

- DTC 41 – RIGHT-FRONT INLET SOLENOID CIRCUIT**
45 – LEFT-FRONT INLET SOLENOID CIRCUIT
51 – RIGHT-REAR INLET SOLENOID CIRCUIT
55 – LEFT-REAR INLET SOLENOID CIRCUIT
42 – RIGHT-FRONT OUTLET SOLENOID CIRCUIT
46 – LEFT-FRONT OUTLET SOLENOID CIRCUIT
52 – RIGHT-REAR OUTLET SOLENOID CIRCUIT
56 – LEFT-REAR OUTLET SOLENOID CIRCUIT



75F00-5E2-30-4

DESCRIPTION

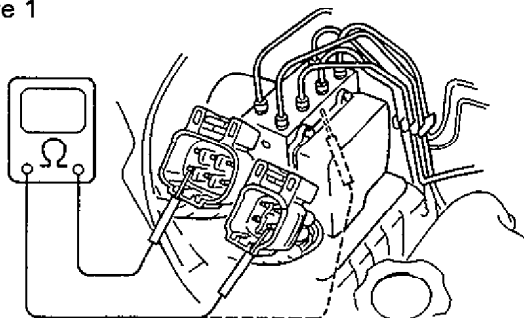
This DTC is set when the voltage at solenoid valve output terminal is extremely low even though ABS control module sends "Solenoid valve OFF" signal, or the voltage at solenoid valve output terminal is extremely high even though ABS control module sends "Solenoid valve ON" signal.

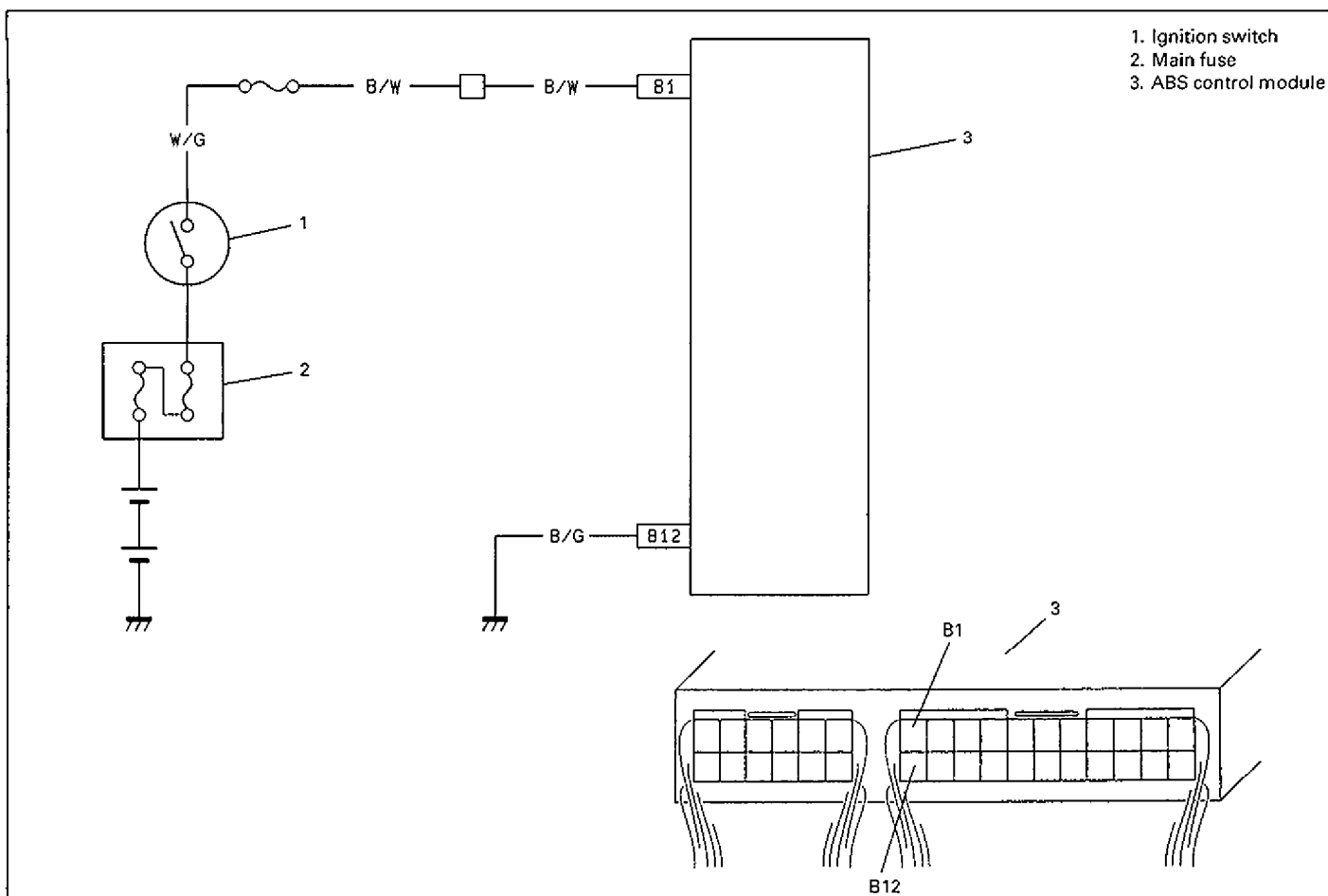
DTC 41, 45, 51, 55, 42, 46, 52, 56 – SOLENOID CIRCUIT**INSPECTION**

STEP	ACTION	YES	NO
1	1) Turn IG switch OFF and disconnect couplers from ABS hydraulic unit. 2) Check for proper connection to ABS hydraulic unit solenoid terminals. 3) If OK, then check the applicable solenoid for resistance and short to ground referring to HYDRAULIC UNIT, SOLENOID VALVE INSPECTION in this section. Is it in good condition? (Figure 1)	Go to Step 2.	Replace ABS hydraulic unit.
2	1) Turn IG switch OFF. 2) Measure resistance between solenoid coupler terminal "BI/Y" of harness side and body ground. Is there continuity?	Go to Step 3.	"BI/Y" circuit open.
3	1) Disconnect connectors from ABS control module. 2) Check for proper connection to ABS control module at solenoid circuit terminal "A1", "A2", "A7", "A8", "B10", "B11", "B21", or "B22". 3) If OK, then measure voltage between terminal "A1", "A2", "A7", "A8", "B10", "B11", "B21", or "B22" of module connector and body ground with IG switch ON. Is it 0V?	Go to step 4.	"BI", "BI/B", "R/Y", "R/B", "B/R", "B/W", "B/Y", or "Br" circuit shorted to power circuit.
4	1) Turn IG switch OFF 2) Connect coupler to ABS hydraulic unit. 3) Measure resistance between terminal "A1", "A2", "A7", "A8", "B10", "B11", "B21", or "B22" of module connector and body ground. Is it about specified solenoid resistance?	Substitute a known-good ABS control module and recheck.	"BI", "BI/B", "R/Y", "R/B", "B/R", "B/W", "B/Y", or "Br" circuit open, poor connection or shorted to ground.

Solenoid Valve	Terminal Number	Lead Wire Color	Solenoid Valve	Terminal Number	Lead Wire Color
RF inlet	B11	R/Y	RF outlet	B22	R/B
LF inlet	A1	BI	LF outlet	A7	BI/B
RR inlet	A2	B/Y	RR outlet	A8	Br
LR inlet	B10	B/R	LR outlet	B21	B/W

Figure 1



DTC 57 – POWER SOURCE CIRCUIT**DESCRIPTION**

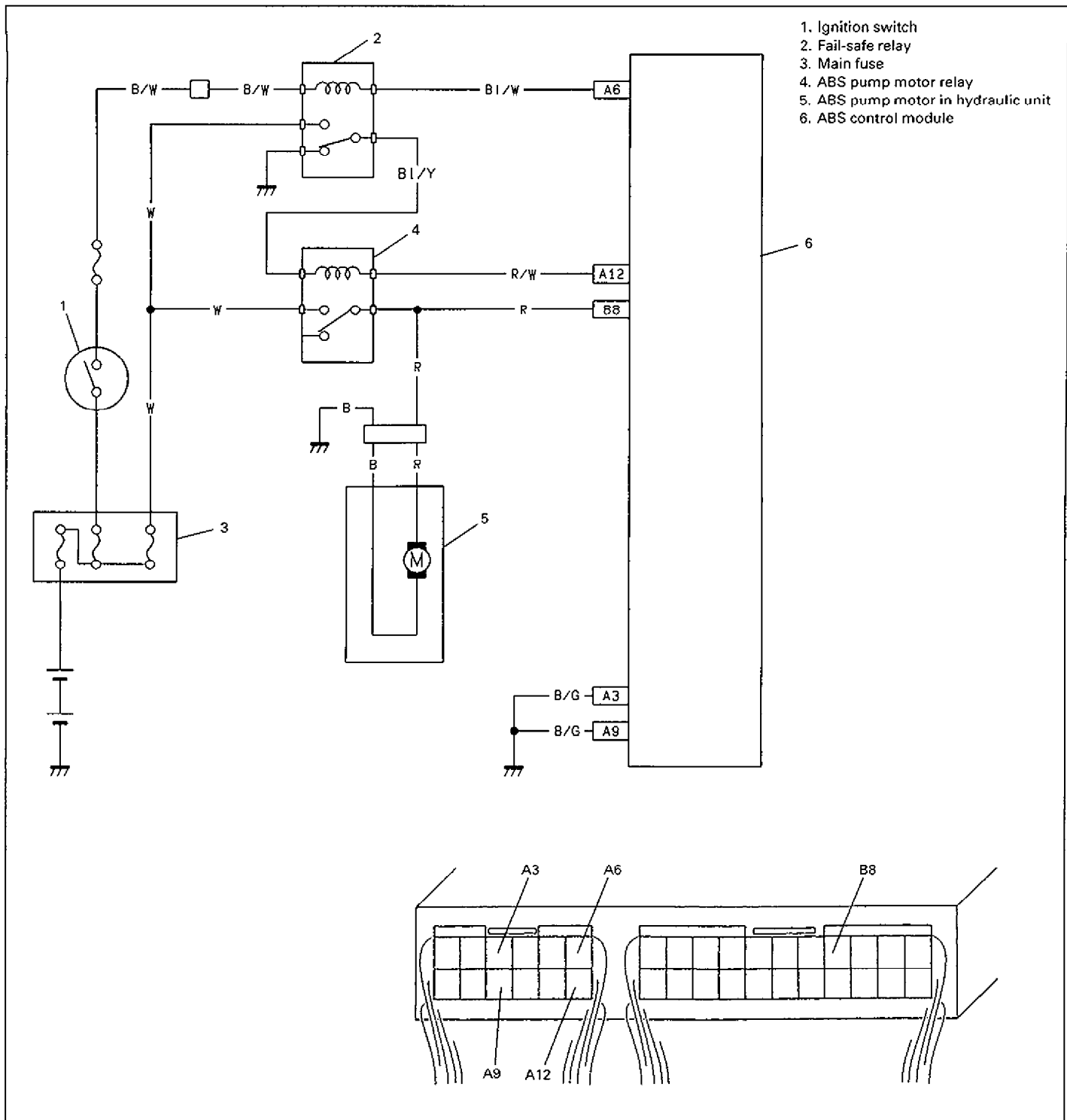
The ABS control module monitors the power source voltage at terminal "B1". When the power source voltage becomes extremely high or low, this DTC will be set. As soon as the voltage rises or lowers to the specified level, the set DTC will be cleared.

INSPECTION

STEP	ACTION	YES	NO
1	1) Connect a voltmeter between battery positive (+) terminal and body ground. 2) Start the engine and measure the maximum voltage when racing the engine. Is it over 18V?	Check charging system referring to SECTION 6H.	Go to Step 2.
2	Keep the engine idling, measure the voltage between terminal "B1" of the ABS control module and body ground (all couplers connected). Is it always under 9V?	• Check charging system referring to SECTION 6H. • Increased resistance of wire "B/W". • Imperfect short between wire "B/W" and ground.	• Poor connection of terminal "B1" or "B12" of the ABS control module. • Increased resistance of wire "B/G". If all the above are in good condition, substitute a known-good ABS control module and recheck.

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DTC 61 – ABS PUMP MOTOR CIRCUIT



75F00-5E2-34-4

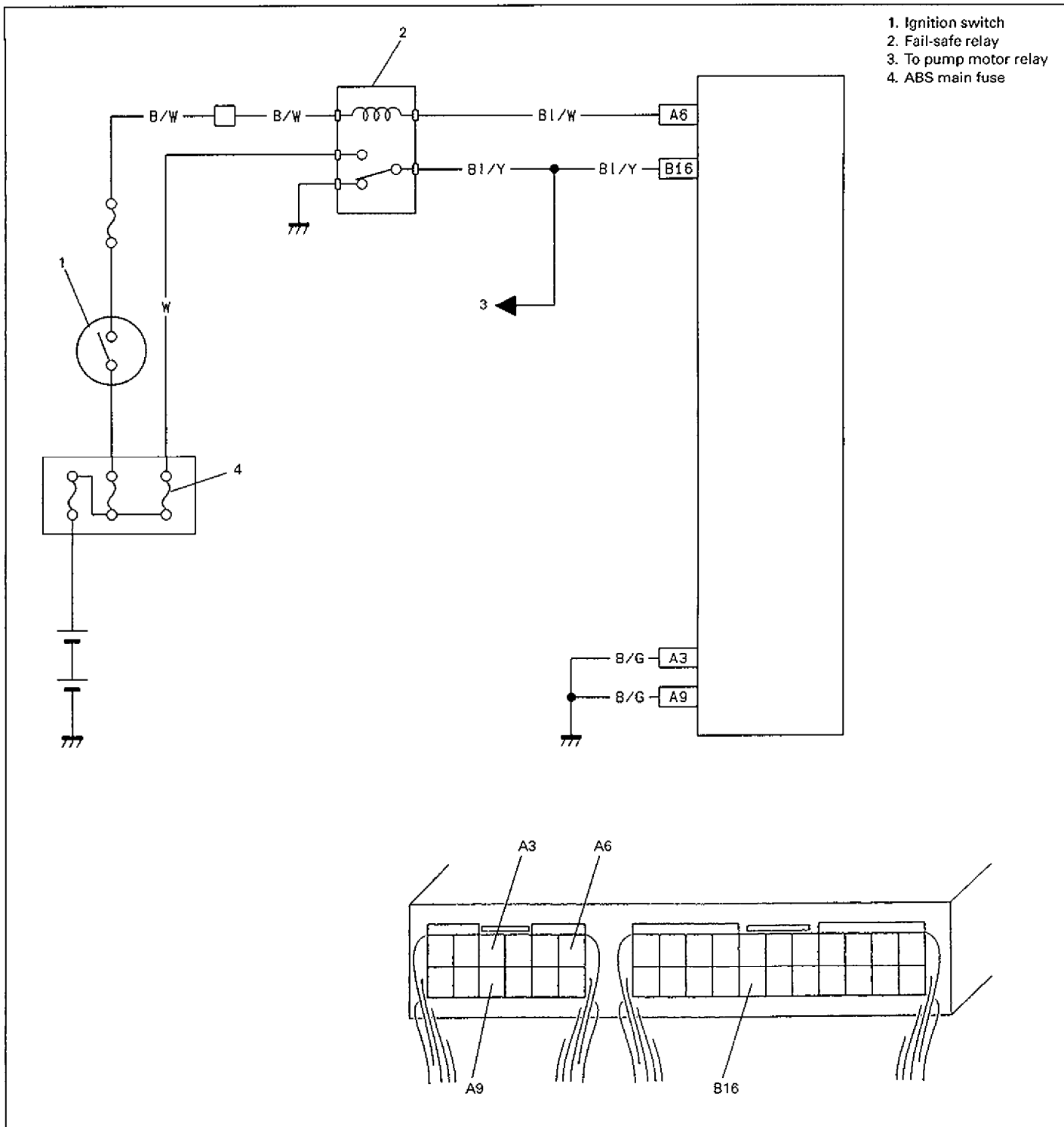
DESCRIPTION

This DTC is set when the voltage at terminal "B8" is extremely low even though the ABS control module sends the "Motor ON" signal to ABS pump motor or when the voltage at terminal "B8" is extremely high even though the ABS control module sends the "Motor OFF" signal to ABS pump motor. Also this DTC is set when the electromotive force (voltage) by pump motor's inertia movement is not input to terminal "B8" right after the ABS control module has sent the "Motor OFF" signal to ABS pump motor.

DTC 61 – ABS PUMP MOTOR CIRCUIT**INSPECTION**

STEP	ACTION	YES	NO
1	1) Turn IG switch OFF, then disconnect ABS control module connector and ABS pump motor coupler. 2) Connect terminals "A6" and "A12" of ABS control module harness side coupler to ground. 3) Turn IG switch ON, measure voltage between terminal "B8" of ABS motor harness side coupler and ground. Is it about 10-14V?	Go to Step 2.	Go to Step 4.
2	Check ABS pump motor relay referring to ABS PUMP MOTOR RELAY INSPECTION in this section. Is it in good condition?	Go to Step 3.	Replace ABS pump motor relay.
3	1) Turn IG switch OFF. 2) Install ABS pump motor relay. 3) Disconnect ABS control module connector and turn IG switch ON. Does ABS pump motor run then?	"R" circuit shorted to power circuit.	Check for proper connection of ABS pump motor ground. If OK, substitute a known-good ABS control module and recheck.
4	1) Turn IG switch OFF. 2) Check for proper connection to ABS pump motor relay. 3) If OK then check ABS pump motor relay referring to ABS PUMP MOTOR RELAY INSPECTION in this section. Is it in good condition?	Go to Step 5.	Replace ABS pump motor relay.
5	1) Check for proper connection to ABS pump motor. 2) If OK then check ABS pump motor referring to ABS PUMP MOTOR INSPECTION in this section. Is it OK?	Go to Step 6.	Replace ABS pump motor.
6	1) Disconnect ABS control module connectors. 2) Check for proper connection to module at terminals "A12", and "B8". 3) If OK, then check "R/W" and "BI/Y" circuit for open and short to ground. Is it in good condition?	Go to step 7.	"R/W" or "BI/Y" circuit open or "R/W" circuit shorted to ground.
7	1) Connect ABS pump motor coupler. 2) Measure resistance between terminal "B8" of module connector and body ground. Is there continuity?	Substitute a known-good ABS control module and recheck.	"R" circuit open or motor "B" circuit open.

DTC 63 – ABS FAIL-SAFE RELAY CIRCUIT



75F00-5E2-36-4

DESCRIPTION

This DTC is set when the voltage at terminal "B16" is extremely low even though the ABS control module sends the "fail safe relay ON" signal, or the voltage at terminal "B16" is extremely high even though the ABS control module sends the "fail-safe relay OFF" signal.

DTC 63 – ABS FAIL-SAFE RELAY CIRCUIT INSPECTION

STEP	ACTION	YES	NO
1	Check ABS main fuse and connection. Is it in good condition?	Go to Step 2.	Repair or replace.
2	1) Turn IG switch OFF. 2) Remove ABS fail safe relay. 3) Check for proper connection to fail safe relay. 4) If OK, then check ABS fail safe relay referring to ABS FAIL SAFE RELAY INSPECTION in this section. Is it in good condition?	Go to Step 3.	Replace ABS fail safe relay.
3	Measure "W" circuit for resistance. Is there continuity?	Go to Step 4.	"W" circuit open.
4	1) Install fail safe relay. 2) Disconnect ABS control module connectors. 3) Check for proper connection to ABS control module at terminals "A1", "A2", "A6", "A7", "A10", "A11", "A21" and "A22". 4) If OK then measure voltage between module connector terminal "A6" and body ground with IG switch ON. Is it 10-14V?	Go to Step 5.	"BI/W" circuit open or shorted to ground.
5	Measure voltage between module connector terminal "B16" and body ground with IG switch ON. Is it about 0V?	Go to step 6.	"BI/Y" circuit shorted to power circuit.
6	1) Turn IG switch OFF. 2) Measure resistance between module connector terminal "B16" and body ground. Is there continuity?	Substitute a known-good ABS control module and recheck.	"BI/Y" circuit open.

DTC 71 – ABS CONTROL MODULE

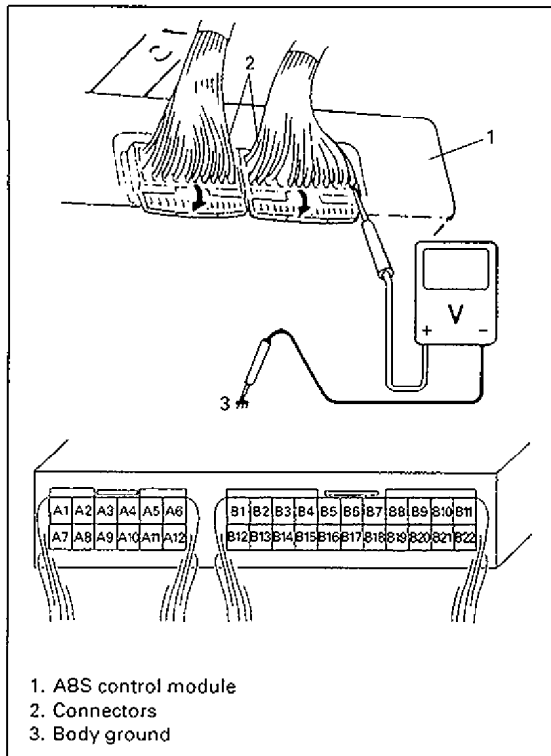
DESCRIPTION

This DTC will be set when an internal malfunction is detected in the ABS control module.

INSPECTION

STEP	ACTION	YES	NO
1	Erase all DTCs. Turn ignition SW ON and check for any DTC. Is it DTC71?	Replace ABS control module.	Could be a temporary malfunction of the ABS control module.

BLANK



75F00-5E2-40-2

STANDARD VOLTAGE AT ABS CONTROL MODULE CONNECTOR TERMINALS

Voltage between each terminal of module connector and body ground is as follows.

CAUTION:

Never connect voltmeter or ohmmeter to ABS control module with connector disconnected from it. Attempt to do it may cause damage to ABS control module.

NOTE:

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

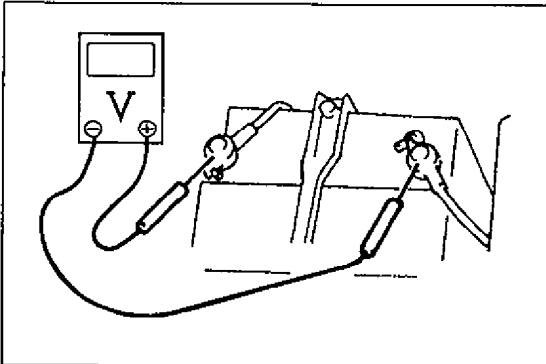
TERMI- NAL	WIRE COLOR	CIRCUIT	STANDARD VOLTAGE	CONDITION
B11	R/Y	Inlet solenoid valve (FR)	10-14V	When hydraulic unit not operating
B10	B/R	Inlet solenoid valve (RL)	10-14V	When hydraulic unit not operating
B9	B/R	Wheel speed sensor + (RL)	about 1V	When vehicle stopped
B8	R	ABS motor voltage monitor	0V	When hydraulic unit not operating
B7	O/BI	Wheel speed sensor + (FR)	about 1V	When vehicle stopped
B5	G/W	Brake switch	10-14V	When brake pedal depressed
			0V	When brake pedal released
B3	W	Wheel speed sensor + (FL)	about 1V	When vehicle stopped
B2	W	Backup power source	10-14V	
B1	B/W	Power source (from ignition switch)	10-14V	
B22	R/B	Outlet solenoid valve (FR)	10-14V	When hydraulic unit not operating
B21	B/W	Outlet solenoid valve (RL)	10-14V	When hydraulic unit not operating
B20	Br	Wheel speed sensor - (RL)	0V	
B19	W/BI	Wheel speed sensor - (FR)	0V	
B18	G	Wheel speed sensor - (RR)	0V	
B16	BI/Y	Valve relay output monitor	10-14V	
B14	R	Wheel speed sensor + (RR)	about 1V	When vehicle stopped
B13	B	Wheel speed sensor - (FL)	0V	
B12	B/G	Ground (for control system)	0V	
A6	BI/W	Valve relay (coil)	below 2V	
A5	W/B	TECH 1	5V or 0V	
A3	B/G	Ground No.1 (for power source)	0V	
A2	B/Y	Inlet solenoid valve (RR)	10-14V	When hydraulic unit not operating
A1	BI	Inlet solenoid valve (FL)	10-14V	When hydraulic unit not operating
A12	R/W	Motor relay (coil)	10-14V	When hydraulic unit not operating
A11	V/Y	Diagnosis switch	about 5V	
A10	R/BI	ABS warning light	below 1V	When ABS warning light ON
			10-14V	When ABS warning light OFF
A9	B/G	Ground No.2 (for power source)	0V	
A8	Br	Outlet solenoid valve (RR)	10-14V	When hydraulic unit not operating
A7	BI/B	Outlet solenoid valve (FL)	10-14V	When hydraulic unit not operating

ON-VEHICLE SERVICE

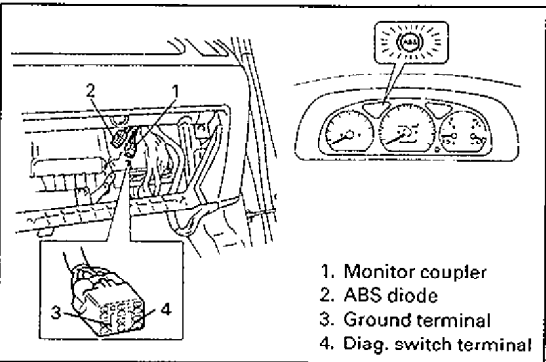
PRECAUTION

When connectors are connected to ABS control module, do not disconnect connectors of hydraulic unit, sensors, relay, fuse etc. and turn ignition switch ON. Then DTC will be set in ABS control module.

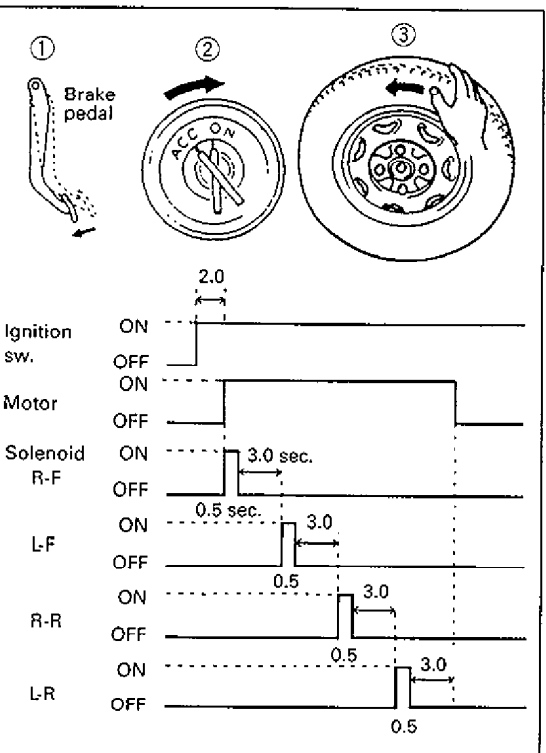
75F00-5E2-42-1



75F00-5E2-42-2



75F00-5E2-42-3

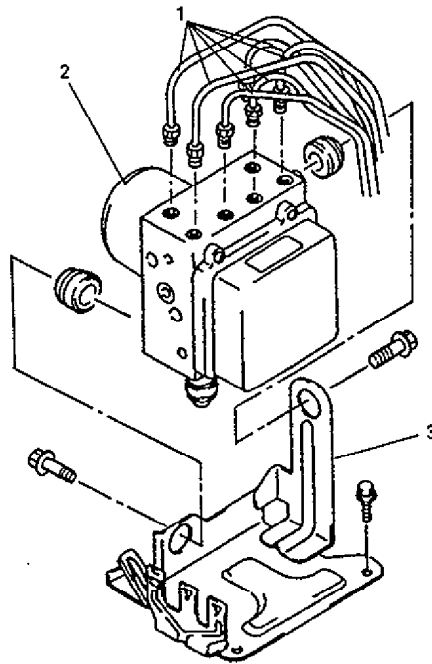


ABS HYDRAULIC UNIT OPERATION CHECK

- 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 P. 5E2-17.
- 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 monitor coupler connected to ground by using service wire and ABS diode removed, 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 Step 8) and 9) till all 4 wheels are checked. If a faulty condition is found in Steps 9) and 10), replace hydraulic unit.
- 11) Turn ignition switch "OFF", remove service wire from monitor coupler and install ABS diode.

75F00-5E2-42-5

ABS HYDRAULIC UNIT



CAUTION:

Never disassemble ABS hydraulic unit, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS hydraulic unit.

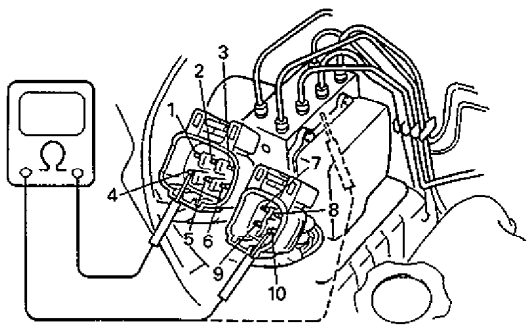
- 1. Brake pipe
- 2. ABS hydraulic unit
- 3. Bracket

75F00-5E2-43-2

HYDRAULIC UNIT INSPECTION

- Check hydraulic unit for fluid leakage.
If any, repair or replace.

75F00-5E2-43-3



SOLENOID VALVE INSPECTION

- 1) Turn ignition switch "OFF".
- 2) Detach connectors from bracket.
- 3) Disconnect solenoid connector.
- 4) Check resistance between terminals and check whether or not short-circuit between each terminal and hydraulic unit body exists.

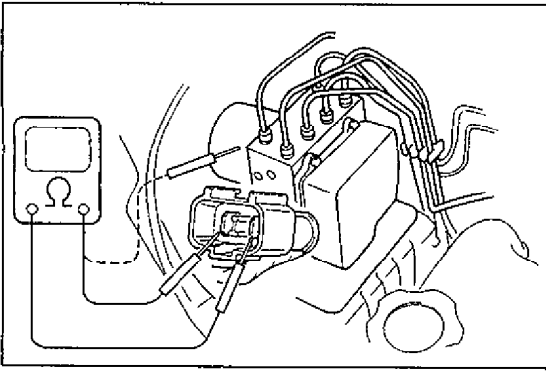
Between terminals:

1 and 10	}	2.9 – 3.9 Ω at 20°C (68°F)
2 and 10		
3 and 8		
7 and 8		
4 and 10	}	7.2 – 9.2 Ω at 20°C (68°F)
5 and 10		
8 and 9		
6 and 8		

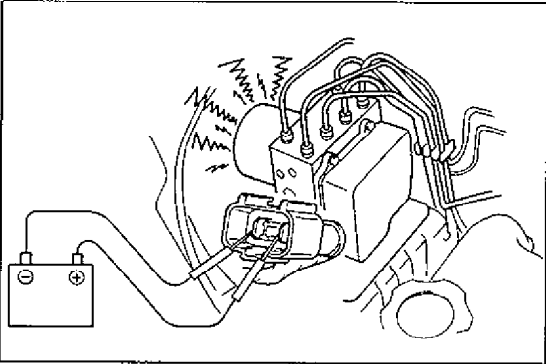
Between each terminal and unit body: ∞ (infinity)

If faulty condition was found, replace hydraulic unit.

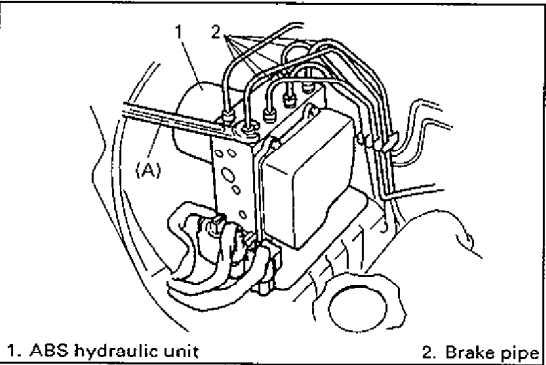
75F00-5E2-43-5



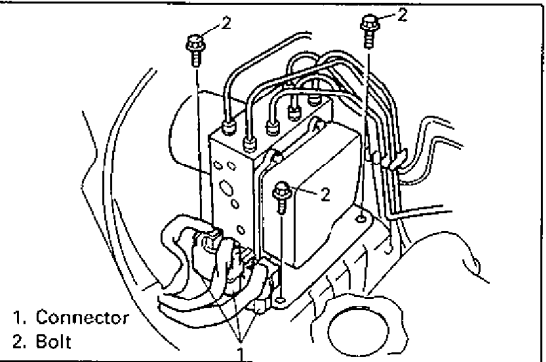
75F00-5E2-44-1



75F00-5E2-44-2



75F00-5E2-44-3



75F00-5E2-44-4

PUMP MOTOR INSPECTION

- 1) Turn ignition switch "OFF".
- 2) Disconnect motor connector.
- 3) Check motor for resistance.

Between motor terminals: Less than 1 Ω at 20°C (68°F)

Between terminal and motor body : 1 M Ω or more

- 4) Connect 12V battery positive terminal to motor connector terminal "1" and negative terminal to "2".
Then check if operation sound is heard from motor.
If faulty condition was found in Step 3) or 4), replace hydraulic unit.

REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Using special tool, disconnect brake pipes from ABS hydraulic unit.

Special Tool

(A): 09950-78210

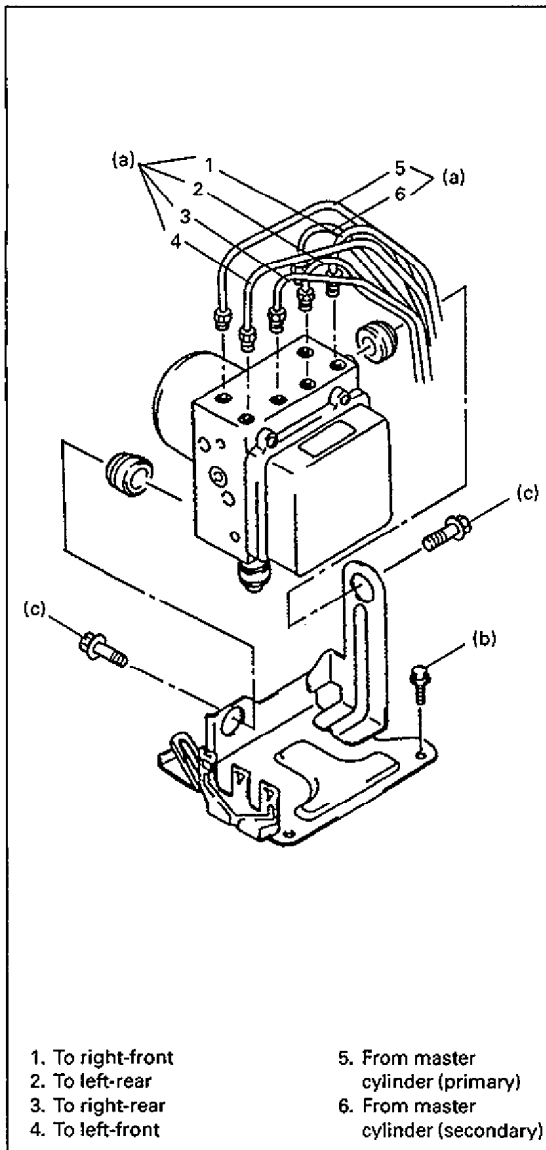
NOTE:

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 connectors.
- 4) Remove three bolts and take out ABS hydraulic unit with 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.



75F00-5E2-45-3

INSTALLATION

1) Install hydraulic unit by reversing removal procedure.

Tightening Torque

(a): 16 N·m (1.6 kg-m, 12.0 lb-ft)

(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)

(c): 9 N·m (0.9 kg-m, 6.5 lb-ft)

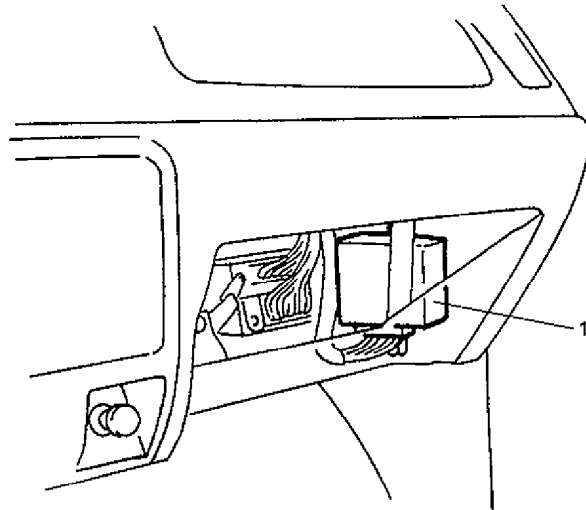
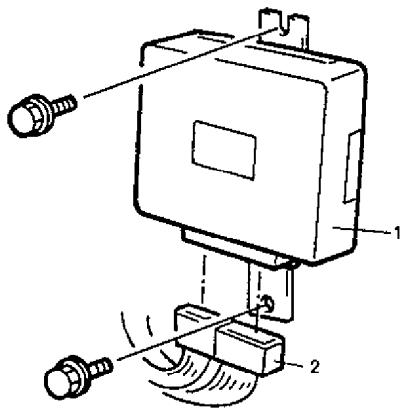
2) Bleed air from brake system referring to Section 5.

3) Check each installed part for fluid leakage and perform hydraulic unit operation check.

ABS CONTROL MODULE

CAUTION:

As ABS control module consists of precision parts, be careful not to expose it to excessive shock.



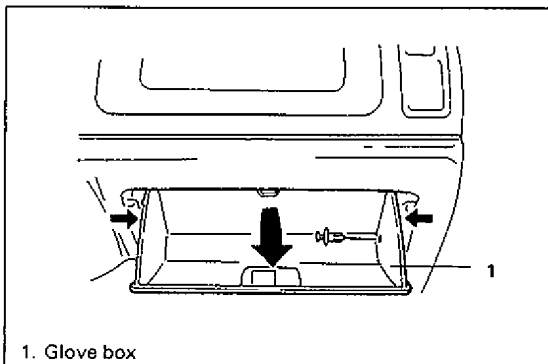
NOTE:

LH steering vehicle shown.

For RH steering vehicle, same location but on the opposite side.

1. ABS control module
2. Couplers

75F00-5E2-46-3



1. Glove box

75F00-5E2-46-4

REMOVAL

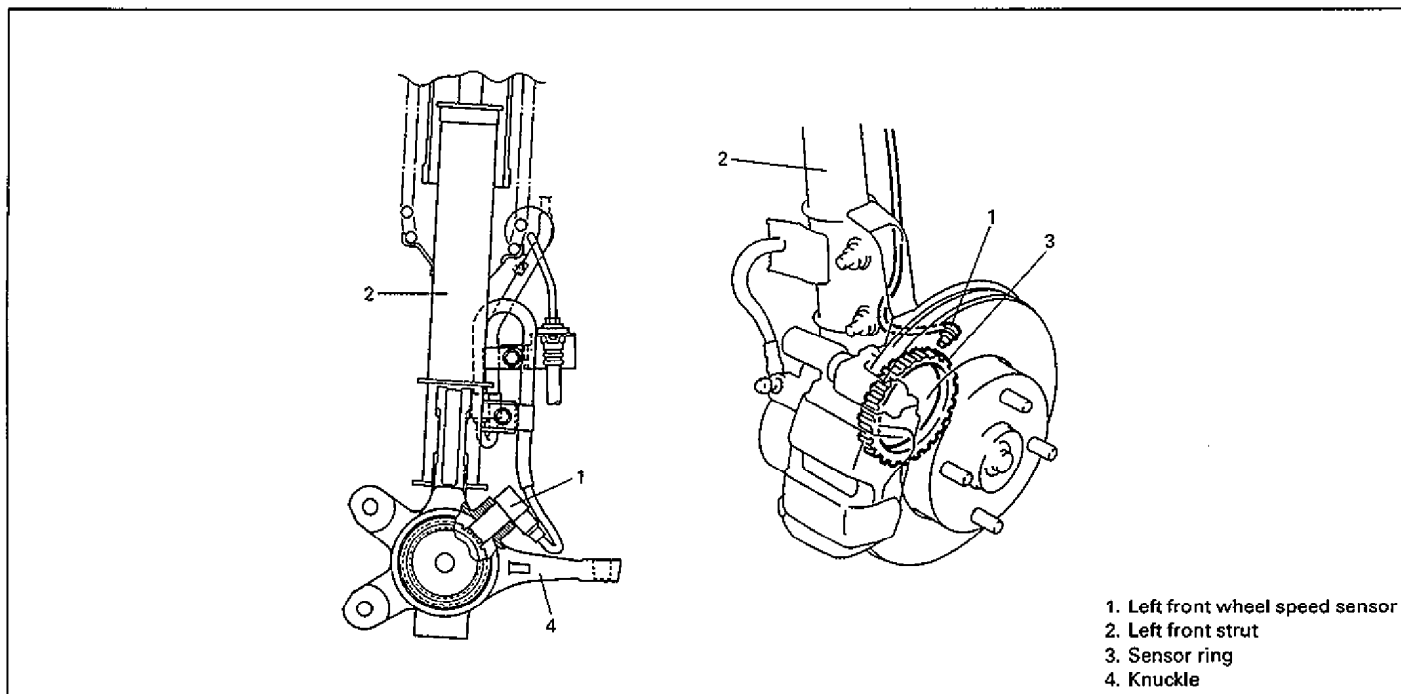
- 1) Disconnect negative cable from battery.
- 2) Remove glove box.

- 3) Disconnect ABS control module couplers.
- 4) Remove two bolts and take out ABS control module.

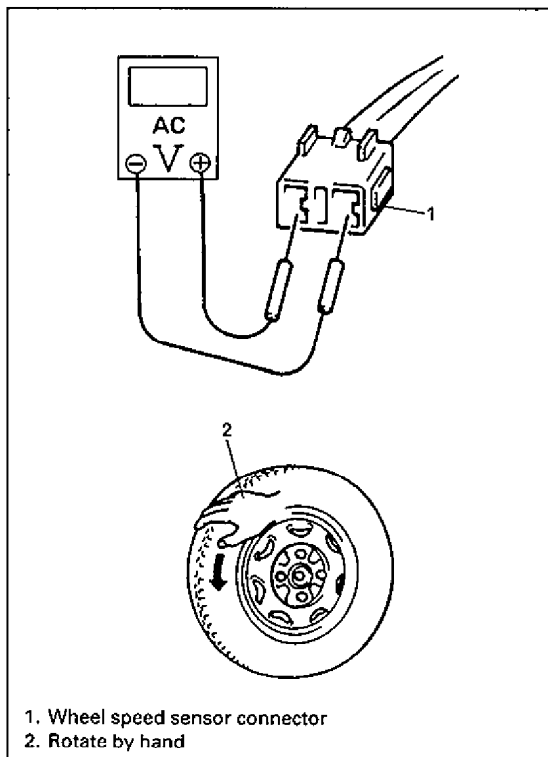
INSTALLATION

Install it by reversing removal procedure.

FRONT WHEEL SPEED SENSOR



75F00-5E2-47-2



75F00-5E2-47-4

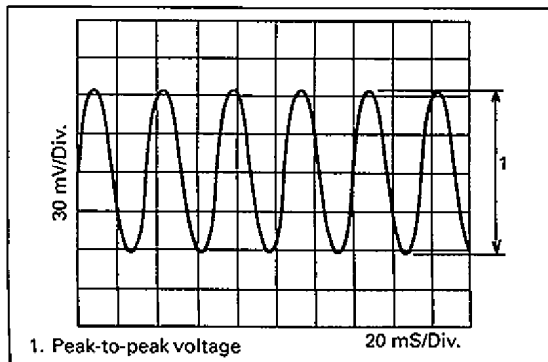
OUTPUT VOLTAGE INSPECTION

- 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 1 full rotation to 1 1/3 rotation per second, check AC voltage of sensor.

Output AC voltage at 1 to

1 1/3 rotation per second (40 – 50 Hz): 42 mV or more

If measured voltage is not as specified, check sensor, rotor and their installation conditions.



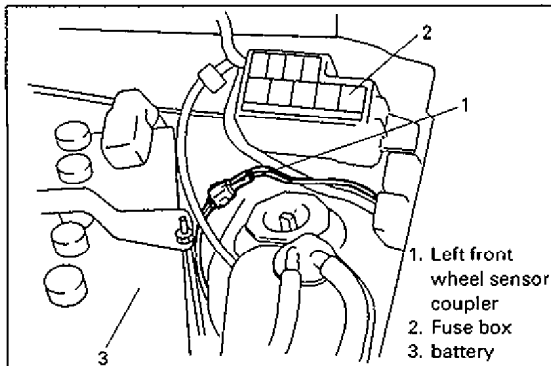
75F00-5E2-47-5

Reference

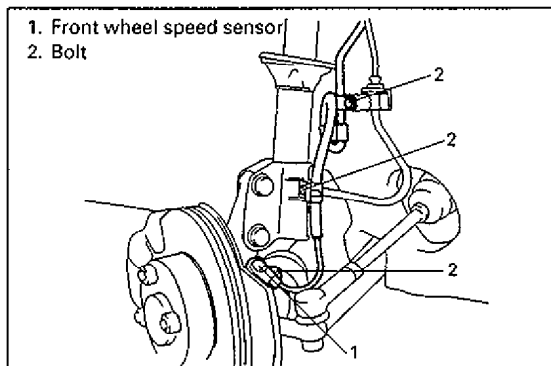
When using oscilloscope for this check, check if peak-to-peak voltage meets specification and waveform is complete.

Peak-to-peak voltage

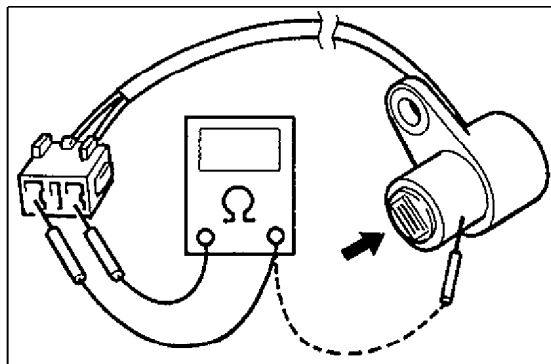
at 1 to 1 1/3 rotation per second (40 – 50 Hz): 120 mV or more



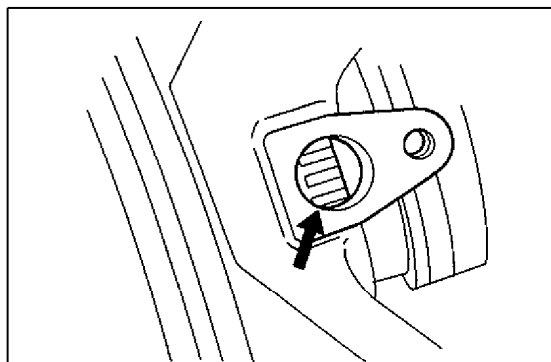
75F00-5E2-48-1



75F00-5E2-48-2



75F00-5E2-48-3



75F00-5E2-48-4

REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Disconnect front wheel speed sensor coupler.
- 3) Hoist vehicle and remove wheel.

- 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: 1.3 – 1.5 k Ω at 20°C (68°F)

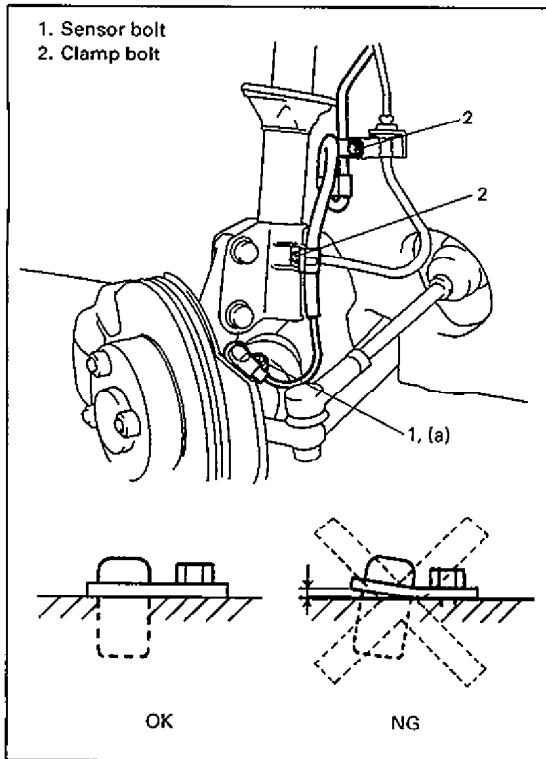
Resistance between terminal and sensor body: 1 M Ω or more

If any malfunction is found, replace.

SENSOR RING INSPECTION

- Check ring serration (teeth) for being missing, damaged or deformed.
- Turn drive shaft and check if ring rotation is free from eccentricity and looseness.
- Check that no foreign material is attached.

If any malfunction is found, repair or replace.



75F00-5E2-49-2

INSTALLATION

- 1) Check that no foreign material is attached to sensor and rotor.
- 2) Install it by reversing removal procedure.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

CAUTION:

Do not pull wire harness or twist more than necessary when installing front wheel speed sensor.

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

FRONT WHEEL SENSOR RING

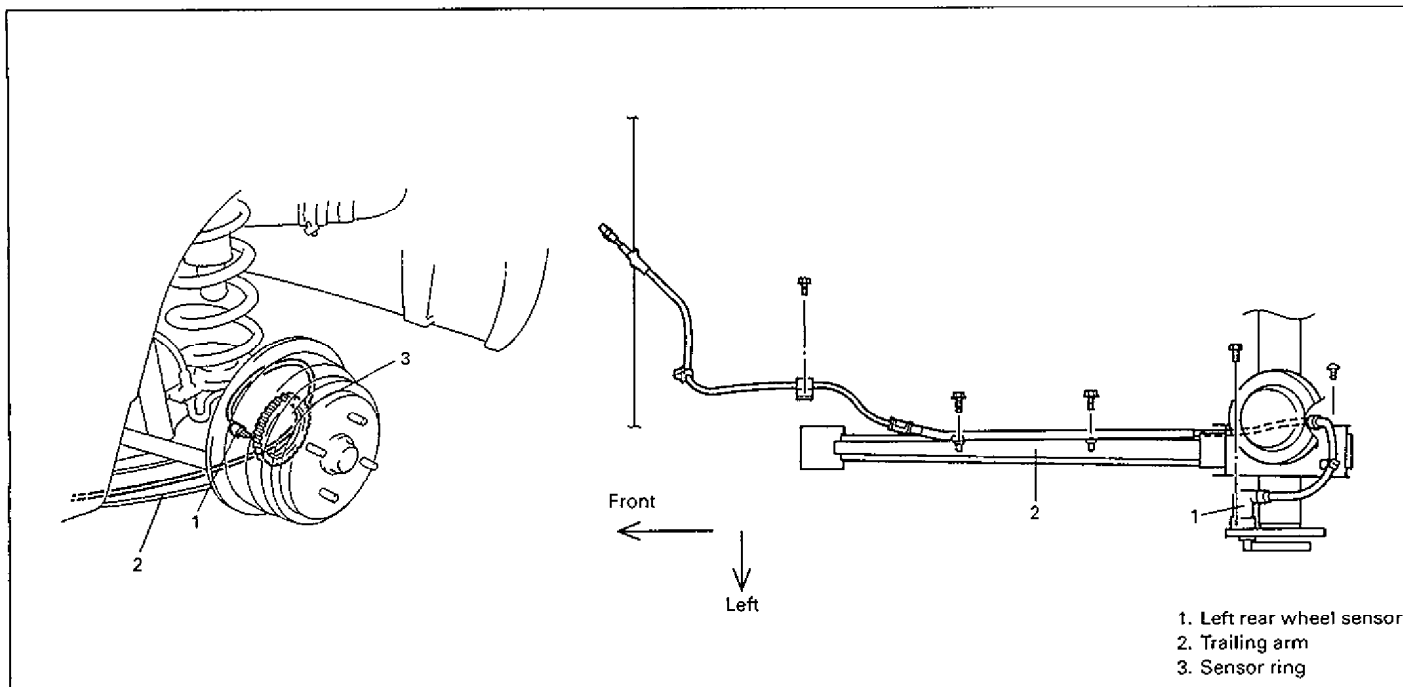
NOTE:

The front wheel sensor ring can not be removed or replaced alone. If front wheel sensor ring needs to be replaced, replace it as a drive shaft assembly.

For removal and installation of front drive shaft, refer to Section 4A1 this manual.

75F00-5E2-49-3

REAR WHEEL SPEED SENSOR

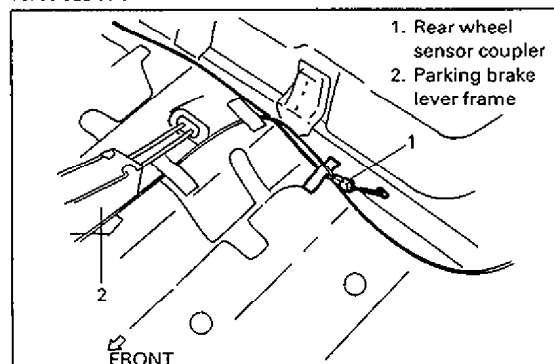


75F00-5E2-50-2

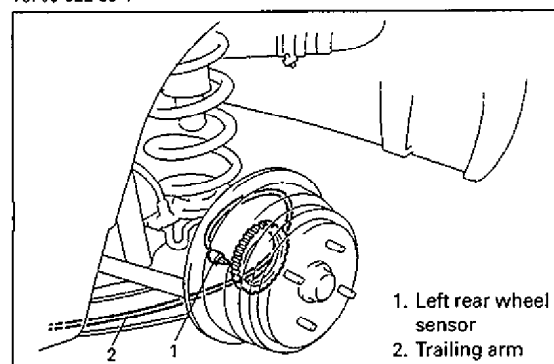
OUTPUT VOLTAGE INSPECTION

Check in the same procedure as used for front wheel speed sensor inspection.

75F00-5E2-50-3



75F00-5E2-50-4



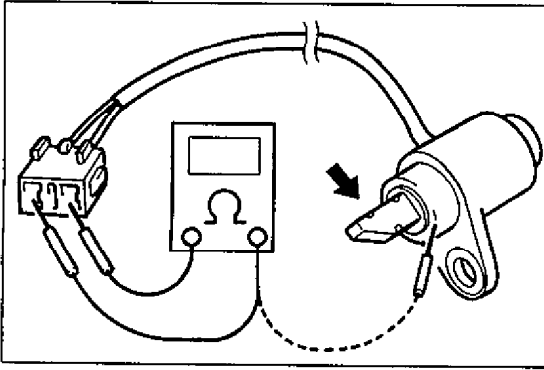
75F00-5E2-50-5

REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Remove floor carpet and silencer pad.
- 3) Disconnect rear wheel speed sensor coupler.
- 4) Hoist vehicle.
- 5) Detach ABS wheel sensor wire harness from suspension frame.
- 6) Remove rear wheel speed sensor from rear axle flange.

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.



75F00-5E2-51-1

SENSOR INSPECTION

- Check sensor for damage.
- Check sensor for resistance.

Resistance between terminals : 1.3 – 1.5 k Ω at 20°C, 68°F

Resistance between terminal and sensor body : 1 M Ω or more

If any malcondition is found, replace.

INSTALLATION

- 1) Check that no foreign material is attached to sensor and ring.
- 2) Install it by reversing removal procedure.

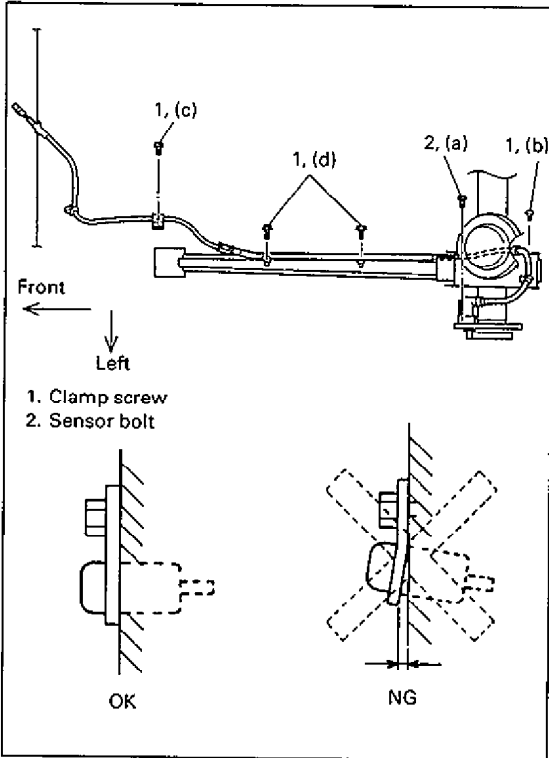
Tightening Torque

- (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)
 (b): 2.5 N·m (0.25 kg-m, 2.0 lb-ft)
 (c): 10 N·m (1.0 kg-m, 7.5 lb-ft)
 (d): 4.5 N·m (0.45 kg-m, 3.5 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 rear axle flange.



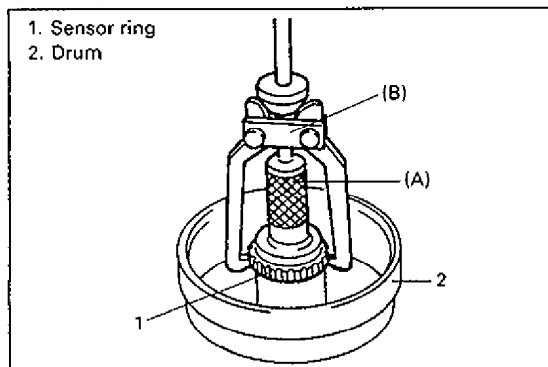
75F00-5E2-51-3

REAR WHEEL SENSOR RING

REMOVAL

- 1) Remove ABS rear wheel sensor from rear axle flange.
- 2) Remove brake drum referring to Section 5 of this manual.

75F00-5E2-52-1



- 3) Remove sensor ring from brake drum using special tool.

Special Tool

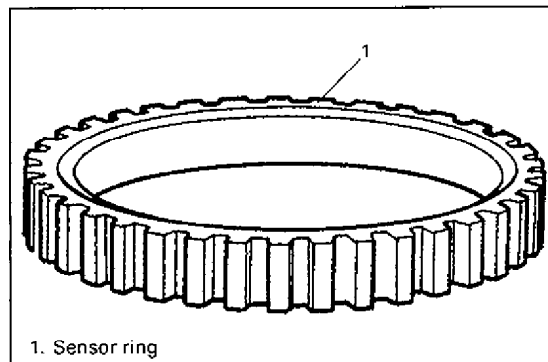
(A): 09913-75520

(B): 09913-65135

CAUTION:

Pull out sensor ring from brake drum gradually and evenly. Attempt to pull it out partially may cause it to be deformed.

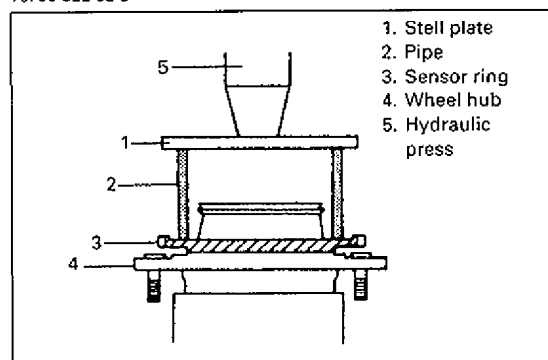
75F00-5E2-52-2



INSPECTION

- Check ring serration (teeth) for being missing, damaged or deformed.
 - Check sensor ring for being deformed (warped).
 - Check that no foreign material is attached.
- If any malfunction is found, repair or replace.

75F00-5E2-52-3



INSTALLATION

NOTE:

Do not reuse (reinstall) removed sensor ring.

- 1) Install new sensor ring as shown.

NOTE:

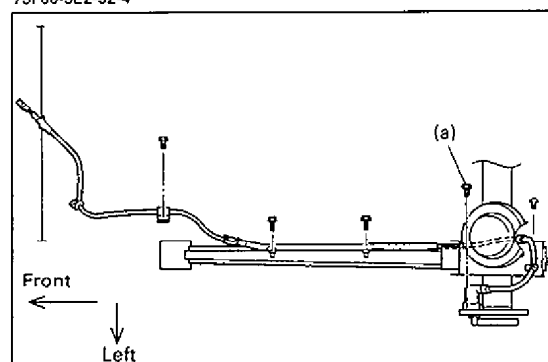
- Pipe used here should have inner diameter of 65 mm (2.56 in.) – 71 mm (2.80 in.) and its outside should not contact teeth of sensor ring.
- Use care not to insert wheel hub diagonally.

- 2) Install brake drum. Refer to Section 5 of this manual.
- 3) Install ABS rear wheel speed sensor to rear axle flange.

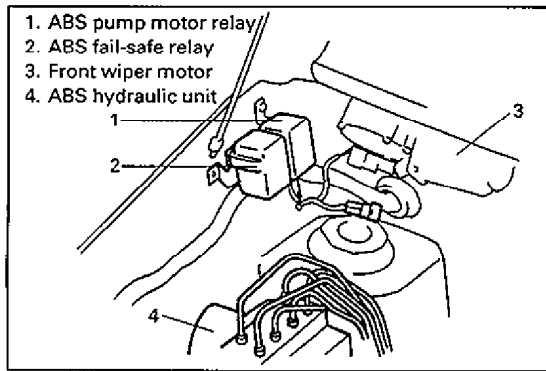
Tightening Torque

(a): 23 N·m (2.3 kg·m, 17.0 lb·ft)

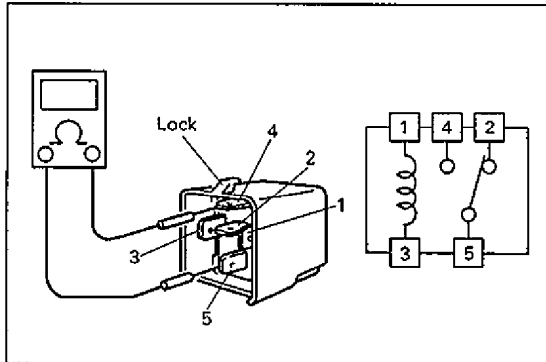
75F00-5E2-52-4



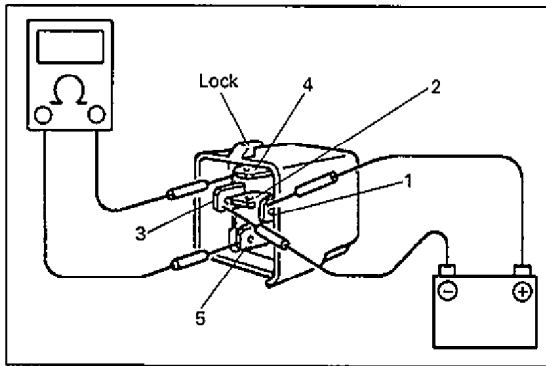
75F00-5E2-52-5



75F00-5E2-53-1



75F00-5E2-53-2



75F00-5E2-53-3

ABS FAIL-SAFE RELAY/ABS PUMP MOTOR RELAY

INSPECTION

- 1) Disconnect negative cable from battery.
- 2) Remove fail-safe relay or pump motor relay from bracket.

- 3) Check resistance between each two terminals.

Between "1" and "3" : 70 – 90 Ω at 20°C, 68°F

Between "2" and "5" : Continuity

Between "4" and "5" : No continuity

- 4) Connect battery to terminals "1" and "3" then check continuity from following terminals.

Between "2" and "5" : No continuity

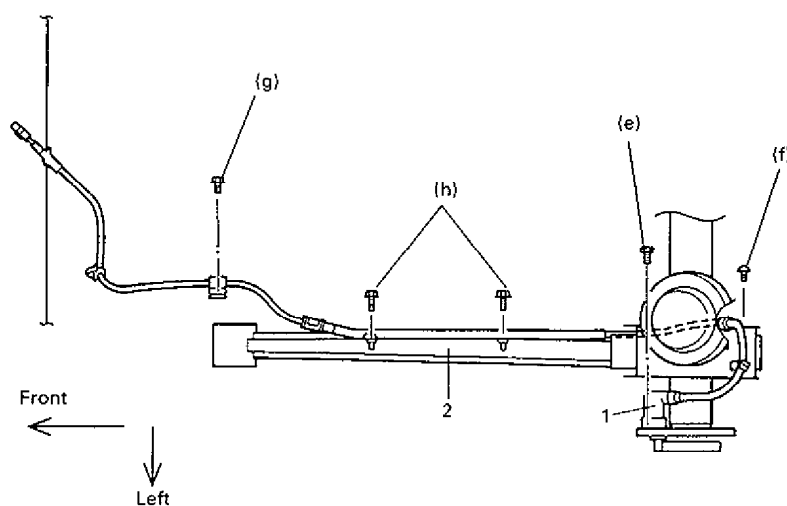
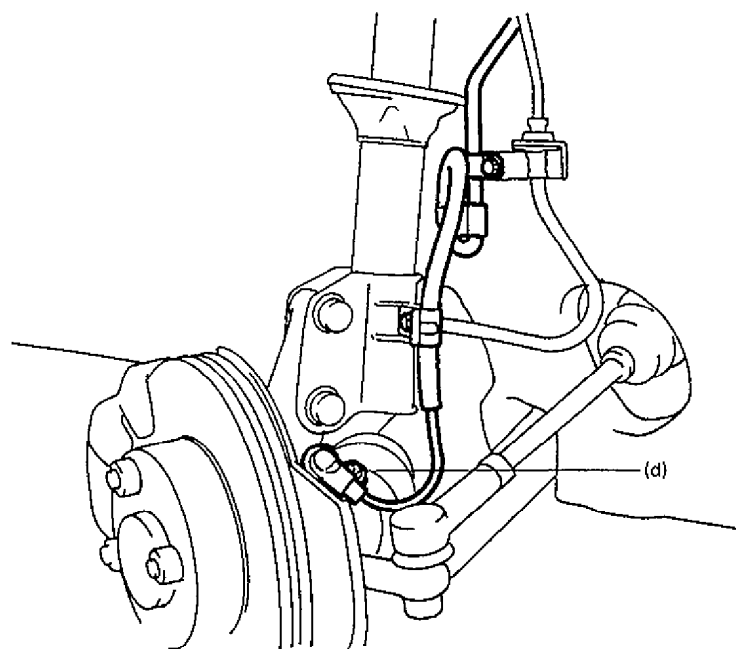
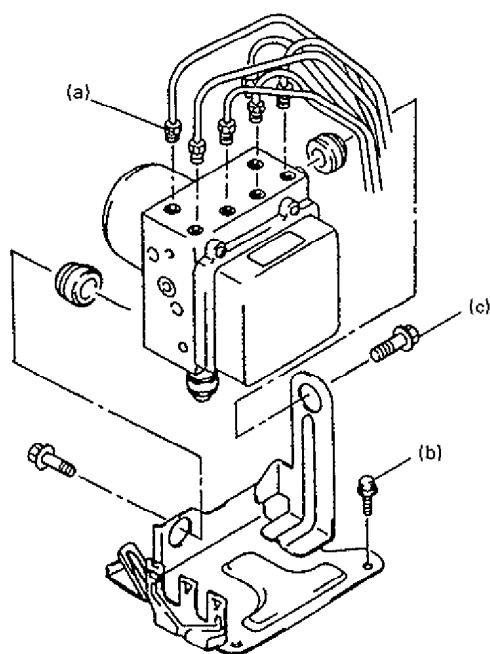
Between "4" and "5" : Continuity

- 5) If inspection in step 3) and/or 4) fails, replace relay.

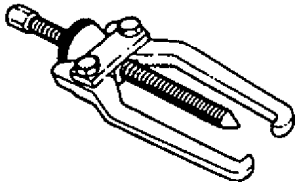
75F00-5E2-53-4

TIGHTENING TORQUE SPECIFICATIONS

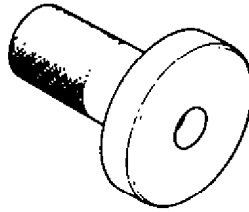
Fastening parts	Tightening Torque		
	N·m	kg-m	lb-ft
Brake pipe flare nut: (a)	16	1.6	11.5
ABS hydraulic unit bolt: (b)	9	0.9	6.5
ABS hydraulic unit bracket bolt: (c)	11	1.1	8.0
Front wheel speed sensor bolt: (d)	23	2.3	17.0
Rear wheel speed sensor bolt: (e)	23	2.3	17.0
Rear wheel speed sensor screw: (f)	2.5	0.25	2.0
Rear wheel speed sensor bolt: (g)	10	1.0	7.5
Rear wheel speed sensor bolt: (h)	4.5	0.45	3.5



SPECIAL TOOLS

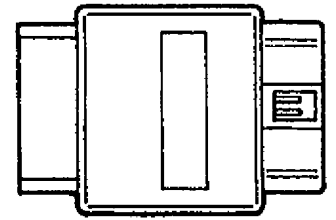


09913-65135
Bearing puller

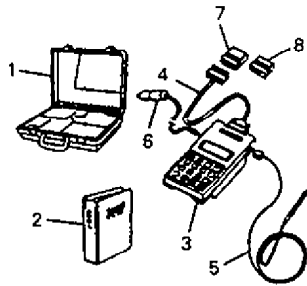


09913-75520
Bearing installer

BLANK



09931-96020
16/12 pin DLC adapter

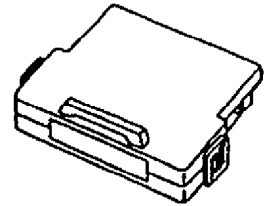


09931-76011
Tech-1 (scan tool) kit

1. Storage case
2. Operator's manual
3. Tech-1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor



09950-78210
Flare nut wrench (10 mm)



Mass storage cartridge
(with BCM 2.0 or later)

SECTION 6

ENGINE

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

GENERAL INFORMATION	6-1
ENGINE DIAGNOSIS	6-5

GENERAL INFORMATION

STATEMENT ON CLEANLINESS AND CARE

An automobile engine is a combination of many machined, honed, polished and lapped surfaces with tolerances that are measured in the thousands of a millimeter (ten thousands of an inch).

Accordingly, when any internal engine parts are serviced, care and cleanliness are important.

Throughout this section, it should be understood that proper cleaning and protection of machined surfaces and friction areas is part of the repair procedure. This is considered standard shop practice even if not specifically stated.

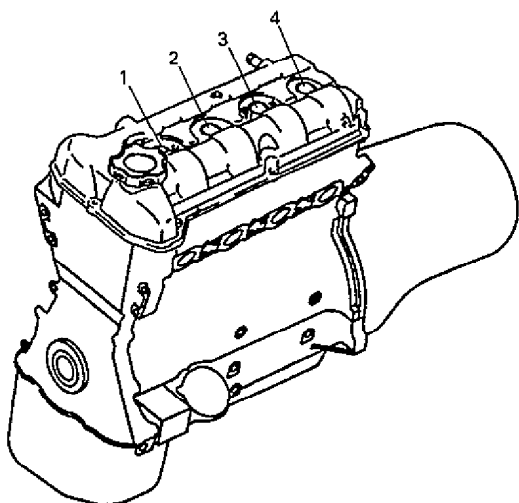
- A liberal coating of engine oil should be applied to friction areas during assembly to protect and lubricate the surfaces on initial operation.
- Whenever valve train components, pistons, piston rings, connecting rods, rod bearings, and crankshaft journal bearings are removed for service, they should be retained in order.

At the time of installation, they should be installed in the same locations and with the same mating surfaces as when removed.

- Battery cables should be disconnected before any major work is performed on the engine.

Failure to disconnect cables may result in damage to wire harness or other electrical parts.

- Throughout this manual, the three (four) cylinders of the engine are identified by numbers; No.1, No.2, No.3 (and No.4) counted front crankshaft pulley side to flywheel side.



1. No.1 cylinder
2. No.2 cylinder
3. No.3 cylinder
4. No.4 cylinder

GENERAL INFORMATION ON ENGINE SERVICE

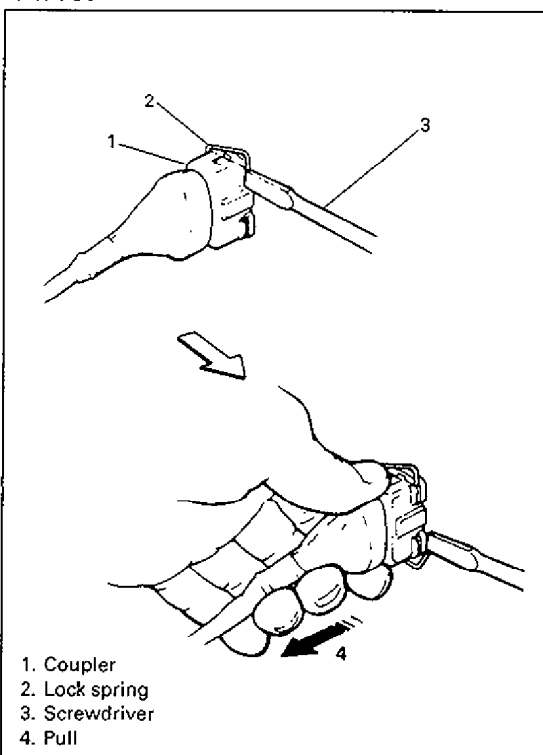
THE FOLLOWING INFORMATION ON ENGINE SERVICE SHOULD BE NOTED CAREFULLY, AS IT IS IMPORTANT IN PREVENTING DAMAGE, AND IN CONTRIBUTING TO RELIABLE ENGINE PERFORMANCE.

- When raising or supporting engine for any reason, do not use a jack under oil pan. Due to small clearance between oil pan and oil pump strainer, jacking against oil pan may cause it to be bent against strainer resulting in damaged oil pick-up unit.
- It should be kept in mind, while working on engine, that 12-volt electrical system is capable of violent and damaging short circuits.

When performing any work where electrical terminals could possibly be grounded, ground cable of the battery should be disconnected at battery.

- Any time the air cleaner, resonator, throttle body or intake manifold is removed, the intake opening should be covered. This will protect against accidental entrance of foreign material which could follow intake passage into cylinder and cause extensive damage when engine is started.

75F00-6-2-3

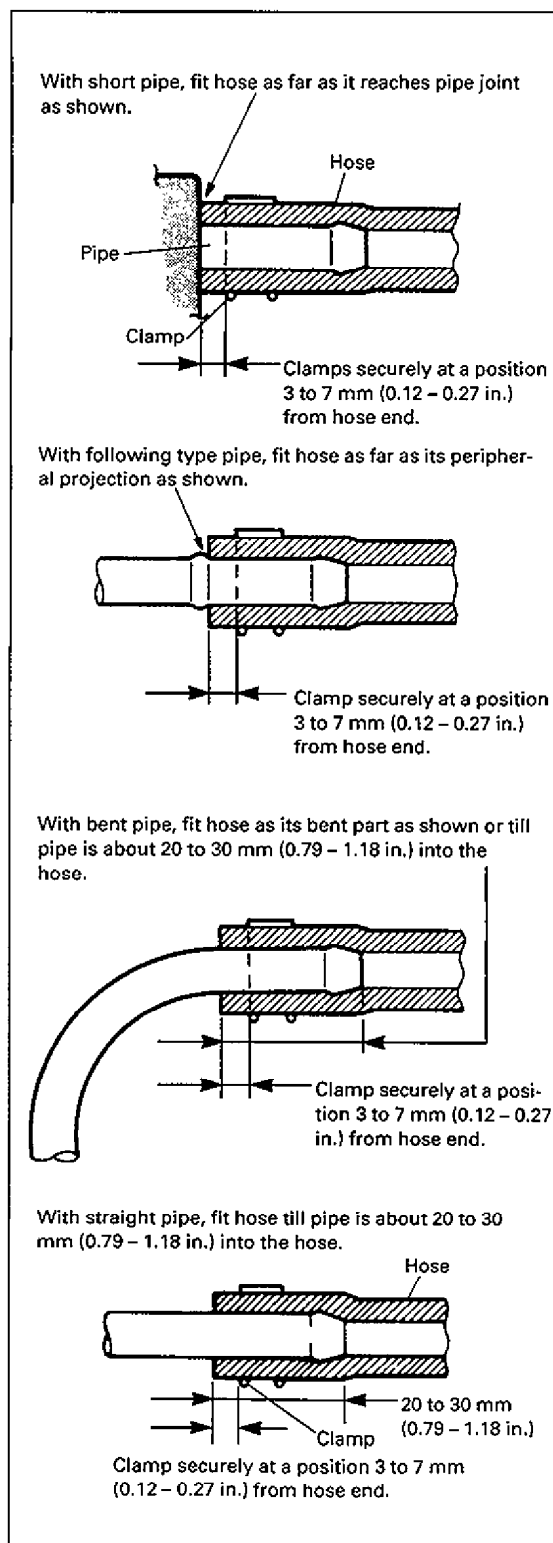


- When disconnecting couplers, don't pull wire harness but make sure to hold coupler itself.

With lock type coupler, be sure to unlock the lock before disconnection. With spring lock type coupler as shown in left figure, push out spring before disconnection, but only within the extent that spring is not deformed. Attempt to disconnect coupler without unlocking may result in damage to coupler.

When connecting lock type coupler, insert it till clicking sound is heard and connect it securely.

75F00-6-2-5



75F00-6-3-4

PRECAUTION ON FUEL SYSTEM SERVICE

- Work must be done with no smoking, in a well-ventilated area and away from any open flames.
- As fuel feed line (between fuel pump and fuel pressure regulator) is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected.

Before loosening or disconnecting fuel feed line, make sure to release fuel pressure according to "FUEL PRESSURE RELIEF PROCEDURE".

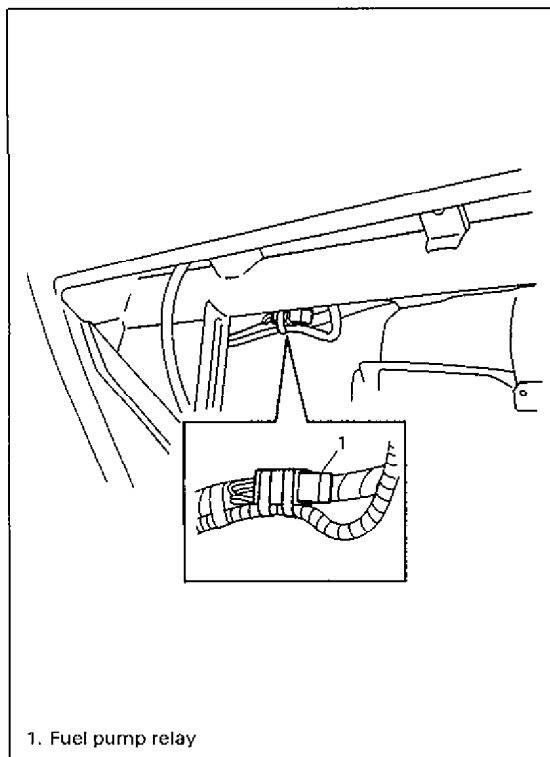
A small amount of fuel may be released after the fuel line is disconnected.

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

- Never run engine with fuel pump relay disconnected when engine and exhaust system are hot.
- Fuel or fuel vapor hose connection varies with each type of pipe. When reconnecting fuel or fuel vapor hose, be sure to connect and clamp each hose correctly referring to left figure Hose Connection.

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

- When installing injector, fuel feed pipe or fuel pressure regulator, lubricate its O ring with spindle oil or gasoline.
- When connecting fuel pipe flare nut, first tighten flare nut by hand and then tighten it to specified torque.



75F00-6-4-2

FUEL PRESSURE RELIEF PROCEDURE

CAUTION:

This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst.

After making sure that engine is cold, relief fuel pressure as follows.

- 1) Place transmission gear shift lever in "Neutral" (Shift selector lever to "P" range for A/T model), set parking brake, and block drive wheels.
- 2) Remove glove box and disconnect fuel pump relay from coupler.
- 3) Remove fuel filler cap to release fuel vapor pressure in fuel tank and then reinstall it.
- 4) Start engine and run it till it stops for lack of fuel. Repeat cranking engine 2 – 3 times for about 3 seconds each time to dissipate fuel pressure in lines. Fuel connections are now safe for servicing.
- 5) Upon completion of servicing, connect fuel pump relay to relay box and install relay box cover.

FUEL LEAKAGE CHECK PROCEDURE

After performing any service on fuel system, check to make sure that there are no fuel leakages as follows.

- 1) Turn ON ignition switch for 3 seconds (to operate fuel pump) and then turn it OFF.
Repeat this (ON and OFF) 3 or 4 times and apply fuel pressure to fuel line (till fuel pressure is felt by hand placed on fuel return hose).
- 2) In this state, check to see that there are no fuel leakages from any part of fuel system.

75F00-6-4-3

ENGINE DIAGNOSIS

This vehicle is equipped with an electronic fuel injection system, which controls the A/F mixture, ignition timing, emission, etc. suitable to engine conditions.

When diagnosing a trouble in the engine including this system, follow "ENGINE DIAGNOSTIC FLOW CHART" given below to obtain correct result smoothly.

ENGINE DIAGNOSTIC FLOW CHART

NOTE:

For the details of each step, refer to the following pages.

STEP	ACTION	YES	NO
1	1. Perform customer complaint analysis referring to CUSTOMER COMPLAINT ANALYSIS on p.6-6. 2. Check DTC referring to DTC CHECK, RECORD AND CLEAR on p.6-7. Is there any trouble code in above step?	Go to step 2	Go to step 3
2	Perform visual inspection referring to VISUAL INSPECTION on p.6-7. Is it OK?	Go to step 4	Go to step 11
3	Perform visual inspection referring to VISUAL INSPECTION on p.6-7. Is it OK?	Go to step 7	Go to step 11
4	Perform problem symptom confirmation referring to PROBLEM SYMPTOM CONFIRMATION on p.6-7. Does trouble identify?	Go to step 5	Go to step 6
5	Recheck DTC referring to DIAGNOSTIC TROUBLE CODE CHECK on p.6-7. Is there any trouble code?	Go to step 8	Go to step 7
6	Recheck DTC referring to DIAGNOSTIC TROUBLE CODE CHECK on p.6-7. Is there any trouble code?	Go to step 8	Go to step 9
7	Check and repair according to ENGINE BASIC CHECK on p.6-8 and ENGINE DIAGNOSIS TABLE on p.6-10. Then perform final confirmation test referring to FINAL CONFIRMATION TEST on p.6-9. Is there any trouble (or DTC)?	Go to step 10	END
8	Check and repair according to DTC flow chart in Section 6E1. Then perform final confirmation test referring to FINAL CONFIRMATION TEST on p.6-9. Is there any trouble (or DTC)?	Go to step 10	END
9	Check and repair for intermittent problem referring to INTERMITTENTS AND POOR CONNECTION in Section 0A. Then perform final confirmation test referring to FINAL CONFIRMATION TEST on p.6-9. Is there any trouble (or DTC)?	Go to step 10	END
10	Did trouble symptom confirm at step 5?	Go to step 5	Go to step 6
11	Repair and replace defective part. Then perform final confirmation test referring to FINAL CONFIRMATION TEST on p.6-9. Is there any trouble (or DTC)?	Go to step 10	END

1. CUSTOMER COMPLAINT ANALYSIS

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

CUSTOMER QUESTIONNAIRE (ENGINE)

User name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:
DESCRIPTION OF PROBLEM			
Difficult Starting		Poor Driveability	
No cranking :		Hesitation on acceleration :	
No 1st explosion but not complete :		Back fire/After fire :	
Poor starting at (cold/warm/always) :		Lose of power :	
Time before start :		Black smoke :	
Other _____		Abnormal knocking :	
		Other _____	
Poor Idling		Engine Stall when . . .	
Poor fast idle :		Immediately after start :	
Abnormal idling (r/min.) :		Accel. pedal is depressed :	
Unstable :		Accel. pedal is released :	
Hunting (r/min. to r/min.) :		Engine stalls but possible to restart :	
Other _____		Other _____	
OTHERS:			
VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS			
Environmental Condition			
Weather	fair/cloudy/rain/snow/always/other _____		
Temperature	hot/warm/cool/cold/()°C/always		
Frequency	always/sometimes (times/ day, month)/only once		
Road	urban/suburb/highway/mountainous (uphill/downhill)/tarmacadam/gravel/other _____		
Vehicle Condition			
Engine	cold/warming up phase/warmed up/always/other at starting/immediately after start/ racing without load		
Vehicle	during driving: constant speed/accelerating/decelerating/right hand corner/left hand corner/when shifting/other _____		
	speed when problem occurs (km/h)		
	shift lever position ()		
MALFUNCTION INDICATOR LAMP FUNCTION			
always ON/sometimes ON/not on			
Diagnostic trouble code indicated/ not indicated			
Diagnostic trouble code recorded			

NOTE:

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

2. PROBLEM SYMPTOM CONFIRMATION

Check if what the customer claimed in Step 1 is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.)

When the symptom is not actually found, possibility is:

- The symptom occurs under certain conditions.
----- Retry with the vehicle under different conditions.
- The trouble occurred only temporarily and normal operation has been restored.
----- Perform Step 3 and if the diagnostic trouble code is indicated, inspect according to the flow chart for that DTC.

3. DIAGNOSTIC TROUBLE CODE (DTC) CHECK, RECORD AND CLEAR

DTCs are indicated by the malfunction indicator lamp ("CHECK ENGINE" light). (Refer to Diagnostic Trouble Code(s) Check in Section 6E1.) When a DTC is indicated by this lamp, it means existence of a malfunction in the system represented by that code but whether it still exists (current) or occurred in the past and has gone (history) is unknown. To know it, clear this DTC once (Refer to Diagnostic Trouble Code(s) Clear in Section 6E1.), perform Step 6 TEST DRIVE and/or PROBLEM SYMPTOM of ENGINE DIAGNOSTIC FLOW CHART in this section and then check DTC again as described in Step 7. Attempt to diagnose the trouble based on the DTC recorded in this step or failure to clear the DTC in this step may mislead the diagnosis or make diagnosing difficult. Even after checking the DTC with the Tech-1, diagnosis should be performed according to this flow chart to check ECM for proper self-diagnosis function.

4. VISUAL INSPECTION

As a preliminary step, perform visual check of the following items that support proper function of the engine.

INSPECTION	REFERRING SECTION
● Engine oil ----- level, leakage	Section 0B
● Engine coolant ----- level, leakage	Section 0B
● Fuel ----- level, leakage	Section 0B
● A/T fluid ----- level, leakage	Section 7B1
● Air cleaner element ----- dirt, clogging	Section 0B
● Battery ----- fluid level, corrosion of terminal	Section 0B
● Water pump belt ----- tension, damage	Section 0B
● Throttle cable ----- play, installation	Section 6E1
● Vacuum hoses of air intake system -----disconnection, looseness, deterioration	Section 0B
● Connectors of electric wire harness ----- disconnection, friction	Section 8
● Fuses ----- burning	Section 8
● Parts ----- installation, bolt ----- looseness	
● Parts ----- deformation	
● Other parts that can be checked visually	
Also add following items at engine start.	
● Indicator, warning lights in combination meter ----- ON (indicating abnormality in system) or OFF	Section 8B
● Abnormal air being inhaled from air intake system	
● Exhaust system ----- leakage of exhaust gas, noise	Section 6K
● Other parts that can be checked visually	

5. ENGINE BASIC CHECK AND ENGINE DIAGNOSIS TABLE

Perform basic engine check according to the chart below first. When the end of the chart has been reached, check the parts of the system suspected as a possible cause referring to ENGINE DIAGNOSIS TABLE on p. 6-10 and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, problem symptom confirmation and /or basic engine check) and repair or replace faulty parts, if any.

BASIC ENGINE CHECK FLOW CHART

STEP	ACTION	YES	NO
1	Check battery voltage. Is it 11V or more?	Go to step 2	Charge or replace battery
2	Is engine cranked?	Go to step 3	Go to "DIAGNOSIS" in SECTION 6G
3	Does engine start?	Go to step 4	Go to step 6
4	Check idle speed. Is it 800 ± 50 r/min?	Go to step 5	Go to ENGINE DIAGNOSIS TABLE on p.6-10
5	Check ignition timing referring to IGNITION TIMING in Section 6F1. Is it $5 \pm 1^\circ$?	Go to ENGINE DIAGNOSIS TABLE on p.6-10	Adjust ignition timing referring to IGNITION TIMING in Section 6F1.
6	Check fuel supply referring to On vehicle inspection of FUEL PUMP in Section 6E1. Is it in good condition?	Go to step 8	Go to step 7
7	Was fuel pump operating sound heard from fuel filler for about 3 seconds after ignition switch ON and stop?	Go to Diag. flow chart B-3 in Section 6E1.	Go to Diag. flow chart B-1 in Section 6E1.
8	Check ignition spark referring to IGNITION SPARK TEST in Section 6F1. Is it in good condition?	Go to step 9	Go to DIAGNOSIS in Section 6F1.
9	Check fuel injector referring to On-Vehicle Inspection of FUEL INJECTOR in Section 6E1. Is it in good condition?	Check engine compression referring to "COMPRESSION CHECK" in Section 6A4.	Go to Diag. flow chart B-2 in Section 6E1.

6. PROBLEM SYMPTOM RECONFIRMATION AND DRIVING TEST

After clearing the malfunction DTC, recheck that a problem symptom still exists. Also, if possible, perform test driving under driving conditions specified in FINAL CHECK description in Section 6E1 and confirm that the malfunction DTC is again indicated.

7. DIAGNOSTIC TROUBLE CODE CHECK

Check diagnostic trouble code, referring diagnostic trouble code(s) check in Section 6E1.

8. DIAGNOSTIC TROUBLE CODE FLOW CHART

Based on the DTC indicated in Step 7 and referring to DIAGNOSTIC TROUBLE CODE FLOW CHART in Section 6E1, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ECM or other part and repair or replace faulty parts.

9. CHECK FOR INTERMITTENT PROBLEM

Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to INTERMITTENT TROUBLE in Section 0A.

10. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the engine is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving under driving conditions specified in FINAL CHECK description in Section 6E1 and confirm that a normal code is indicated.

ENGINE DIAGNOSIS TABLE

Condition	Possible Cause	Referring Item
Hard Starting (Engine cranks OK)	Ignition system out of order	
	- Faulty spark plug - Leaky high-tension cord - Loose connection or disconnection of high-tension cords or lead wires - Maladjusted signal rotor air gap - Faulty camshaft position sensor (pickup coil) or igniter - Faulty ignition coil - Cracked rotor or cap in distributor - Faulty noise suppressor	Spark plugs in Section 6F1 High-tension cords in Section 6F1 High-tension cords in Section 6F1 Distributor in Section 6F1 Distributor in Section 6F1 Ignition coil in Section 6F1 Distributor unit in Section 6F1 Noise suppressor in Section 6F1
	Fuel system out of order	
	Dirty fuel filter	Diagnostic Flow Chart B-3 in Section 6E1
	Dirty or clogged fuel hose or pipe	Diagnostic Flow Chart B-3 in Section 6E1
	Malfunctioning fuel pump	Diagnostic Flow Chart B-3 in Section 6E1
	Air inhaling from intake manifold gasket or throttle body gasket	
	Electronic Fuel Injection system out of order	Trouble diagnosis in Section 6E1
	Low compression	Compression check in Section 6A4
	- Poor spark plug tightening or faulty gasket - Compression leak from valve seat - Sticky valve stem - Weak or damaged valve springs	Spark plugs in Section 6F1 Valves inspection in Section 6A4 Valves inspection in Section 6A4 Valves springs inspection in Section 6A4
	Compression leak at cylinder head gasket	Cylinder head inspection in Section 6A4
	Sticking or damaged piston ring	Cylinders, pistons and piston rings inspection in Section 6A4
	Worn piston, ring or cylinder	Cylinders, pistons and piston rings inspection in Section 6A4
	Others	
	Malfunctioning PCV valve	PCV valve and system inspection in Section 6E1

Condition	Possible Cause	Referring Item
Engine has no power	Ignition system out of order • Faulty spark plug • Worn distributor terminals • Leaks, loose connection or disconnection of high-tension cord Engine overheating Fuel system out of order • Clogged fuel hose or pipe • Dirty or clogged fuel filter • Air inhaling from intake manifold gasket or throttle body gasket Electronic Fuel Injection system out of order Low compression Others • Malfunctioning EGR valve • Dragging brakes • Slipping clutch	Spark plugs in Section 6F1 Distributor in Section 6F1 High-tension cords in Section 6F1 Refer to "Overheating" section Diagnostic Flow Chart B-3 in Section 6E1 Diagnostic Flow Chart B-3 in Section 6E1 Trouble diagnosis in Section 6E1 Previously outlined EGR system inspection in Section 6E1 Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C
Improper engine idling or engine fails to idle	Ignition system out of order • Faulty spark plug • Leaky or disconnected high-tension cord • Worn distributor terminals • Cracked cap in distributor with leakage inside Fuel system out of order • Clogged fuel filter • Leaky manifold, throttle body, or cylinder head gasket Electronic Fuel Injection system out of order Engine overheating Low ompression Others • Loose connection or disconnection of vacuum hoses • Malfunctioning EGR valve • Malfunctioning PCV valve	Spark plugs in Section 6F1 High-tension cords in Section 6F1 Distributor unit in Section 6F1 Distributor unit in Section 6F1 Diagnostic Flow Chart B-3 in Section 6E1 Trouble diagnosis in Section 6E1 Refer to "Overheating" section Previously outlined EGR system inspection in Section 6E1 PCV valve and system inspection in Section 6E1

Condition	Possible Cause	Referring Item
Engine hesitates (Momentary lack of response as accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make vehicle move, as from a stop sign.)	Ignition system out of order - Spark plug faulty or plug gap out of adjustment - Leaky high-tension cord Fuel system out of order - Clogged fuel filter or fuel lines Electronic Fuel Injection system out of order Engine overheating Low compression Others - Malfunctioning EGR valve	Spark plugs in Section 6F1 High-tension cords in Section 6F1 Diagnostic Flow Chart B-3 in Section 6E1 Trouble diagnosis in Section 6E1 Refer to "Overheating" section Previously outlined EGR system inspection in Section 6E1
Surge (Engine power variation under steady throttle or cruise. Feels like vehicle speeds up and down with no change in accelerator pedal.)	Ignition system out of order - Leaky or loosely connected high-tension cord - Faulty spark plug (excess carbon deposits, improper gap, and burned electrodes, etc.) - Cracked rotor or cap in distributor Fuel system out of order - Clogged fuel filter or fuel lines - Kinky or damaged fuel hose and lines Electronic Fuel Injection system out of order Others - Malfunctioning EGR valve	High-tension cords in Section 6F1 Spark plugs in Section 6F1 Distributor in Section 6F1 Diagnostic Flow Chart B-3 in Section 6E1 Diagnostic Flow Chart B-3 in Section 6E1 Trouble diagnosis in Section 6E1 EGR system inspection in Section 6E1
Excessive detonation (Engine makes sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.)	Engine overheating Ignition system out of order - Faulty spark plug - Loose connection of high-tension cord Fuel system out of order - Clogged fuel filter or fuel lines - Air inhaling from intake manifold or throttle body gasket Electronic Fuel Injection system out of order Others - Loose connection or disconnection of vacuum hoses - Excessive combustion chamber deposits - Malfunctioning EGR valve	Refer to "Overheating" section Spark plugs in Section 6F1 High-tension cords in Section 6F1 Diagnostic Flow Chart B-3 in Section 6E1 Trouble diagnosis in Section 6E1 Piston and cylinder head cleaning in Section 6A4 EGR system inspection in Section 6E1

Condition	Possible Cause	Referring Item
Overheating	• Inoperative thermostat • Poor water pump performance • Clogged or leaky radiator • Improper engine oil grade • Clogged oil filter or oil strainer • Poor oil pump performance • Faulty radiator fan control system • Dragging brakes • Slipping clutch • Blown cylinder head gasket	Thermostat in Section 6B Water pump in Section 6B Radiator in Section 6B Engine oil and oil filter change in Section 0B Oil pressure check in Section 6A4 Oil pressure check in Section 6A4 Diagnostic Flow Chart B-7 in Section 6E1 Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C Cylinder head in Section 6A4
Poor gasoline mileage	Ignition system out of order • Leaks or loose connection of high-tension cord • Faulty spark plug (improper gap, heavy deposits, and burned electrodes, etc.) Electronic Fuel Injection system out of order Low compression Others • Poor valve seating • Dragging brakes • Slipping clutch • Thermostat out of order • Improper tire pressure • Malfunctioning EGR valve	High-tension cords in Section 6F1 Spark plugs in Section 6F1 Trouble diagnosis in Section 6E1 Previously outlined Valves inspection in Section 6A4 Trouble diagnosis in Section 5 Trouble diagnosis in Section 7C Thermostat in Section 6B Refer to in Section 3F EGR system inspection in Section 6E1
Excessive engine oil consumption	Oil leakage • Blown cylinder head gasket • Leaky camshaft oil seals Oil entering combustion chamber • Sticky piston ring • Worn piston and cylinder • Worn piston ring groove and ring • Improper location of piston ring gap • Worn or damaged valve stem seal • Worn valve stem	Cylinder head in Section 6A4 Camshaft in Section 6A4 Piston cleaning in Section 6A4 Piston and cylinders inspection in Section 6A4 Pistons inspection in Section 6A4 Pistons assembly in Section 6A4 Valves removal and installation in Section 6A4 Valves inspection in Section 6A4

Condition	Possible Cause	Referring Item
Low oil pressure	• Improper oil viscosity • Malfunctioning oil pressure switch • Clogged oil strainer • Functional deterioration of oil pump • Worn oil pump relief valve • Excessive clearance in various sliding parts	Engine oil and oil filter change in Section 0B Oil pressure switch inspection in Section 8B Oil pan and oil pump strainer cleaning in Section 6A4 Oil pump in Section 6A4 Oil pump in Section 6A4
Engine noise Note: Before checking mechanical noise, make sure that: • Specified spark plug is used. • Specified fuel is used.	Valve noise • Improper valve lash • Worn valve stem and guide • Weak or broken valve spring • Warped or bent valve Piston, ring and cylinder noise • Worn piston, ring and cylinder bore Connecting rod noise • Worn rod bearing • Worn crank pin • Loose connecting rod nuts • Low oil pressure Crankshaft noise • Low oil pressure • Worn bearing • Worn crankshaft journal • Loose bearing cap bolts • Excessive crankshaft thrust play	Valve lash in Section 6A4 Valve inspection in Section 6A4 Valve springs inspection in Section 6A4 Valves inspection in Section 6A4 Pistons and cylinders inspection in Section 6A4 Crank pin and connecting rod bearing inspection in Section 6A4 Crank pin and connecting rod bearing inspection in Section 6A4 Connecting rod installation in Section 6A4 Previously outlined Previously outlined Crankshaft and bearing inspection in Section 6A4 Crankshaft and bearing inspection in Section 6A4 Crankshaft inspection in Section 6A4 Crankshaft thrust play inspection in Section 6A4

SECTION 6A4

6A4

ENGINE MECHANICAL

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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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NOTE:

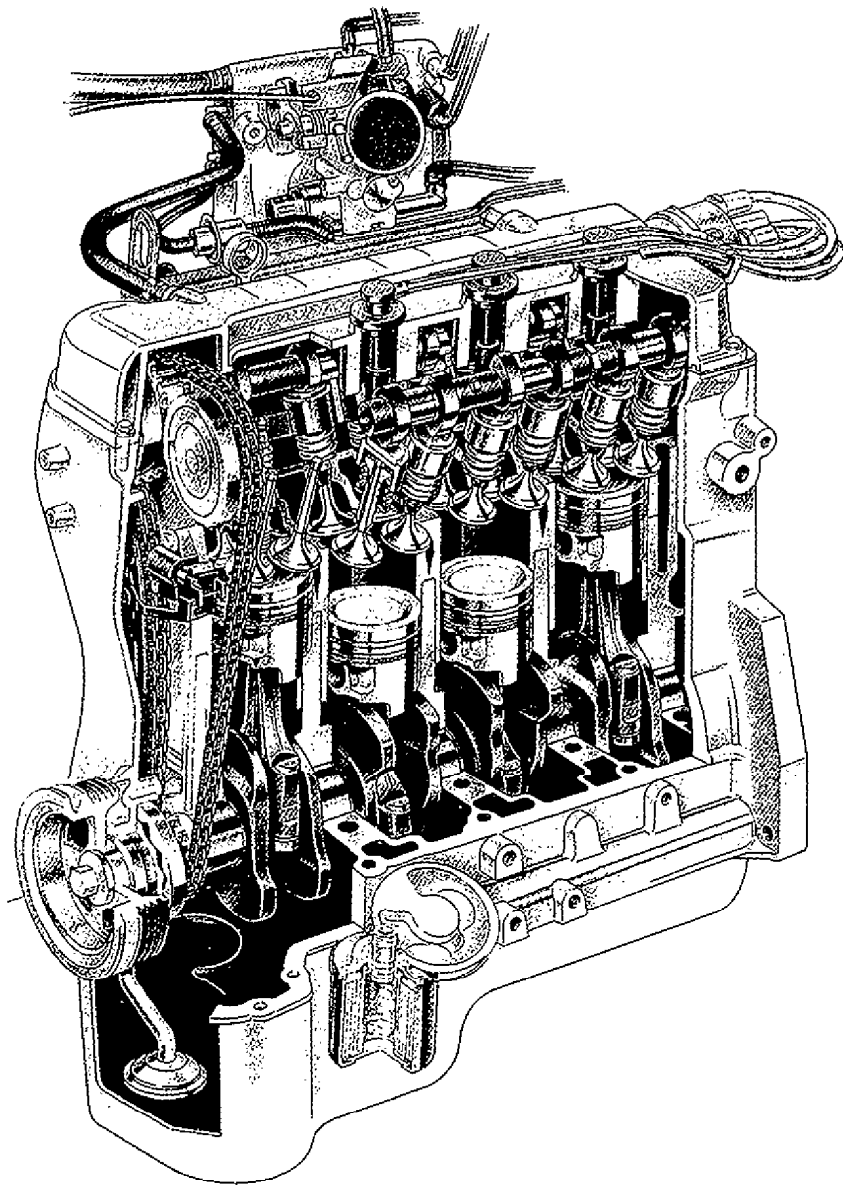
For what each abbreviation stands for (i.e, full term), refer to SECTION 0A.

GENERAL DESCRIPTION

ENGINE

The engine is a water-cooled, in line 4 cylinders, 4 stroke cycle gasoline unit equipped with its D.O.H.C. (Double Overhead Camshaft) valve mechanism arranged for "V"-type valve configuration and 16 valves (IN 2 and EX 2/one cylinder).

Both overhead camshafts are mounted over the cylinder head: they are driven from crankshaft through timing chain and opens and closes its valves.



ENGINE LUBRICATION

The oil pump is of a trochoid type, and mounted on crankshaft at crankshaft pulley side.

Oil is drawn up through oil pump strainer and passed through pump to oil filter.

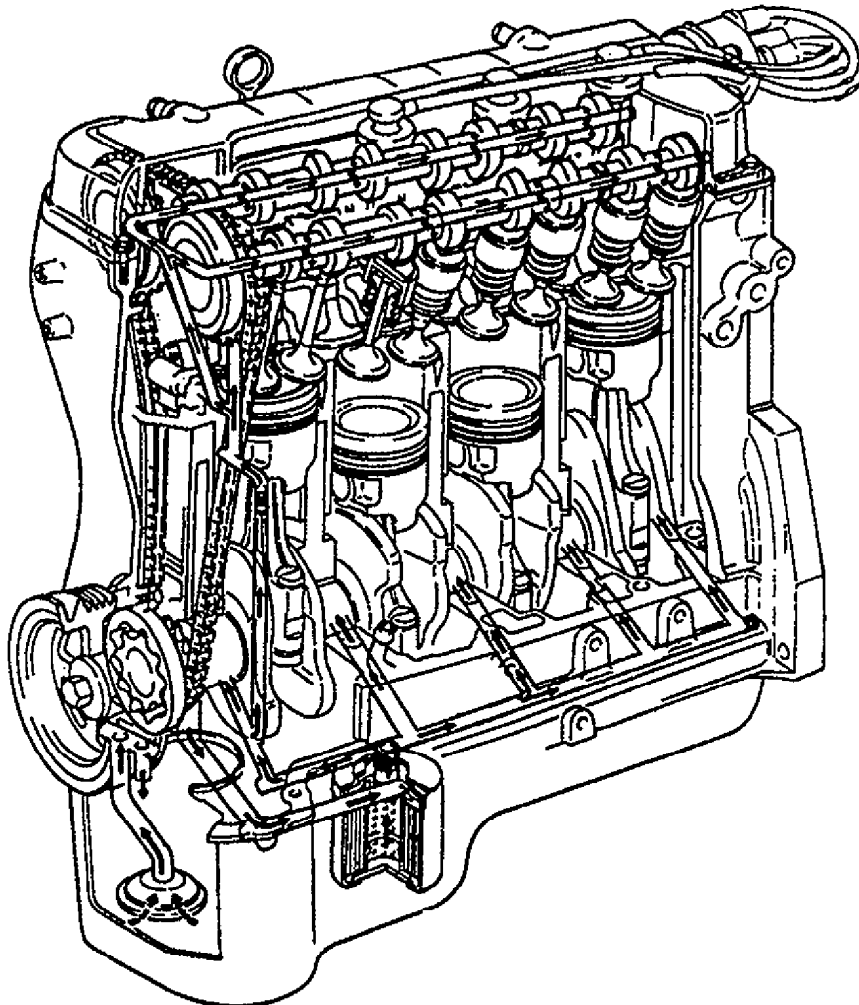
The filtered oil flows into two paths in cylinder block.

In one path, oil reaches crankshaft journal bearings.

Oil from crankshaft journal bearings is supplied to connecting rod bearings by means of intersecting passages drilled in crankshaft, and then injected from a small hole provided on big end of connecting rod to lubricate piston, rings, and cylinder wall.

In another path, oil goes up to cylinder head and lubricates camshaft journals, camshafts, etc., passing through the internal oilways in camshafts.

An oil relief valve is provided on oil pump. This valve starts relieving oil pressure when the pressure comes over about 340 kPa (3.4 kg/cm², 48.3 psi). Relieved oil drains back to oil pan.



CYLINDER BLOCK

The cylinder block is made of cast aluminum alloy and has 4 cylinders arranged "In-Line". A cylindrical cast iron sleeve is installed in each cylinder.

CRANKSHAFT AND MAIN BEARINGS

A monoblock casting crankshaft is supported by 5 main bearings which are of precision insert type. Four crank pins on the crankshaft are positioned 180° apart.

PISTONS, RINGS, PISTON PINS AND CONNECTING RODS

The piston is cast aluminum alloy, and has two compression rings and one oil ring.

Among two compression rings (top and 2nd rings), the outer surface of the top ring is treated with hard chromium for improvement in abrasion resistance.

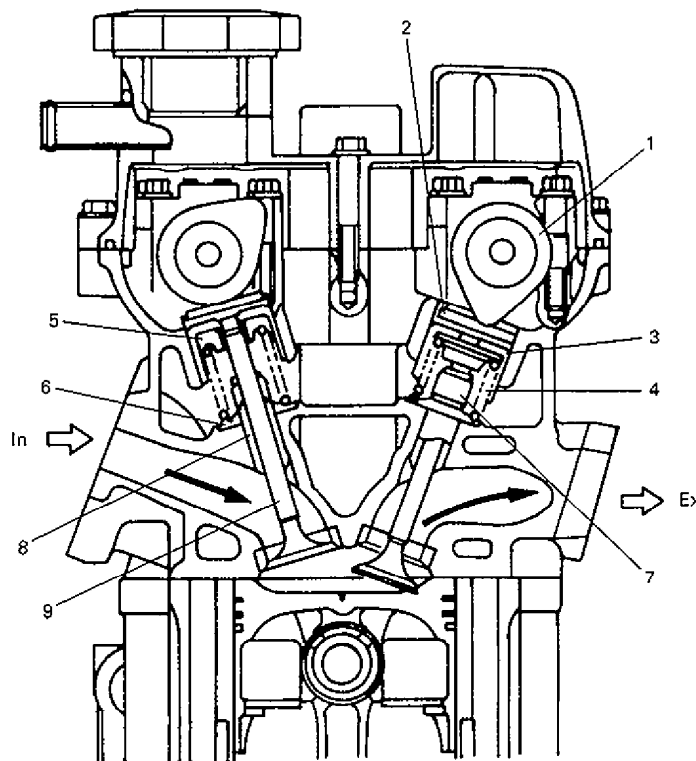
The oil ring consists of two rails and one spacer. The piston pin is offset 0.5 mm towards the major thrust side.

This allows a gradual change in thrust pressure against the cylinder wall as the piston travels its path.

Pins, made of chromium steel, have a floating fit in the pistons and in the connecting rods. The connecting rods are made of forged steel, and the rod bearings are of precision insert type.

CYLINDER HEAD AND VALVE TRAIN

The cylinder head is made of aluminum casting. The supporting part of the camshaft is an independent cap type. The combustion chamber has 4 valves and uses the center plug type pent roof shape for higher intake and exhaust efficiency.



- | | | |
|-----------------|--------------------------|--------------------|
| 1. Camshaft | 5. Valve spring retainer | 9. Valve stem (IN) |
| 2. Shim | 6. Valve spring seat | |
| 3. Tappet | 7. Valve stem seal | |
| 4. Valve spring | 8. Valve guide (IN) | |

ON VEHICLE SERVICE COMPRESSION CHECK

Check compression pressure on all four cylinders as follows:

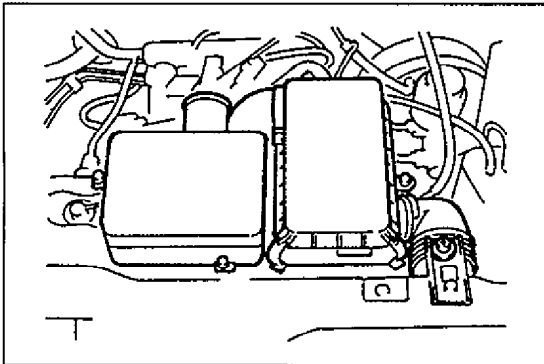
- 1) Warm up engine.
- 2) Stop engine after warming up.

NOTE:

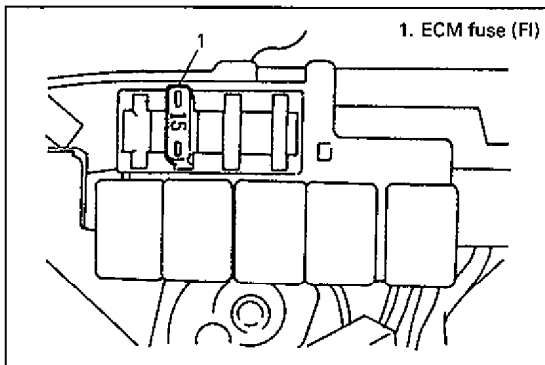
After warming up engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.

- 3) Remove air cleaner assembly and resonator.
Refer to "AIR CLEANER ASSEMBLY AND RESONATOR".
- 4) Remove all spark plugs.

75F00-6A4-5-1



75F00-6A4-5-2

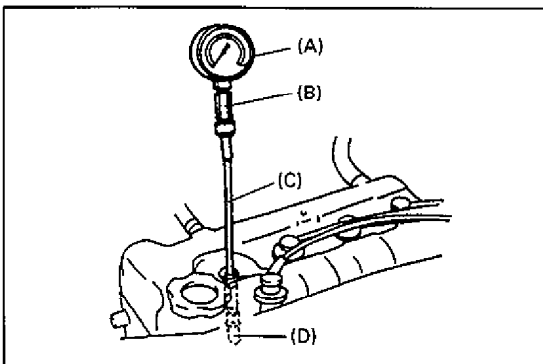


- 5) Disconnect ECM fuse (FI) from main fuse box.

WARNING:

Failure in disconnecting ECM fuse (FI) can cause spark to occur in engine room possibly resulting in a dangerous explosion.

75F00-6A4-5-3

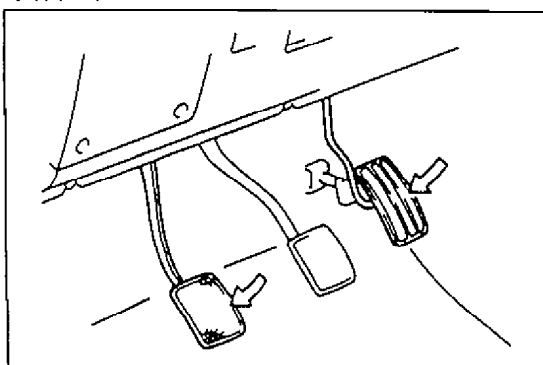


- 6) Install special tool (Compression gauge) into spark plug hole.

Special Tool

- (A): 09915-64510-001
(B): 09915-64510-002
(C): 09915-64530
(D): 09915-64550

75F00-6A4-5-4



- 7) Disengage clutch (to lighten starting load on engine) for M/T model, and depress accelerator pedal all the way to make throttle valve full-open.

75F00-6A4-5-5

- 8) Crank engine with fully charged battery, and read the highest pressure on compression gauge.

NOTE:

For measuring compression pressure, crank engine at least 250 r/min. by using fully charged battery.

	Compression pressure
Standard	1250 kPa (12.5 kg/cm ² , 177.8 psi)
Limit	900 kPa (9.0 kg/cm ² , 128.0 psi)
Max. difference between any two cylinders	100 kPa (1.0 kg/cm ² , 14.2 psi)

75F00-6A4-6-2

- 9) Carry out steps 6) through 8) on each cylinder to obtain four readings.
- 10) After checking, connect ignition coil coupler securely and install spark plugs.
- 11) Install air cleaner assembly and resonator.
Refer to "AIR CLEANER ASSEMBLY AND RESONATOR".

75F00-6A4-6-3

ENGINE VACUUM CHECK

The engine vacuum that develops in the intake line is a good indicator of the condition of the engine. The vacuum checking procedure is as follows:

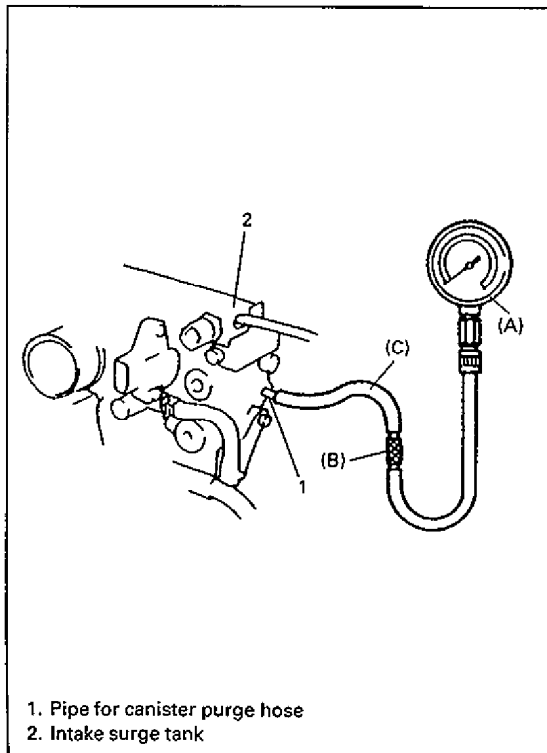
75F00-6A4-7-1

- 1) Warm up engine to normal operating temperature.

NOTE:

After warming up engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.

75F00-6A4-7-2



75F00-6A4-7-4

- 2) With engine stopped, disconnect canister purge hose from intake surge tank and connect hose and special tools (vacuum gauge and joint) as shown in figure.

Special Tool

(A): 09915-67310

(B): 09918-08210

SUZUKI GENUINE PARTS

(C): Hose 09343-03087

- 3) Run engine at specified idle speed, and read vacuum gauge.

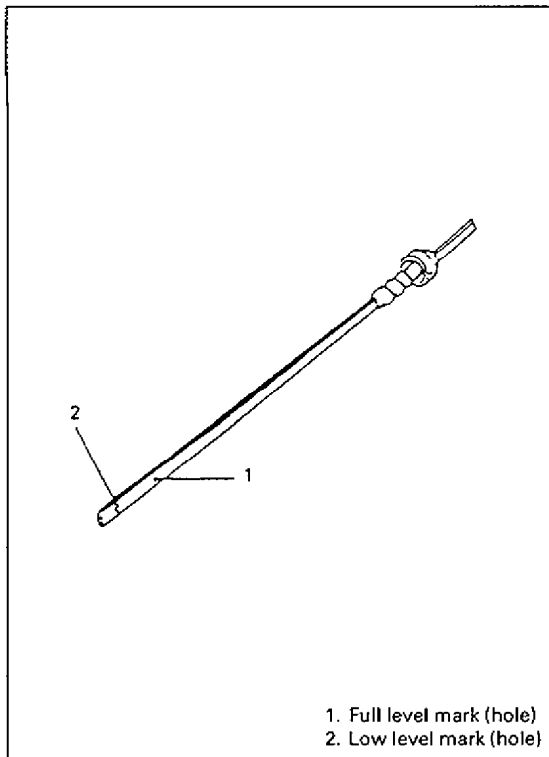
Vacuum should be within following specification.

Vacuum specification (at sea level):

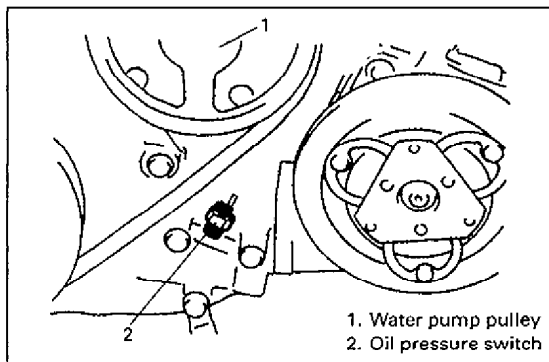
56.0 – 70.6 kPa (42 – 53 cmHg, 16.5 – 20.9 in.Hg) at specified idling speed

- 4) After checking, connect vacuum hose to intake surge tank.

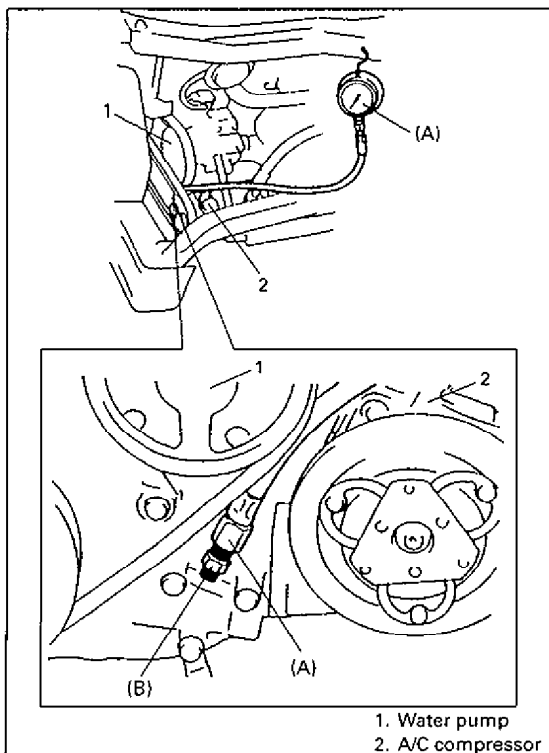
75F00-6A4-7-5



75F00-6A4-8-2



75F00-6A4-8-3



75F00-6A4-8-5

OIL PRESSURE CHECK

NOTE:

Prior to checking oil pressure, check following items.

- Oil level in oil pan.
If oil level is low, add oil up to Full level mark (hole) on oil level gauge.
- Oil quality.
If oil is discolored, or deteriorated, change it.
For particular oil to be used, refer to the table in Section 0B.
- Oil leaks.
If leak is found, repair it.

- 1) Remove front bumper (refer to Section 9) and oil pressure switch from cylinder block.

- 2) Install special tool (Oil pressure gauge) to vacated threaded hole.

Special Tool

(A): 09915-77310

(B): 09915-78211

- 3) Start engine and warm it up to normal operating temperature.

NOTE:

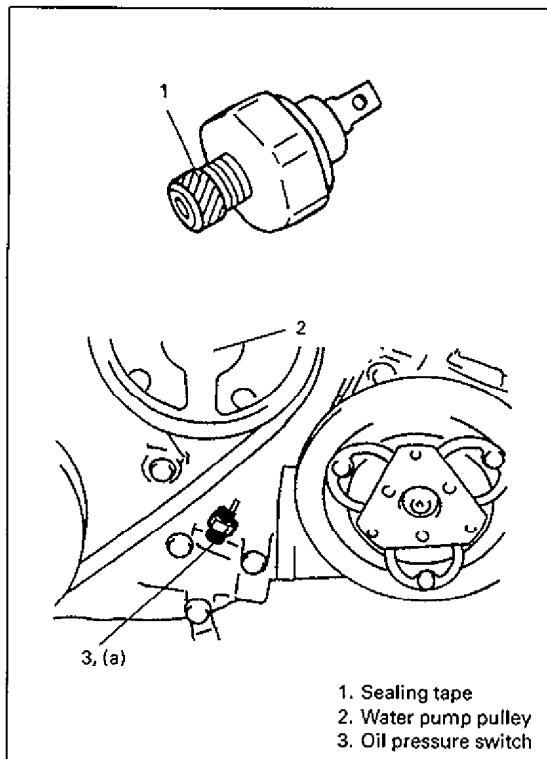
Be sure to place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.

- 4) After warming up, raise engine speed to 4,000 r/min and measure oil pressure.

Oil pressure specification:

330 – 430 kPa (3.3 – 4.3 kg/cm², 46.9 – 61.1 psi) at 4,000 r/min (rpm)

- 5) Stop engine and remove oil pressure gauge.



75F00-6A4-9-2

- 6) Before reinstalling oil pressure switch, be sure to wrap its screw threads with sealing tape and tighten switch to specified torque.

NOTE:

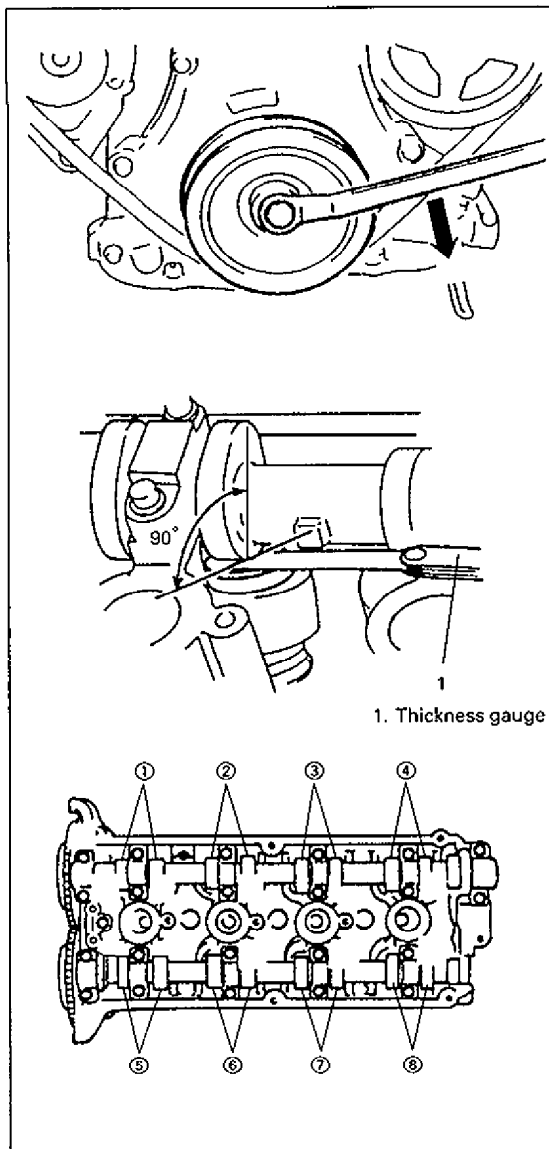
If sealing tape edge is bulged out from screw threads of switch, cut it off.

Tightening Torque

(a): 12 N·m (1.2 kg-m, 9.0 lb-ft)

- 7) Start engine and check oil pressure switch for oil leakage.
If oil leakage is found, repair it.
- 8) Install front bumper (refer to Section 9).

75F00-6A4-9-3



VALVE LASH (CLEARANCE)

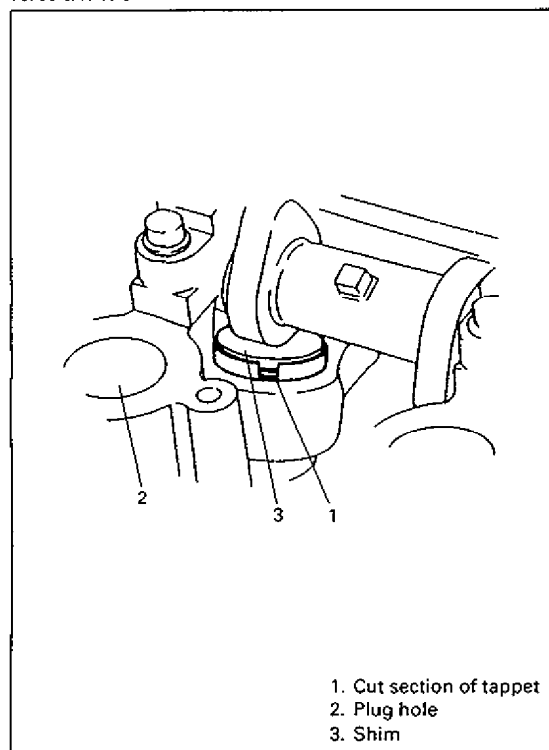
- 1) Remove negative cable at battery.
- 2) Remove cylinder head cover referring to item "Cylinder Head cover".
- 3) Using 17 mm wrench, turn crankshaft pulley clockwise until cam noses become perpendicular to shim faces at valves ① and ⑦ (valve No.s ① through ⑧ are shown in figure) as shown in figure.
- 4) Check valve lashes with thickness gauge according to following procedure.
 - (1) Check valve lashes at valves ① and ⑦.
 - (2) Turn camshafts by 90° (by turning crankshaft with wrench).
 - (3) Make sure that cam noses are perpendicular to shim faces at valves to be checked (in this case, ③ and ⑧), if not, adjust it by turning crankshaft. Check valve lashes.
 - (4) In the same manner as (2) – (3), check valve lashes at valves ④ and ⑥.
 - (5) In the same manner as (2) – (3) again, check valve lashes at valves ② and ⑤.

Valve clearance specification		When cold (Coolant temperature is 15 – 25°C or 59 – 77°F)	When hot (Coolant temperature is 60 – 68°C or 140 – 154°F)
	Intake	0.18 – 0.23 mm (0.007 – 0.009 in.)	0.21 – 0.27 mm (0.008 – 0.011 in.)
	Exhaust		0.20 – 0.26 mm (0.008 – 0.010 in.)

If valve lash is out of specification, adjust it to specification by replacing shim.

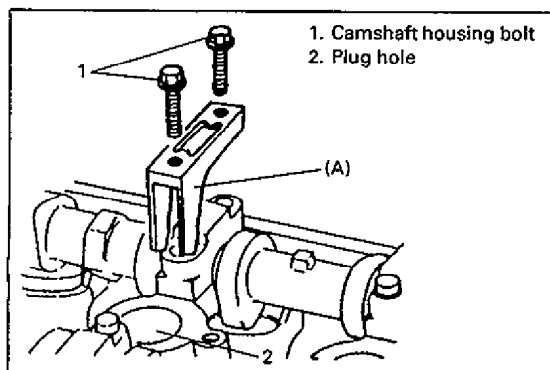
Replacement of shim

- 1) Close the valve whose shim is to be replaced by turning crankshaft, then turn tappet till its cut section faces inside as shown in figure.

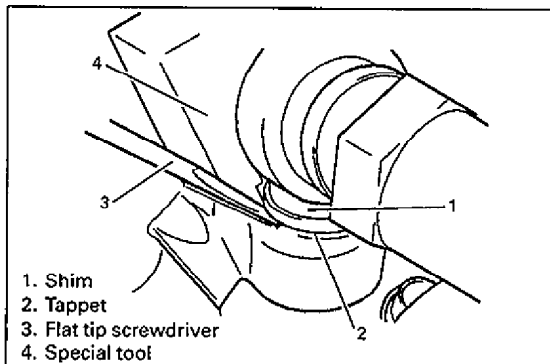


75F00-6A4-10-3

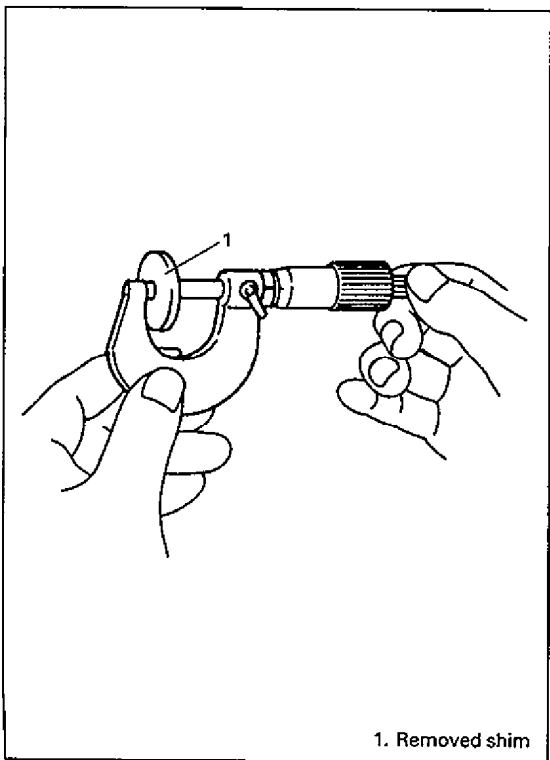
75F00-6A4-10-5



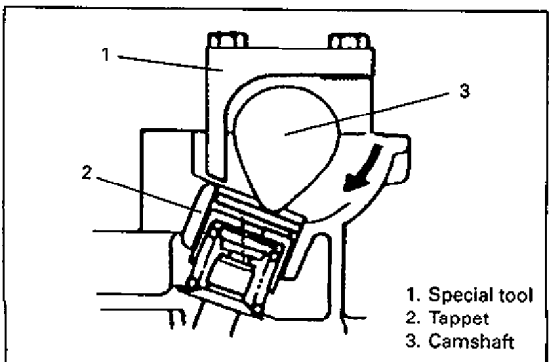
75F00-6A4-11-1



75F00-6A4-11-2



75F00-6A4-11-4



75F00-6A4-11-5

- 2) Lift valve by turning crankshaft and then remove camshaft housing bolts where the shim to be replaced.
- 3) Install special tool with camshaft housing bolts as shown in figure.

Special Tool**(A): 09916-67010****NOTE:****Check that shim is not under pressure of special tool.**

- 4) Turn camshaft by approximately 90° clockwise and remove shim.

- 5) Measure thickness of removed shim and calculate thickness of shim to be installed.

$$A = B + C - 0.20 \text{ mm}$$

A : Thickness of new shim to be installed (mm)**B : Removed shim thickness (mm)****C : Valve clearance as measured (mm)**

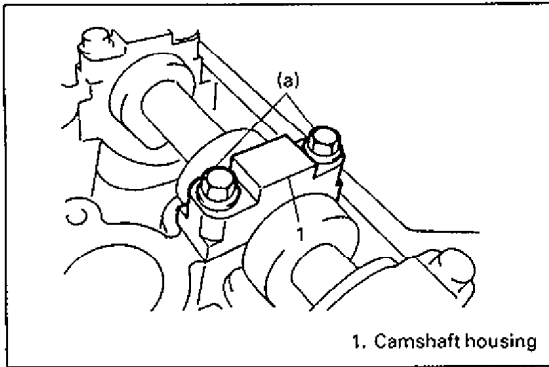
- 6) Select new shim from following thickness and install it to tappet.

NOTE:**When installing shim, make sure to direct its size mark toward tappet.**

Shim thickness (mm):

2.18	2.30	2.42	2.54	2.66	2.78	2.90
2.20	2.32	2.44	2.56	2.68	2.80	2.92
2.22	2.34	2.46	2.58	2.70	2.82	2.94
2.24	2.36	2.48	2.60	2.72	2.84	2.96
2.26	2.38	2.50	2.62	2.74	2.86	2.98
2.28	2.40	2.52	2.64	2.76	2.88	3.00

- 7) Lift valve by turning crankshaft in opposite direction and remove special tool.



75F00-6A4-12-1

- 8) Install camshaft housing bolts and tighten them to specified torque.

Tightening Torque

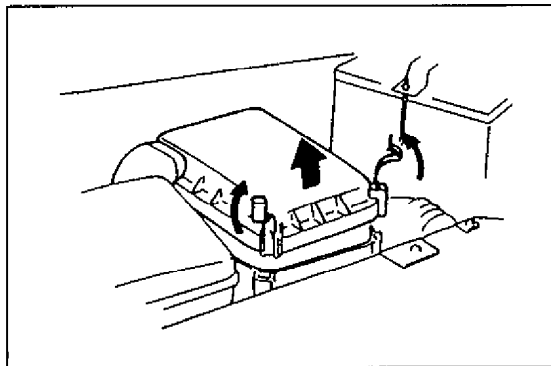
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

Check valve clearance again after adjusting it.

- 9) After checking and adjusting all valves, reverse removal procedure for installation.

AIR CLEANER ELEMENT**REMOVAL**

- 1) Open air cleaner case by unhooking its clamps.
- 2) Remove air cleaner element from case.

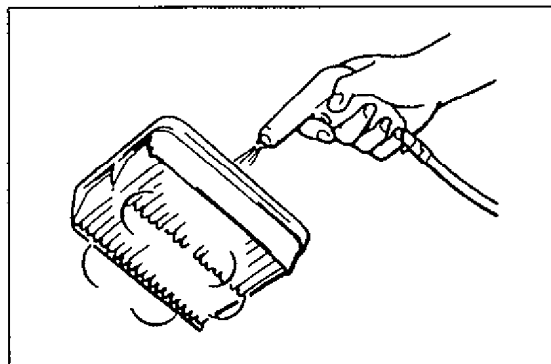


75F00-6A4-12-2

INSPECT

Check air cleaner element for dirt. Replace excessively dirty element.

75F00-6A4-12-3



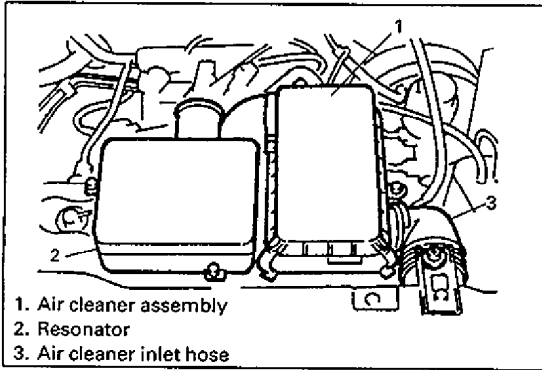
75F00-6A4-12-4

CLEAN

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

INSTALLATION

Reverse removal procedure for installation.



75F00-6A4-13-1

AIR CLEANER ASSEMBLY AND RESONATOR REMOVAL

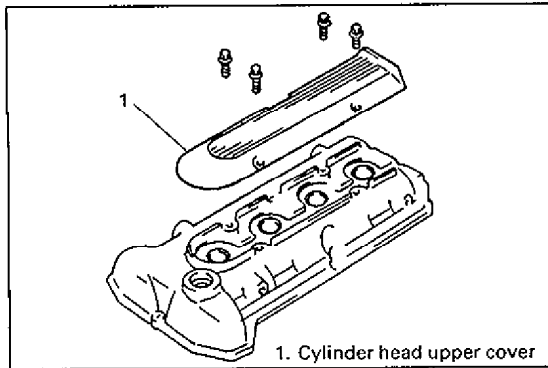
- 1) Disconnect negative cable at battery.
- 2) Disconnect breather hose from air cleaner assembly.
- 3) Remove air cleaner assembly, resonator and their hoses together by removing bolts and loosening clamps shown in figure.

INSTALLATION

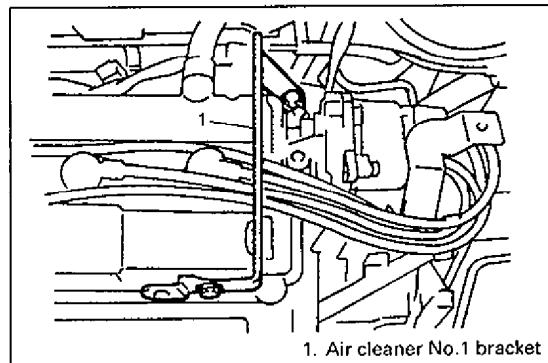
Reverse removal procedure for installation, noting following.

- Clamp each hose securely.

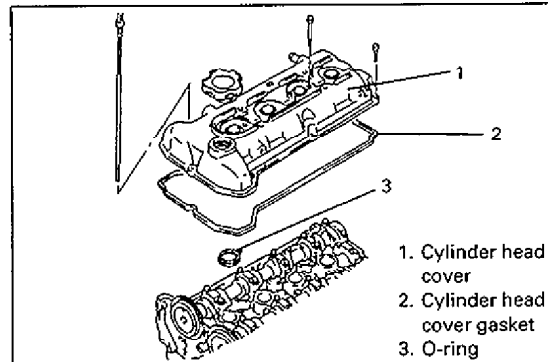
75F00-6A4-13-2



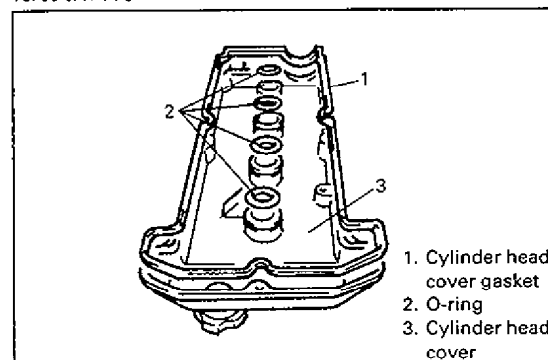
75F00-6A4-14-1



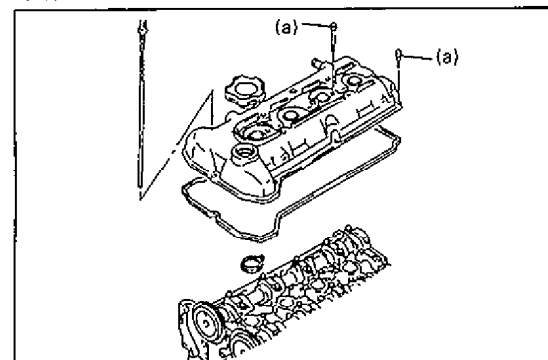
75F00-6A4-14-2



75F00-6A4-14-3



75F00-6A4-14-4



75F00-6A4-14-5

CYLINDER HEAD COVER

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove air cleaner assembly, resonator and hoses as previously outlined.
- 3) Remove cylinder head upper cover.
- 4) Disconnect oil level gauge.
- 5) Remove air cleaner No.1 bracket.
- 6) Disconnect high-tension cords from spark plugs.
- 7) Disconnect PCV valve.

- 8) Remove cylinder head cover with cylinder head cover gasket and O-rings.

INSTALLATION

- 1) Install O-rings and cylinder head cover gasket to cylinder head cover.

NOTE:

Be sure to check each of these parts for deterioration or any damage before installation and replace if found defective.

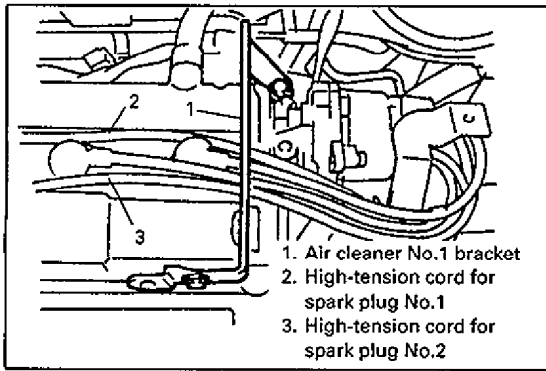
- 2) Install cylinder head cover to cylinder head and tighten cover bolts to specified torque.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

NOTE:

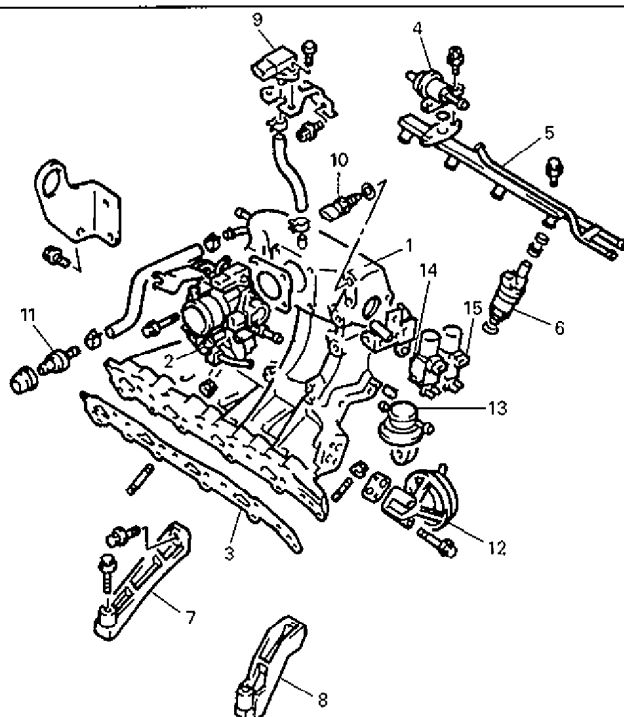
When installing cylinder head cover, use care so that cylinder head cover gasket or O-rings will not get out of place or fall off.



75F00-6A4-15-1

- 3) Connect high-tension cords to spark plugs as shown in figure.
- 4) Install air cleaner No.1 bracket.
- 5) Connect breather hose and PCV valve hose, then clamp them securely.
- 6) Install cylinder head upper cover.
- 7) Install air cleaner assembly and resonator, and clamp their hoses securely.
- 8) Connect negative cable at battery.

THROTTLE BODY AND INTAKE MANIFOLD



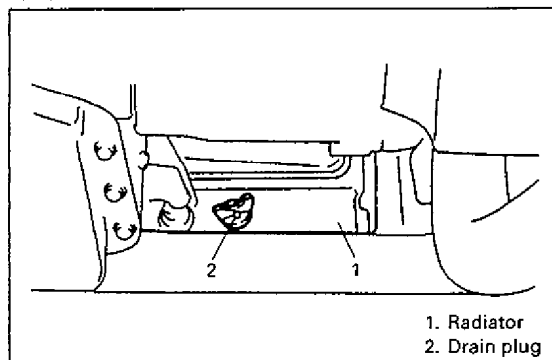
1. Intake manifold
 2. Throttle body
 3. Gasket
 4. Fuel pressure regulator
 5. Fuel delivery pipe
 6. Fuel injector
 7. Upper stiffener No.1
 8. Upper stiffener No.2
 9. MAP sensor
 10. IAT sensor
 11. PCV valve
 12. EGR valve
 13. EGR pressure transducer
 14. EGR solenoid vacuum valve
 15. EVAP canister purge valve
- (if equipped)

75F00-6A4-16-2

REMOVAL

- 1) Relieve fuel pressure according to procedure described in p. 6-4.
- 2) Disconnect negative cable at battery.

75F00-6A4-16-3

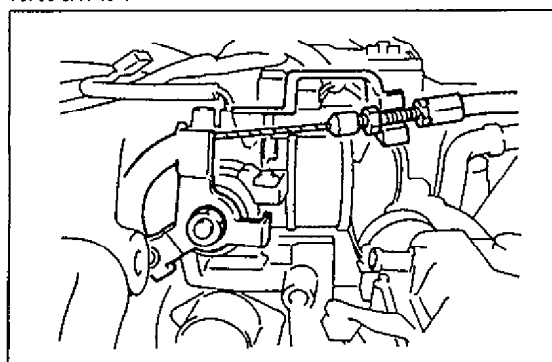


- 3) Drain cooling system.

WARNING:

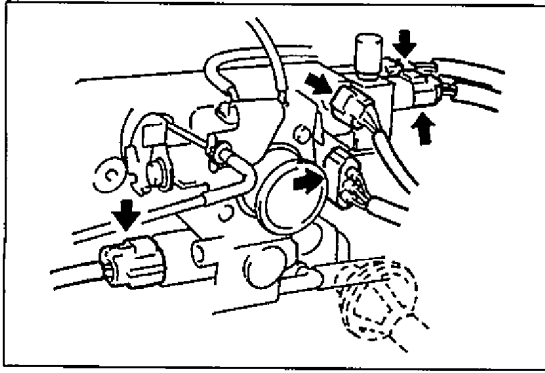
To help avoid danger of being burned, do not remove drain plug and radiator cap while engine and radiator are still hot. Scalding fluid and steam can be blown out under pressure if plug and cap are taken off too soon.

75F00-6A4-16-4



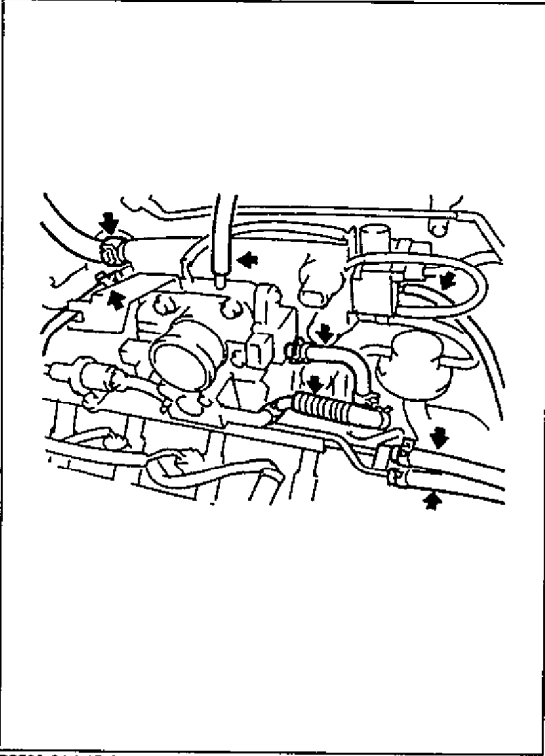
- 4) Remove air cleaner assembly, resonator and their hoses as previously outlined.
- 5) Disconnect accelerator cable.

75F00-6A4-16-5



75F00-6A4-17-1

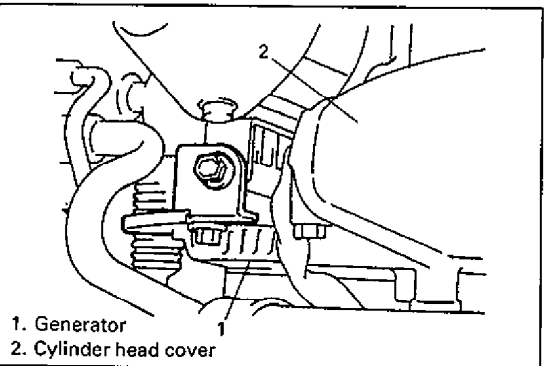
- 6) Disconnect following electric lead wires:
- EGR solenoid vacuum valve (if equipped)
 - Injectors, TP sensor, IAT sensor and IAC valve lead wires at the coupler
 - EVAP canister purge valve



75F00-6A4-17-3

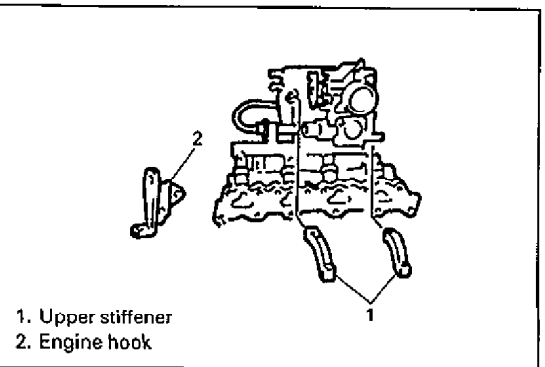
- 7) Disconnect following hoses:
- Brake booster hose from intake surge tank
 - Canister purge hose from EVAP canister
 - Engine cooling water (coolant) hoses (inlet and outlet) from IAC valve
 - MAP sensor hose from MAP sensor
 - PCV valve hose from intake surge tank

- 8) Disconnect fuel feed hose. Disconnect fuel return hose from pipe.



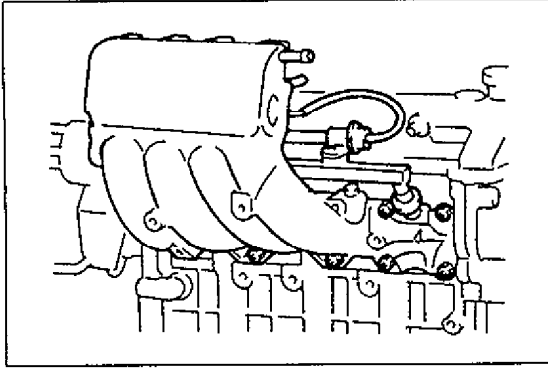
75F00-6A4-17-4

- 9) Remove generator adjust arm stiffener bolt.



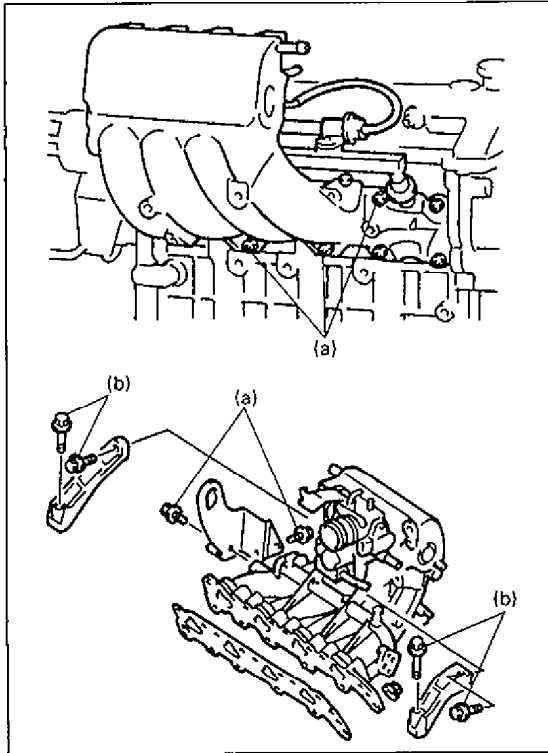
75F00-6A4-17-5

- 10) Remove intake manifold upper stiffeners and engine hook.



75F00-6A4-18-1

- 11) Remove intake manifold with throttle body from cylinder head, and then its gasket.



75F00-6A4-18-4

INSTALLATION

Reverse removal procedure for installation noting the followings.

- Use new intake manifold gasket.
- Tighten bolts and nuts to specified torque.

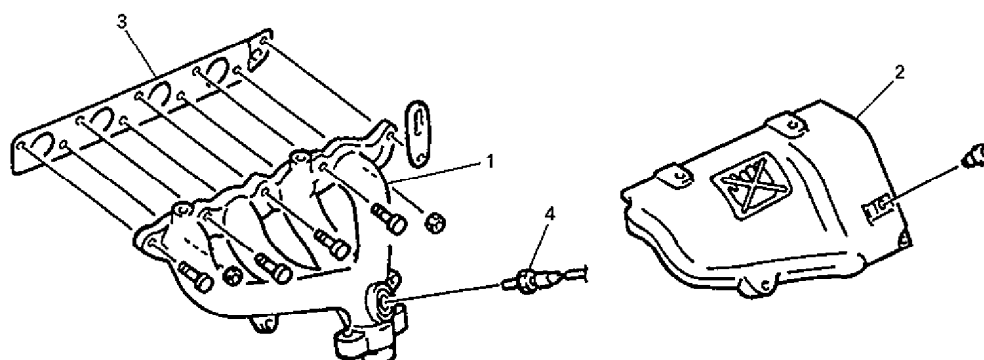
Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
- Refill cooling system, referring to "ENGINE COOLING" section.
- Upon completion of installation, turn ignition switch ON but engine OFF and check for fuel leaks.
- Finally, start engine and check for engine coolant leaks.

EXHAUST MANIFOLD



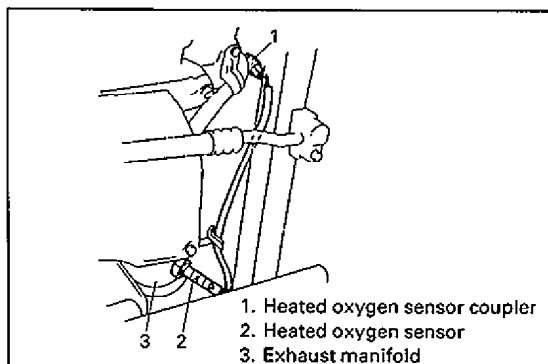
- 1. Exhaust manifold
- 2. Exhaust manifold cover
- 3. Gasket
- 4. Heated oxygen sensor

75F00-6A4-19-2

WARNING:

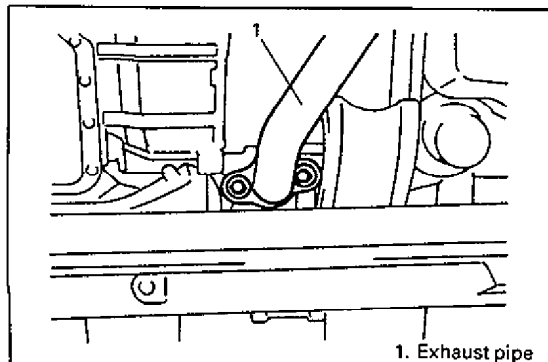
To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system cools down.

75F00-6A4-19-3



- 1. Heated oxygen sensor coupler
- 2. Heated oxygen sensor
- 3. Exhaust manifold

75F00-6A4-19-4

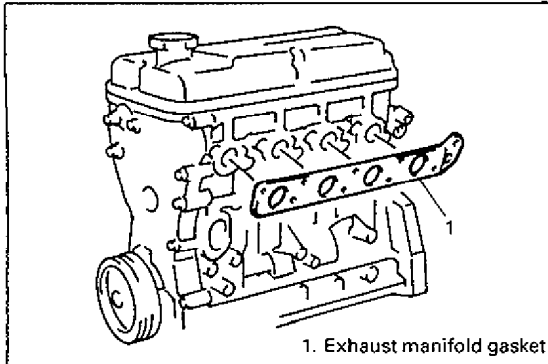


- 1. Exhaust pipe

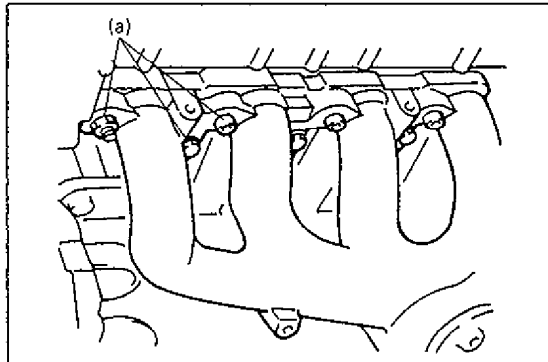
75F00-6A4-19-5

REMOVAL

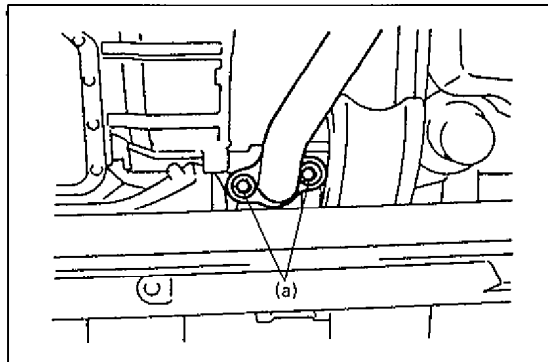
- 1) Disconnect negative cable at battery.
- 2) Remove front bumper (refer to section 9).
- 3) Disconnect heated oxygen sensor coupler.
- 4) Remove exhaust manifold cover.
- 5) Remove or disconnect exhaust pipe from exhaust manifold.
- 6) Remove exhaust manifold and its gasket from cylinder head.



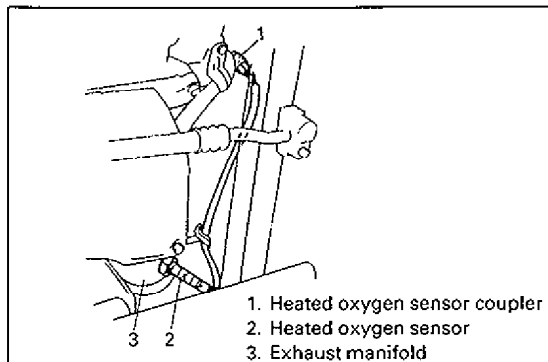
75F00-6A4-20-1



75F00-6A4-20-2



75F00-6A4-20-3



75F00-6A4-20-4

INSTALLATION

1) Install new gasket to cylinder head.

2) Install exhaust manifold.

Tighten bolts and nuts to specified torque.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

3) Install pipe gasket and install exhaust pipe to exhaust manifold.

Before installing pipe gasket, check it for deterioration or damage, and replace as necessary.

Tighten pipe fasteners to specified torque.

Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

4) Install upper cover to exhaust manifold.

5) Connect heated oxygen sensor coupler and clamp its wire securely.

6) Install front bumper (refer to section 9).

7) Connect negative cable at battery.

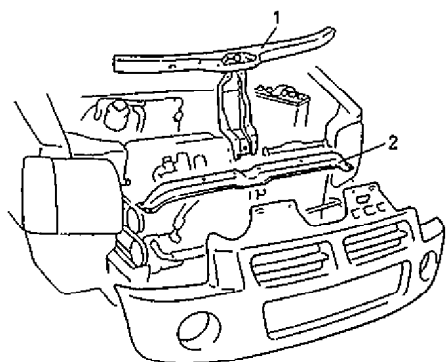
8) Check exhaust system for exhaust gas leakage.

UNIT REPAIR OVERHAUL

ENGINE ASSEMBLY

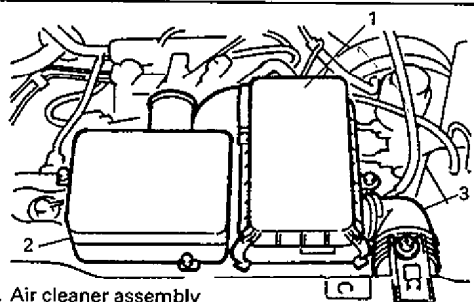
REMOVAL

- 1) Release fuel pressure in fuel feed line by referring to p. 6-4.
- 2) Remove battery.
- 3) Remove engine hood and front bumper (refer to Section 9).
- 4) Remove upper and lower member.
- 5) Drain cooling system and remove radiator with cooling fan.
Refer to Section 6B.
- 6) Drain engine and transmission oil.



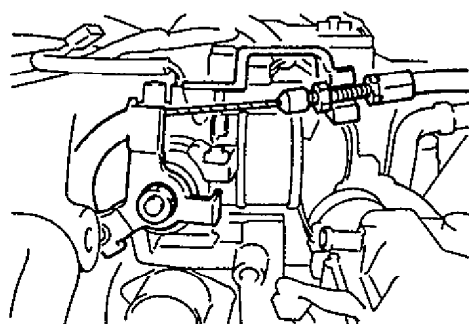
1. Upper member
2. Lower member

75F00-6A4-21-2



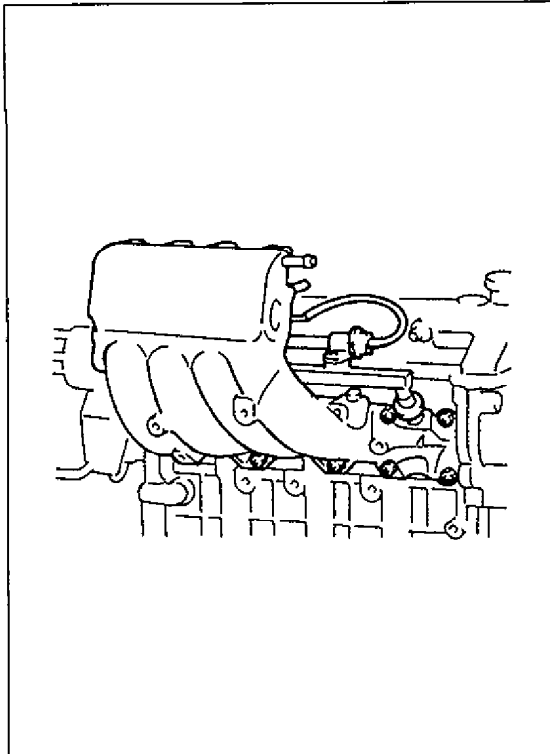
1. Air cleaner assembly
2. Resonator
3. Air cleaner inlet hose

75F00-6A4-21-3



75F00-6A4-21-4

- 7) Remove air cleaner assembly, resonator and their hoses as previously outlined.
- 8) Disconnect following cables and rod.
 - Accelerator cable from throttle body
 - Clutch cable, shift control rod and extension rod from transmission (M/T)
 - Gear select cable from transmission (A/T)



75F00-6A4-22-2

9) Disconnect following electric wires:

- High-tension cord and CMP sensor from distributor
- Horn
- Engine oil pressure switch
- EGR solenoid vacuum valve
- EVAP solenoid purge valve
- Startor
- Back-up light switch (M/T)
- A/C compressor switch
- Ground wire from cylinder block
- Engine coolant temp. sensor
- IAT sensor
- TP sensor and IAC valve wires at the coupler
- Shift switch (A/T)
- Vehicle speed sensor
- Heated oxygen sensor
- A/T shift solenoid coupler (A/T)
- A/T VSS coupler (A/T)
- Battery ground cable from transmission
- Generator
- EGR solenoid vacuum valve and then release wire harnesses from clamps.

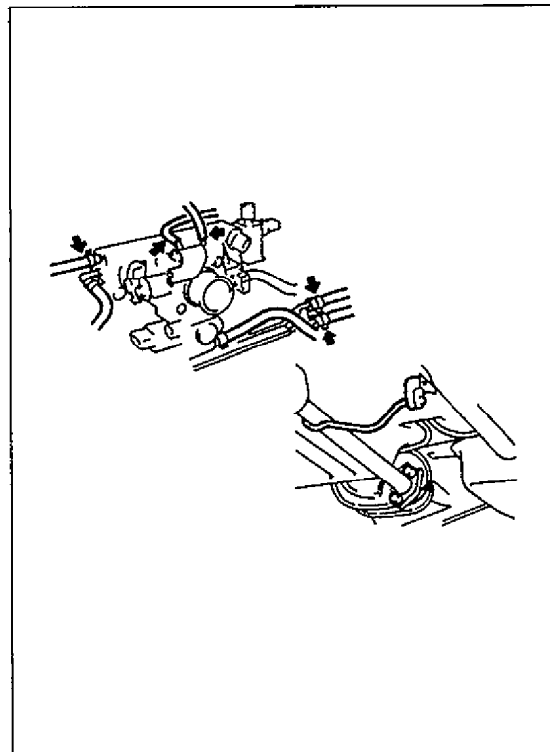
10) Disconnect following hoses:

- Canister purge hose from EVAP canister purge valve
- Brake booster hose from surge tank
- Radiator outlet hose from inlet pipe
- Radiator inlet hose from thermostat cap
- Heater inlet and outlet hose from heater unit
- MAP sensor hose from MAP sensor
- Fuel feed and return hoses from pipes
- A/T fluid hoses from radiator (A/T)

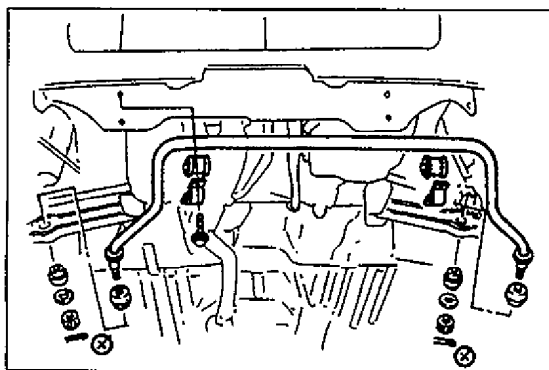
11) Hoist vehicle.

12) Drain engine oil.

13) Remove exhaust pipe by removing bolts and unhooking hanger.



75F00-6A4-22-4



75F00-6A4-23-1

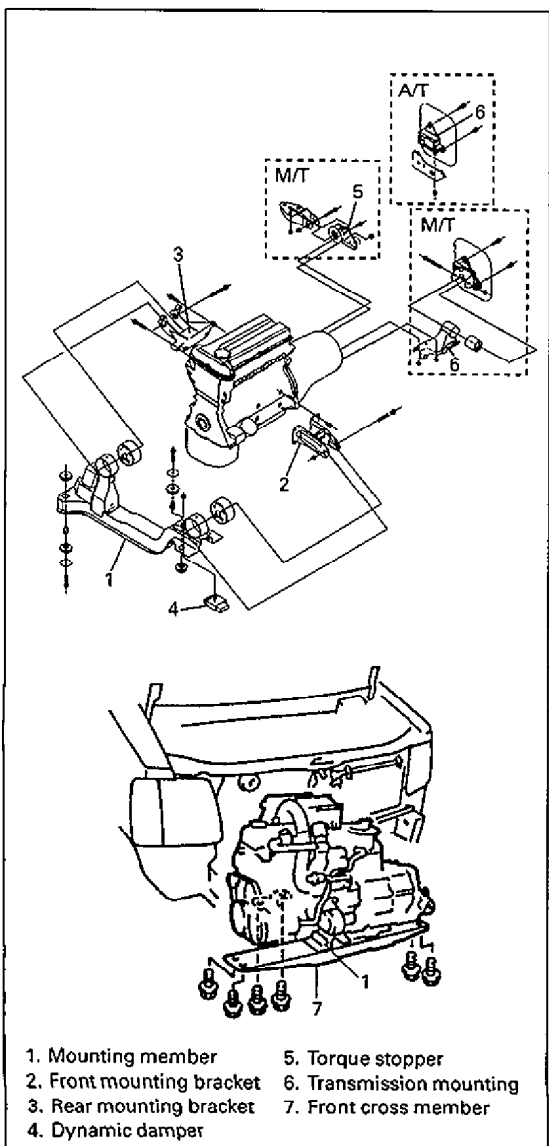
14) Remove stabilizer bar.

15) Remove drive shaft joints from differential gear of transmission.

Refer to Section 4A (DRIVE SHAFT) for procedure to disconnect drive shaft joint.

For engine and transmission removal, it is not necessary to remove drive shafts from steering knuckle.

75F00-6A4-23-2



- | | |
|---------------------------|--------------------------|
| 1. Mounting member | 5. Torque stopper |
| 2. Front mounting bracket | 6. Transmission mounting |
| 3. Rear mounting bracket | 7. Front cross member |
| 4. Dynamic damper | |

75F00-6A4-23-5

16) Remove A/C compressor bracket with hose still attached (if equipped).

NOTE:

Suspend removed compressor at a place where no damage will be caused during removal and installation of engine assembly.

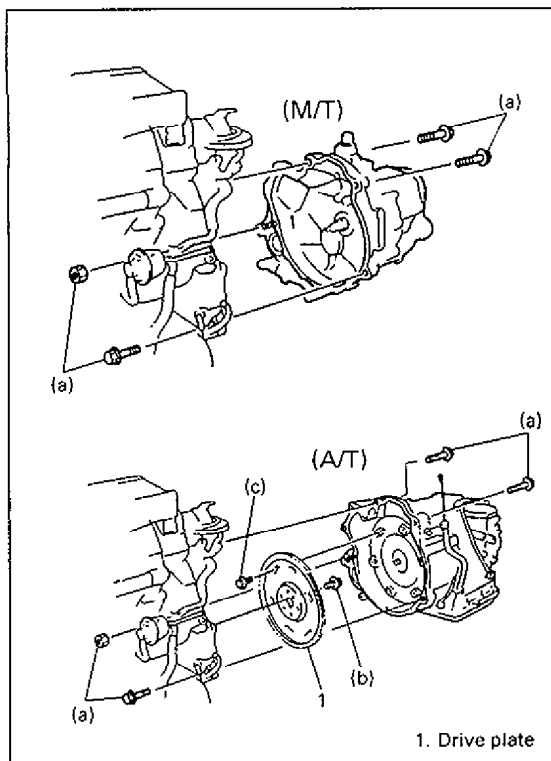
17) Install lifting device.

18) Remove transmission mounting from transmission.

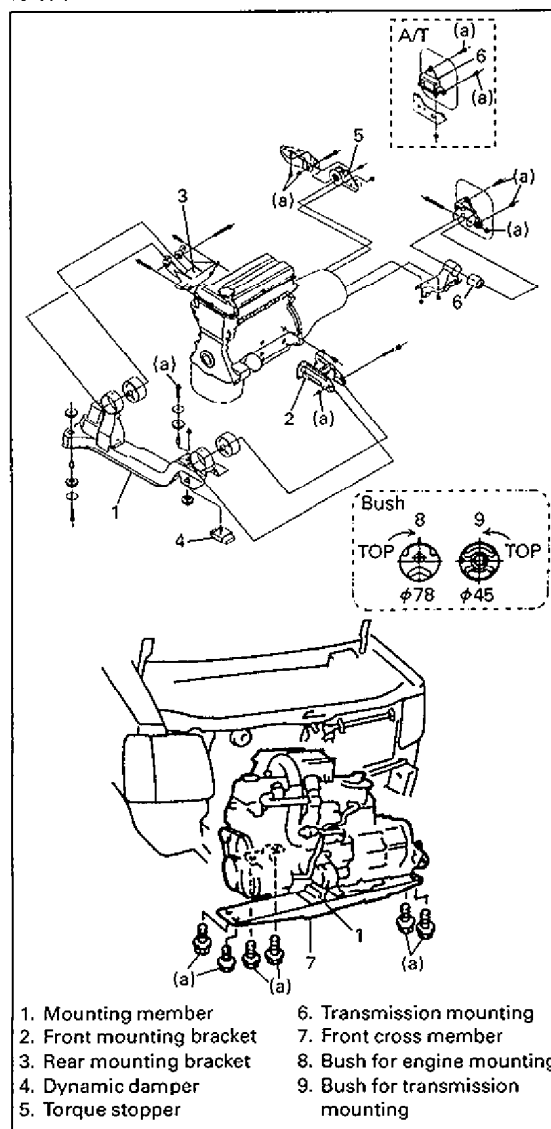
19) Remove torque stopper from engine (M/T).

20) Before lifting engine, check to ensure all hoses, electric wires and cables are disconnected from engine.

21) Remove engine assembly together with transmission, front cross member and engine mounting member from body.



75F00-6A4-24-2



75F00-6A4-24-5

INSTALLATION

- 1) Install transmission to engine.

Tightening Torque

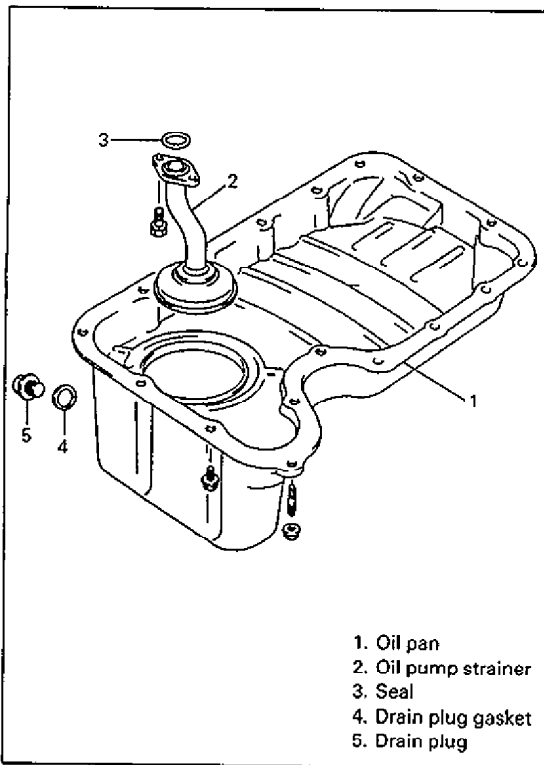
- (a) : 50 N·m (5.0 kg-m, 36.6 lb-ft)
(b) : 70 N·m (7.0 kg-m, 50.5 lb-ft)
(c) : 20 N·m (2.0 kg-m, 14.5 lb-ft)

- 2) With transmission, front cross member and engine mounting member installed, lift engine with transmission into engine compartment, but do not remove lifting device.
- 3) Install transmission to transmission mounting bracket.
- 4) Install engine mounting member and front cross member to body.
- 5) Install torque stopper to body (M/T).
- 6) Tighten bolts and nuts of all parts installed in above steps 3), 4) and 5) to specified torque.

Tightening Torque

- (a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

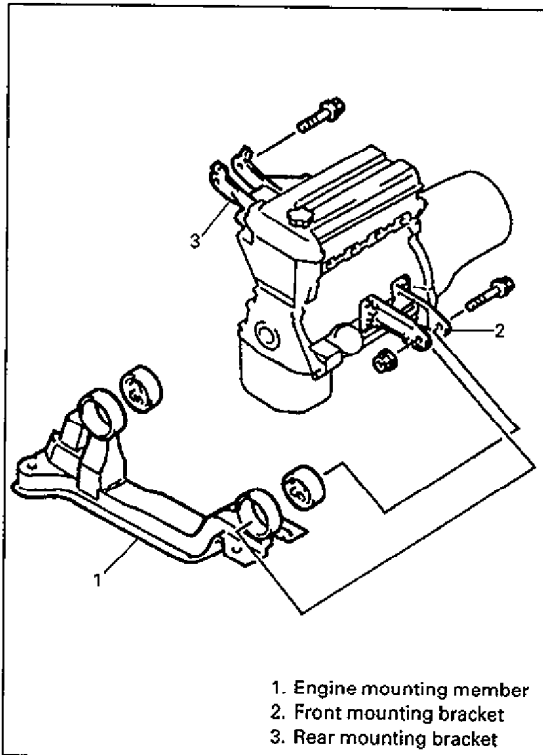
- 7) Remove lifting device.
- 8) Reverse removal procedure for installation of remainder.
 - Push in each drive shaft joint fully so that snap ring engages with differential gear.
Use care not to damage oil seal lip when inserting.
 - Clamp electric wire securely.
- 9) Adjust clutch pedal free travel, referring to Section 7C. (M/T)
- 10) Refill transmission with gear oil (A/T fluid for A/T model), referring to Section 0B.
- 11) Refill engine with engine oil, referring to Section 0B.
- 12) Refill cooling system, referring to Section 6B.
- 13) Adjust A/C compressor (if equipped) and/or generator belt, referring to Section 0B.
- 14) Upon completion of installation, verify that there is no fuel leakage, coolant leakage, transmission oil leakage or exhaust gas leakage at each connection.
- 15) Adjust accelerator cable play, referring to Section 6E1.
- 16) Check ignition timing and adjust it as necessary, referring to Section 6F1.



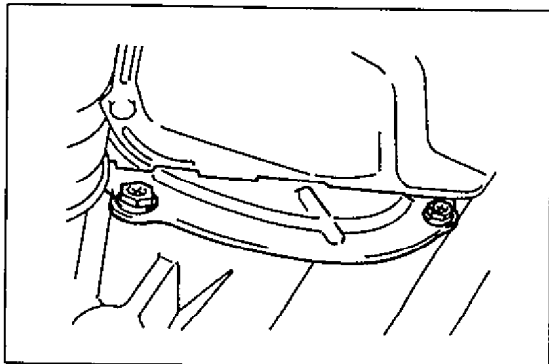
75F00-6A4-25-2

REMOVAL

- 1) Remove engine assembly from vehicle as previously outlined.
- 2) Remove engine mounting member from front and rear mounting bracket.

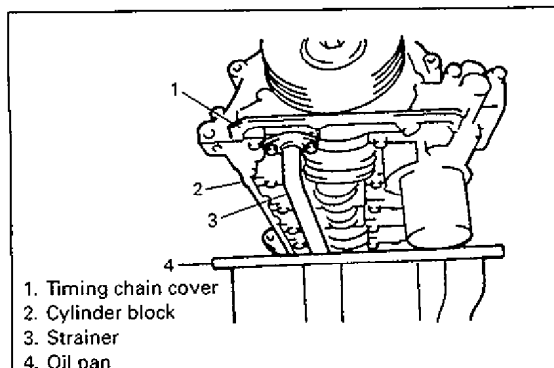


75F00-6A4-25-4



75F00-6A4-25-5

- 3) Remove clutch (torque converter) housing lower plate.

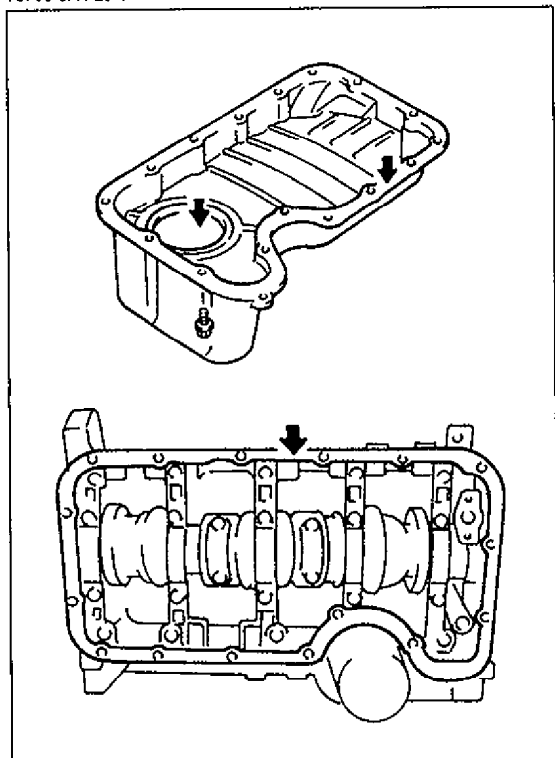


75F00-6A4-26-1

4) Remove oil pan and then oil pump strainer.

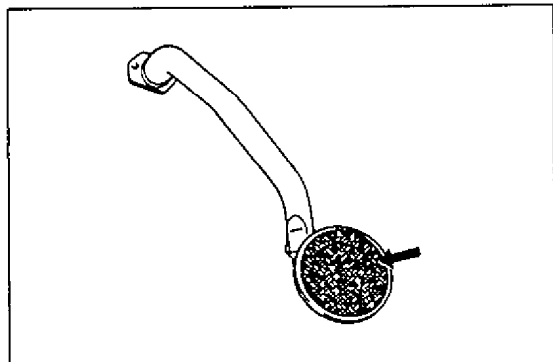
CLEANING

- Clean mating surfaces of oil pan and cylinder block.
Remove oil, old sealant, and dusts from mating surfaces and oil pan inside

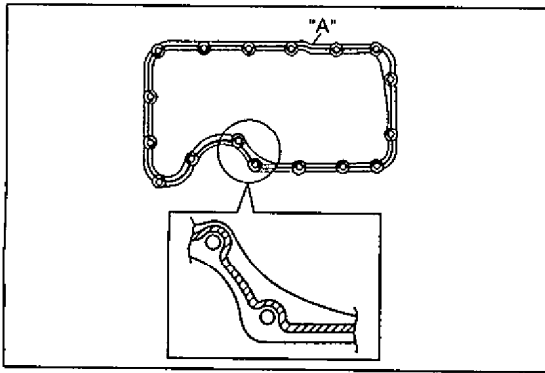


75F00-6A4-26-3

- Clean oil pump strainer screen.



75F00-6A4-26-4

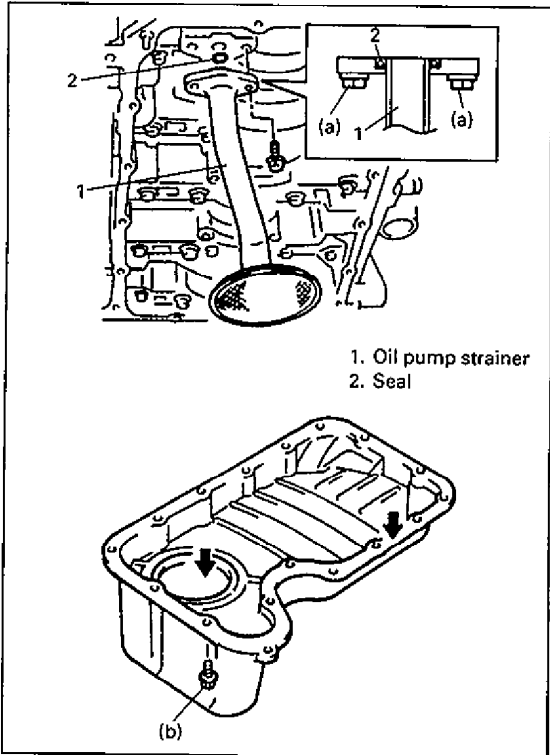


75F00-6A4-27-1

INSTALLATION

- 1) Apply sealant to oil pan mating surface continuously as shown in figure.

"A" Sealant: 99000-31150



75F00-6A4-27-3

- 2) Install oil pump strainer and oil pan.

Install seal to oil pump strainer in the position as shown in figure.

Install strainer to cylinder block, then tighten strainer bolt to specified torque.

Tightening Torque

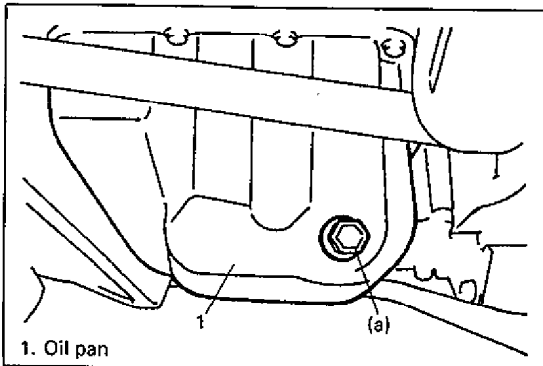
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

After fitting oil pan to cylinder block, run in securing bolts and start tightening at the center: move wrench outward, tightening one bolt at a time.

Tighten bolts to specified torque.

Tightening Torque

(b): 11 N·m (1.1 kg-m, 8.0 lb-ft)

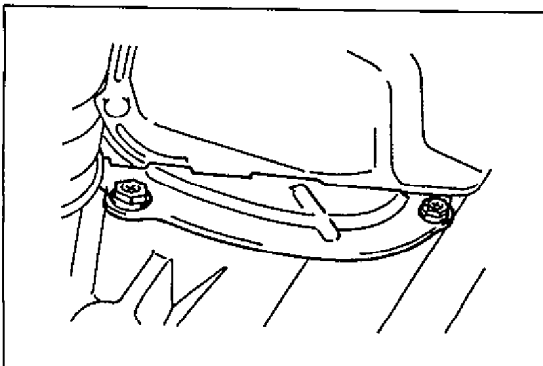


75F00-6A4-27-4

- 3) Install gasket and drain plug to oil pan. Tighten drain plug to specified torque.

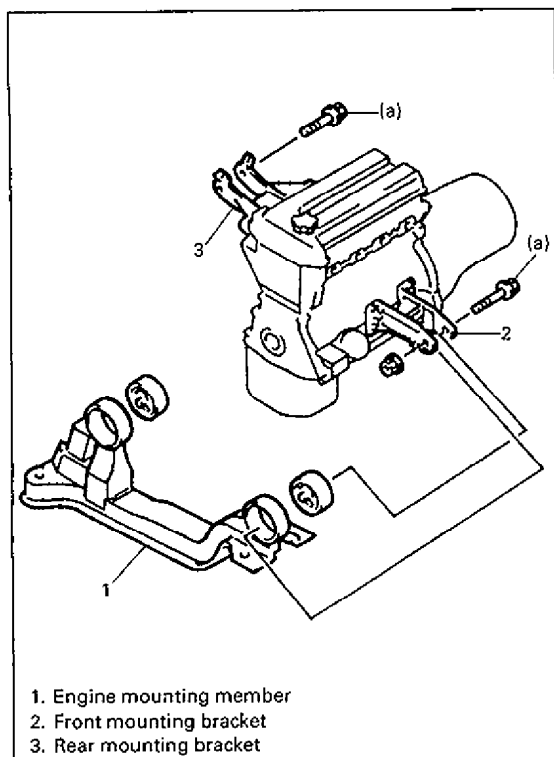
Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



75F00-6A4-27-5

- 4) Install clutch (torque converter) housing lower plate.



75F00-6A4-28-2

- 5) Install engine mounting member to front and rear mounting bracket.

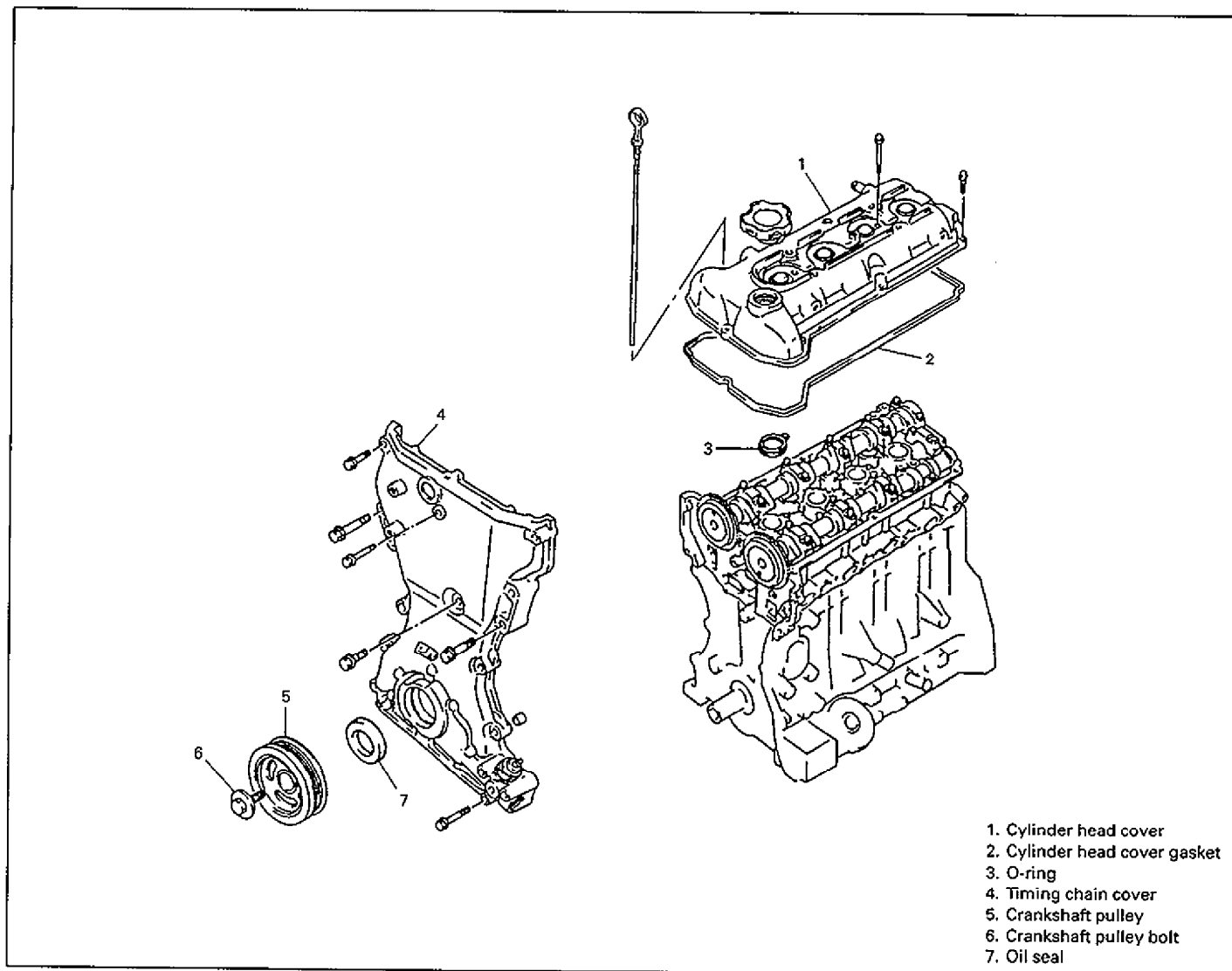
Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

- 6) Install engine assembly to body as previously outlined.

75F00-6A4-28-3

TIMING CHAIN COVER

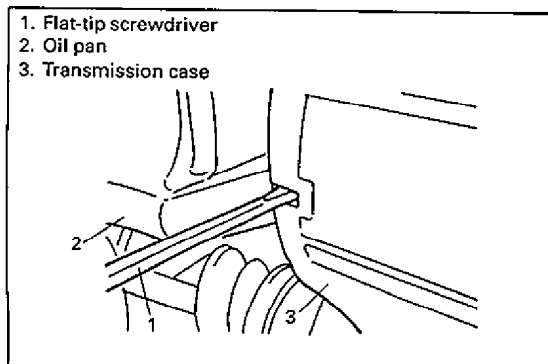


75F00-6A4-29-3

REMOVAL

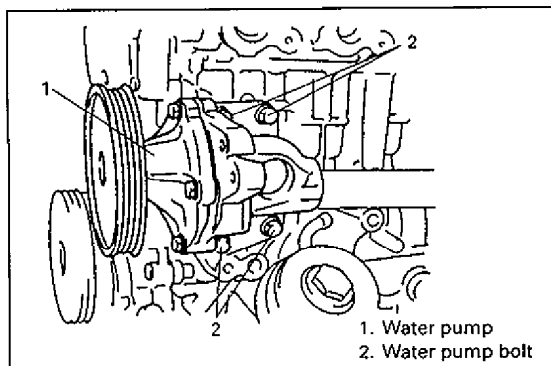
- 1) Remove engine assembly from body as previously outlined.
- 2) Remove generator belt.

74F00-6A4-29-4

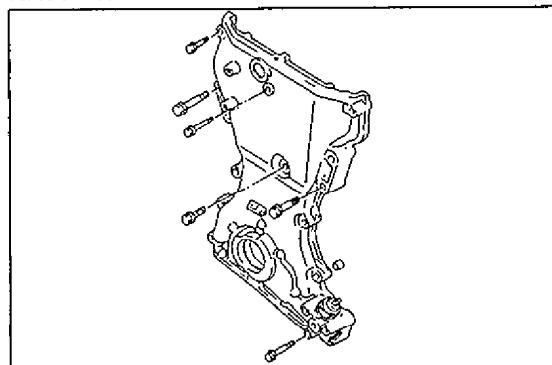


- 3) Remove crankshaft pulley with crankshaft locked as shown in figure.

75F00-6A4-29-5



75F00-6A4-30-1



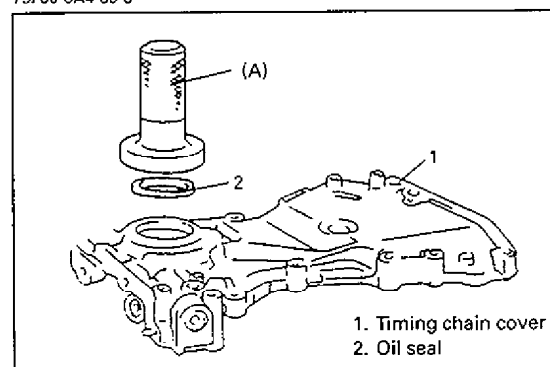
75F00-6A4-30-2

- 4) Remove water pump by removing water pump bolts.
- 5) Remove oil pan.
Refer to "OIL PAN AND OIL PUMP STRAINER" in this section.
- 6) Remove cylinder head cover.
Refer to "CYLINDER HEAD COVER" in this section.
- 7) Remove bolts and then timing chain cover.

CLEAN

- Clean sealing surface on timing chain cover, crank case, cylinder block and cylinder head.
Remove oil, old sealant, and dust from sealing surface.

75F00-6A4-30-3



75F00-6A4-30-4

INSPECTION

- Check oil seal lip for fault or other damage.
Replace as necessary.

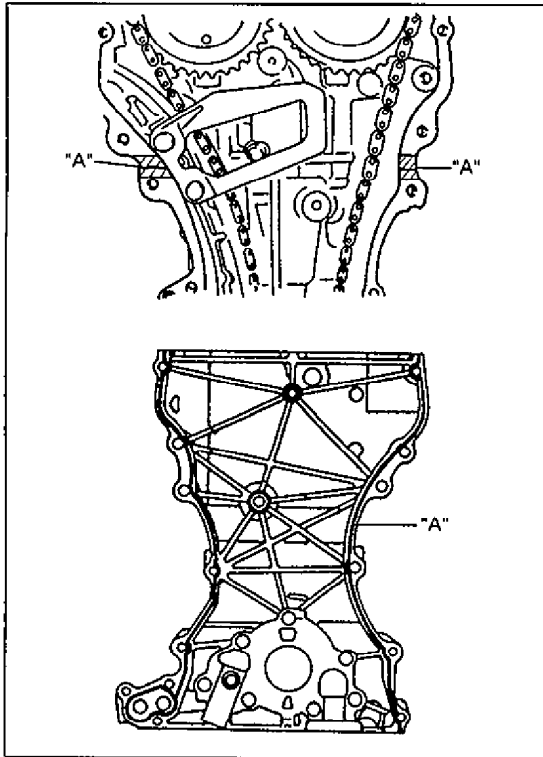
NOTE:

When installing new oil seal, top it in until its surface is flush with edge of timing chain cover.

To install oil seal, use special tool (bearing installer).

Special Tool

(A): 09913-75520



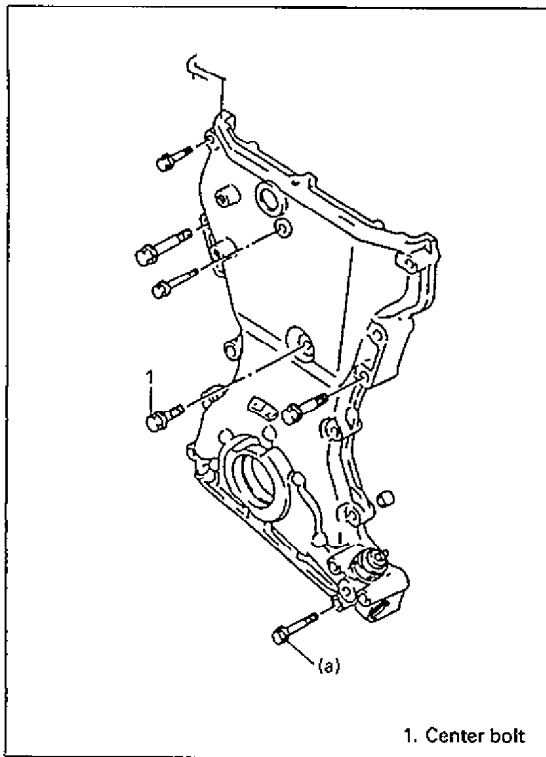
75F00-6A4-31-2

INSTALLATION

Reverse removal sequence to install timing chain cover noting following points.

- 1) Apply sealant "A" to area as shown in figure.

"A": Sealant 99000-31150



75F00-6A4-31-4

- 2) Apply engine oil to oil seal lip, then install timing chain cover.

Tighten bolts and nut to specified torque.

NOTE:

- Before installing timing chain cover, check that pin is securely fitted.
- Use new center bolt.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

- 3) Install water pump.

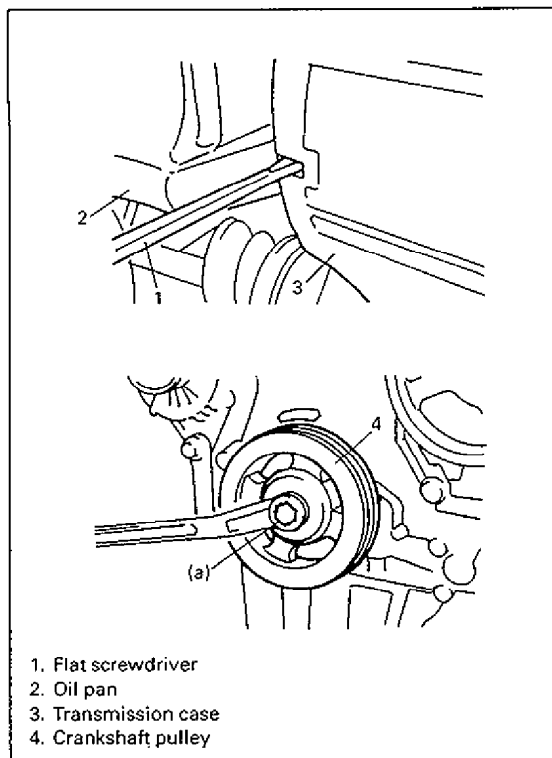
Refer to "WATER PUMP" in Section 6B.

- 4) Install oil pan.

Refer to "OIL PAN AND OIL PUMP STRAINER" in this section.

- 5) Install cylinder head cover.

Refer to "CYLINDER HEAD COVER".



75F00-6A4-32-2

6) Install crankshaft pulley. Tighten bolt to specified torque.

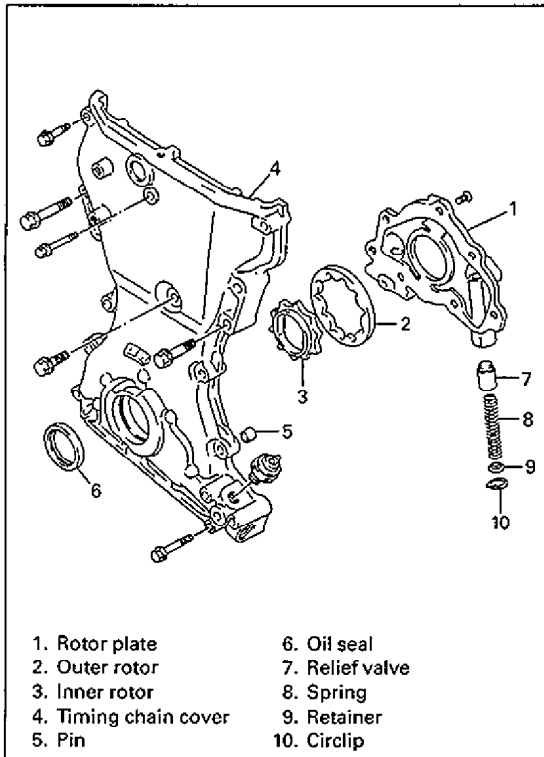
Tightening Torque

(a): 115 N·m (11.5 kg-m, 83.5 lb-ft)

7) Install generator belt. Refer to Section 6H.

8) Install engine assembly as previously outlined.

75F00-6A4-32-3

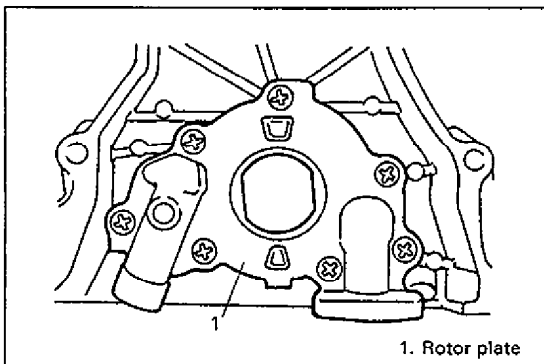


75F00-6A4-33-2

OIL PUMP

REMOVAL

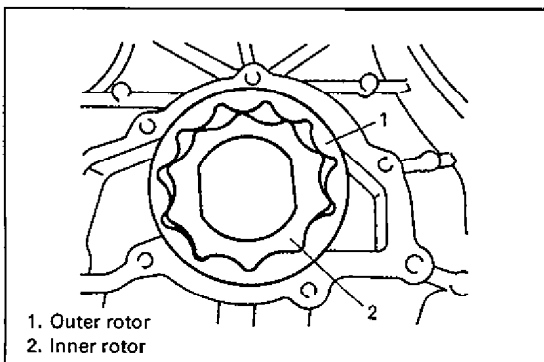
- 1) Disconnect negative cable at battery.
- 2) Remove timing chain cover as previously outlined.



75F00-6A4-33-3

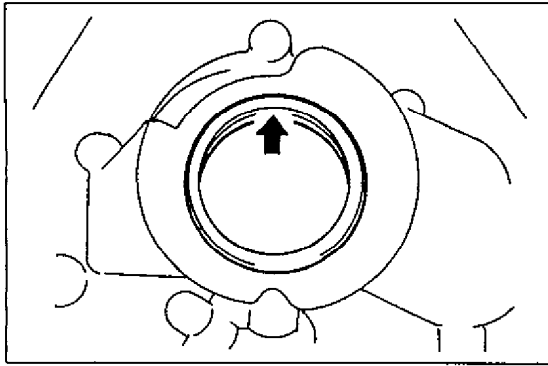
DISASSEMBLY

- 1) Remove rotor plate.



75F00-6A4-33-4

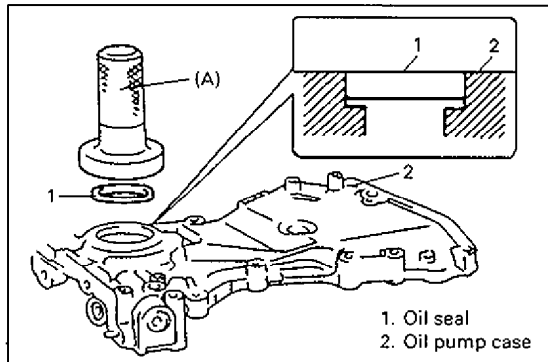
- 2) Remove outer rotor and inner rotor.



75F00-6A4-34-1

INSPECTION

- Check oil seal lip for fault or other damage. Replace as necessary.



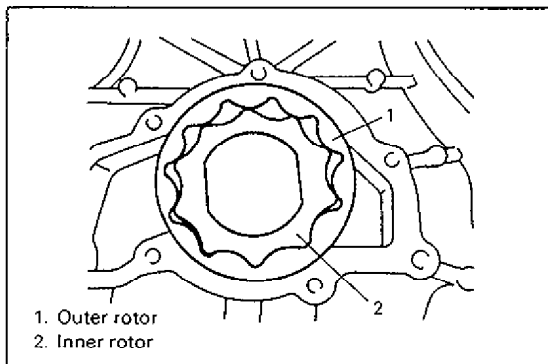
75F00-6A4-34-2

NOTE:

When installing oil seal, press-fit it till its end face is flush with oil pump case end face.

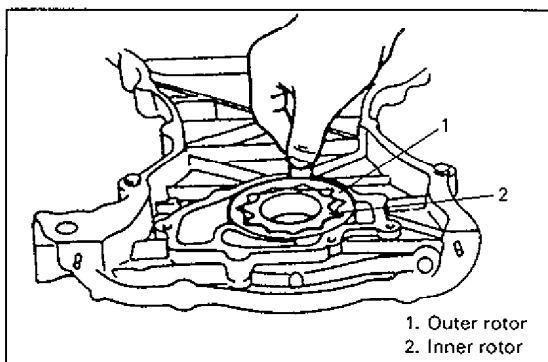
Special Tool

(A): 09913-75520



75F00-6A4-34-3

- Check outer and inner rotors, rotor plate, and oil pump case for excessive wear or damage.



75F00-6A4-34-4

MEASUREMENT

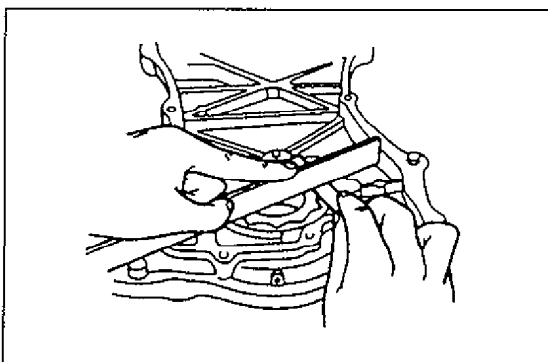
• Radial clearance

Check radial clearance between outer rotor and case, using thickness gauge.

If clearance exceeds its limit, replace outer rotor or case.

Limit on radial clearance between outer rotor and case:

0.310 mm (0.0122 in.)

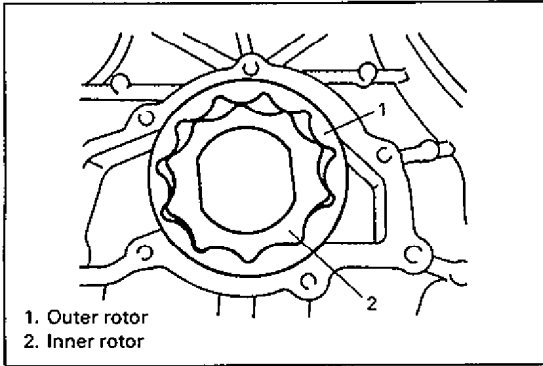


75F00-6A4-34-5

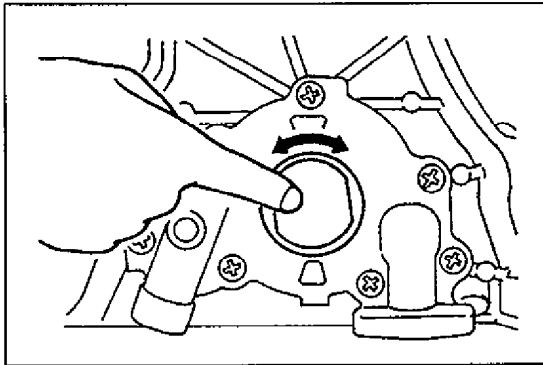
• Side clearance

Using straight edge and thickness gauge, measure side clearance.

Limit on side clearance: 0.15 mm (0.0059 in.)



75F00-6A4-35-1



ASSEMBLY

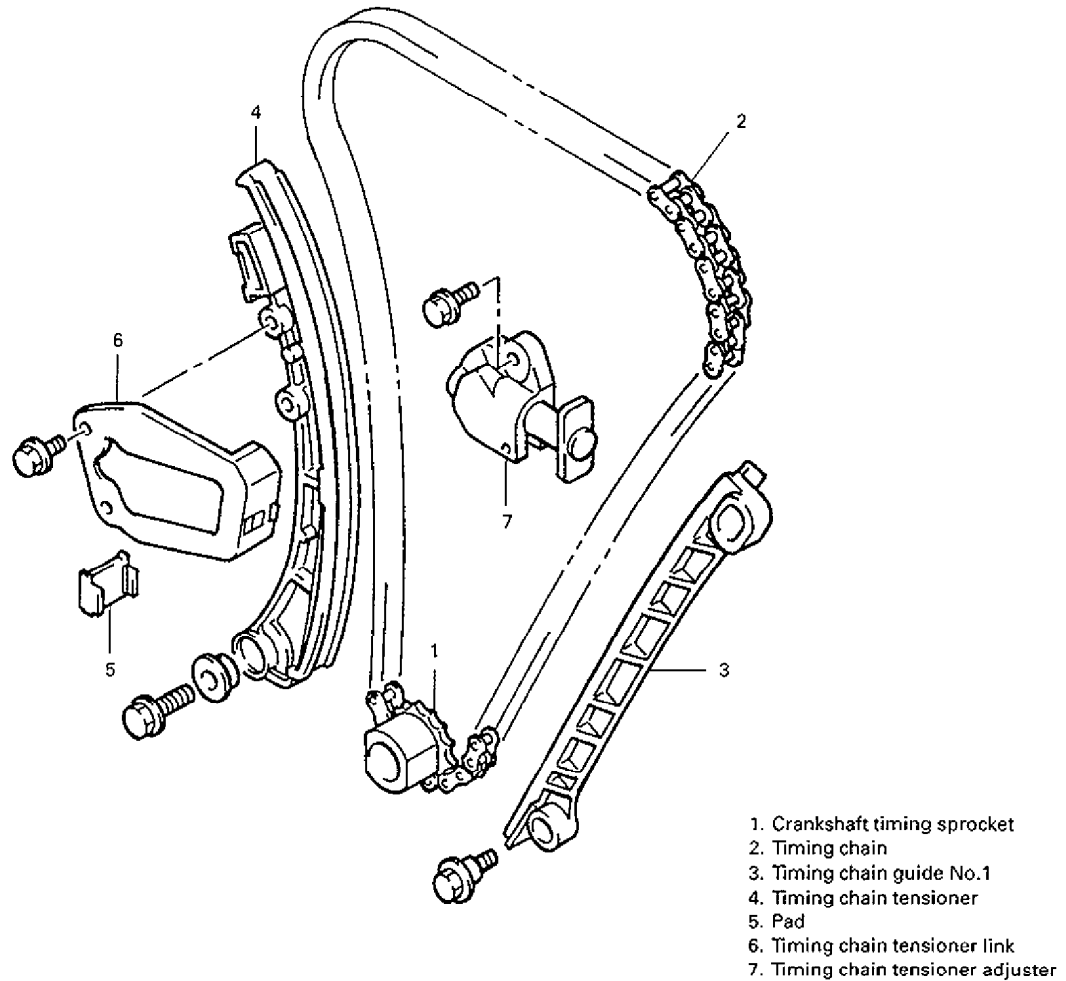
- 1) Wash, clean and then dry all disassembled parts.
- 2) Apply thin coat of engine oil to inner and outer rotors, oil seal lip portion, and inside surfaces of oil pump case and plate.
- 3) Install outer and inner rotors to pump case.
- 4) Install rotor plate. Tighten 7 screws securely.
After installing plate, check to be sure that gears turn smoothly by hand.

INSTALLATION

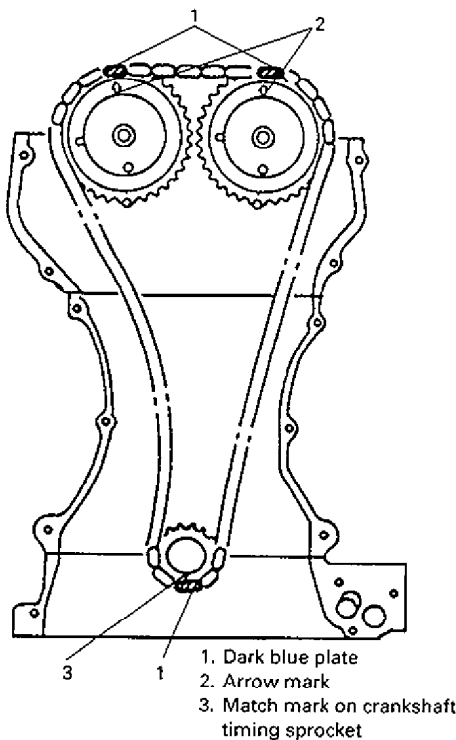
For installation, refer to "Timing Chain Cover".

75F00-6A4-35-3

TIMING CHAIN AND CHAIN TENSIONER



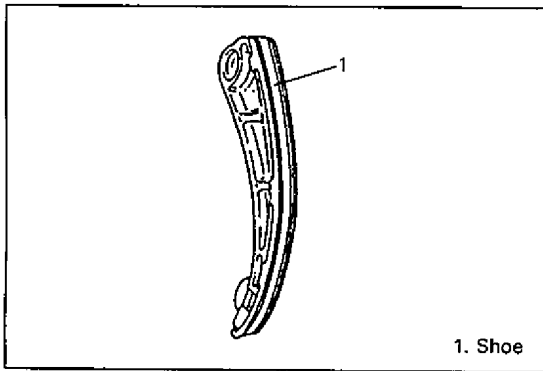
75F00-6A4-36-3



REMOVAL

- 1) Remove engine assembly from body.
Refer to item "ENGINE ASSEMBLY".
- 2) Remove oil pan.
Refer to item "OIL PAN AND OIL PUMP STRAINER" in this section for removal.
- 3) Remove cylinder head cover.
Refer to item "CYLINDER HEAD COVER" in this section for removal.
- 4) Remove timing chain cover.
Refer to item "TIMING CHAIN COVER" in this section for removal.
- 5) Turn crankshaft until dark blue plates and match marks come at positions as shown in figure.
- 6) Remove timing chain guide No.1 and No.2.
- 7) Remove tensioner link.
- 8) Remove timing chain tensioner.
- 9) Remove timing chain tensioner adjuster.
- 10) Remove timing chain with crankshaft timing sprocket.

75F00-6A4-36-5

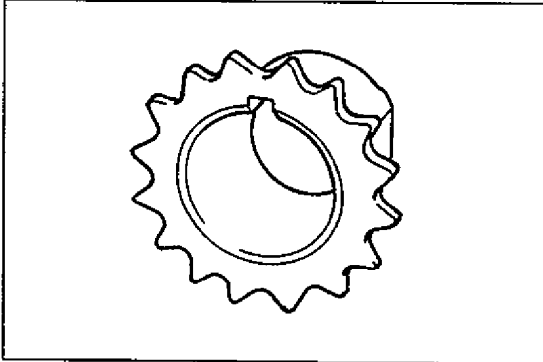


1. Shoe

75F00-6A4-37-1

Timing chain tensioner

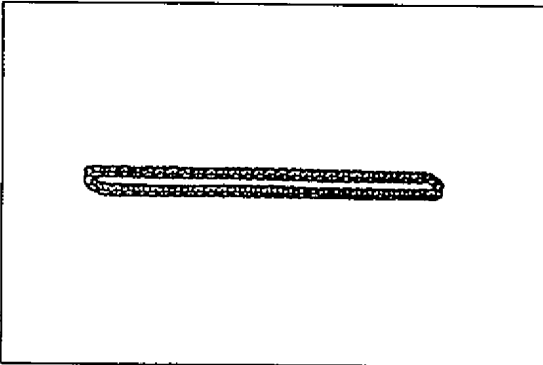
- Check shoe for wear or damage.



75F00-6A4-37-2

Crankshaft timing sprocket

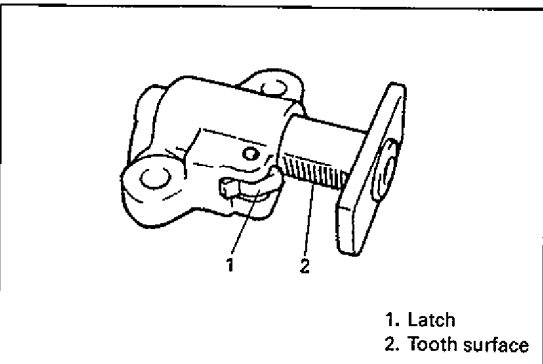
- Check teeth of sprocket for wear or damage.



75F00-6A4-37-3

Timing chain

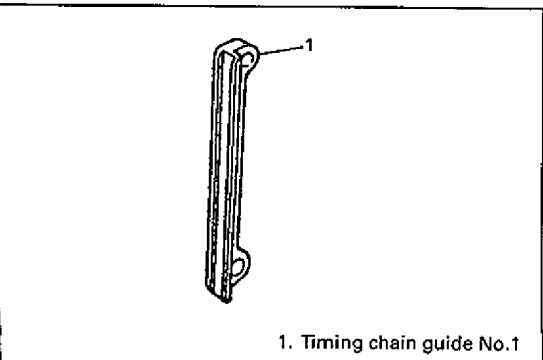
- Check timing chain for wear or damage.

1. Latch
2. Tooth surface

75F00-6A4-37-4

Timing chain tensioner adjuster

- Check that latch and tooth surface are free from damage and latch functions properly.

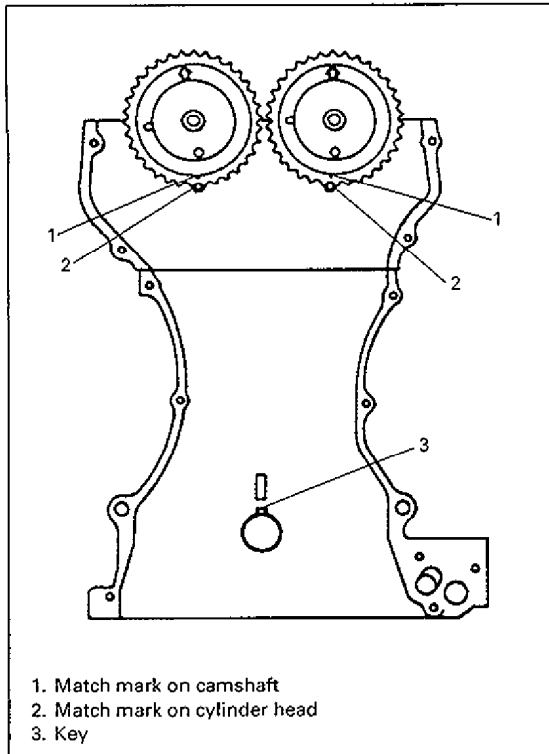


1. Timing chain guide No.1

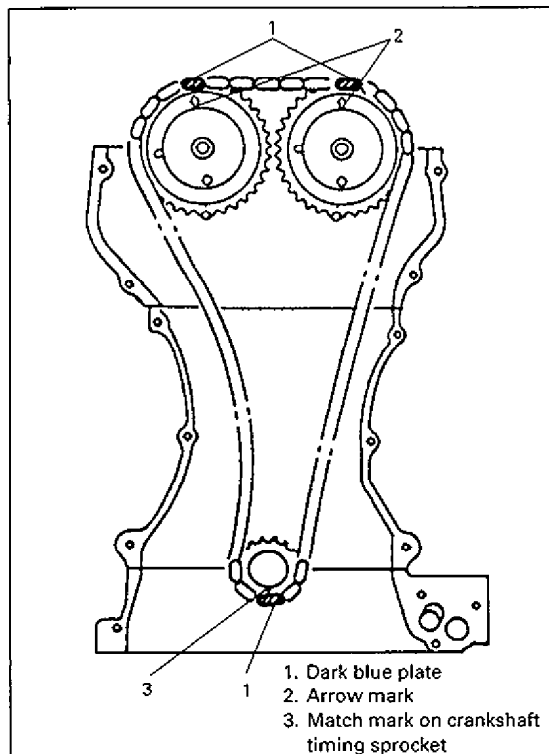
75F00-6A4-37-5

Timing chain guide

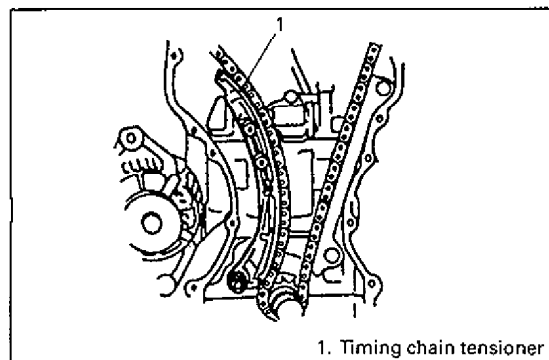
- Check shoe for wear or damage.



75F00-6A4-38-2



75F00-6A4-38-4



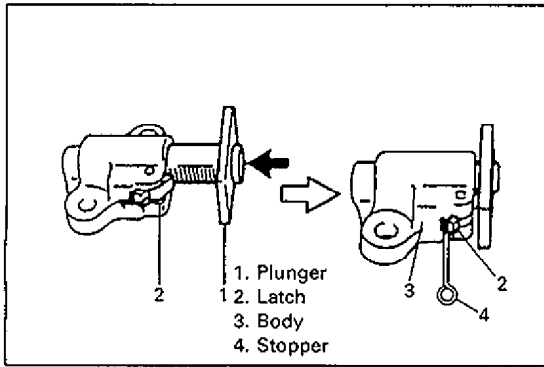
75F00-6A4-38-5

INSTALLATION

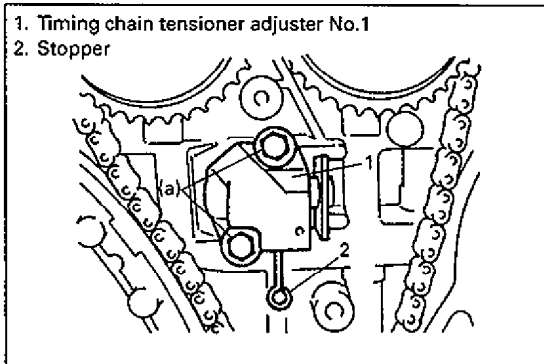
- 1) Check that match marks on camshafts are in match with timing marks on cylinder head as shown in figure.
- 2) Set key and align it with timing mark on cylinder block as shown in figure by turning crankshaft.

- 3) Install timing chain by aligning dark blue plate of timing chain and arrow on camshaft as shown in figure.
- 4) Bring plate of timing chain into match with match mark on crankshaft timing sprocket. Then install crankshaft timing sprocket to crankshaft.

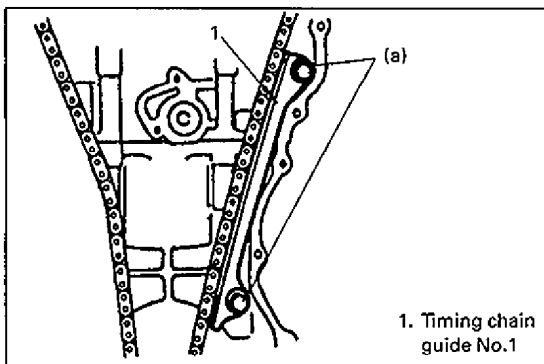
- 5) Install timing chain tensioner as shown in figure.



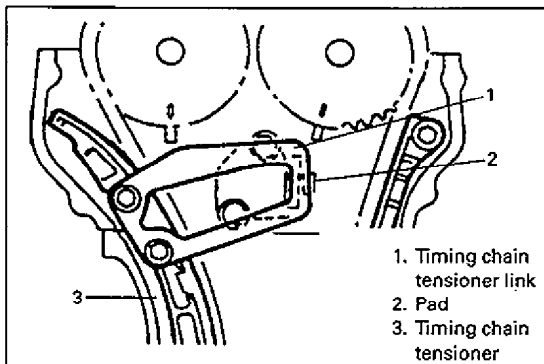
75F00-6A4-39-1



75F00-6A4-39-2



75F00-6A4-39-4



75F00-6A4-39-5

6) With latch of tensioner adjuster returned and plunger pushed back into body, insert stopper into latch and body. After inserting it, check to make sure that plunger will not come out.

7) Install timing chain tensioner adjuster.

Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

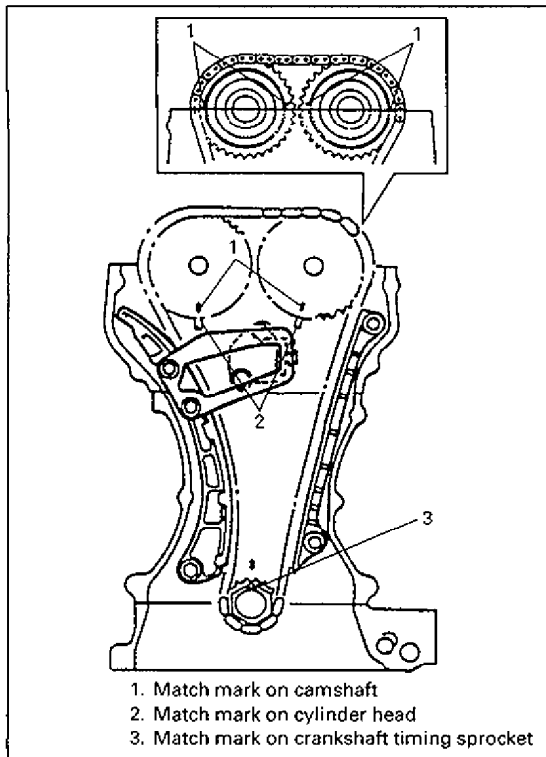
8) Install timing chain guide No.1.

Tightening Torque

(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

9) Install timing chain tensioner link.

10) Pull out stopper from adjuster.



75F00-6A4-40-2

- 11) Turn crankshaft clockwise by 2 revolutions and check that match marks are aligned as shown in figure.

- 12) Install timing chain cover.

Refer to item "TIMING CHAIN COVER" in this section for installation.

- 13) Install cylinder head cover.

Refer to item "CYLINDER HEAD COVER" in this section for installation.

- 14) Install oil pan.

Refer to item "OIL PAN AND OIL PUMP STRAINER" in this section for installation.

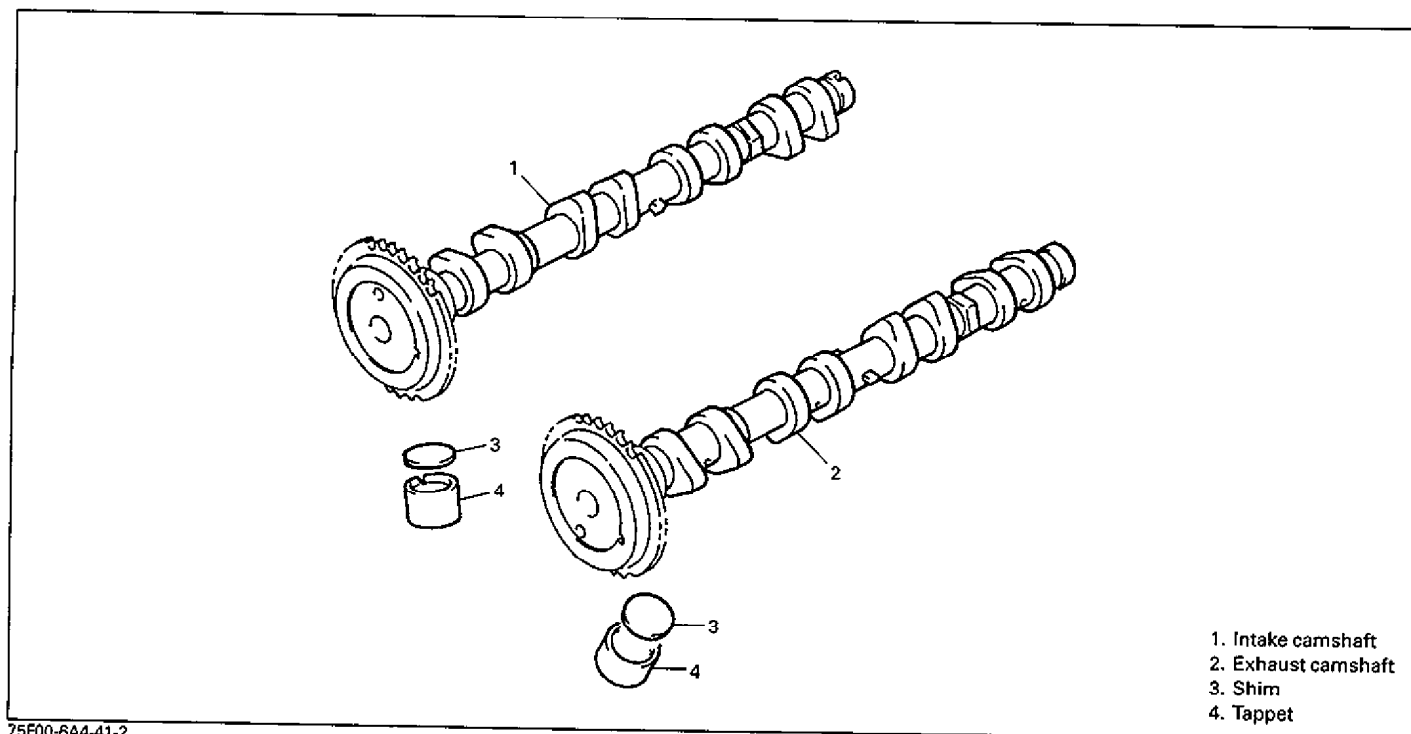
- 15) Install engine assembly to vehicle.

Refer to item "ENGINE ASSEMBLY".

- 16) Check ignition timing and adjust as necessary, referring to Section 6F1.

75F00-6A4-40-4

CAMSHAFT, TAPPET AND SHIM

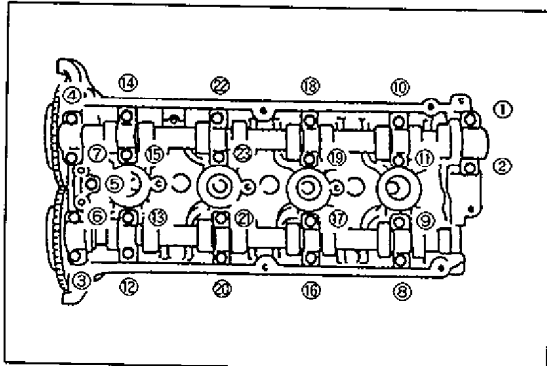


75F00-6A4-41-2

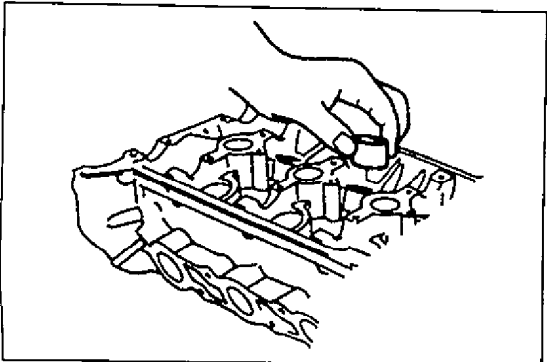
REMOVAL

- 1) Remove cylinder head and oil pan as previously outlined.
- 2) Remove timing chain cover.
Refer to "TIMING CHAIN COVER".
- 3) Remove timing chain.
Refer to "TIMING CHAIN AND CHAIN TENSIONER".

75F00-6A4-41-3

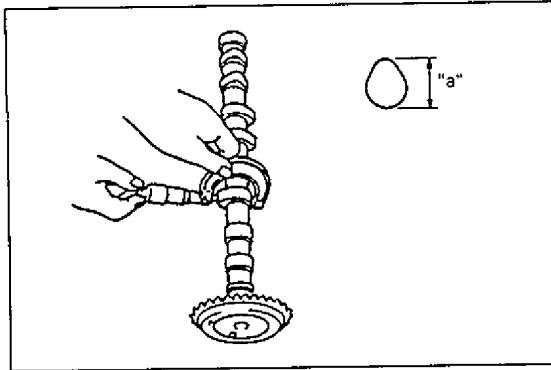


75F00-6A4-41-4



75F00-6A4-41-5

- 4) Loosen camshaft housing bolts in such order as indicated in figure and remove them.
- 5) Remove camshaft housings.
- 6) Remove camshafts and distributor. For distributor removal, refer to Section 6F1.
- 7) Remove tappets with shims.



75F00-6A4-42-1

INSPECTION

Cam Wear

Using a micrometer, measure cam height. If measured height is below its limit, replace camshaft.

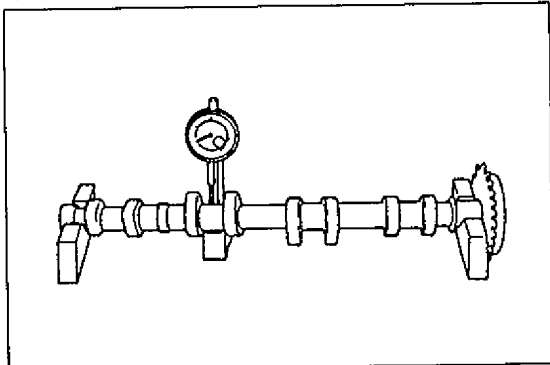
Cam height	Standard	Limit
Intake cam	37.54 – 37.70 mm (1.478 – 1.484 in.)	37.41 mm (1.473 in.)
Exhaust cam	37.05 – 37.21 mm (1.459 – 1.465 in.)	36.91 mm (1.453 in.)

Camshaft Runout

Set camshaft between two "V" blocks, and measure its runout by using a dial gauge.

If measured runout exceeds below specified limit, replace camshaft.

Runout limit: 0.10 mm (0.0039 in.)

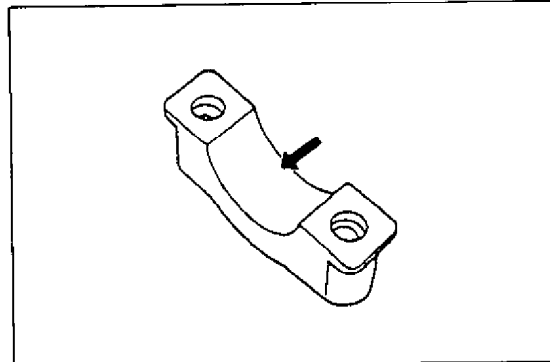


75F00-6A4-42-2

Camshaft Journal Wear

Check camshaft journals and camshaft housings for pitting, scratches, wear or damage.

If any malcondition is found, replace camshaft or cylinder head with housing. Never replace cylinder head without replacing housings.



75F00-6A4-42-3

Check clearance by using gaging plastic. Checking procedure is as follows.

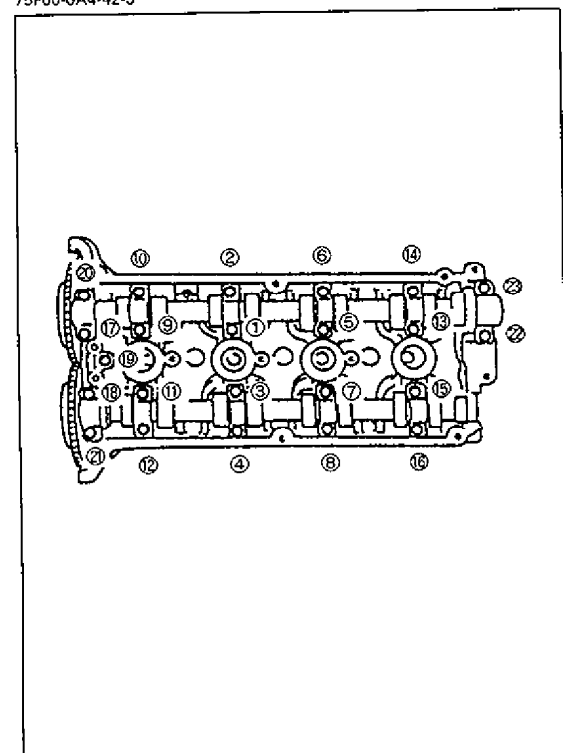
- 1) Clean housings and camshaft journals.
- 2) Remove all tappets with shims.
- 3) Install camshafts to cylinder head.
- 4) Place a piece of gaging plastic to full width of journal of camshaft (parallel to camshaft).
- 5) Install camshaft housing.
- 6) Tighten camshaft housing bolts in such order as indicated in figure a little at a time till they are tightened to specified torque.

NOTE:

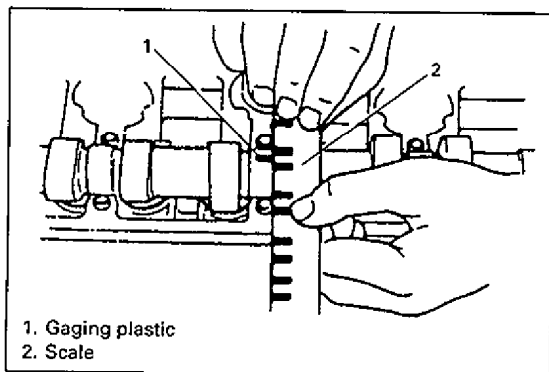
Do not rotate camshaft while gaging plastic is installed.

Tightening Torque

11 N·m (1.1 kg-m, 8.0 lb-ft)



75F00-6A4-42-5



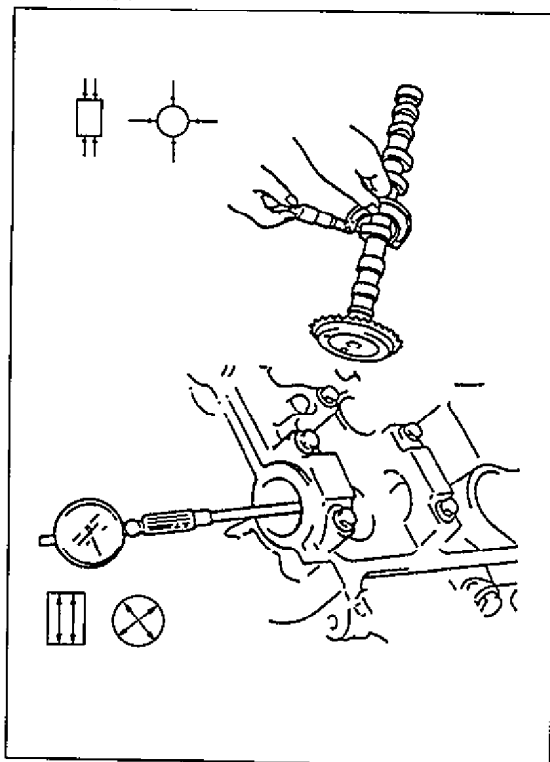
75F00-6A4-43-1

- 6) Remove housing, and using scale on gaging plastic envelop, measure gaging plastic width at its widest point.

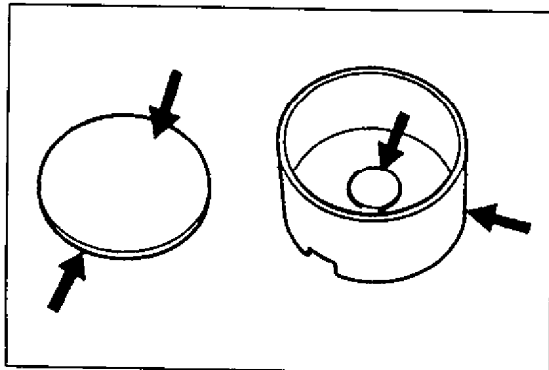
	Standard	Limit
Journal clearance	0.045 – 0.087 mm (0.0018 – 0.0034 in.)	0.12 mm (0.0047 in.)

If measured camshaft journal clearance exceeds limit, measure journal (housing) bore and outside diameter of camshaft journal. Replace camshaft or cylinder head assembly whichever the difference from specification is greater.

Item	Standard
Camshaft journal bore dia. (IN & EX)	23.000 – 23.021 mm (0.9055 – 0.9063 in.)
Camshaft journal O.D. (IN & EX)	22.934 – 22.955 mm (0.9029 – 0.9037 in.)



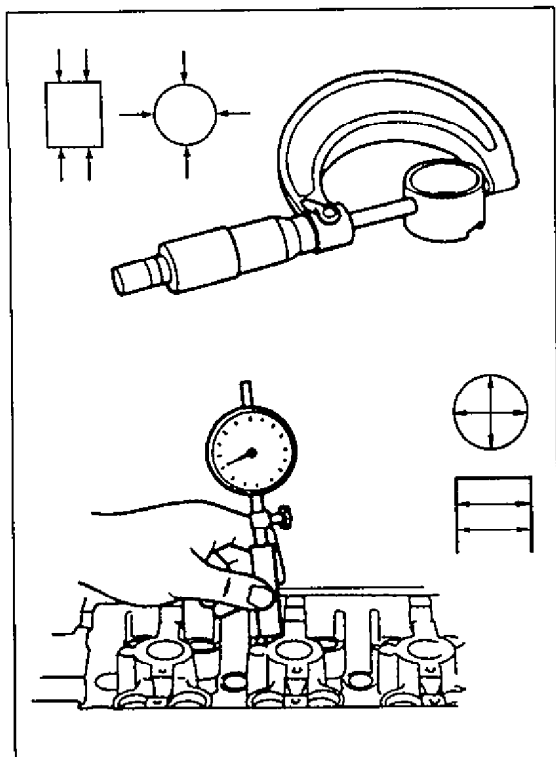
75F00-6A4-43-3



75F00-6A4-43-4

Wear of tappet and shim

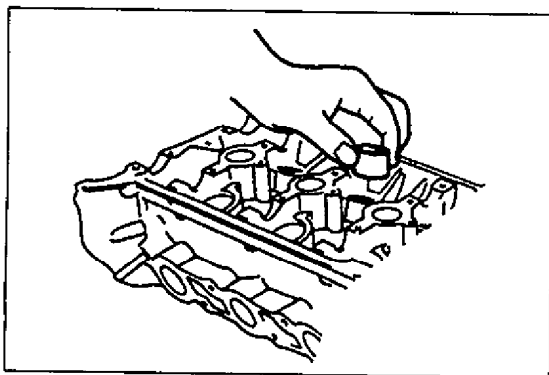
Check adjuster for pitting, scratches, or damage. If any malcondition is found, replace.



75F00-6A4-44-2

Measure cylinder head bore and tappet outside diameter to determine cylinder head-to-tappet clearance. If clearance exceeds limit, replace tappet or cylinder head.

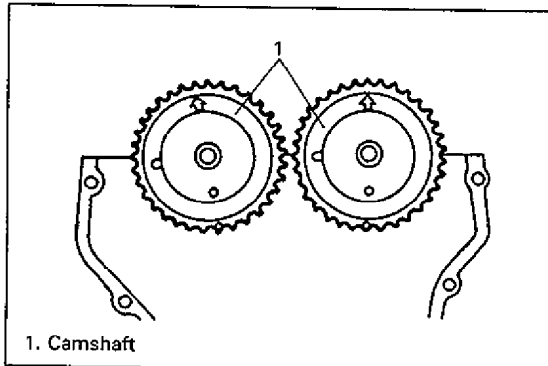
Item	Standard	Limit
Tappet O.D.	26.959 – 26.975 mm (1.0614 – 1.0620 in.)	–
Cylinder head bore	27.000 – 27.021 mm (1.0630 – 1.0638 in.)	–
Cylinder head to tappet clearance	0.025 – 0.062 mm (0.0010 – 0.0024 in.)	0.15 mm (0.0059 in.)



75F00-6A4-45-1

INSTALLATION

- 1) Install tappets and shims to cylinder head.
Apply engine oil around tappet and then install it to cylinder head.



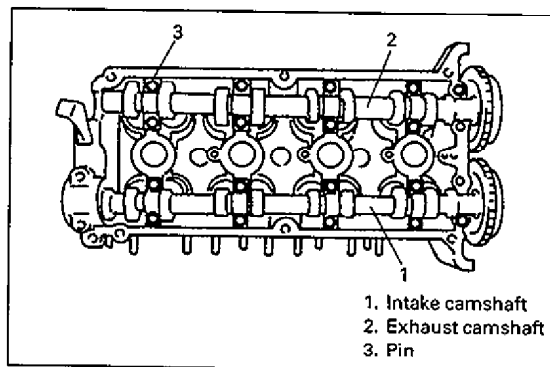
75F00-6A4-45-2

- 2) Install camshafts.

NOTE :

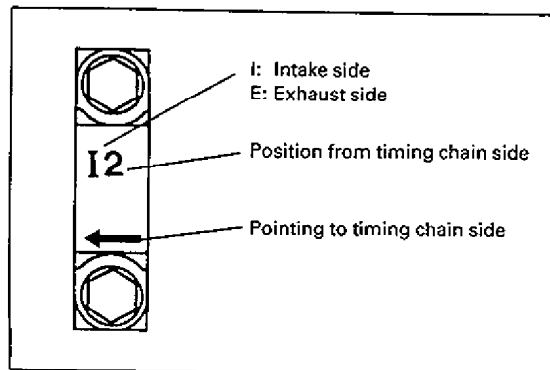
Before installing camshafts, turn crankshaft until key position faces upward. Refer to figure in page 6A4-38.

Apply oil to sliding surface of each camshaft and camshaft journal then install them as shown in figure.



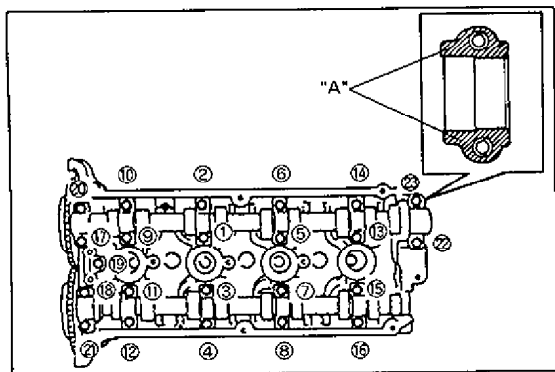
75F00-6A4-45-3

- 3) Install camshaft housing pins as shown in figure.



75F00-6A4-45-4

- 4) Check position of camshaft housings.
Embossed marks are provided on each camshaft housing, indicating position and direction for installation. Install housings as indicated by these marks.



- 5) Apply sealant "A" to intake camshaft end housing sealing surface area as shown in figure.

"A": Sealant 99000-31150

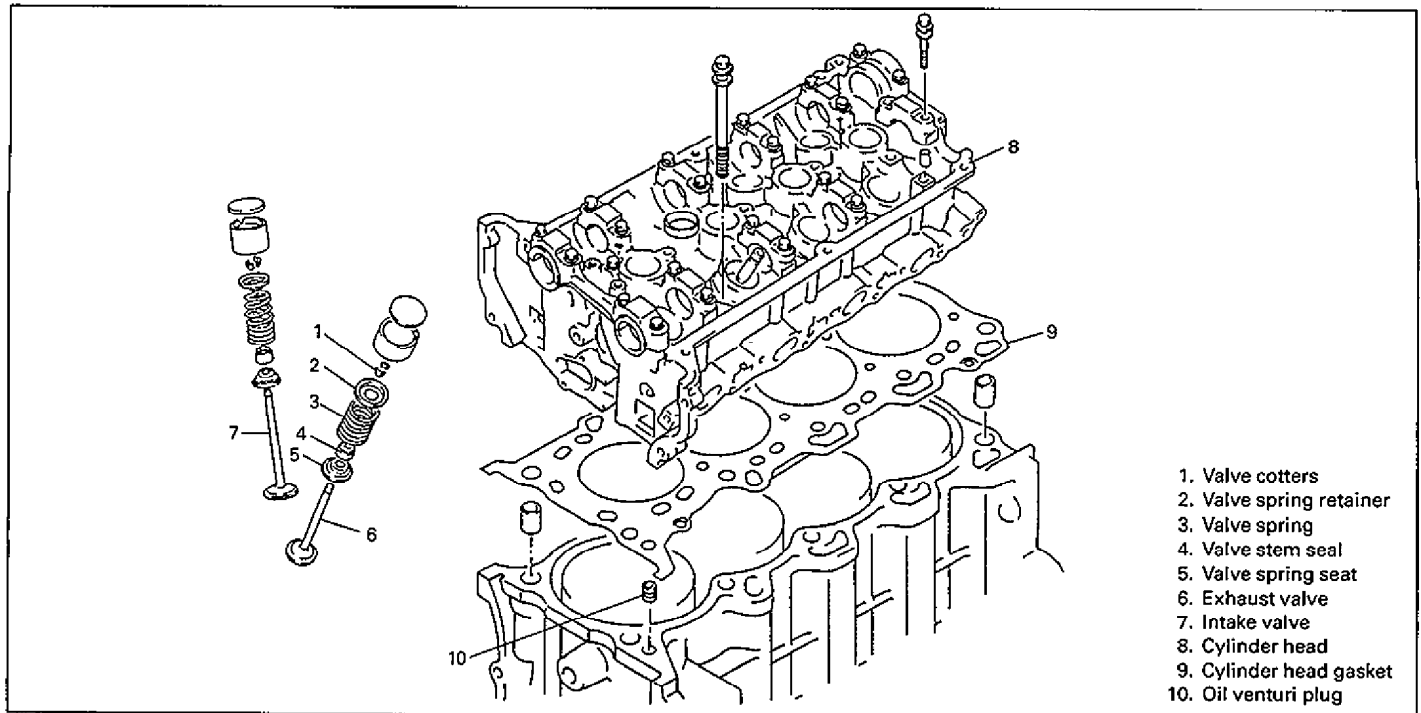
- 6) After applying oil to housing bolts, tighten them temporarily first. Then tighten them by following numerical order in figure. Tighten a little at a time and evenly among bolts and repeat tightening sequence two or three times before they are tightened to specified torque.

Tightening Torque

11 N·m (1.1 kg-m, 8.0 lb-ft)

- 7) Install timing chain with crankshaft sprocket.
Refer to "TIMING CHAIN AND CHAIN TENSIONER".
- 8) Install timing chain cover.
Refer to "TIMING CHAIN COVER".
- 9) Check valve lashes as previously outlined.
- 10) Install cylinder head cover and oil pan as previously outlined.
- 11) Install engine assembly to body as previously outlined.

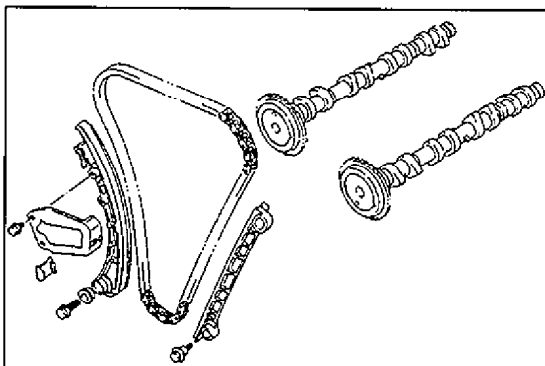
VALVES AND CYLINDER HEAD



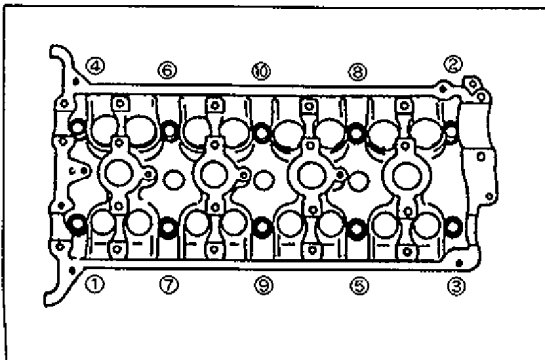
75F00-6A4-47-2

REMOVAL

- 1) Remove engine assembly from body as previously outlined.
- 2) Remove oil pan.
Refer to item "OIL PAN AND OIL PUMP STRAINER" in this section for removal.
- 3) Remove cylinder head cover.
Refer to item "CYLINDER HEAD COVER" in this section for removal.
- 4) Remove timing chain cover.
Refer to item "TIMING CHAIN COVER" in this section for removal.
- 5) Remove camshafts and distributor.
Refer to item "CAMSHAFT, TAPPET AND SHIM" in this section.

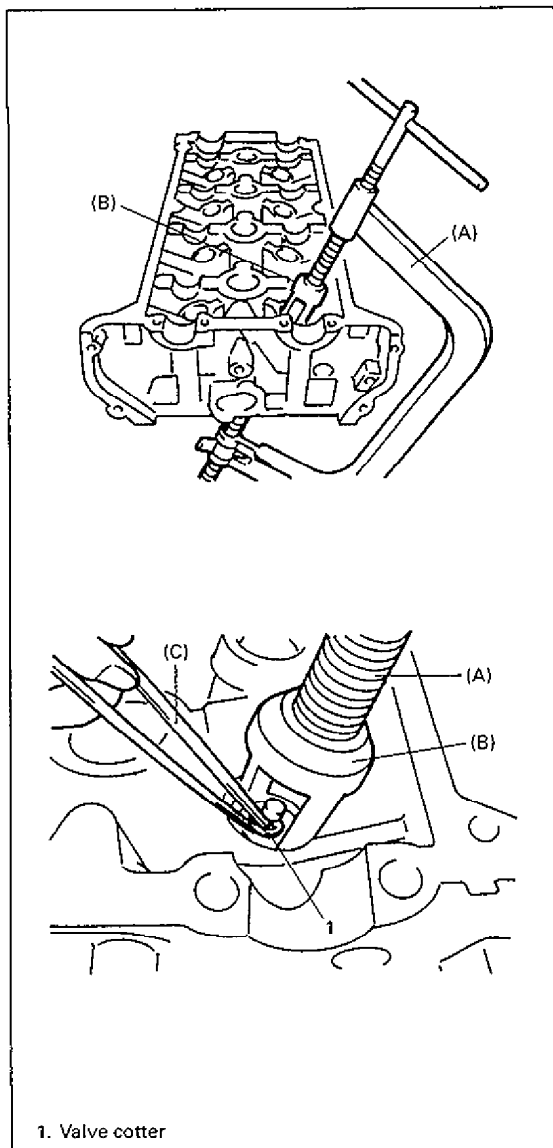


75F00-6A4-47-4



75F00-6A4-47-5

- 6) Loosen cylinder head bolts in such order as indicated in figure and remove them.
- 7) Check all around cylinder head for any other parts required to be removed or disconnected and remove or disconnect whatever necessary.
- 8) Remove cylinder head with intake manifold and exhaust manifold, using lifting device.



DISASSEMBLY

- 1) For ease in servicing cylinder head, remove intake manifold with throttle body and exhaust manifold from cylinder head.
- 2) Remove tappets and shims as previously outlined.
- 3) Using special tool (Valve lifter), compress valve springs and then remove valve cotters by using special tool (Forceps) as shown.

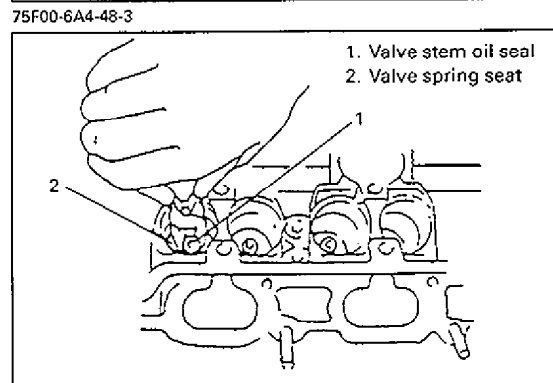
Special Tool

(A): 09916-14510

(B): 09916-14910

(C): 09916-84510

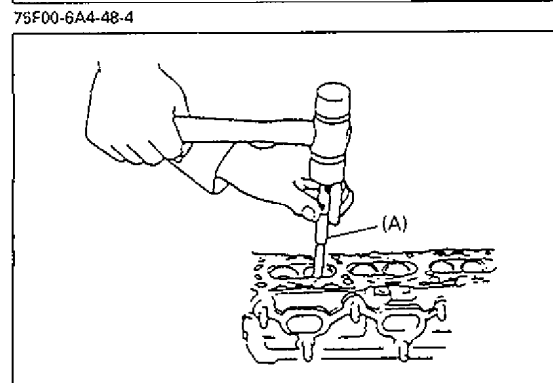
- 4) Release special tool, and remove spring retainer and valve spring.
- 5) Remove valve from combustion chamber side.



- 6) Remove valve stem oil seal from valve guide, and then valve spring seat.

NOTE:

Do not reuse oil seal once disassembled. Be sure to use new oil seal when assembling.



- 7) Using special tool (Valve guide remover), drive valve guide out from combustion chamber side to valve spring side.

Special Tool

(A): 09916-44910

NOTE:

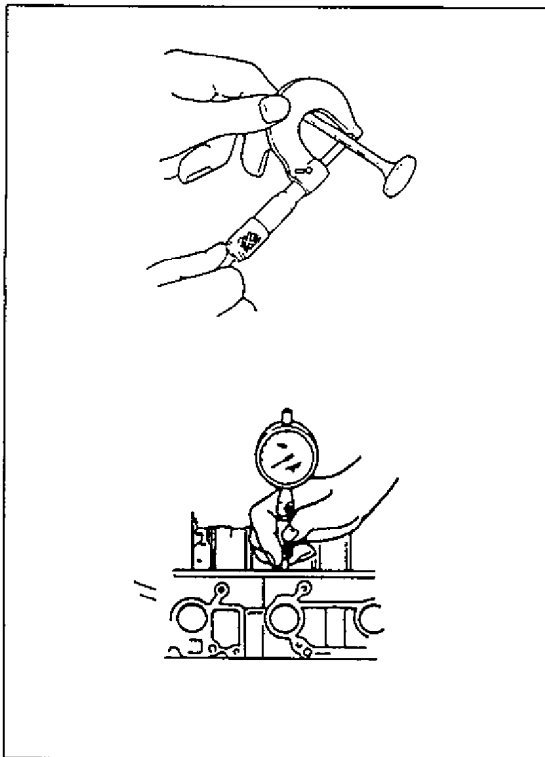
Do not reuse valve guide once disassembled. Be sure to use new valve guide when assembling.

- 8) Place disassembled parts except valve stem seal and valve guide in order, so that they can be installed in their original position.

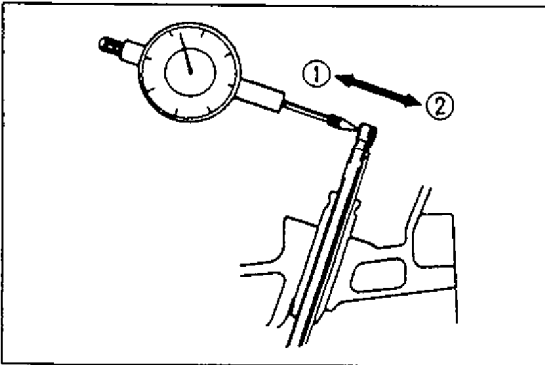
75F00-6A4-48-3

75F00-6A4-48-4

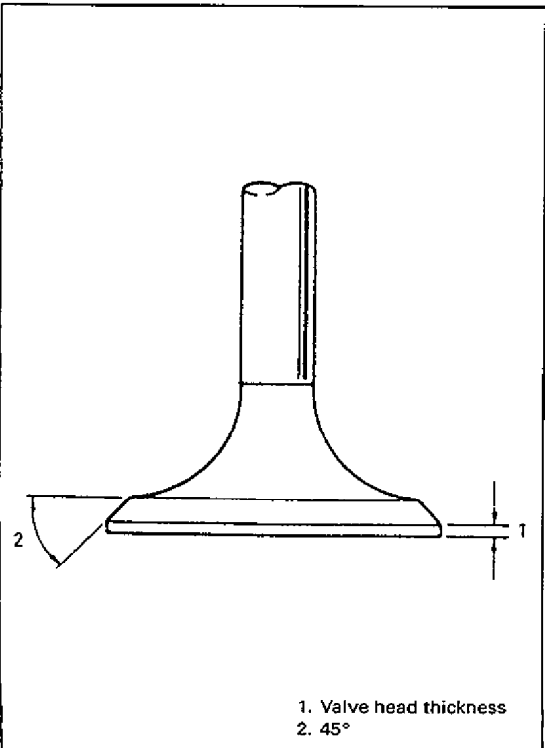
75F00-6A4-48-5



75F00-6A4-49-2



75F00-6A4-49-3



75F00-6A4-49-5

INSPECTION

Valve Guides

Using a micrometer and bore gauge, take diameter readings on valve stems and guides to check stem-to-guide clearance. Be sure to take reading at more than one place along the length of each stem and guide.

If clearance exceeds limit, replace valve and valve guide.

Item		Standard	Limit
Valve stem diameter	In	5.465 – 5.480 mm (0.2152 – 0.2157 in.)	–
	Ex	5.440 – 5.455 mm (0.2142 – 0.2148 in.)	–
Valve guide I.D.	In	5.485 – 5.510 mm	–
	Ex	(0.2159 – 0.2169 in.)	
Stem-to-guide clearance	In	0.005 – 0.045 mm (0.0002 – 0.0018 in.)	0.07 mm (0.0027 in.)
	Ex	0.030 – 0.070 mm (0.0012 – 0.0028 in.)	0.09 mm (0.0035 in.)

If bore gauge is not available, check end deflection of valve stem with a dial gauge instead.

Move stem end in directions ① and ② to measure end deflection.

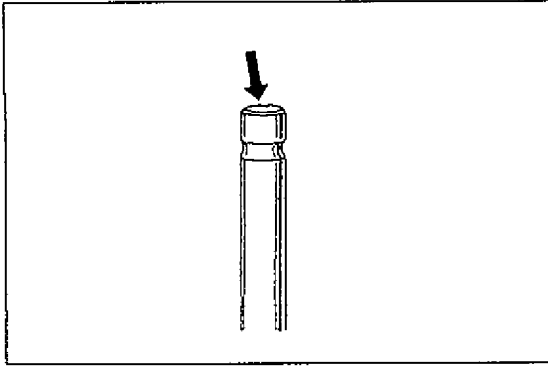
If deflection exceeds its limit, replace valve stem and valve guide.

Valve stem end deflection limit	In	0.14 mm (0.005 in.)
	Ex	0.18 mm (0.007 in.)

Valves

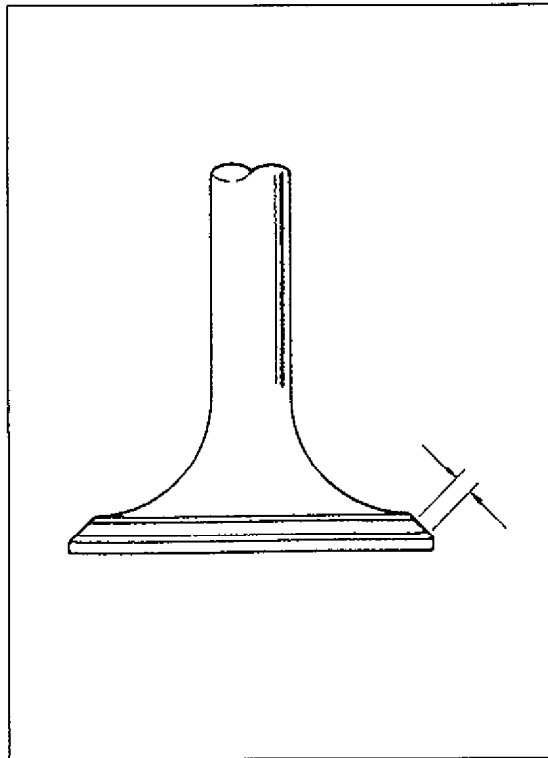
- Remove all carbon from valves.
- Inspect each valve for wear, burn or distortion at its face and stem end, as necessary, replace it.
- Measure thickness of valve head. If measured thickness exceeds limit, replace valve.

Valve head thickness		
	Standard	Limit
IN	1.0 mm (0.039 in.)	0.7 mm (0.027 in.)
EX	1.15 mm (0.045 in.)	0.5 mm (0.020 in.)



75F00-6A4-50-1

- Inspect valve stem end face for pitting and wear. If pitting or wear is found there, valve stem end may be resurfaced, but not so much as to grind off its chamfer. When it is worn so much that its chamfer is gone, replace valve.

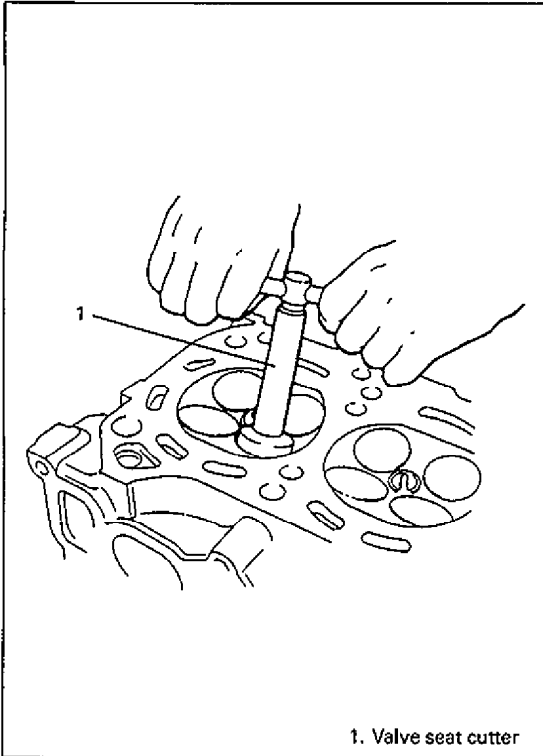


75F00-6A4-50-3

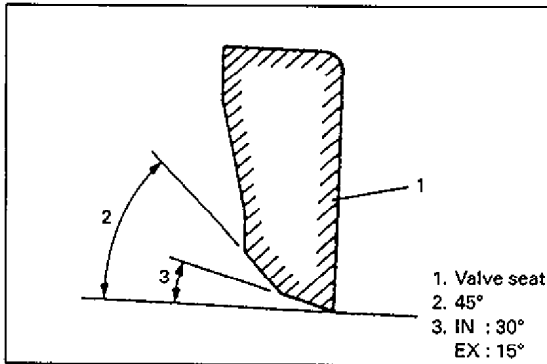
- Seating contact width:
Create contact pattern on each valve in the usual manner, i.e., by giving uniform coat of marking compound to valve seat and by rotatingly tapping seat with valve head. Valve lapper (tool used in valve lapping) must be used.

Pattern produced on seating face of valve must be a continuous ring without any break, and the width of pattern must be within specified range.

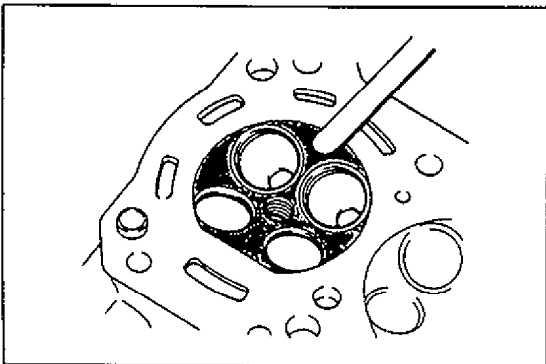
Standard seating width revealed by contact pattern on valve face	In	1.80 – 2.20 mm (0.0709 – 0.0866 in.)
	Ex	1.65 – 2.05 mm (0.0650 – 0.0807 in.)



75F00-6A4-51-2



75F00-6A4-51-3



75F00-6A4-51-4

- Valve seat repair:

A valve seat not producing a uniform contact with its valve or showing width of seating contact that is out of specified range must be repaired by regrinding or by cutting and regrinding and finished by lapping.

- 1) EXHAUST VALVE SEAT: Use valve seat cutters to make two cuts as illustrated in figure. Two cutters must be used: the first for making 15° angle, and the second for making 45° angle. The second cut must be made to produce desired seat width.

Seat width for exhaust valve seat:

1.65 – 2.05 mm (0.0650 – 0.0807 in.)

- 2) INTAKE VALVE SEAT: Cutting sequence is the same as for exhaust valve seats. But note that the first cutting angle is 30° for intake valve seat.

Seat width for intake valve seat:

1.80 – 2.20 mm (0.0709 – 0.0866 in.)

- 3) VALVE LAPPING: Lap valve on seat in two steps, first with coarse size lapping compound applied to face and the second with fine-size compound, each time using valve lapper according to usual lapping method.

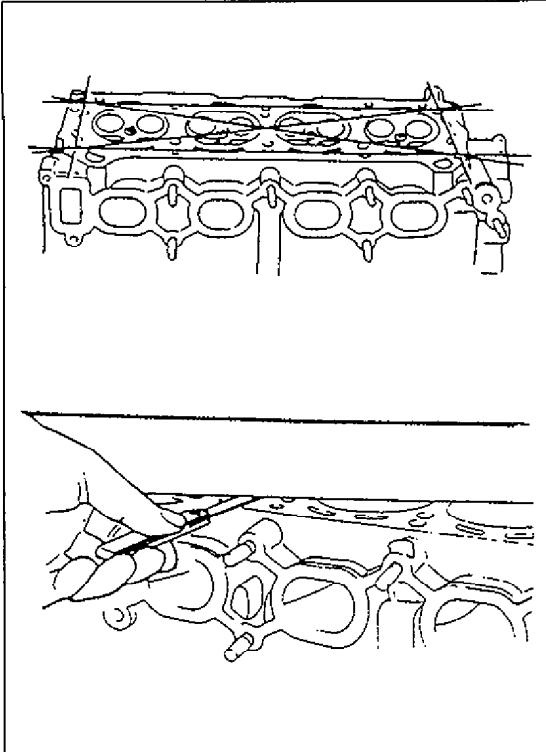
Cylinder Head

- Remove all carbon from combustion chambers.

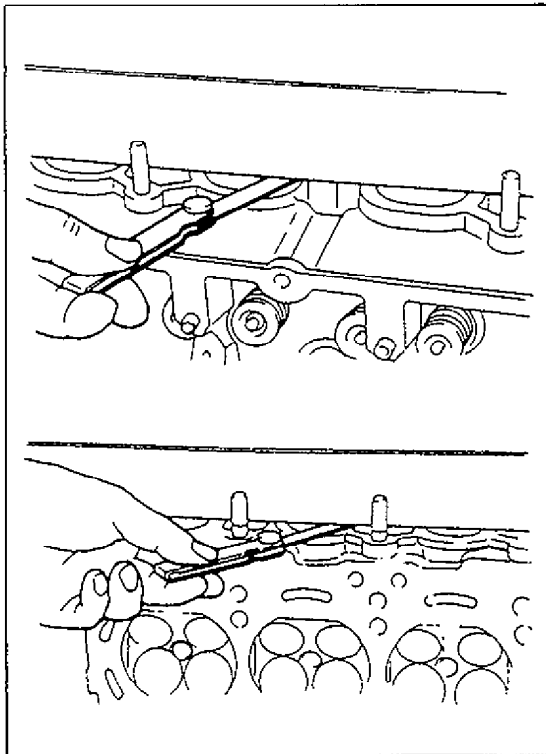
NOTE:

Do not use any sharp-edged tool to scrape off carbon. Be careful not to scuff or nick metal surfaces when decarboning. The same applies to valves and valve seats, too.

- Check cylinder head for cracks in intake and exhaust ports, combustion chambers, and head surface.



75F00-6A4-52-2



75F00-6A4-52-4

- Flatness of gasketed surface:

Using a straightedge and thickness gauge, check surface at a total of 6 locations. If distortion limit, given below, is exceeded, correct gasketed surface with a surface plate and abrasive paper of about #400 (Waterproof silicon carbide abrasive paper): place paper on and over surface plate, and rub gasketed surface against paper to grind off high spots. Should this fail to reduce thickness gauge readings to within limit, replace cylinder head.

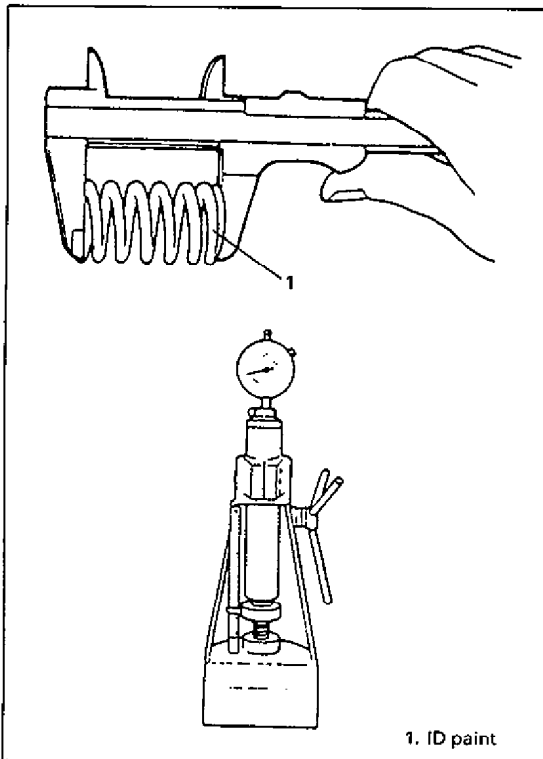
Leakage of combustion gases from this gasketed joint is often due to warped gasketed surface: such leakage results in reduced power output.

Limit of distortion: 0.05 mm (0.002 in.)

- Distortion of manifold seating faces:

Check seating faces of cylinder head for manifolds, using a straightedge and thickness gauge, in order to determine whether these faces should be corrected or cylinder head replaced.

Limit of distortion: 0.10 mm (0.004 in.)



75F00-6A4-53-2

Valve Springs

- Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

CAUTION:

Orange colored valve springs must not be used in combination with any non orange colored valve springs but must be used with only orange colored ones. Otherwise, it could cause insufficient engine performance.

While for non orange colored valve springs, any combination among them is acceptable.

ID paint color: Violet or Yellow

Item	Standard	Limit
Valve spring free length	32.52 mm (1.2803 in.)	29.00 mm (1.1417 in.)
Valve spring preload	8.4 – 9.6 kg for 28.5 mm (18.5 – 21.2 lb/1.12 in.)	7.0 kg for 28.5 mm (15.4 lb/1.12 in.)

ID paint color: Light green or Blue

Item	Standard	Limit
Valve spring free length	33.13 mm (1.3043 in.)	32.30 mm (1.2716 in.)
Valve spring preload	9.7 – 11.3 kg for 28.5 mm (21.4 – 24.9 lb/1.12 in.)	8.5 kg for 28.5 mm (18.7 lb/1.12 in.)

ID paint color: White

Item	Standard	Limit
Valve spring free length	36.30 mm (1.4291 in.)	34.80 mm (1.3700 in.)
Valve spring preload	13.5 – 14.5 kg for 28.5 mm (29.8 – 31.9 lb/1.12 in.)	12.0 kg for 28.5 mm (26.4 lb/1.12 in.)

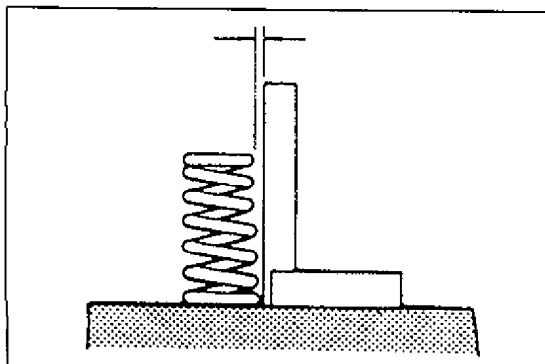
ID paint color: Orange

Item	Standard	Limit
Valve spring free length	36.11 mm (1.4265 in.)	34.80 mm (1.3700 in.)
Valve spring preload	13.5 – 14.5 kg for 28.5 mm (29.8 – 31.9 lb/1.12 in.)	12.0 kg for 28.5 mm (26.4 lb/1.12 in.)

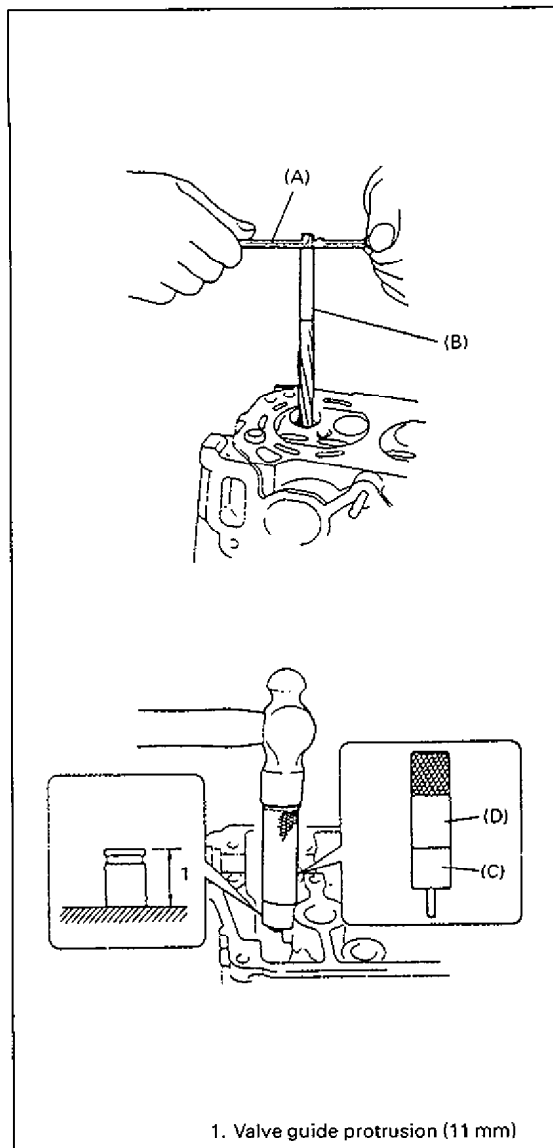
- Spring squareness:

Use a square and surface plate to check each spring for squareness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

Valve spring squareness limit: 2.0 mm (0.079 in.)



75F00-6A4-53-3



75F00-6A4-54-3

ASSEMBLY

- 1) Before installing valve guide into cylinder head, ream guide hole with special tool (10.5 mm reamer) so remove burrs and make it truly round.

Special Tool

(A): 09916-34542

(B): 09916-37320

- 2) Install valve guide to cylinder head.

Heat cylinder head uniformly at a temperature of 80 to 100°C (176 to 212°F) so that head will not be distorted, and drive new valve guide into hole with special tools. Drive in new valve guide until special tool (Valve guide installer) contacts cylinder head.

After installing, make sure that valve guide protrudes by 11 mm (0.43 in.) from cylinder head.

Special Tool

(C): 09917-87010

(D): 09916-58210

NOTE:

- Do not reuse valve guide once disassembled. Install new valve guide.
- Intake and exhaust valve guides are identical.

- 3) Ream valve guide bore with special tool (5.5 mm reamer). After reaming, clean bore.

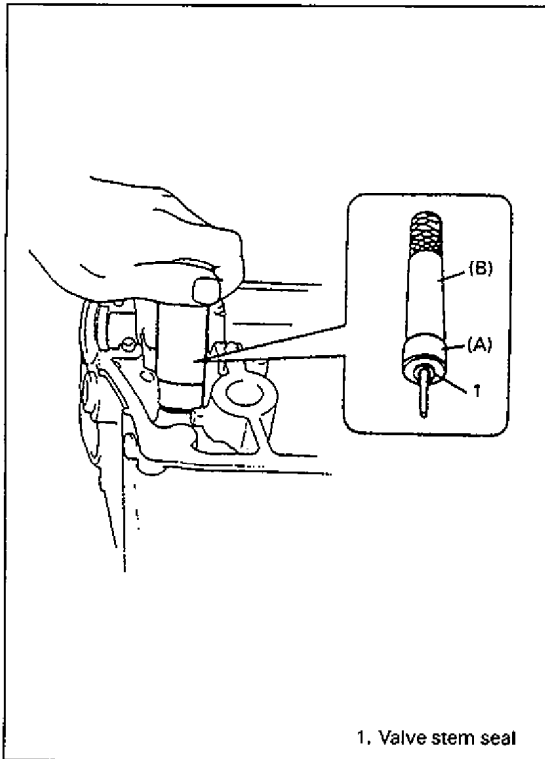
Special Tool

(A): 09916-34542

(B): 09916-34550

- 4) Install valve spring seat to cylinder head.

75F00-6A4-54-4



75F00-6A4-55-2

- 5) Install new valve stem seal to valve guide.

After applying engine oil to seal and spindle of special tool (Valve guide installer handle), fit oil seal to spindle, and then install seal to valve guide by pushing special tool by hand.

After installing, check to be sure that seal is properly fixed to valve guide.

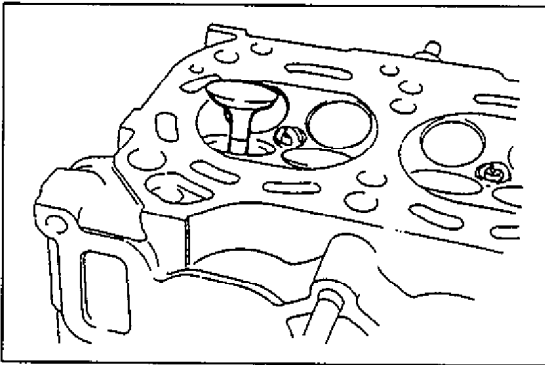
Special Tool

(A): 09917-98221

(B): 09916-58210

NOTE:

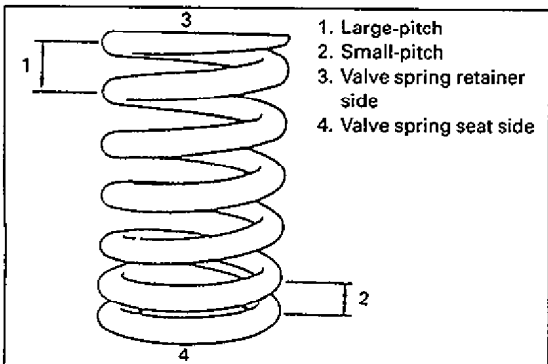
- Do not reuse seal once disassembled. Be sure to install new seal.
- When installing, never tap or hit special tool with a hammer or else. Install seal to guide only by pushing special tool by hand. Tapping or hitting special tool may cause damage to seal.



75F00-6A4-55-3

- 6) Install valve to valve guide.

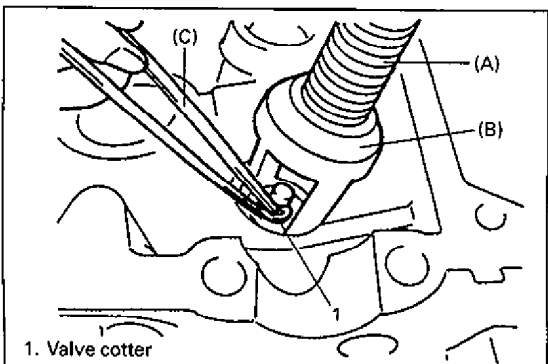
Before installing valve to valve guide, apply engine oil to stem seal, valve guide bore, and valve stem.



75F00-6A4-55-4

- 7) Install valve spring and spring retainer.

Each valve spring has top end (large-pitch end) and bottom end (small-pitch end). Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).



75F00-6A4-55-5

- 8) Using special tool (Valve lifter), compress valve spring and fit two valve cotteners into groove in valve stem.

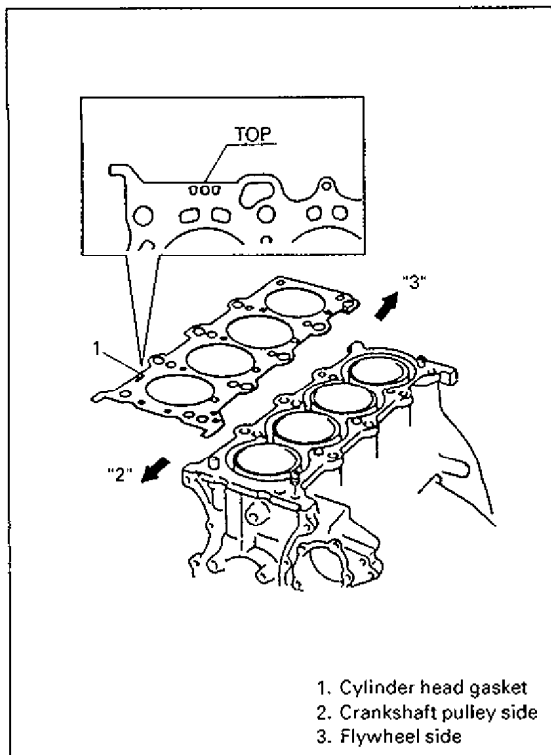
Special Tool

(A): 09916-14510

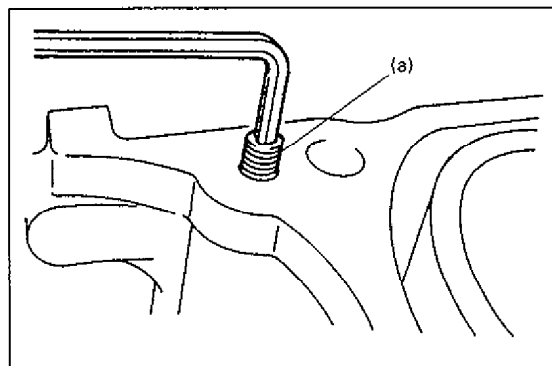
(B): 09916-14910

(C): 09916-84510

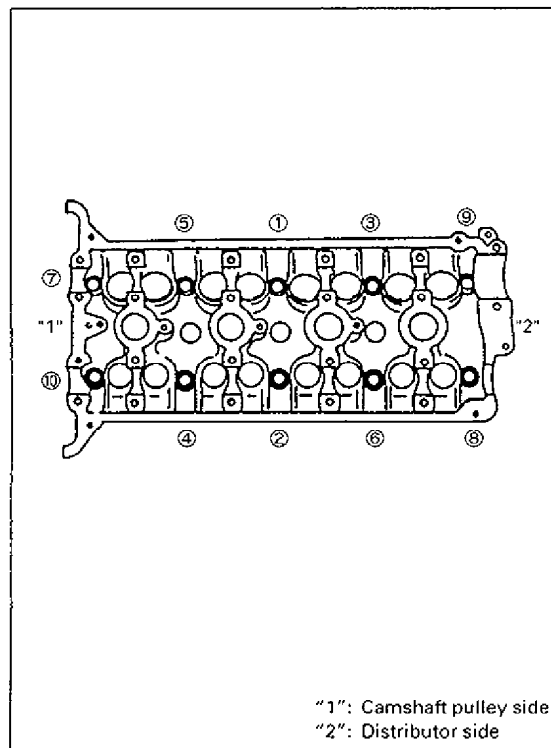
- 9) Install intake manifold and exhaust manifold.



75F00-6A4-56-2



75F00-6A4-56-3



75F00-6A4-56-5

INSTALLATION

- 1) Remove old gasket and oil on mating surfaces and install new head gasket as shown in figure, that is, "TOP" mark provided on gasket comes to crankshaft pulley side, facing up (toward cylinder head side).

- 2) Check to make sure that oil jet (venturi plug) is installed and if it is, that it is not clogged.
When installing it, be sure to tighten to specified torque.

Tightening Torque

(a): 5 N·m (0.5 kg-m, 4.0 lb-ft)

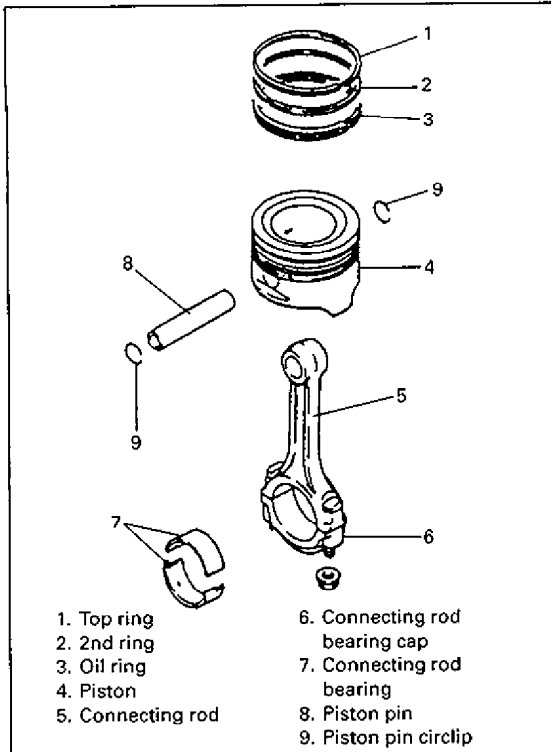
- 3) Apply engine oil to cylinder head bolts and tighten them gradually as follows.

- (1) Tighten all bolts to 30 N·m (3.0 kg-m, 21.5 lb-ft) according to numerical order in figure.
- (2) In the same manner as in (1), tighten them to 48 N·m (4.8 kg-m, 34.5 lb-ft).
- (3) Loosen all bolts to 0 N·m (0 kg-m, 0 lb-ft) reversing to numerical order in figure.
- (4) In the same manner as in (1) again, tighten them to 48 N·m (4.8 kg-m, 34.5 lb-ft).
- (5) In the same manner as in (1), tighten them to specified torque.

Tightening Torque

(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)

- 4) Install camshafts, camshaft housings, distributor, timing chain, tensioner, tensioner link, tensioner adjuster, sprockets, and guide as previously outlined.
- 5) Install timing chain cover.
Refer to item "TIMING CHAIN COVER" in this section for installation.
- 6) Install cylinder head cover.
Refer to item "CYLINDER HEAD COVER" in this section for installation.
- 7) Install oil pan.
Refer to item "OIL PAN AND OIL PUMP STRAINER" in this section for installation.
- 8) Install engine assembly as previously outlined.



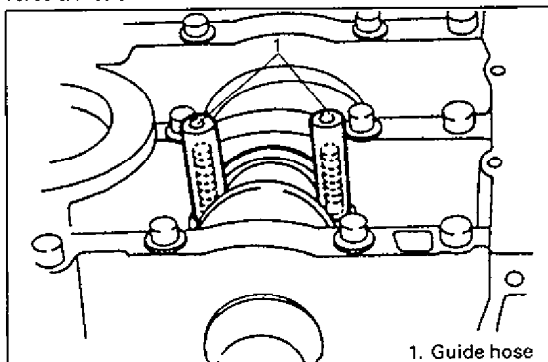
75F00-6A4-58-2

PISTON, PISTON RINGS, CONNECTING RODS AND CYLINDERS

REMOVAL

- 1) Remove cylinder head from cylinder block as previously outlined.
- 2) Drain engine oil.
- 3) Remove oil pan and oil pump strainer as previously outlined.
- 4) Mark cylinder number on all pistons, connecting rods and rod bearing caps, using silver pencil or quick drying paint.

75F00-6A4-58-3



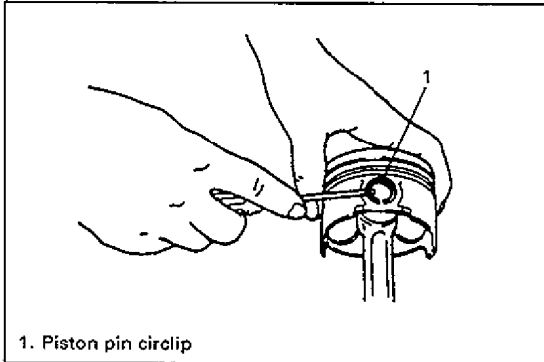
75F00-6A4-58-4

- 5) Remove rod bearing caps.
- 6) Install guide hose over threads of rod bolts. This is to prevent damage to bearing journal and rod bolt threads when removing connecting rod.
- 7) Decarbon top of cylinder bore before removing piston from cylinder.
- 8) Push piston and connecting rod assembly out through the top of cylinder bore.

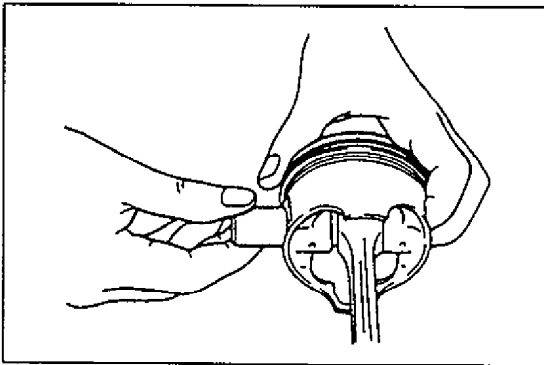
DISASSEMBLY

- 1) Using piston ring expander, remove two compression rings (Top and 2nd) and oil ring from piston.

75F00-6A4-89-1



75F00-6A4-59-2



75F00-6A4-59-3

- 2) Remove piston pin from connecting rod.
 - Ease out piston pin circlips, as shown.

- Force piston pin out.

CLEANING

Clean carbon from piston head and ring grooves, using a suitable tool.

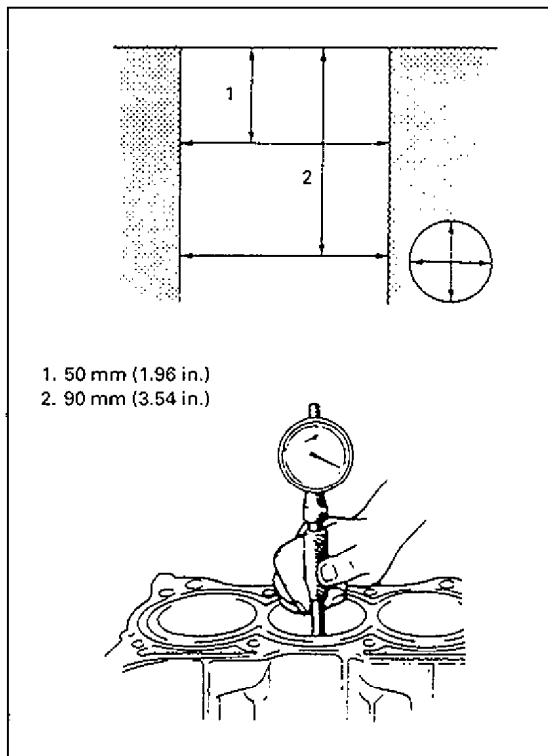
75F00-6A4-59-4

INSPECTION

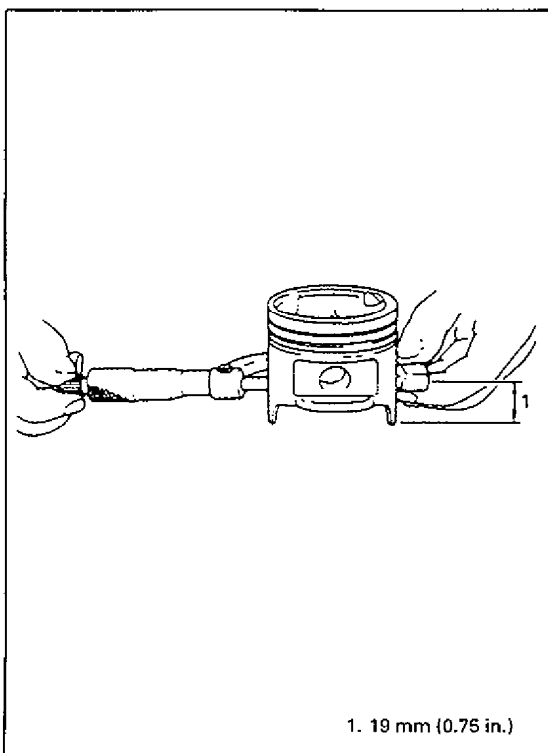
Cylinders

- Inspect cylinder walls for scratches, roughness, or ridges which indicate excessive wear. If cylinder bore is very rough or deeply scratched, or ridged, rebore cylinder and use oversize piston.

75F00-6A4-60-1



75F00-6A4-60-3



75F00-6A4-60-5

- Using a cylinder gauge, measure cylinder bore in thrust and axial directions at two positions as shown in figure. If any of following conditions is noted, rebore cylinder.

- Cylinder bore dia. exceeds limit.
- Difference of measurements at two positions exceeds taper limit.
- Difference between thrust and axial measurements exceeds out-of-round limit.

Cylinder bore dia. limit: 68.070 mm (2.6799 in.)

Taper and out-of-round limit: 0.10 mm (0.0039 in.)

NOTE:

If any one of four cylinders has to be rebored, rebore all four to the same next oversize. This is necessary for the sake of uniformity and balance.

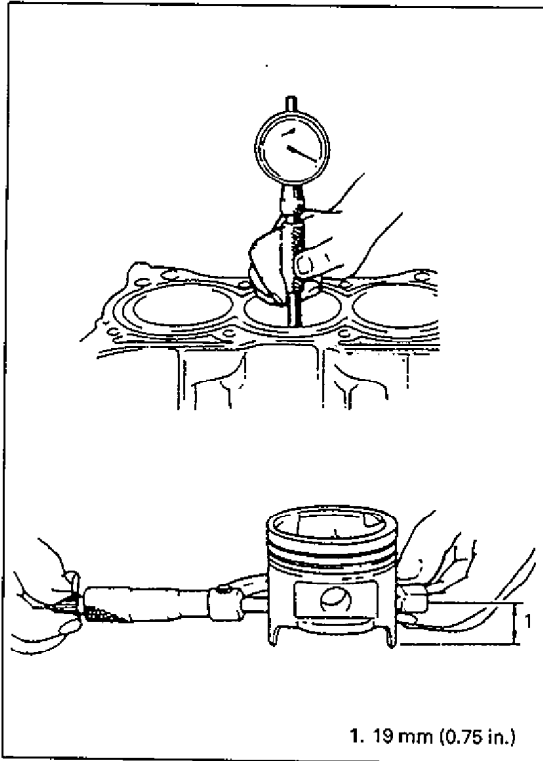
Pistons

- Inspect piston for faults, cracks or other damaged. Damaged or faulty piston should be replaced.

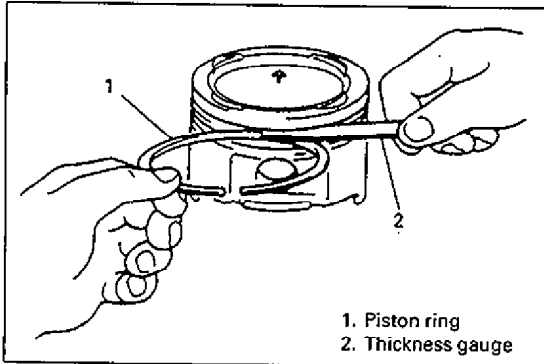
- Piston diameter:

As indicated in figure, piston diameter should be measured at a position 19 mm (0.75 in.) from piston skirt end in the direction perpendicular to piston pin.

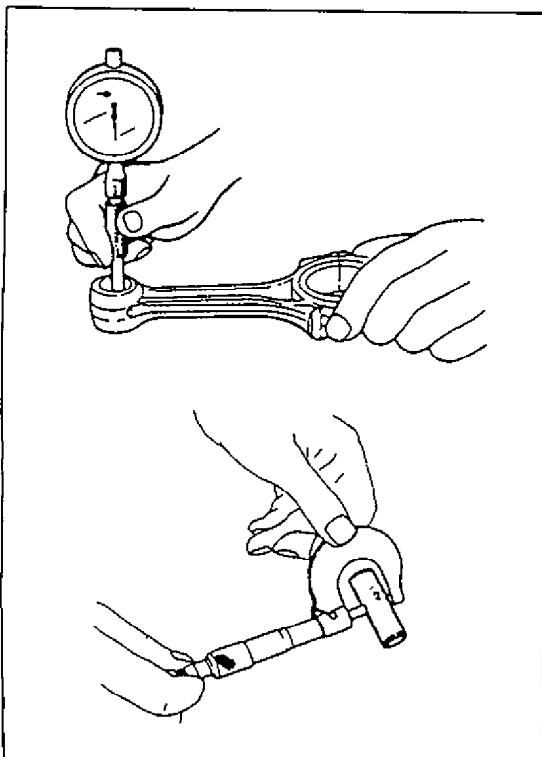
Piston diameter	Standard	67.970 – 67.990 mm (2.6760 – 2.6768 in.)
	Oversize: 0.25 mm (0.0098 in.)	68.220 – 68.240 mm (2.6858 – 2.6866 in.)
	0.50 mm (0.0196 in.)	68.470 – 68.490 mm (2.6957 – 2.6965 in.)



75F00-6A4-61-2



75F00-6A4-61-3



75F00-6A4-61-5

● Piston clearance:

Measure cylinder bore diameter and piston diameter to find their difference which is piston clearance. Piston clearance should be within specification as given below. If it is out of specification, rebore cylinder and use oversize piston.

Piston clearance: 0.02 – 0.04 mm (0.0008 – 0.0015 in.)

NOTE:

Cylinder bore diameters used here are measured in thrust direction at two positions.

● Ring groove clearance:

Before checking, piston grooves must be clean, dry and free of carbon.

Fit new piston ring into piston groove, and measure clearance between ring and ring land by using thickness gauge. If clearance is out of specification, replace piston.

Ring groove clearance:

Top ring: 0.03 – 0.07 mm (0.0012 – 0.0027 in.)

2nd ring: 0.02 – 0.06 mm (0.0008 – 0.0023 in.)

Oil ring : 0.06 – 0.15 mm (0.0023 – 0.0059 in.)

Piston Pin

- Check piston pin, connecting rod small end bore and piston bore for wear or damage, paying particular attention to condition of small end bore bush. If pin, connecting rod small end bore or piston bore is badly worn or damaged, replace pin, connecting rod or piston.

● Piston pin clearance:

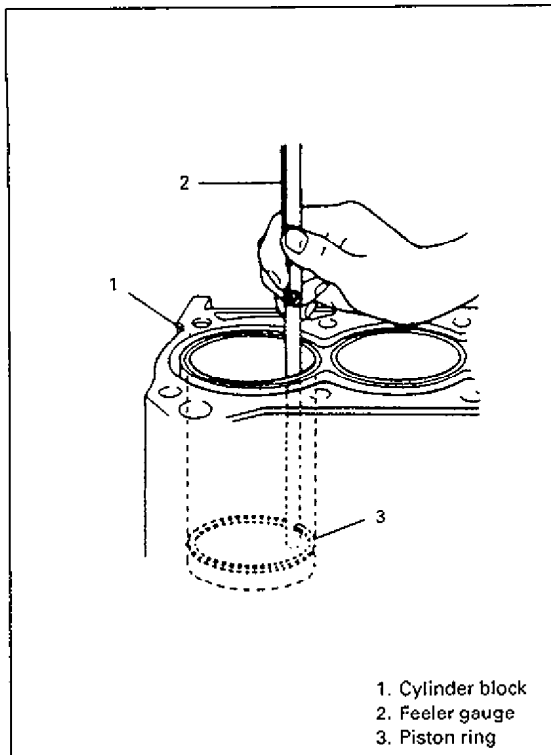
Check piston pin clearance in small end. Replace connecting rod if its small end is badly worn or damaged or if measured clearance exceeds limit.

Item	Standard	Limit
Piston pin clearance in connecting rod small end	0.003 – 0.016 mm (0.0001 – 0.0006 in.)	0.05 mm (0.0020 in.)

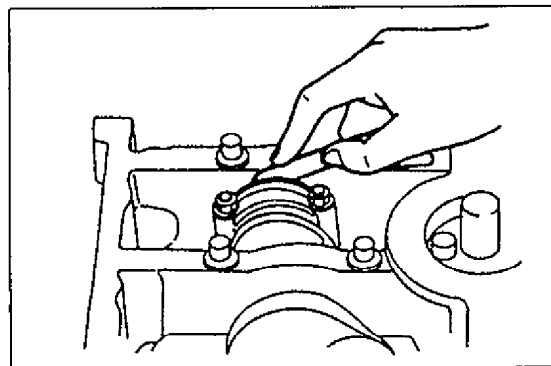
Small-end bore: 18.003 – 18.011 mm (0.7088 – 0.7091 in.)

Piston bore : 18.006 – 18.014 mm (0.7089 – 0.7092 in.)

Piston pin dia. : 17.995 – 18.000 mm (0.7085 – 0.7087 in.)



75F00-6A4-62-2



75F00-6A4-62-3

Piston Rings

To measure end gap, insert piston ring into cylinder bore and then measure the gap by using thickness gauge. If measured gap is out of specification, replace ring.

NOTE:

Decarbon and clean top of cylinder bore before inserting piston ring.

Item		Standard	Limit
Piston ring end gap	Top ring	0.12 – 0.27 mm (0.0047 – 0.0106 in.)	0.7 mm (0.0276 in.)
	2nd ring	0.35 – 0.50 mm (0.0138 – 0.0197 in.)	1.0 mm (0.0394 in.)
	Oil ring	0.10 – 0.40 mm (0.0039 – 0.0157 in.)	1.5 mm (0.0591 in.)

Connecting Rod

• Big-end side clearance:

Check big-end of connecting rod for side clearance, with rod fitted and connected to its crank pin in the normal manner. If measured clearance is found to exceed its limit, replace connecting rod.

Item	Standard	Limit
Big-end side clearance	0.11 – 0.31 mm (0.0043 – 0.0122 in.)	0.35 mm (0.0137 in.)

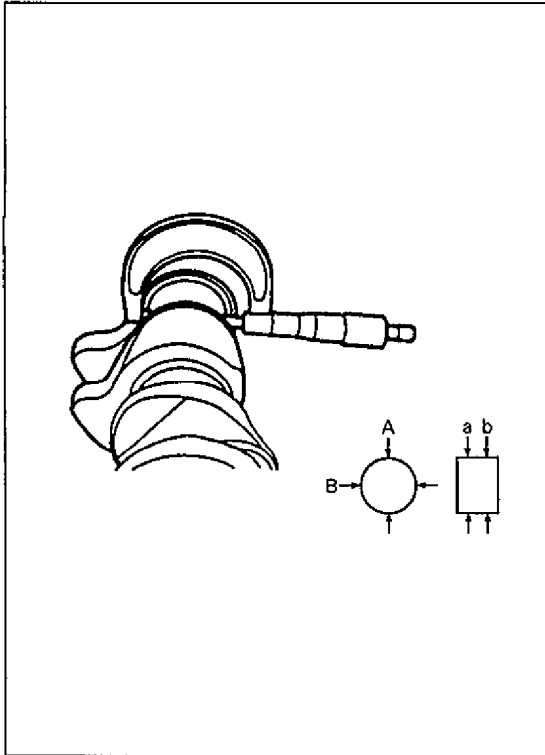
• Connecting rod alignment:

Mount connecting rod on aligner to check it for bow and twist and, if limit is exceeded, replace it.

Limit on bow: 0.05 mm (0.0020 in.)

Limit on twist: 0.10 mm (0.0039 in.)

75F00-6A4-62-4



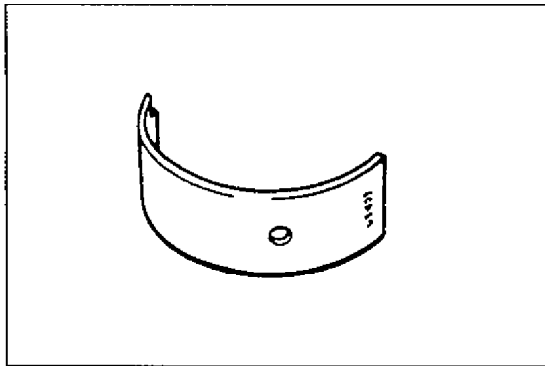
75F00-6A4-63-2

Crank Pin and Connecting Rod Bearings

- Inspect crank pin for uneven wear or damage. Measure crank pin for out-of-round or taper with a micrometer. If crank pin is damaged, or out-of-round or taper is out of limit, replace crankshaft.

Crank pin diameter : 37.982 – 38.000 mm (1.4954 – 1.4961 in.)

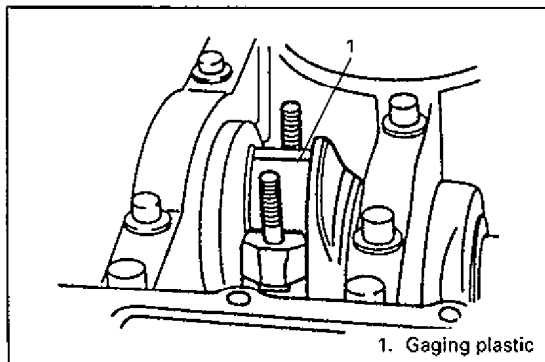
Out-of-round and taper limit: 0.01 mm (0.0004 in.)



75F00-6A4-63-3

- Rod bearing:

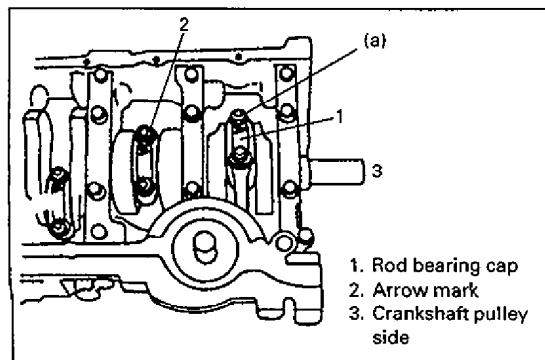
Inspect bearing shells for signs of fusion, pitting, burn or flaking and observe contact pattern. Bearing shells found in defective condition must be replaced.



75F00-6A4-63-4

- Rod bearing clearance:

- 1) Before checking bearing clearance, clean bearing and crank pin.
- 2) Install bearing in connecting rod and bearing cap.
- 3) Place a piece of gaging plastic to full width of crankpin as contacted by bearing (parallel to crankshaft), avoiding oil hole.



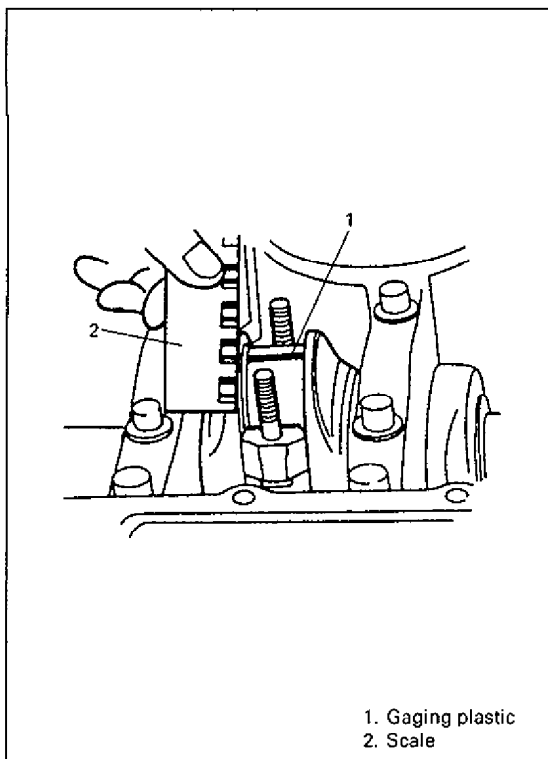
75F00-6A4-63-5

- 4) Install rod bearing cap to connecting rod.

When installing cap, be sure to point arrow mark on cap to crankshaft pulley side, as shown in figure. After applying engine oil to rod bolts, tighten cap nuts to specified torque. DO NOT turn crankshaft with gaging plastic installed.

Tightening Torque

(a): 33 N·m (3.3 kg-m, 24.0 lb-ft)



75F00-6A4-64-2

- 5) Remove cap and using a scale on gaging plastic envelope, measure gaging plastic width at the widest point (clearance).

If clearance exceeds its limit, use a new standard size bearing and remeasure clearance.

Item	Standard	Limit
Bearing clearance	0.020 – 0.040 mm (0.0008 – 0.0016 in.)	0.065 mm (0.0026 in.)

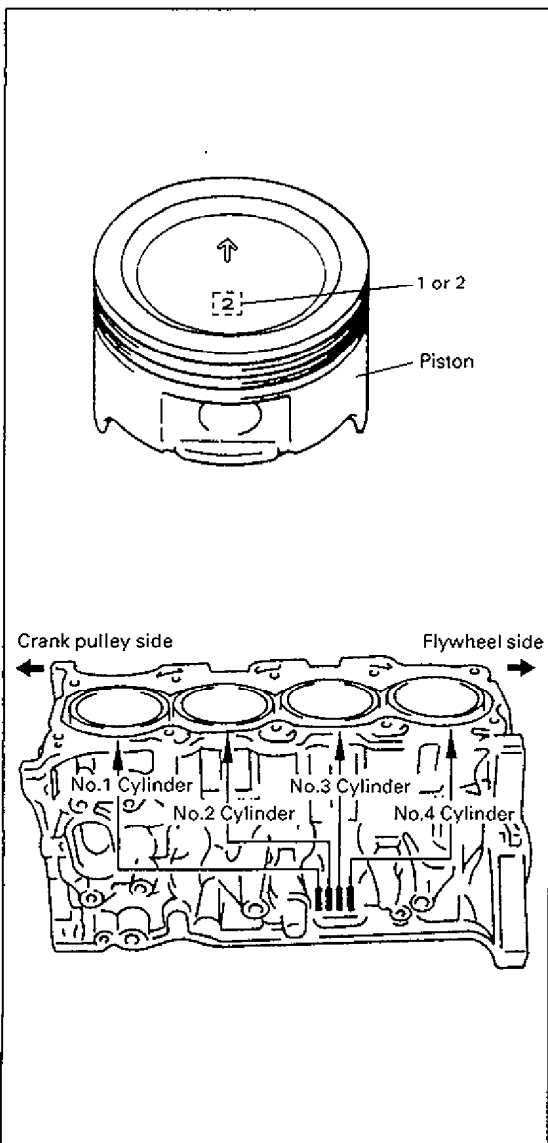
ASSEMBLY

NOTE:

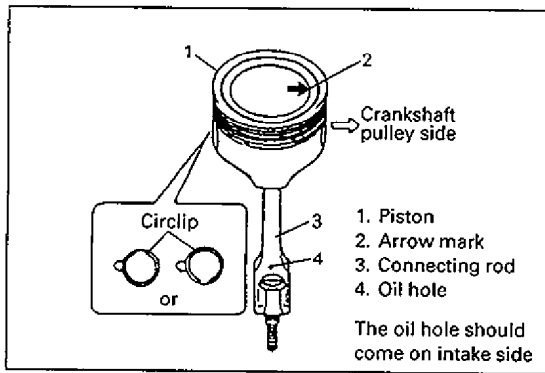
Two sizes of piston are available as standard size spare part so as to ensure proper piston-to-cylinder clearance. When installing a standard size piston, make sure to match piston with cylinder as follows.

- Each piston has stamped number 1 or 2 as shown. It represents outer diameter of piston.
- There are paints on the cylinder block as shown. The color (red or blue) of each paint represents cylinder bore diameter. The first paint from crank pulley side represents inner diameter of No.1 cylinder, the second paint of No.2 cylinder, the third paint of No.3 cylinder and the fourth paint of No.4 cylinder.
- Stamped number on piston and paint on cylinder block should correspond. That is, install number 2 stamped piston to cylinder which is identified with blue paint and a number 1 piston to cylinder with red paint.

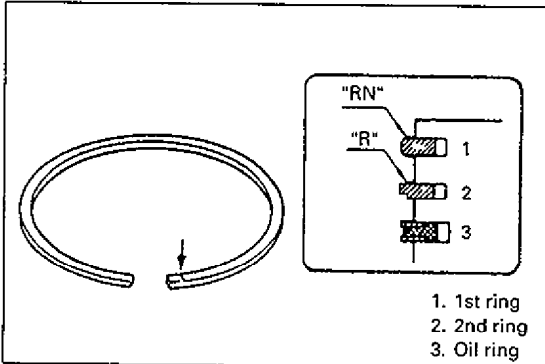
Piston		Cylinder		Piston-to-cylinder clearance
Number at the top (mark)	Outer diameter	Color (paint)	Bore diameter	
1	67.98 – 67.99 mm (2.6764 – 2.6768 in.)	Red	68.01 – 68.02 mm (2.6776 – 2.6780 in.)	0.02 – 0.04 mm (0.0008 – 0.0015 in.)
2	67.97 – 67.98 mm (2.6760 – 2.6764 in.)	Blue	68.00 – 68.01 mm (2.6772 – 2.6776 in.)	0.02 – 0.04 mm (0.0008 – 0.0015 in.)



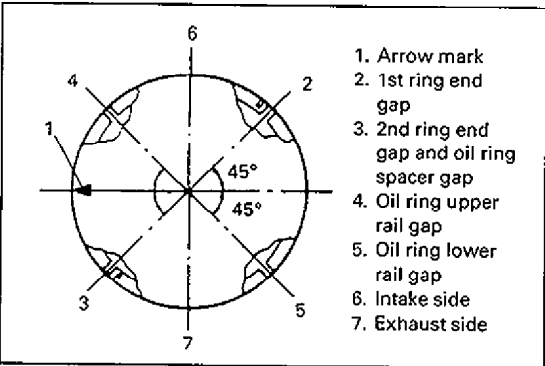
75F00-6A4-64-5



75F00-6A4-65-1



75F00-6A4-65-2



75F00-6A4-65-3

1) Install piston pin to piston and connecting rod:

After applying engine oil to piston pin and piston pin holes in piston and connecting rod, fit connecting rod to piston as shown in figure and insert piston pin to piston and connecting rod, and install piston pin circlips.

NOTE:

Circlip should be installed with its cut part facing either up or down as shown in figure.

2) Install piston rings to piston:

- As indicated in figure at the left, 1st and 2nd rings have "RN", "T" or "R" mark respectively. When installing these piston rings to piston, direct marked side of each ring toward top of piston.

- 1st ring differs from 2nd ring in thickness, shape and color of surface contacting cylinder wall.

Distinguish 1st ring from 2nd ring by referring to figure.

- When installing oil ring, install spacer first and then two rails.

3) After installing three rings (1st, 2nd and oil rings), distribute their end gaps as shown in figure.

INSTALLATION OR CONNECTION

1) Apply engine oil to pistons, rings, cylinder walls, connecting rod bearings and crankpins.

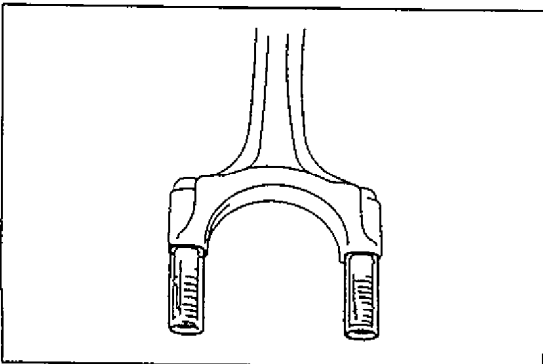
NOTE:

Do not apply oil between connecting rod and bearing or between bearing cap and bearing.

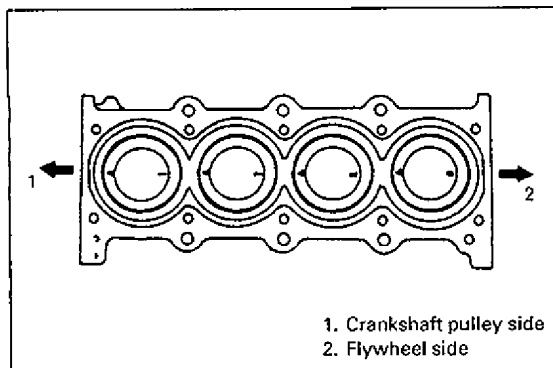
2) Install guide hoses over connecting rod bolts.

These guide hoses protect crankpin and threads of rod bolt from damage during installation of connecting rod and piston assembly.

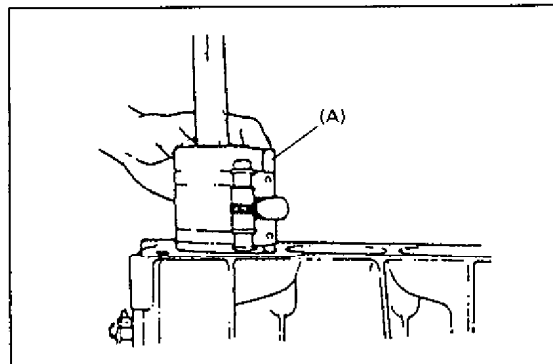
75F00-6A4-65-4



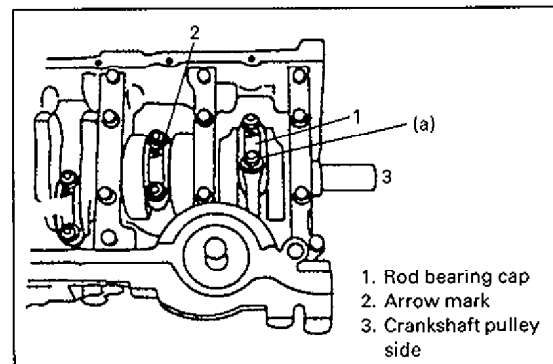
75F00-6A4-65-5



75F00-6A4-66-1



75F00-6A4-66-2



75F00-6A4-66-3

- 3) When installing piston and connecting rod assembly into cylinder bore, point arrow mark on piston head to crankshaft pulley side.

- 4) Install piston and connecting rod assembly into cylinder bore. Use special tool (Piston ring compressor) to compress rings. Guide connecting rod into place on crankshaft. Using a hammer handle, tap piston head to install piston into bore. Hold ring compressor firmly against cylinder block until all piston rings have entered cylinder bore.

Special Tool

(A): 09916-77310

- 5) Install bearing cap:
Point arrow mark on cap to crankshaft pulley side.
Tighten cap nuts to specification.

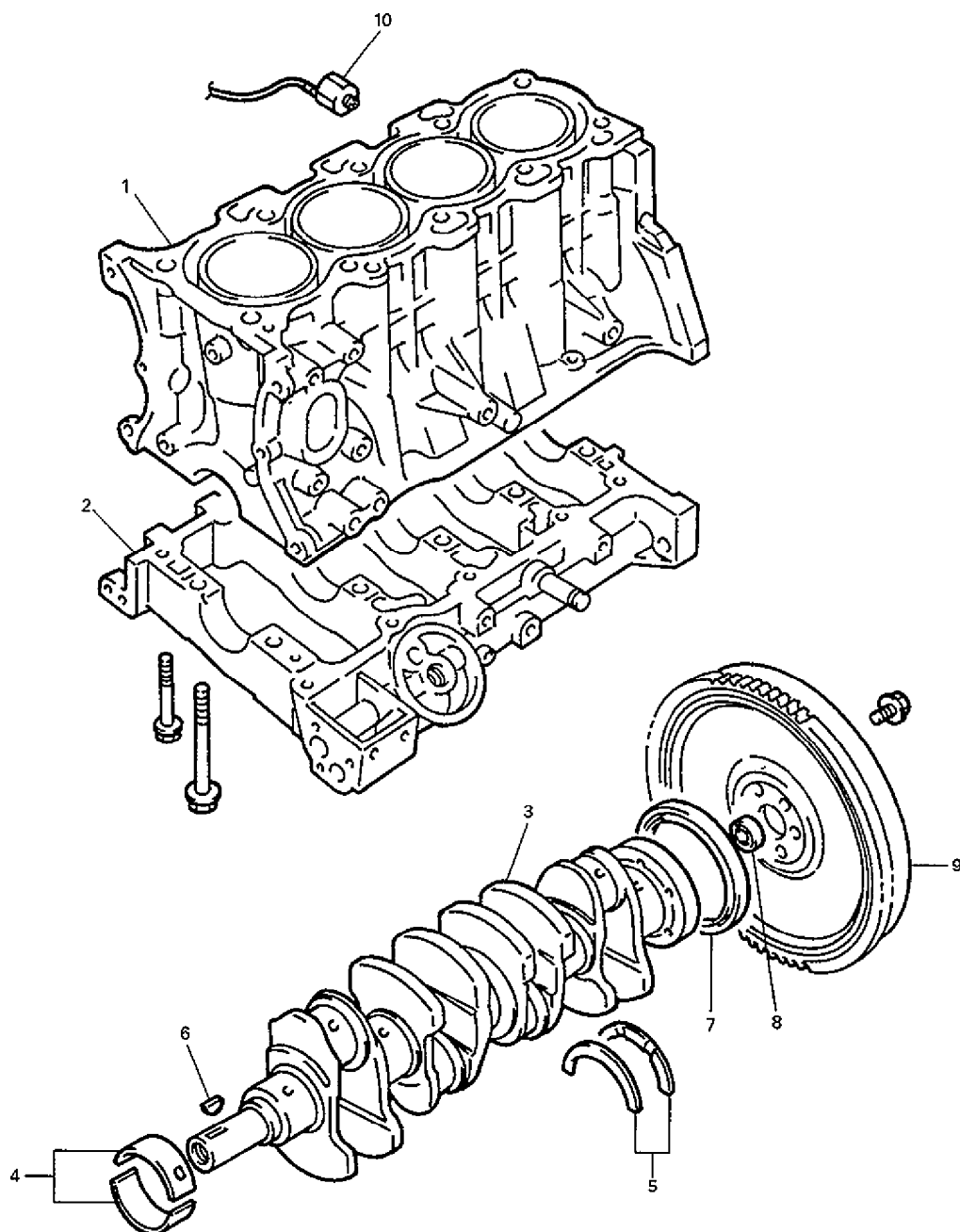
Tightening Torque

(a): 33 N·m (3.3 kg-m, 24.0 lb-ft)

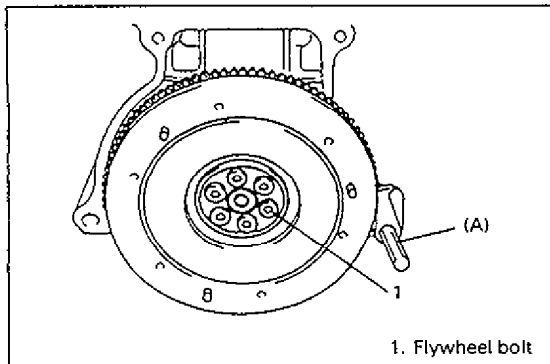
- 6) Reverse removal procedure for installation, as previously outlined.
7) Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
8) Install engine assembly to vehicle as previously outlined.

75F00-6A4-66-4

MAIN BEARINGS, CRANKSHAFT AND CYLINDER BLOCK



- 1. Cylinder block
- 2. Lower crankcase
- 3. Crankshaft
- 4. Main bearing
- 5. Thrust bearing
- 6. Crankshaft timing sprocket key
- 7. Rear oil seal
- 8. Input shaft bearing
- 9. Flywheel
- 10. Knock sensor



75F00-6A4-68-1

REMOVAL

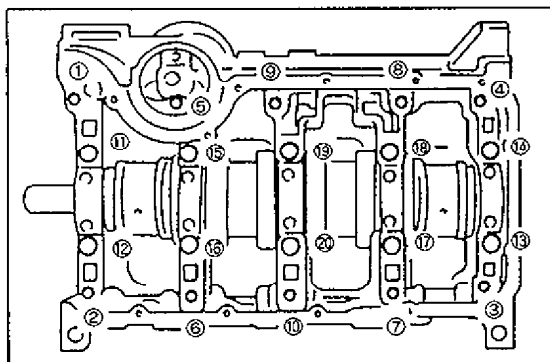
- 1) Remove engine assembly from body as previously outlined.
- 2) Remove clutch cover, clutch disc and flywheel (drive plate for A/T).

Special Tool

(A): 09924-17810

- 3) Remove oil pan and oil pump strainer.
- 4) Remove cylinder head cover as previously outlined.
- 5) Remove timing chain cover.
- 6) Remove timing chain guide, chain tensioner, tensioner link timing chain and crank timing sprocket.
- 7) Remove cylinder head assembly with intake manifold and exhaust manifold.
- 8) Remove pistons and connecting rods.

75F00-6A4-68-3



75F00-6A4-68-4

- 9) Loosen lower crankcase bolts in such order as indicated in figure a little at a time and remove lower crankcase.
- 10) Remove crankshaft from cylinder block.

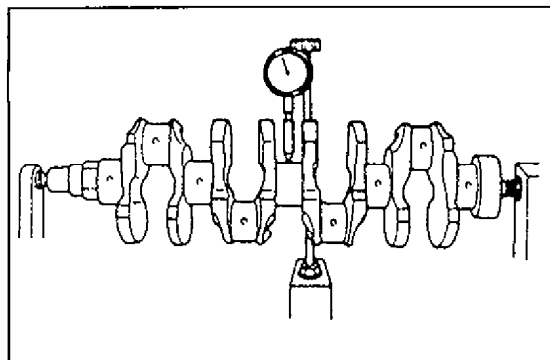
INSPECTION

Crankshaft

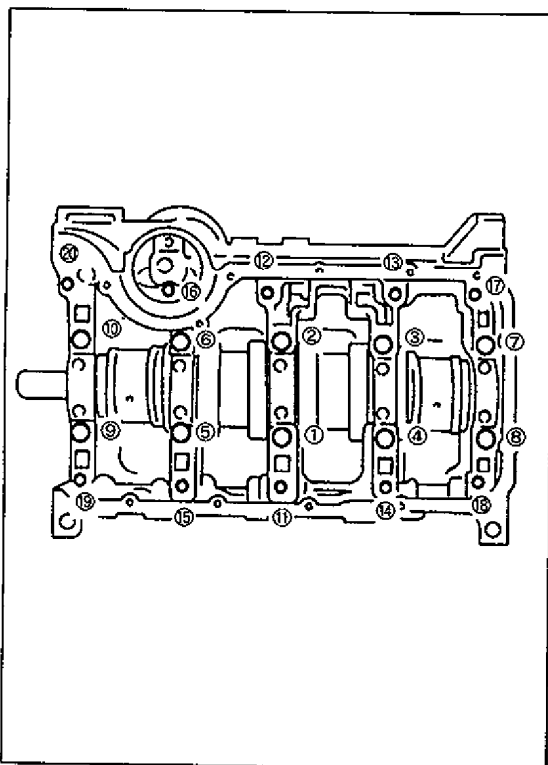
Crankshaft runout

Using a dial gauge, measure runout at center journal. Rotate crankshaft slowly. If runout exceeds its limit, replace crankshaft.

Limit on runout: 0.04 mm (0.0016 in.)



75F00-6A4-68-5



75F00-6A4-69-2

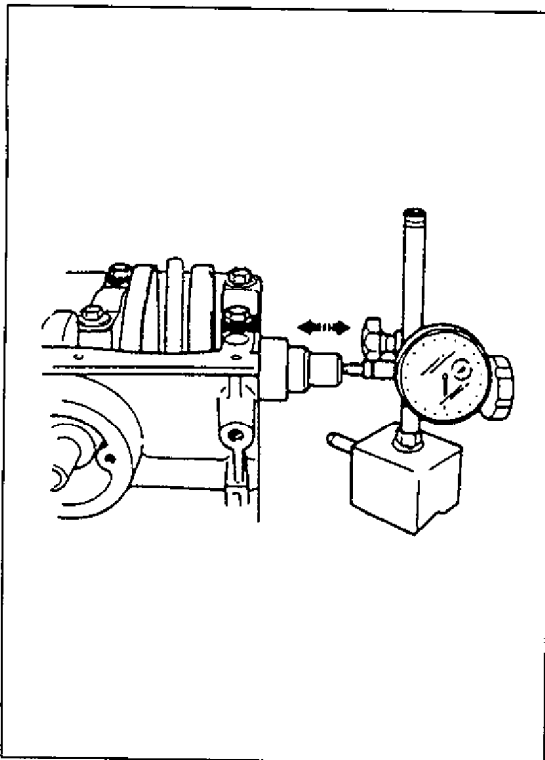
Crankshaft thrust play

Tighten crankcase bolts according to next procedure.

- 1) Tighten bolts ① to ⑩ to 41 N·m (4.1 kg-m, 29.5 lb-ft) in order of their numbers.
- 2) Tighten bolts ⑪ to ⑳ to 17 N·m (1.7 kg-m, 12.0 lb-ft) in order of their numbers.
- 3) In the same manner as in 1), tighten them to specified torque.
- 4) In the same manner as in 2), tighten them to specified torque.

Tightening Torque

- ① to ⑩ : 58 N·m (5.8 kg-m, 42.0 lb-ft)
 ⑪ to ⑳ : 24 N·m (2.4 kg-m, 17.5 lb-ft)



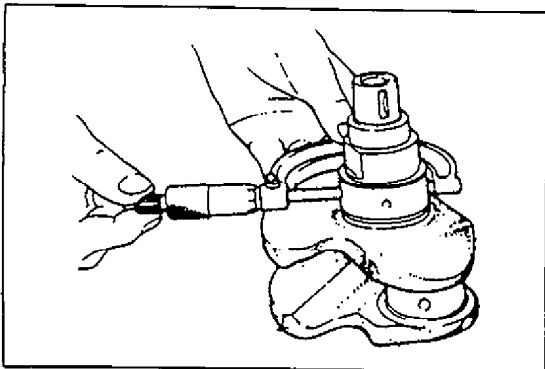
75F00-6A4-69-4

Use a dial gauge to read displacement in axial (thrust) direction of crankshaft.

If its limit is exceeded, replace thrust bearing with new standard one or oversize one to obtain standard thrust play.

Item	Standard	Limit
Crankshaft thrust play	0.11 – 0.31 mm (0.0044 – 0.0122 in.)	0.35 mm (0.0149 in.)

Thickness of crankshaft thrust bearing	Standard	2.500 mm (0.0984 in.)
	Oversize: 0.125 mm (0.0049 in.)	2.563 mm (0.1009 in.)



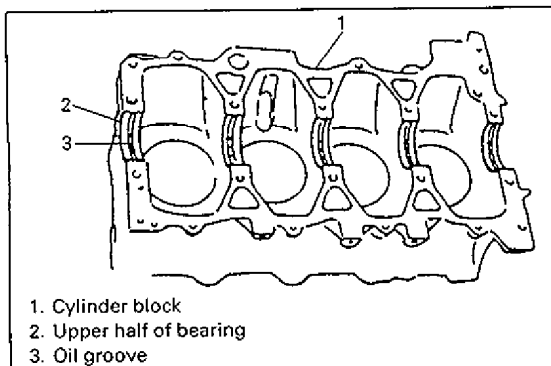
75F00-6A4-69-5

Out-of-round and taper (uneven wear) of journals

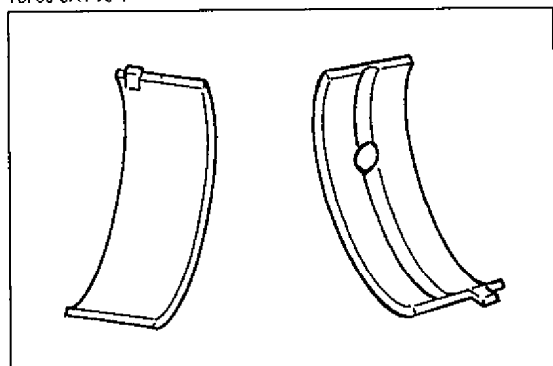
An unevenly worn crankshaft journal shows up as a difference in diameter at a cross section or along its length (or both). This difference, if any, is determined by taking micrometer readings.

If any one of journals is badly damaged or if amount of uneven wear in the sense explained above exceeds its limit, regrind or replace crankshaft.

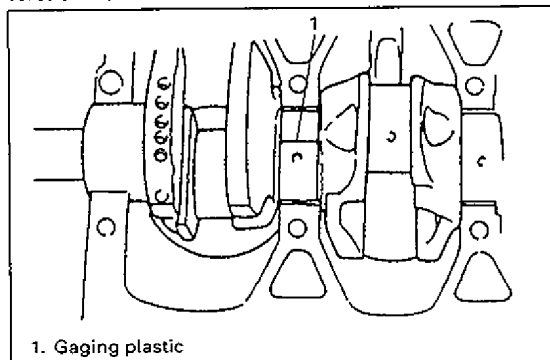
Limit on out-of-round and taper: 0.01 mm (0.0004 in.)



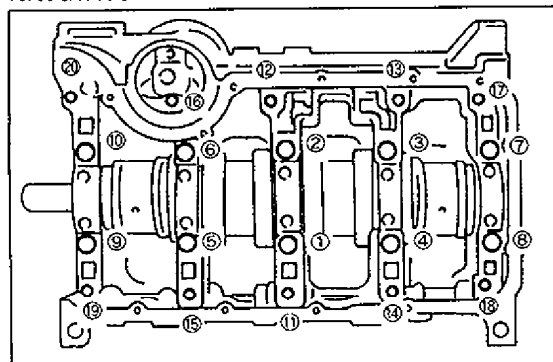
75F00-6A4-70-1



75F00-6A4-70-2



75F00-6A4-70-3



75F00-6A4-70-4

Main Bearings

General information

Upper half of bearing has oil groove as shown in figure. Install this half with oil groove to cylinder block.

Inspection

Check bearings for pitting, scratches, wear or damage.

If any malfunction is found, replace both upper and lower halves. Never replace one half without replacing the other half.

Main bearing clearance

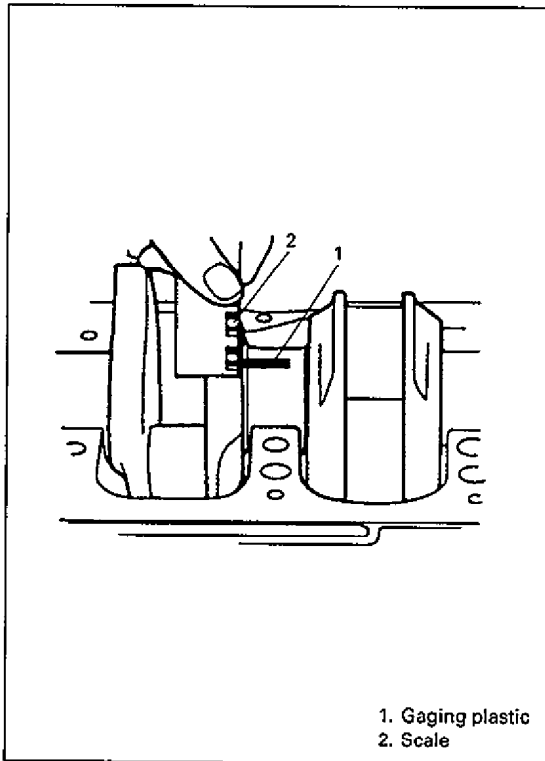
Check clearance by using gaging plastic according to following procedure.

- 1) Remove lower crankcase.
- 2) Clean bearings and main journals.
- 3) Place a piece of gaging plastic to full width of bearing (parallel to crankshaft) on journal, avoiding oil hole.

- 4) Install lower crankcase as previously outlined in "Crankshaft thrust play".
Lower crankcase **MUST** be torqued to specification in order to assure proper reading of clearance.

NOTE:

Do not rotate crankshaft while gaging plastic is installed.



75F00-6A4-71-2

- 5) Remove cap and using scale on gaging plastic envelope, measure gaging plastic width at its widest point. If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.

A new bearing may produce proper clearance.

After selecting new bearing, recheck clearance.

Bearing clearance	Standard	Limit
	0.020 – 0.040 mm (0.0008 – 0.0016 in.)	0.065 mm (0.026 in.)

Selection of main bearings

If bearing is in malcondition, or bearing clearance is out of specification, select a new bearing according to following procedure and install it.

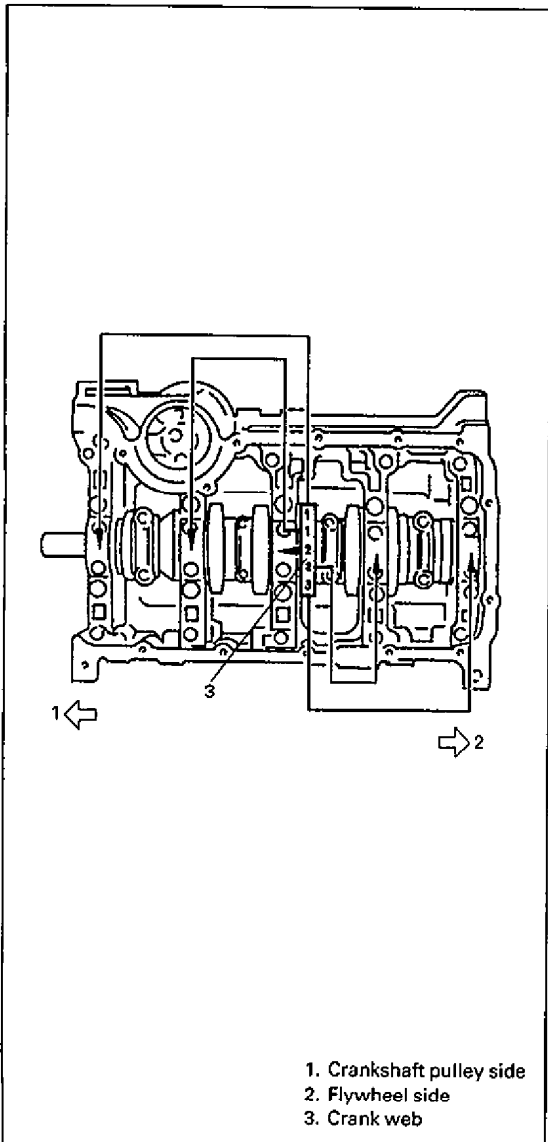
- 1) First check journal diameter by using following procedure. As shown in figure, crank web of No.3 cylinder has five stamped numerals.

Three kinds of numerals ("1", "2" and "3") represent following journal diameters.

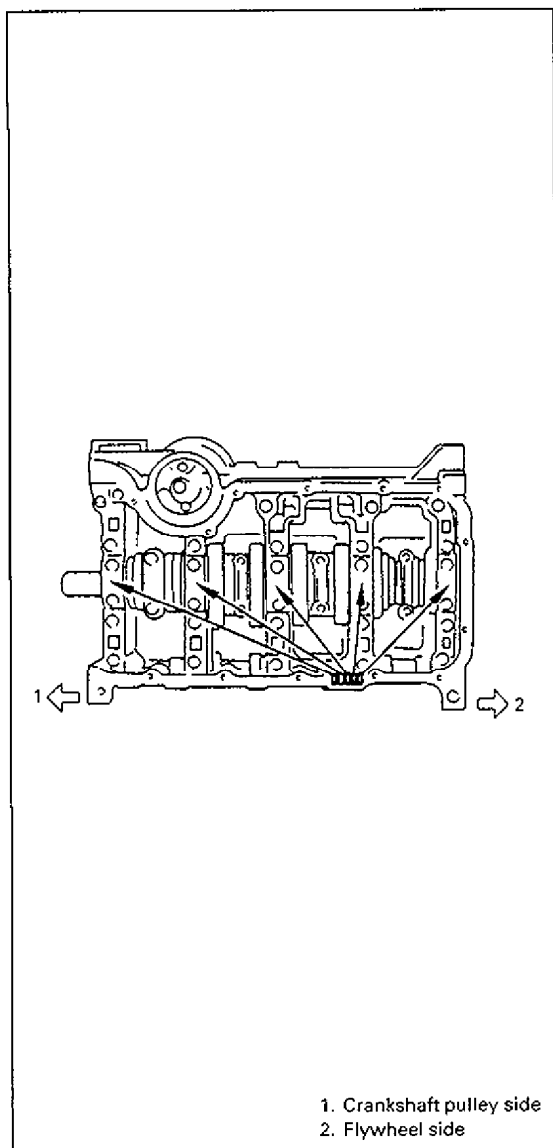
Numeral stamped	Journal diameter
1	44.994 – 45.000 mm (1.7714 – 1.7717 in.)
2	44.988 – 44.994 mm (1.7712 – 1.7714 in.)
3	44.982 – 44.988 mm (1.7709 – 1.7712 in.)

The first, second, third, fourth and fifth (left to right) stamped numerals represent journal diameters respectively as shown in figure.

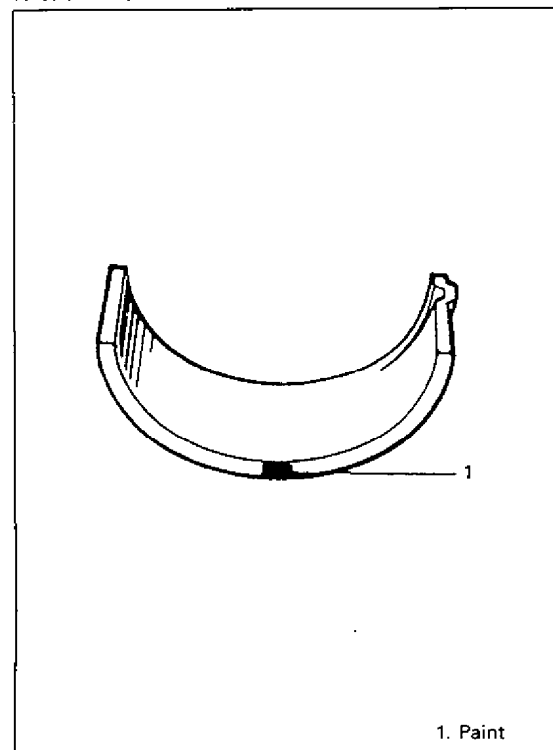
For example, in figure, the first (uppermost) numeral "1" indicates that corresponding (leftmost, in this case) journal dia. is within 44.994 – 45.000 mm.



75F00-6A4-71-5



75F00-6A4-72-3



75F00-6A4-72-5

- 2) Next, check bearing cap bore diameter without bearing. On lower crankcase, five numerals are stamped as shown in figure.

Three kinds of numerals ("1", "2" and "3") represent following cap bore diameters.

Alphabet stamped	Bearing cap bore diameter (without bearing)
1	49.000 – 49.006 mm (1.9291 – 1.9294 in.)
2	49.006 – 49.012 mm (1.9294 – 1.9296 in.)
3	49.012 – 49.018 mm (1.9296 – 1.9298 in.)

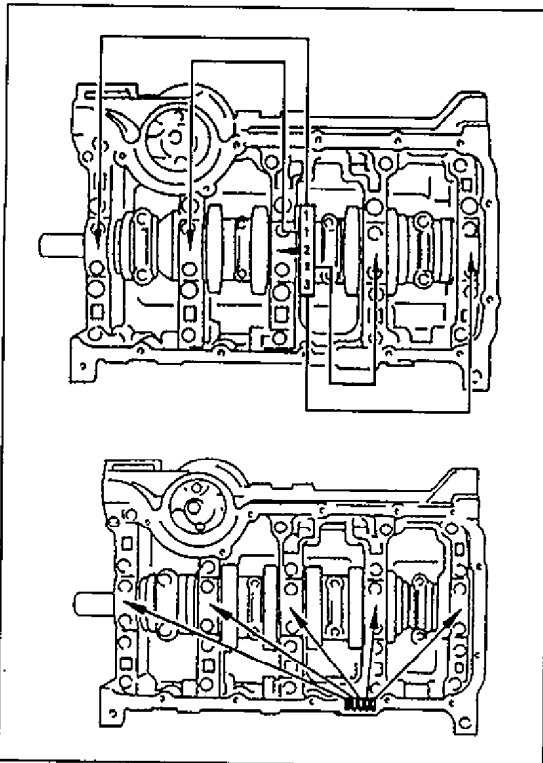
Stamped numerals on lower crankcase represent bearing cap bore diameter marked with an arrow in figure respectively.

For example, stamped number "1" indicates that corresponding bearing cap bore diameter is 49.000 – 49.006 mm.

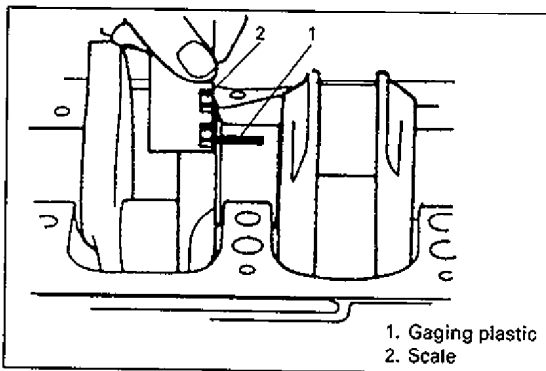
- 3) There are five kinds of bearings differing in thickness. To distinguish them, they are painted in following colors at the position as indicated in figure.

Each color indicates following thickness at the center of bearing.

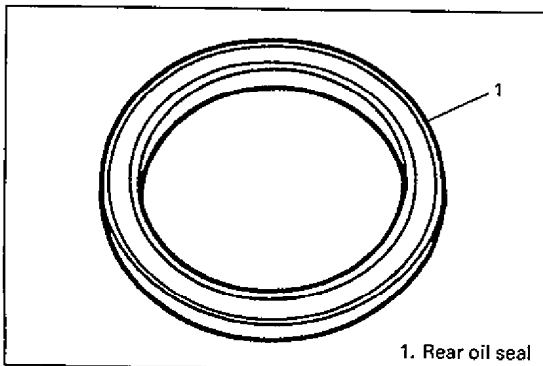
Color painted	Bearing thickness
Green	1.999 – 2.003 mm (0.0787 – 0.0788 in.)
Black	2.002 – 2.006 mm (0.0788 – 0.0789 in.)
Colorless (no paint)	2.005 – 2.009 mm (0.0789 – 0.0790 in.)
Yellow	2.008 – 2.012 mm (0.0790 – 0.0791 in.)
Blue	2.011 – 2.015 mm (0.0792 – 0.0793 in.)



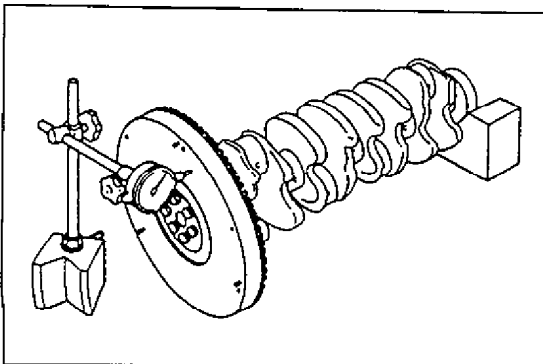
75F00-6A4-73-2



75F00-6A4-73-3



75F00-6A4-73-4



75F00-6A4-73-5

- 4) From numerals stamped on crank web of No.3 cylinder and the numerals stamped on lower crankcase, determine new bearing to be installed to journal, by referring to table given below.

For example, if numeral stamped on crank web is "1" and numeral stamped on mating surface is "2", install a new standard bearing painted in "Black" to its journal.

		Numeral stamped on crank web (Journal diameter)		
		1	2	3
Numeral stamped on mating surface (Bearing cap bore dia.)	1	Green	Black	Colorless
	2	Black	Colorless	Yellow
	3	Colorless	Yellow	Blue
		New bearing to be installed		

- 5) Using gaging plastic, check bearing clearance with newly selected bearing.

If clearance still exceeds its limit, use next thicker bearing and recheck clearance.

- 6) When replacing crankshaft or cylinder block due to any reason, select new standard bearings to be installed by referring to numerals stamped on new crankshaft or alphabets stamped on mating surface of new cylinder block.

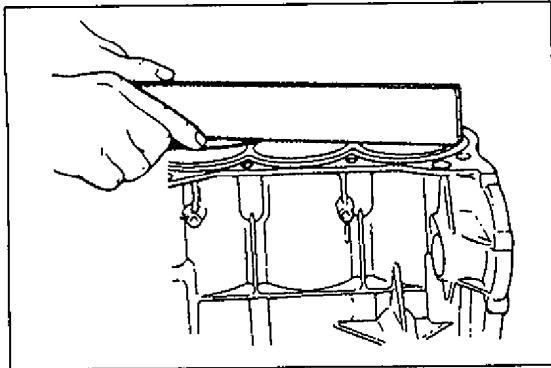
Rear Oil Seal

Carefully inspect oil seal for wear or damage. If its lip is worn or damaged, replace it.

Flywheel

- If ring gear is damaged, cracked or worn, replace flywheel.
- If the surface contacting clutch disc is damaged, or excessively worn, replace flywheel.
- Check flywheel for face runout with dial gauge. If runout exceeds its limit, replace flywheel.

Limit on runout: 0.2 mm (0.0078 in.)



75F00-6A4-74-1

Cylinder Block

Distortion of gasketed surface

Using straightedge and thickness gauge, check gasketed surface for distortion and, if flatness exceeds its limit, correct it.

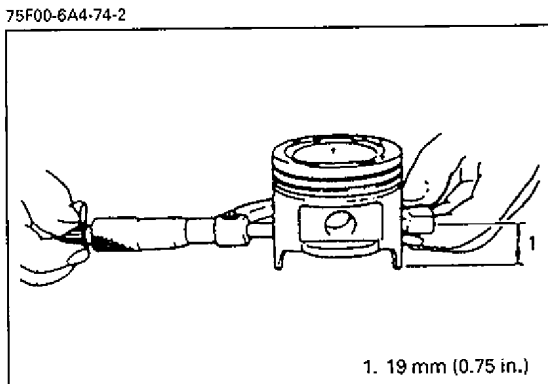
Limit of distortion : 0.05 mm (0.020 in.)

Honing or reboring cylinders

- 1) When any cylinder needs reboring, all other cylinders must also be rebored at the same time.
- 2) Select oversized piston according to amount of cylinder wear.

Size	Piston diameter
O/S 0.25	68.220 – 68.240 mm (2.6858 – 2.6866 in.)
O/S 0.50	68.470 – 68.490 mm (2.6957 – 2.6965 in.)

- 3) Using micrometer, measure piston diameter.



75F00-6A4-74-3

- 4) Calculate cylinder bore diameter to be rebored.

$$D = A + B - C$$

D: Cylinder bore diameter to be rebored.

A: Piston diameter as measured.

B: Piston clearance = 0.02 – 0.04 mm
(0.0008 – 0.0015 in.)

C: Allowance for honing = 0.02 mm (0.0008 in.)

- 5) Rebore and hone cylinder to calculated dimension.

NOTE:

Before reboring, install lower crankcase and tighten to specification to avoid distortion of bearing bores.

- 6) Measure piston clearance after honing.

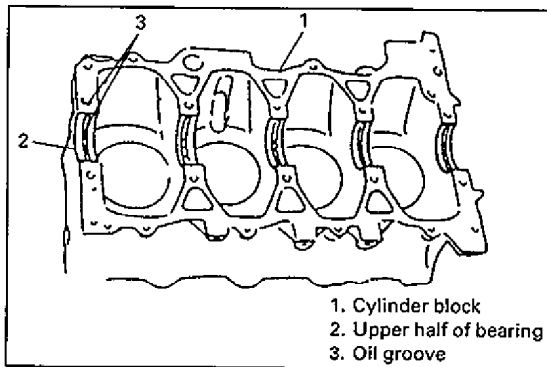
75F00-6A4-74-4

INSTALLATION

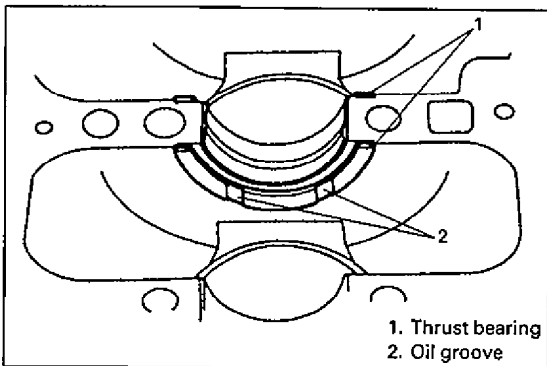
NOTE:

- All parts to be installed must be perfectly clean.
- Be sure to oil crankshaft journals, journal bearings, thrust bearings, crankpins, connecting rod bearings, pistons, piston rings and cylinder bores.
- Journal bearings, connecting rods, rod bearings, rod bearing caps, pistons and piston rings are in combination sets. Do not disturb such combination and make sure that each part goes back to where it came from, when installing.

75F00-6A4-75-2

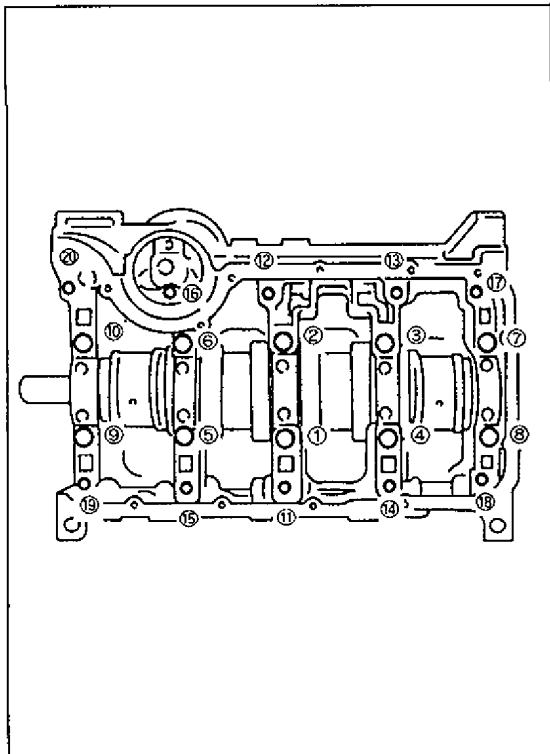


75F00-6A4-75-3



75F00-6A4-75-4

- 1) Install main bearings to cylinder block.
One of two halves of main bearing, has an oil groove. Install it to cylinder block, and the other half without oil groove to lower crankcase.
Make sure that two halves are painted in the same color.
- 2) Install thrust bearings to cylinder block between No.2 and No.3 cylinders. Face oil groove sides to crank webs.



75F00-6A4-76-2

3) Install crankshaft to cylinder block.

4) Install lower crankcase to cylinder block.

Tighten crankcase bolts according to next procedure.

(1) Tighten bolts ① to ⑩ to 41 N·m (4.1 kg-m, 29.5 lb-ft) in order of their numbers.

(2) Tighten bolts ⑪ to ⑳ to 17 N·m (1.7 kg-m, 12.0 lb-ft) in order of their numbers.

(3) In the same manner as in (1), tighten them to specified torque.

(4) In the same manner as in (2), tighten them to specified torque.

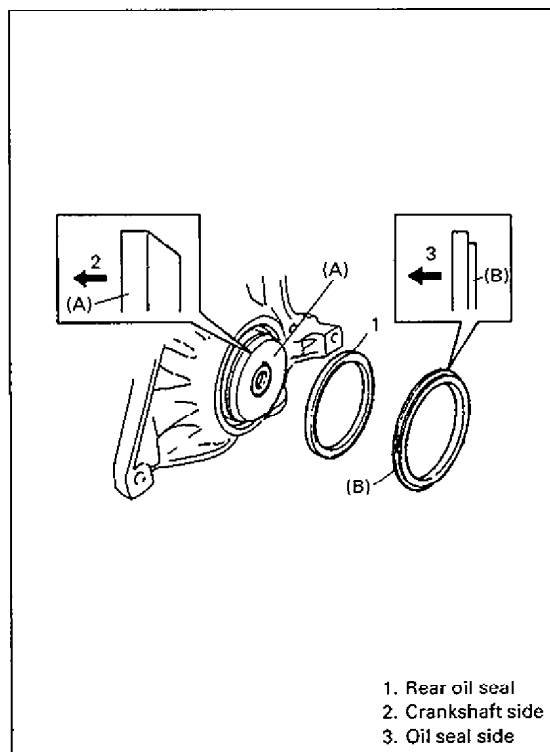
Tightening Torque

① to ⑩ : 58 N·m (5.8 kg-m, 42.0 lb-ft)

⑪ to ⑳ : 24 N·m (2.4 kg-m, 17.5 lb-ft)

NOTE:

After tightening lower crankcase bolts, check to be sure that crankshaft rotates smoothly when turned by hand.



- 1. Rear oil seal
- 2. Crankshaft side
- 3. Oil seal side

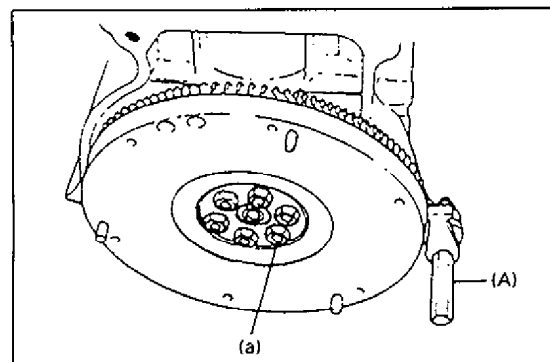
75F00-6A4-76-4

5) Install rear oil seal. With special tools, press fit rear oil seal so that it is flush with cylinder block.

Special Tool

(A): 09911-97020

(B): 09911-97030



75F00-6A4-76-5

6) Install flywheel (M/T model) or drive plate (A/T model).

Using special tool, lock flywheel or drive plate, and torque its bolts to specification.

Special Tool

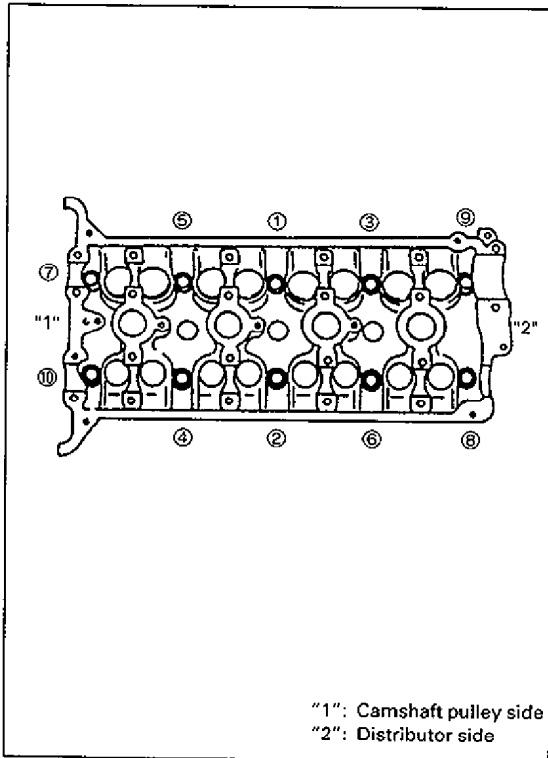
(A): 09924-17810

Tightening Torque

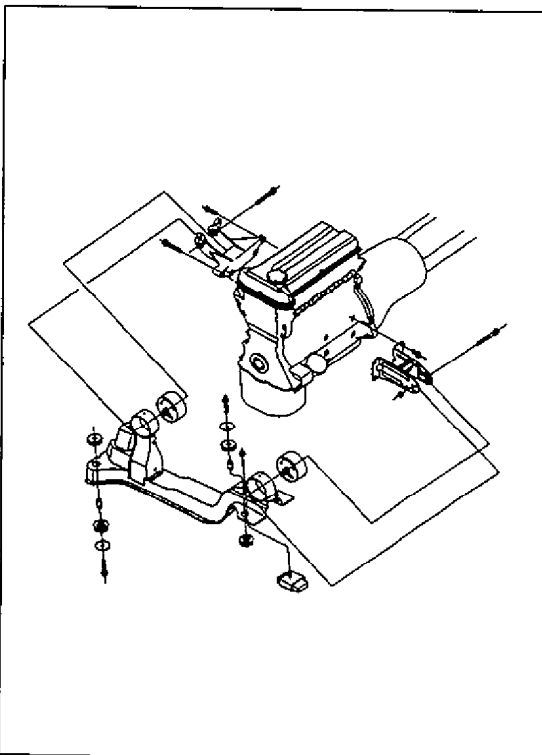
(a): 70 N·m (7.0 kg-m, 50.5 lb-ft)

7) Install pistons and connecting rods as previously outlined.

75F00-6A4-77-1



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75F00-6A4-77-5

8) Install cylinder head assembly to cylinder block as previously outlined.

9) Install camshaft, crankshaft timing sprocket, timing chain, timing chain cover, cylinder head cover, water pump, etc., as previously outlined.

10) Install oil pump strainer and oil pan as previously outlined.

11) Install clutch to flywheel (for M/T vehicle). For clutch installation, refer to Section 7C "CLUTCH" section.

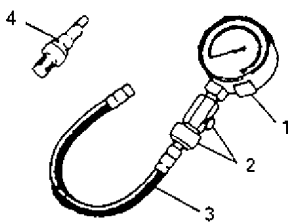
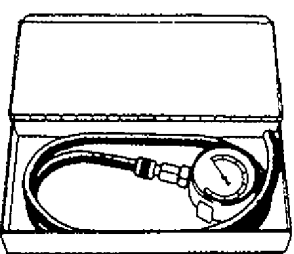
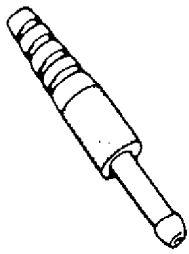
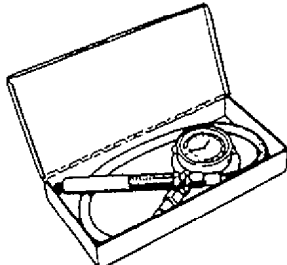
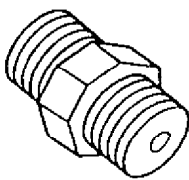
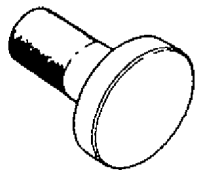
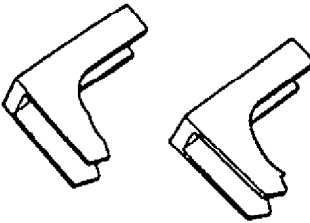
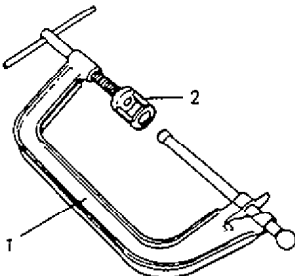
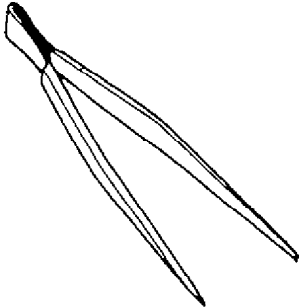
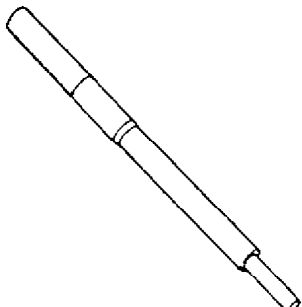
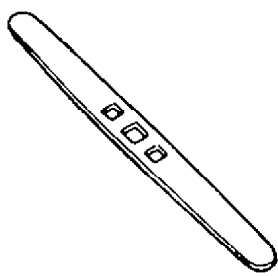
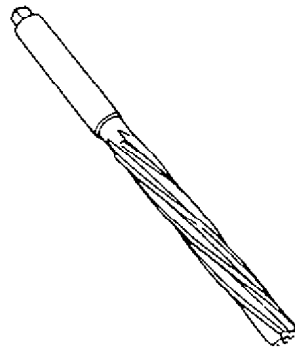
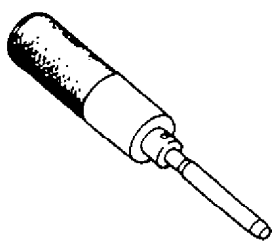
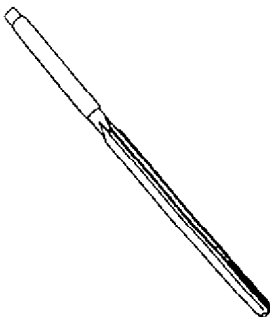
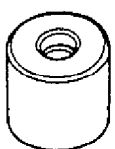
12) Install transmission to engine assembly.

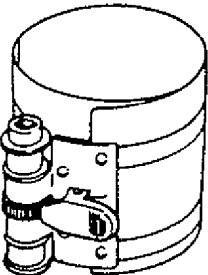
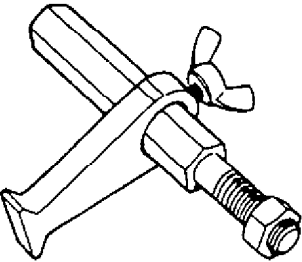
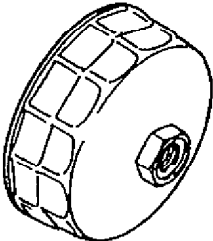
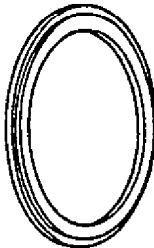
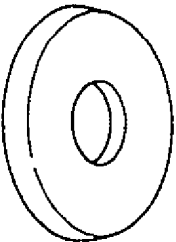
Refer to "Engine Assembly" in this section.

13) Install engine mountings and brackets as previously outlined.

14) Install engine assembly to vehicle as previously outlined.

SPECIAL TOOLS

 1. 09915-64510-001 Compression gauge 2. 09915-64510-002 Connector 3. 09915-64530 Hose 4. 09915-64550 Attachment	 09915-67310 Vacuum gauge	 09918-08210 Vacuum gauge hose joint	 09915-77310 Oil pressure gauge
 09915-78211 Oil pressure gauge attachment	 09913-75520 Bearing installer	 09916-67010 Tappet holder	 1. 09916-14510 Valve lifter 2. 09916-14910 Valve lifter attachment
 09916-84510 Forceps	 09916-44910 Valve guide remover	 09916-34542 Reamer handle	 09916-37320 Reamer (10.5 mm)
 09916-58210 Valve guide installer handle	 09917-87010 Valve guide installer attachment	 09916-34550 Reamer (5.5 mm)	 09917-98221 Valve stem seal installer

 09916-77310 Piston ring compressor	 09924-17810 Flywheel holder	 09915-47340 Oil filter wrench	 09911-97030 Oil seal installer
 09911-97020 Oil seal guide			

75F00-6A4-79-3

REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Sealant	SUZUKI BOND NO. 1207C (99000-31150)	• Mating surfaces of cylinder block and oil pan. • Mating surfaces of cylinder block and timing chain cover. • Mating surfaces of camshaft housings (No.6).

75F00-6A4-79-4

TIGHTENING TORQUE SPECIFICATIONS

FASTENING PARTS		TIGHTENING TORQUE		
		N·m	kg-m	lb-ft
Oil pressure switch		12	1.2	9.0
Cylinder head cover bolts		11	1.1	8.0
Intake manifold bolts and nuts		10	1.0	7.5
Intake manifold stiffener bolts		23	2.3	17.0
Engine hook bolts		10	1.0	7.5
Timing chain tensioner adjuster bolt		11	1.1	8.0
Timing chain cover bolts		11	1.1	8.0
Exhaust manifold bolts and nuts		23	2.3	17.0
Exhaust pipe nuts and bolts		50	5.0	36.5
Oil pump strainer bolt and stay bolt		11	1.1	8.0
Oil pan bolts and nuts				
Oil pan drain plug		50	5.0	36.5
Crankshaft pulley bolt		115	11.5	83.5
Camshaft housing bolts		11	1.1	8.0
Cylinder head venturi plug		5	0.5	4.0
Cylinder head bolts		60	6.0	43.5
Connecting rod bearing cap nuts		33	3.3	24.0
Bolt and nuts fastening T/M and cylinder block		50	5.0	36.5
Lower crancase bolts	(inner side)	58	5.8	42.0
	(outer side)	24	2.4	17.5
Timing chain guide No.1 bolts		9	0.9	6.5
Flywheel bolts (Drive plate bolts for A/T)		70	7.0	50.5
Engine mounting & bracket bolts and nuts		Refer to p. 6A4-24.		

SECTION 6B**ENGINE COOLING****6B****WARNING:****For vehicles equipped with Air Bag System**

- 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 **CAUTIONS** in **SECTION 10B** or **10B1** and **Precautions, Air Bag System Components and Wiring Location View** in **SECTION 10B** or **10B1** before performing service on or around the air bag system components or wiring. Failure to follow **WARNINGS** could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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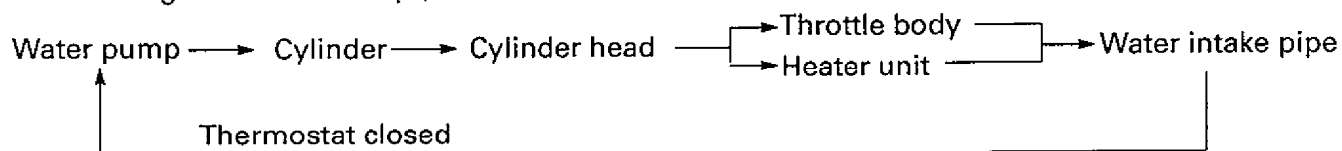
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GENERAL DESCRIPTION

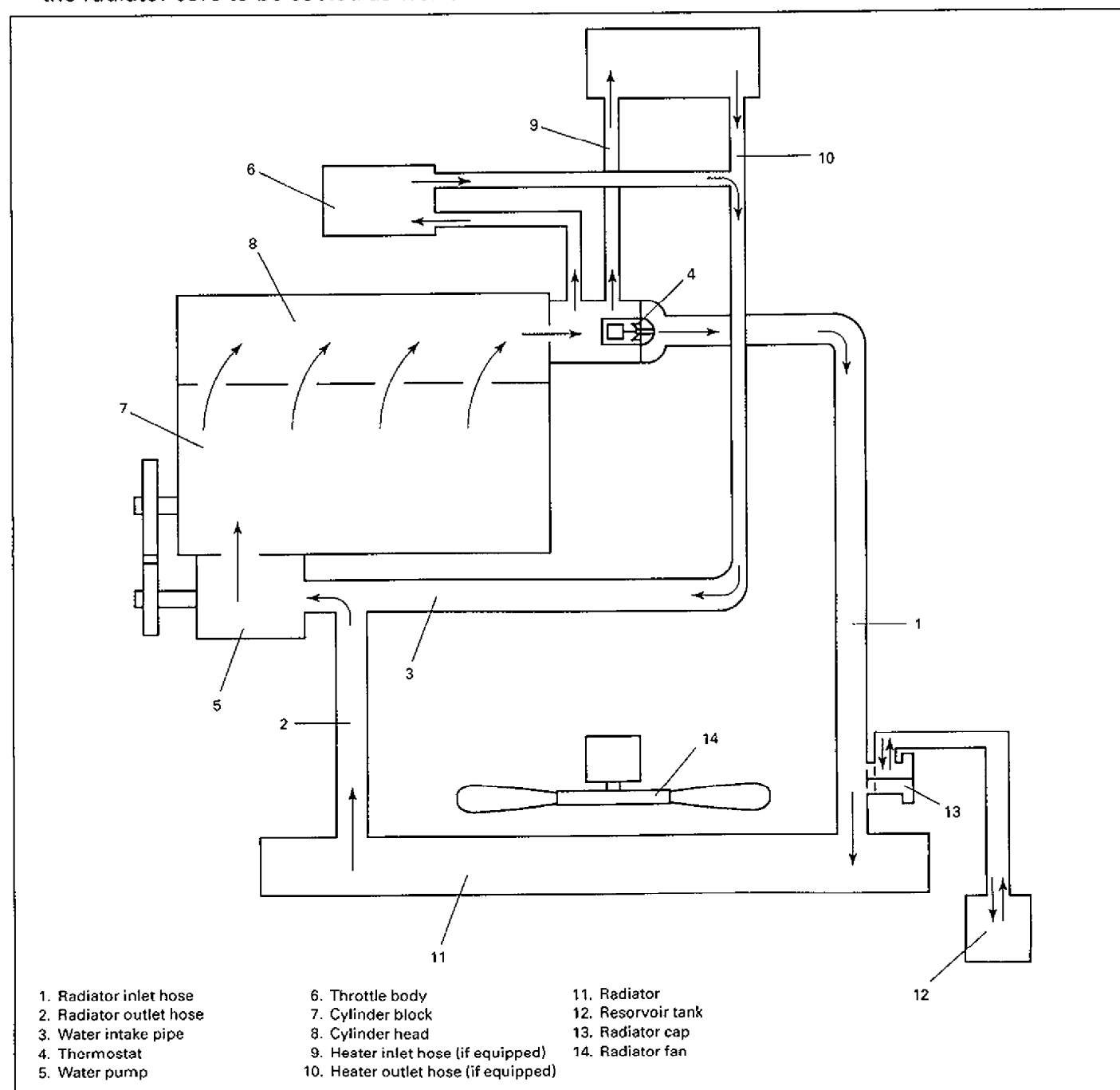
The cooling system consists of the radiator cap, radiator, coolant reservoir tank, hoses, water pump, cooling fan, thermostat. The radiator is of tube-and-fin type.

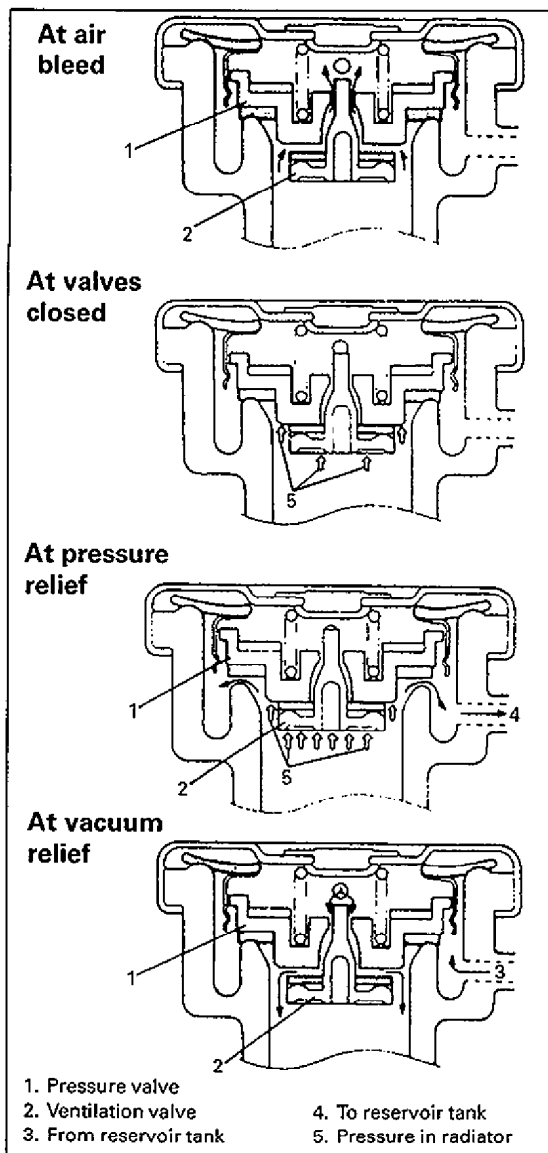
COOLING SYSTEM CIRCULATION

1) While the engine is warmed up (thermostat closed), coolant circulates as follows.



2) When coolant is warmed up to normal temperature and the thermostat opens, coolant passes through the radiator core to be cooled as well as the above flow circuit.





75F00-6B-3-3

RADIATOR CAP

A pressure-vent cap is used on the radiator. The cap contains a pressure valve and ventilation valve.

The pressure valve is held against its seat by a spring of predetermined strength which protects the cooling system by relieving the pressure if the pressure in cooling system rises by 110 kPa (1.1 kg/cm², 15.6 psi).

The ventilation valve operates as follows.

- It opens to let the air out of the radiator when the temperature and the pressure in the radiator are lower than ventilation valve weight.
- It closes when the engine has warmed up and the pressure in the radiator has risen.
- It opens when the engine has cooled after being warmed up once and vacuum has occurred in the radiator so as to prevent the coolant level in the radiator from falling and the radiator from being collapsed due to the vacuum in it.

NOTE:

Do not remove radiator cap to check engine coolant level; check coolant visually at the see-through coolant reservoir tank.

Coolant should be added only to reservoir tank as necessary.

WARNING:

As long as there is pressure in the cooling system, the temperature can be considerably higher than the boiling temperature of the solution in the radiator without causing the solution to boil. Removal of the radiator cap while engine is hot and pressure is high will cause the solution to boil instantaneously and possibly with explosive force, spewing the solution over engine, fenders and person removing cap. If the solution contains flammable anti-freeze such as alcohol (not recommended for use at any time), there is also the possibility of causing a serious fire.

COOLANT RESERVOIR TANK

A "see-through" plastic reservoir tank is connected to the radiator by a hose. As the vehicle is driven, the coolant is heated and expands. The portion of the coolant displaced by this expansion flows from the radiator into the reservoir tank.

When the vehicle is stopped and the coolant cools and contracts, the displaced coolant is drawn back into the radiator by vacuum.

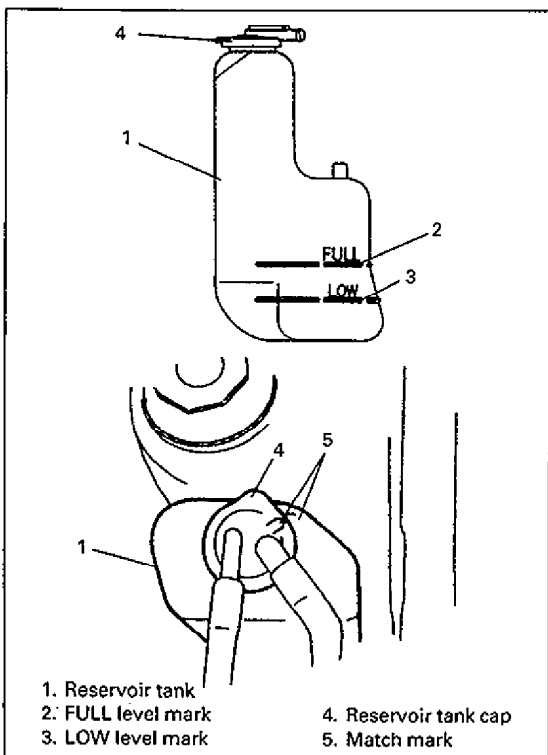
Thus, the radiator is kept filled with coolant to the desired level at all times, resulting in increased cooling efficiency.

Coolant level should be between "FULL" and "LOW" marks on the reservoir tank.

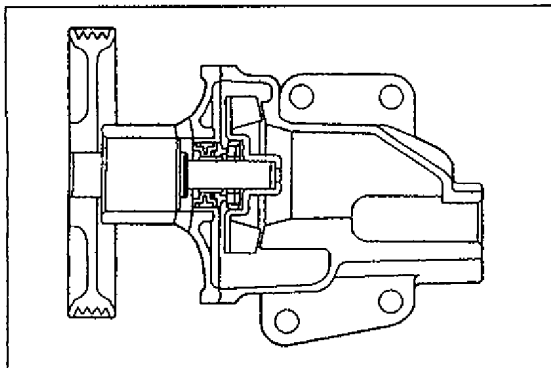
Coolant should be added only to the reservoir tank as necessary.

NOTE:

- **Be sure to check cap gasket is located as shown figure and breather hole is not plugged.**
- **When installing reservoir tank cap, turn breather cap forward.**



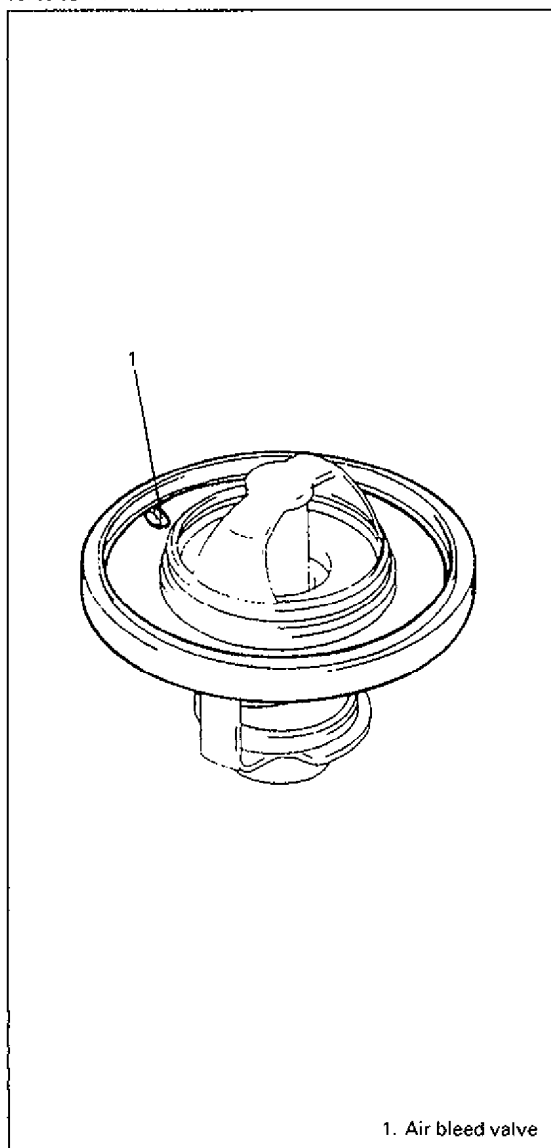
75F00-6B-3-5



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WATER PUMP

The centrifugal type water pump is used in the cooling system. The pump impeller is supported by a totally sealed bearing. The water pump can not be disassembled.



75F00-6B-4-4

THERMOSTAT

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

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

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

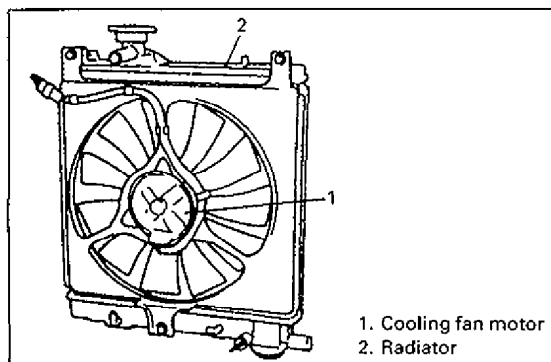
As the pellet is cooled, the contraction allows the spring to close the valve.

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

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

As the engine warms, the pellet expands and the thermostat valve opens, permitting coolant to flow through the radiator. In the top portion of the thermostat, an air bleed valve is provided; this valve is for venting out the gas or air, if any, that is accumulated in the circuit.

Thermostat functional spec. $\pm 1.5^{\circ}\text{C}$ (2.7°F)	
Temp. at which valve begins to open	82°C (179°F)
Temp. at which valve becomes fully open	95°C (203°F)
Valve lift	More than 8 mm at 95°C



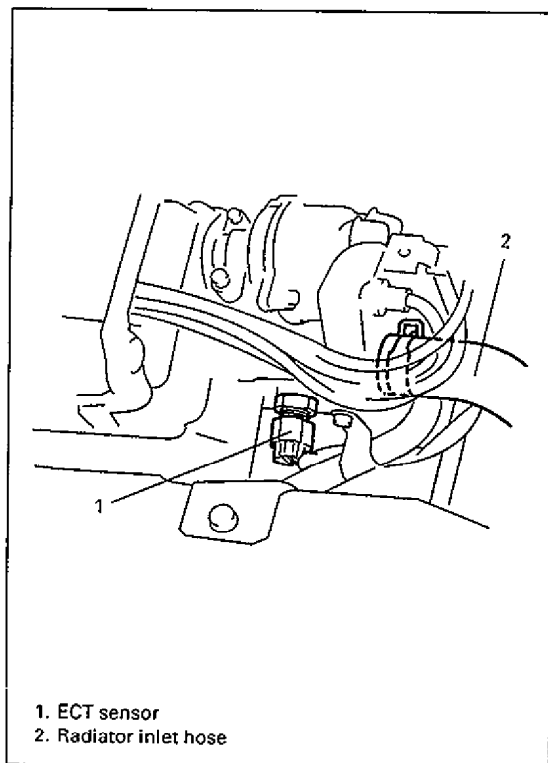
75F00-6B-4-5

COOLING FAN

The cooling fan is driven by electric motor, and the motor is activated by ECM (and ECT sensor). For its details, refer to SECTION 6E1.

WARNING:

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



75F00-6B-5-2

COOLANT (WATER) TEMP. GAUGE

Coolant (water) temp. gauge is incorporated with engine coolant temperature sensor and installed to water outlet cap. This gauge activates a temp. meter gauge in the instrument cluster.

DIAGNOSIS

Condition	Possible Cause	Correction
Engine overheats	• Loose or broken water pump belt • Not enough coolant • Faulty thermostat • Faulty water pump • Dirty or bent radiator fins • Coolant leakage on cooling system • Defective cooling fan motor • Faulty fan motor control circuit • Plugged radiator • Faulty radiator cap • Maladjusted ignition timing • Dragging brakes • Slipping clutch	Adjust or replace. Check coolant level and add as necessary. Replace. Replace. Clean or remedy. Repair Check and replace as necessary. Refer to SECTION 6E1. Check and replace radiator as necessary. Replace. Adjust. Adjust brake. Adjust or replace.

75F00-6B-5-4

MAINTENANCE

COOLANT

The coolant recovery system is standard. The coolant in the radiator expands with heat, and the overflow is collected in the reservoir tank.

When the system cools down, the coolant is drawn back into the radiator.

The cooling system has been filled at the factory with a quality coolant that is a 50/50 mixture of water and ethylene glycol antifreeze (70/30; in a market where no freezing temperature is anticipated).

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

- Maintain cooling system freeze protection at -36°C (-33°F) to ensure protection against corrosion and loss of coolant from boiling. This

should be done even if freezing temperatures are not expected.

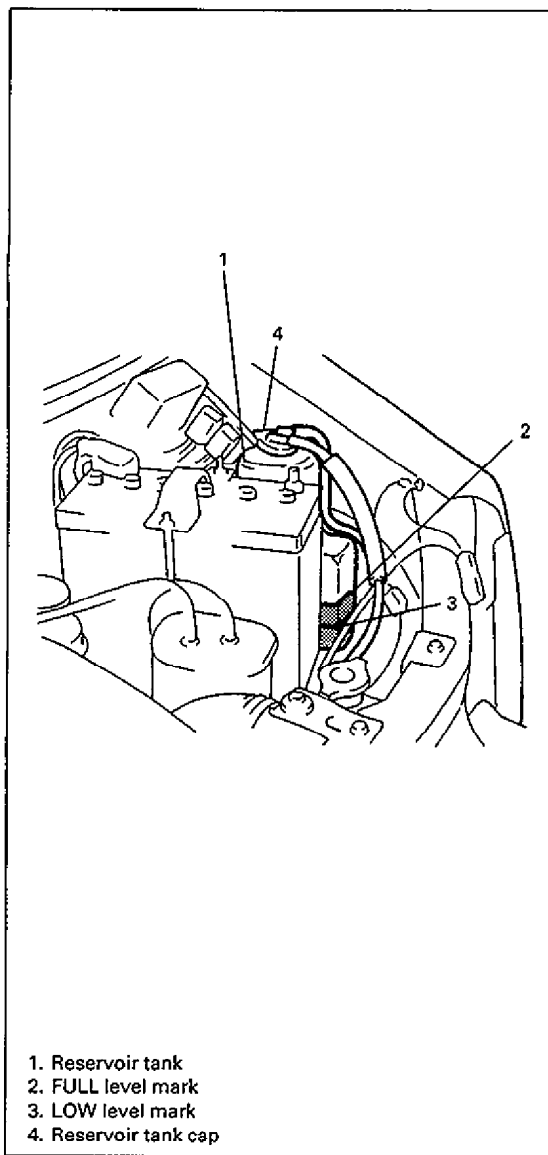
- Add ethylene glycol base coolant when coolant has to be added because of coolant loss or to provide added protection against freezing at temperature lower than -36°C (-33°F).

NOTE:

- **Alcohol or methanol base coolant or plain water alone should not be used in cooling system at any time as damage to cooling system could occur.**
- **Even in a market where no freezing temperature is anticipated, mixture of 70% water and 30% ethylene glycol antifreeze (Antifreeze/Anticorrosion coolant) should be used for the purpose of corrosion protection and lubrication.**

ANTI-FREEZE PROPORTIONING CHART

			Vehicle with M/T		Vehicle with A/T	
ANTI-FREEZE PROPORTIONING CHART	Freezing temperature	°C	-16	-36	-16	-36
		°F	3	-33	3	-33
	Anti-freeze/Anti-corrosion coolant concentration	%	30	50	30	50
	Ratio of compound to cooling water	ltr.	1.08/2.52	1.80/1.80	1.05/2.45	1.75/1.75
		US pt.	2.28/5.33	3.80/3.80	2.22/5.18	3.70/3.70
		Imp pt.	1.90/4.44	3.17/3.17	1.85/4.31	3.08/3.08
COOLANT CAPACITY	Engine radiator and heater		3.23 liters (6.82/5.68 US/Imp. pt.)		3.13 liters (6.61/5.51 US/Imp. pt.)	
	Reservoir tank		0.37 liters (0.78/0.65 US/Imp. pt.)			
	Total		3.60 liters (7.61/6.34 US/Imp. pt.)		3.50 liters (7.40/6.16 US/Imp. pt.)	



75F00-6B-7-3

COOLANT LEVEL

Coolant Level

To check level, lift hood and look at "see-through" coolant reservoir tank.

It is not necessary to remove radiator cap to check coolant level.

WARNING:

To help avoid danger of being burned:

- do not remove reservoir tank cap while coolant is "boiling", and
- do not remove radiator cap while engine and radiator are still hot.

Scalding fluid and steam can be blown out under pressure if either cap is taken off too soon.

When engine is cool, check coolant level in reservoir tank.

A normal coolant level should be between "FULL" and "LOW" marks on reservoir tank.

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

NOTE:

- If proper quality antifreeze is used, there is no need to add extra inhibitors or additives that claim to improve system. They may be harmful to proper operation of system, and are unnecessary expense.
- When installing reservoir cap, align arrow marks on reservoir and cap.

COOLING SYSTEM SERVICE

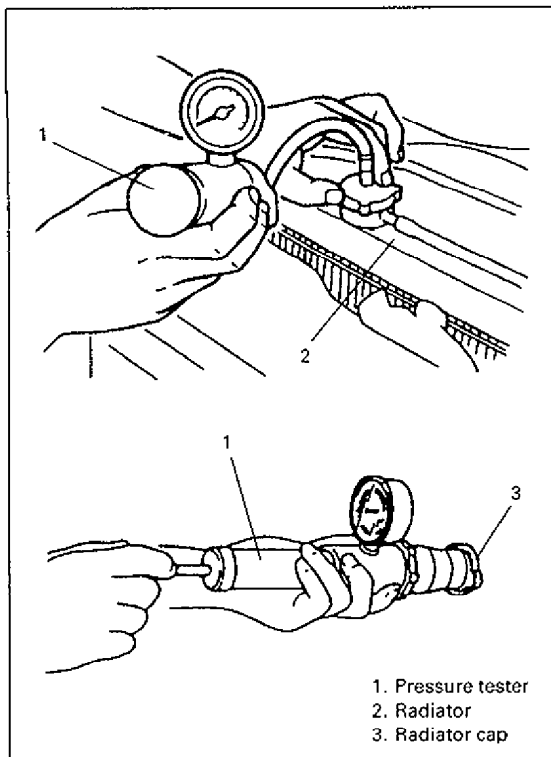
WARNING:

To help avoid danger of being burned, do not remove radiator cap while engine and radiator are still hot.

Scalding fluid and steam can be blown out under pressure if cap is taken off too soon.

Cooling system should be serviced as follows.

- 1) Check cooling system for leakage or damage.
- 2) Wash radiator cap and filler neck with clean water by removing radiator cap when engine is cold.
- 3) Check coolant for proper level and freeze protection.



75F00-6B-8-2

- 4) Using a pressure tester, check system and radiator cap for proper pressure holding capacity 110 kPa (1.1 kg/cm², 15.6 psi). If replacement of cap is required, use proper cap specified torque for this vehicle.

NOTE:

After installing radiator cap to radiator, make sure that the ear of cap lines is parallel to radiator.

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

COOLING SYSTEM FLUSH AND REFILL

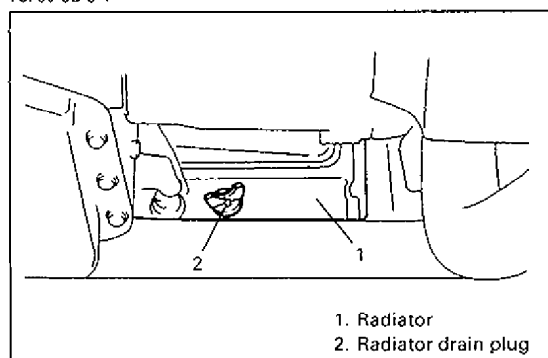
- 1) Remove radiator cap when engine is cool:
Turn cap counterclockwise slowly until it reaches a "stop".
(Do not press down while turning it.)
Wait until pressure is relieved (indicated by a hissing sound) then press down on cap and continue to turn it counterclockwise.

WARNING:

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

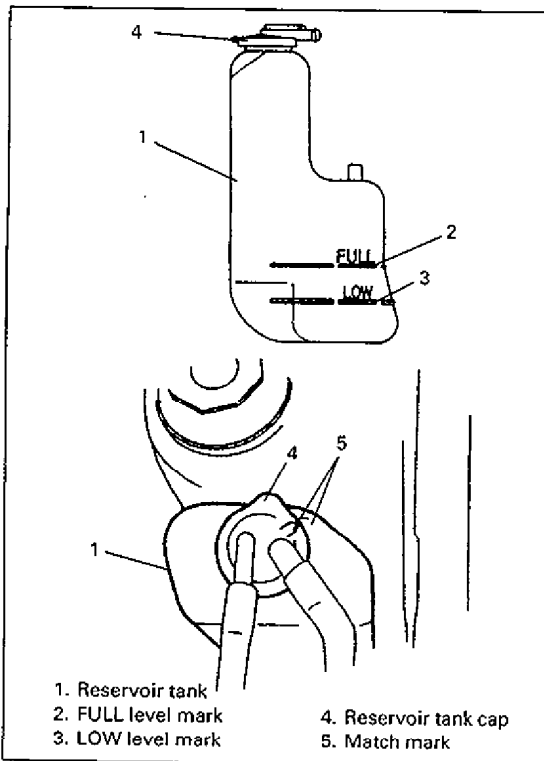
- 2) With radiator cap removed, run engine until upper radiator hose is hot (this shows that thermostat is open and coolant is flowing through system).

75F00-6B-8-4



75F00-6B-8-5

- 3) Stop engine and drain coolant.
- 4) Close drain plug. Add water until system is filled and run engine until upper radiator hose is hot again.
- 5) Repeat steps 3) and 4) several times until drained liquid is nearly colorless.
- 6) Drain system and then close radiator drain plug tightly.



75F00-6B-9-2

- 7) Remove reservoir tank and remove cap from reservoir tank and pour out any fluid, scrub and clean inside of tank with soap and water.
Flush it well with clean water and drain. Reinstall tank.
- 8) Add 50/50 mixture of good quality ethylene glycol anti-freeze and water to radiator and tank.
Fill radiator to the base of radiator filler neck and reservoir tank to "FULL" level mark. Reinstall reservoir tank cap and align match marks on tank and cap.
- 9) Run engine, with radiator cap removed, until radiator upper hose is hot.
- 10) With engine idling, add coolant to radiator until level reaches the bottom of filler neck. Install radiator cap, making sure that the ear of cap lines is parallel to radiator.

WATER PUMP BELT TENSION

WARNING:

- Disconnect negative cable at battery before checking and adjusting belt tension.
- See "WARNING" described in "COOLING SYSTEM SERVICE".

- 1) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If it is necessary to replace belt, refer to page 6B-12 for procedure.

- 2) Check belt for tension. Belt is in proper tension when it deflects 9 to 12 mm (0.35 – 0.47 in.) under thumb pressure (about 10 kg or 22 lb.).

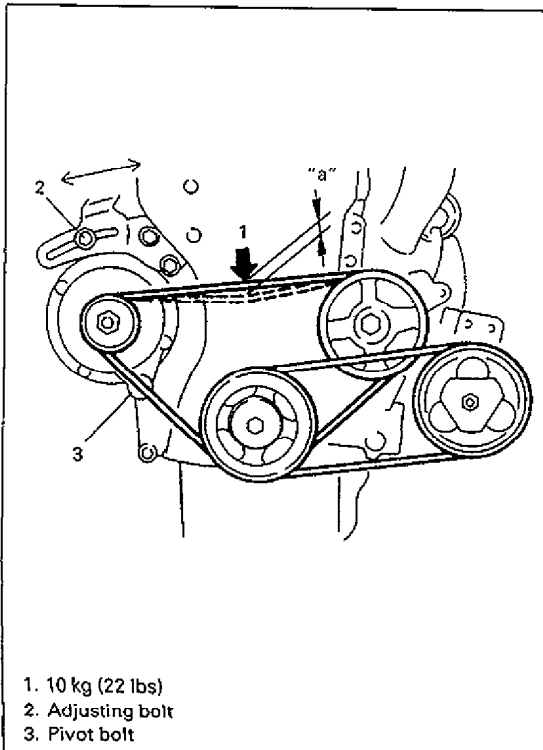
Belt tension "a": 12 – 15mm (0.47 – 0.59 in.) as deflection

NOTE:

When replacing belt with a new one, adjust belt tension to 8 – 9 mm (0.31 – 0.35 in.).

- 3) If belt is too tight or too loose, adjust it to proper tension by displacing generator position.
- 4) Tighten belt adjusting bolt and generator pivot bolts.
- 5) Connect negative cable at battery terminal.

75F00-6B-9-3



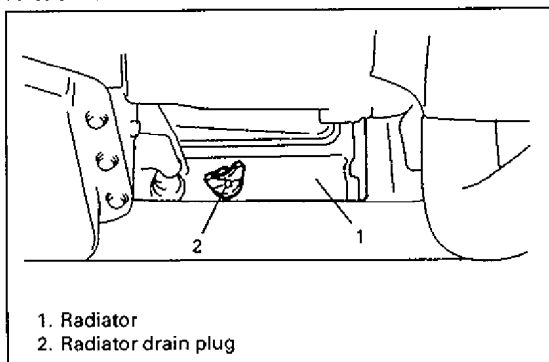
75F00-6B-9-5

ON-VEHICLE SERVICE

WARNING:

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

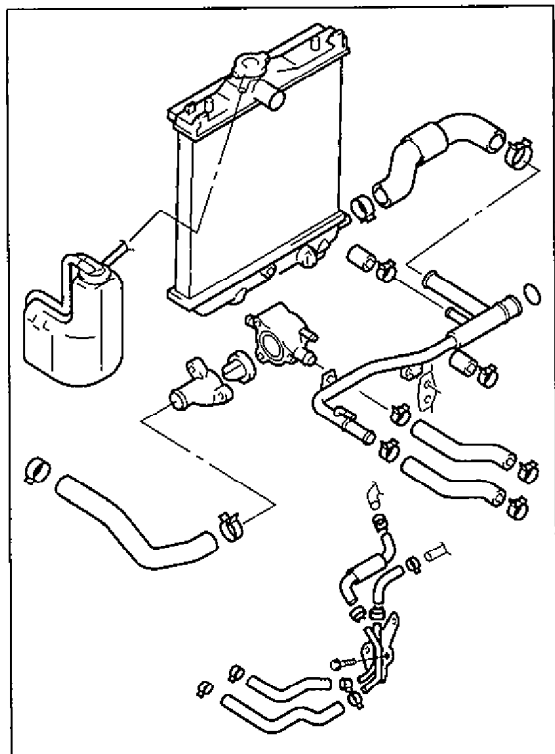
75F00-6B-10-1



COOLING SYSTEM DRAINING

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

75F00-6B-10-2



COOLING WATER PIPES OR HOSES

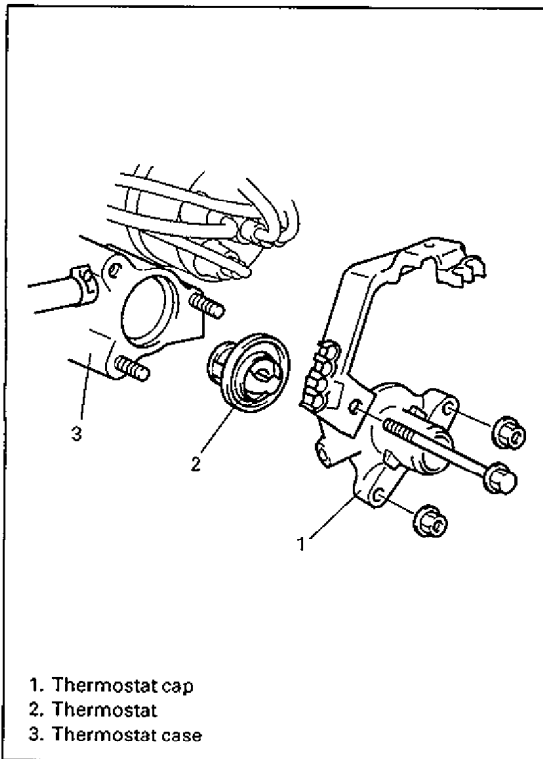
REMOVAL

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

INSTALLATION

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

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

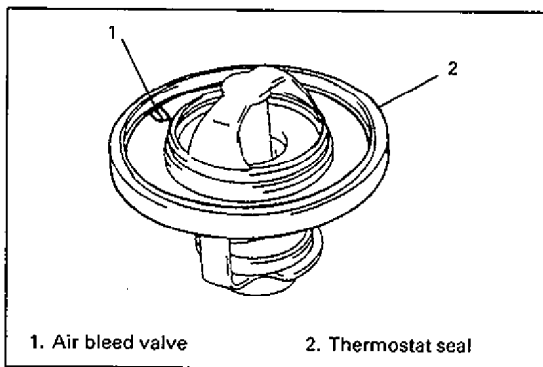


75F00-6B-11-2

THERMOSTAT

REMOVAL

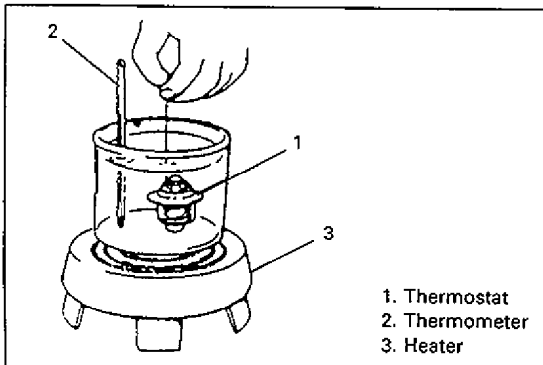
- 1) Drain coolant and tighten drain plug.
- 2) Remove radiator inlet hose at thermostat cap.
- 3) Remove thermostat cap.
- 4) Remove thermostat.



75F00-6B-11-3

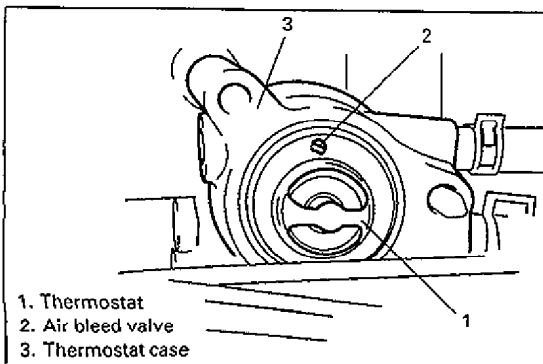
INSPECTION

- 1) Make sure that air bleed valve of thermostat is clean.
Should this valve be clogged, engine would tend to over-heat.
- 2) Check to make sure that valve seat is free from foreign matters which would prevent valve from seating tight.
- 3) Check thermostat seal for breakage, deterioration or any other damage.



75F00-6B-11-4

- 4) Check thermostatic movement of wax pellet as follows:
 - ① Immerse thermostat in water, and heat water gradually.
 - ② Check that valve starts to open at specific temperature.
 - ③ If valve starts to open at a temperature substantially below or above specific temperature, thermostat unit should be replaced with a new one. Such a unit, if re-used, will bring about overcooling or overheating tendency.



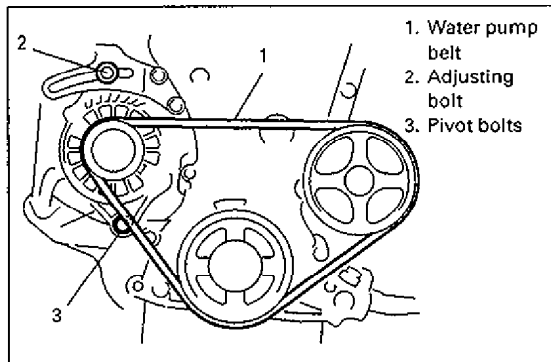
75F00-6B-11-5

INSTALLATION

- 1) When positioning thermostat on thermostat case, be sure to position it so that air bleed valve comes at position as shown in figure.
- 2) Install thermostat cap to thermostat case.
- 3) Connect cooling water hose.

- 4) Fill cooling system (refer to page 6B-6, 6B-7).
- 5) Connect negative cable at battery.
- 6) After installation, check each part for leakage.

75F00-6B-12-1



75F00-6B-12-2

WATER PUMP BELT

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove air cleaner assembly.
- 3) Loosen drive belt adjusting bolt and generator pivot bolts.
When servicing car equipped with A/C, remove compressor drive belt before removing water pump belt.
- 4) Slacken belt by displacing generator and then remove it.

INSTALLATION

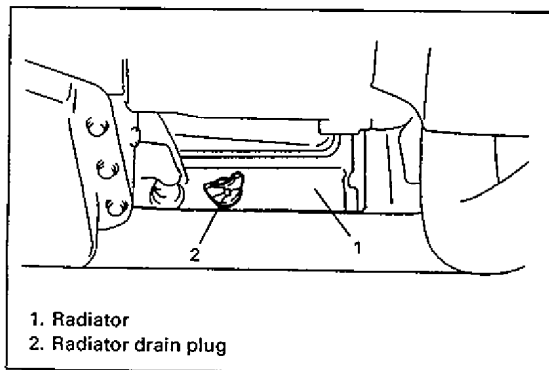
- 1) Install belt to water pump pulley, crankshaft pulley and generator pulley.
When servicing car equipped with A/C, install compressor drive belt, too.
- 2) Adjust belt tension.
For Adjustment of compressor drive belt tension, refer to SECTION 0B of this manual.
- 3) Tighten water pump belt adjusting bolt and pivot bolts.
- 4) Connect negative cable at battery.

WATER PUMP BELT TENSION INSPECTION AND ADJUSTMENT

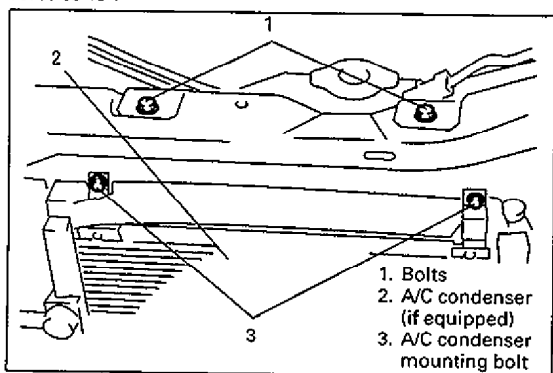
For this inspection or adjustment, refer to WATER PUMP BELT TENSION on page 6B-9.

75F00-6B-12-3

75F00-6B-12-4



75F00-6B-13-1



75F00-6B-13-2

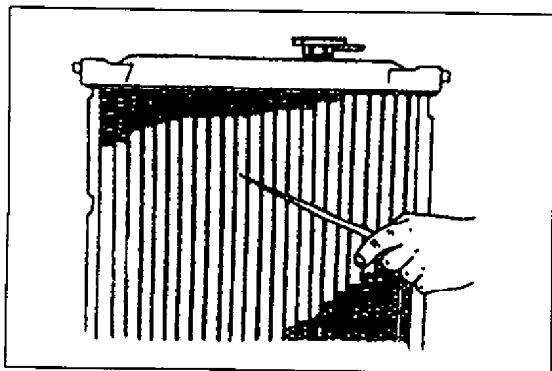
RADIATOR

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Drain cooling system by loosening drain plug of radiator.
- 3) Disconnect coupler of cooling fan motor.
- 4) Remove front bumper (see Section 9).
- 5) Remove air cleaner case and air intake hose (see Section 6A4).
- 6) Remove A/C condenser mounting bolt (if equipped) and radiator bolts.

- 7) Disconnect radiator inlet and outlet hoses and reservoir tank hose from radiator.
- 8) Remove radiator with cooling fan motor.

75F00-6B-13-3



75F00-6B-13-4

INSPECTION

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

CLEANING

Clean frontal area of radiator cores.

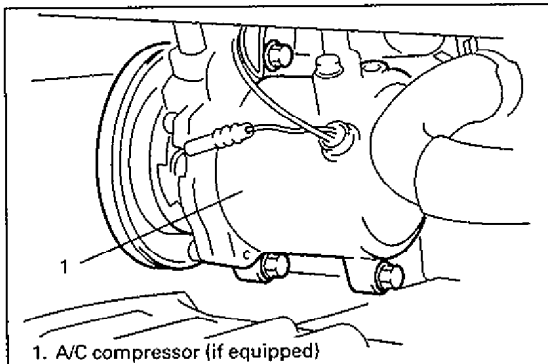
INSTALLATION

Reverse removal procedures.

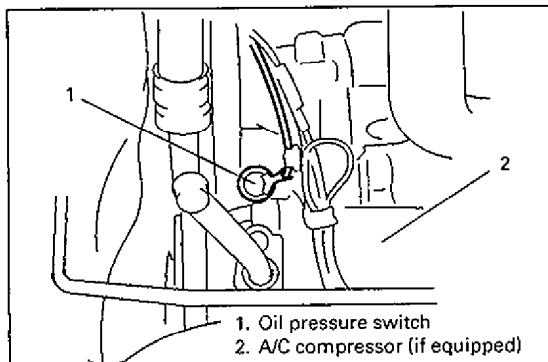
NOTE:

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

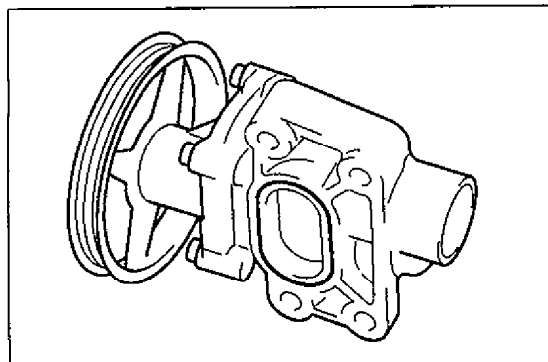
75F00-6B-14-1



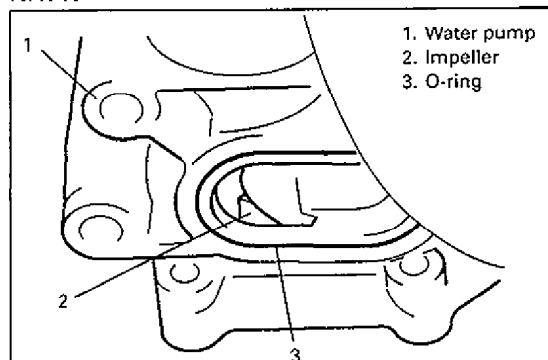
75F00-6B-14-2



75F00-6B-14-3



75F00-6B-14-4



75F00-6B-14-5

WATER PUMP

- 1) Disconnect negative cable at battery.
- 2) Drain coolant.
- 3) Remove front bumper (see Section 9).
- 4) Remove exhaust manifold cover.
- 5) Remove A/C compressor from its bracket with hose still attached (if equipped), then remove A/C compressor belt.
- 6) Loosen drive belt adjusting bolt and generator pivot bolt, then Remove water pump bolt.
- 7) Disconnect oil pressure switch coupler and remove clamp.
- 8) Remove water pump assembly by removing 4 bolts.

INSPECTION

NOTE:

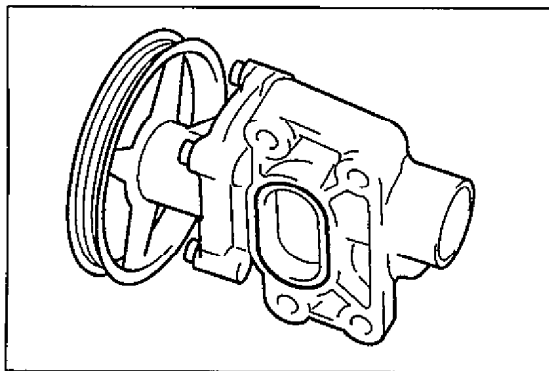
Do not disassemble water pump.

If any repair is required on pump, replace it as assembly.

- 1) Rotate water pump by hand to check for smooth operation. If pump does not rotate smoothly or makes abnormal noise, replace it.
- 2) Inspect water pump impeller for damage. Replace as necessary.

NOTE:

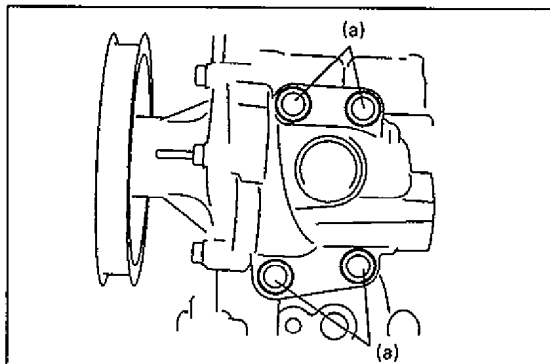
Do not disassemble water pump to check the water pump impeller.



75F00-6B-15-1

INSTALLATION

1) Install new O-rings to water pump and water inlet pipe.



75F00-6B-15-2

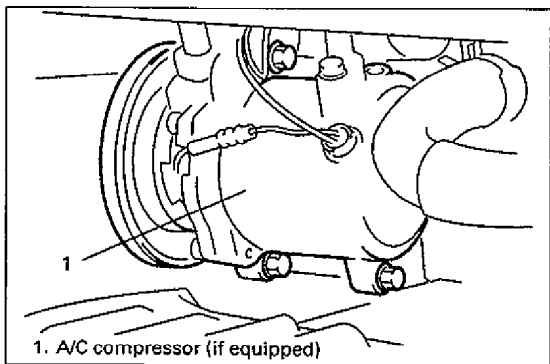
2) Install water pump to cylinder block and tighten to specified torque.

Tightening Torque

(a): 22 N·m (2.2 kg-m, 16.0 lb-ft)

3) Connect oil pressure switch coupler and install clamp with its harness.

4) Install A/C compressor to its bracket.



75F00-6B-15-3

5) Install exhaust manifold cover.

6) Install water pump belt (refer to page 6B-12).

7) Install A/C compressor belt (if equipped).

8) Fill coolant.

9) Connect negative cable at battery.

REQUIRED SERVICE MATERIAL

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

75F00-6B-15-4

SECTION 6C

ENGINE FUEL

6C

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

CONTENTS

GENERAL DESCRIPTION	6C- 2	ON-VEHICLE SERVICE	6C- 4
Fuel System	6C- 2	Fuel Lines	6C- 5
Fuel Tank	6C- 2	Fuel Pipe	6C- 5
Fuel Pump Assembly (with fuel filter, fuel level gauge and fuel cut valve)	6C- 3	Fuel Filler Cap	6C- 6
Fuel Filler Cap	6C- 3	Fuel Tank	6C- 7
		Fuel Pump Assembly (with fuel filter, fuel level gauge and fuel cut valve)	6C-11
		SPECIAL TOOL	6C-13

CAUTION:

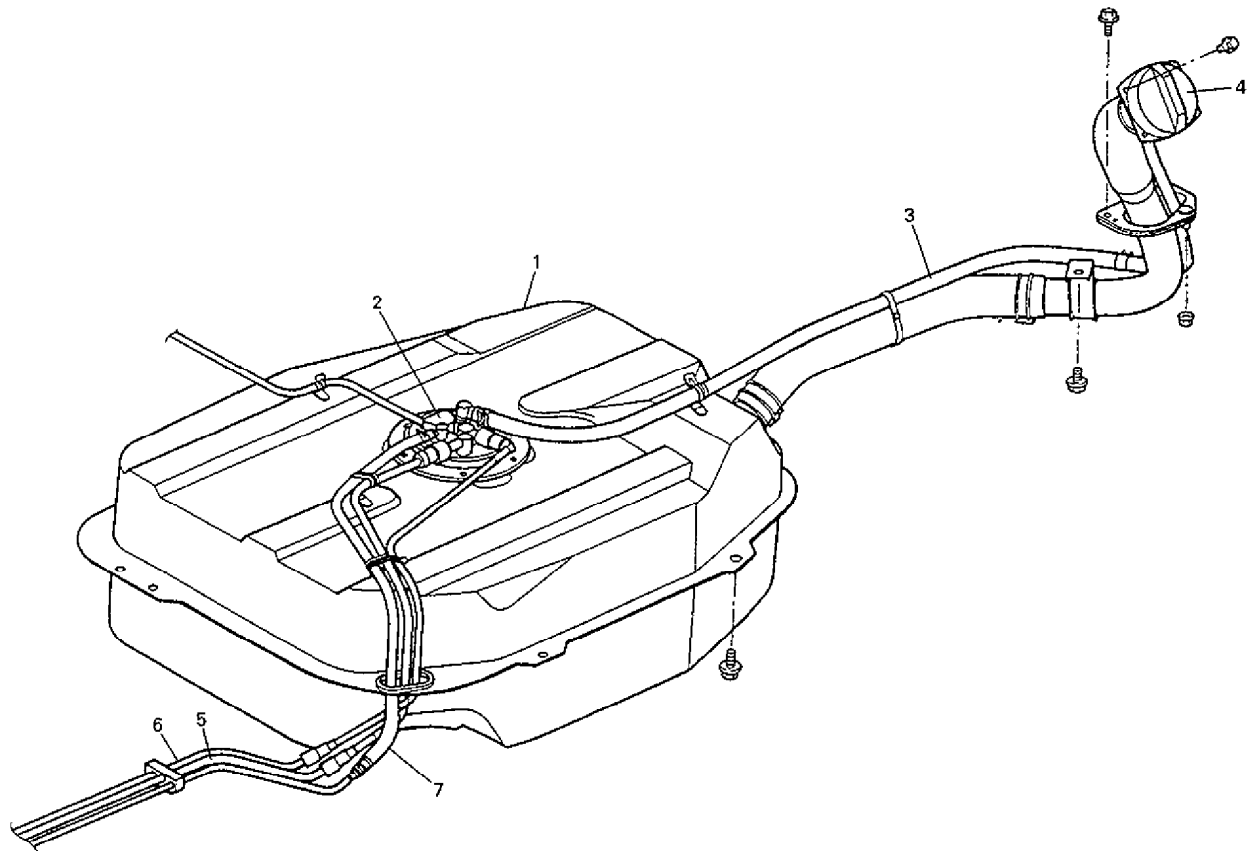
THE ENGINE OF THIS VEHICLE REQUIRES THE USE OF UNLEADED FUEL ONLY. USE OF LEADED AND/OR LOW LEAD FUEL CAN RESULT IN ENGINE DAMAGE AND REDUCE THE EFFECTIVENESS OF THE EMISSION CONTROL SYSTEM.

GENERAL DESCRIPTION

FUEL SYSTEM

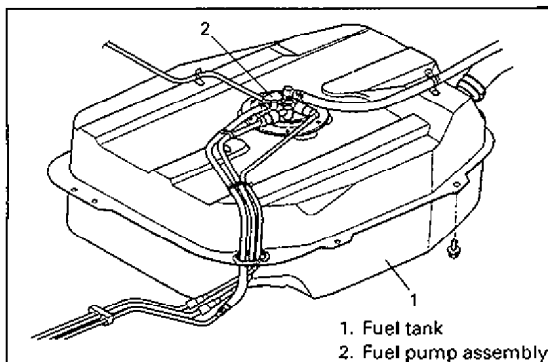
The main components of the fuel system are fuel tank, fuel pump assembly (with fuel filter and fuel level gauge and fuel cut valve), fuel feed line, fuel return line and fuel vapor line.

For the details of fuel flow and fuel vapor flow, refer to "ENGINE AND EMISSION CONTROL SYSTEM" section.



1. Fuel tank
2. Fuel pump assembly
3. Breather hose
4. Fuel filler cap
5. Fuel feed line
6. Fuel return line
7. Fuel vapor line (vehicle with EVAP canister only)

75F00-6C-2-4

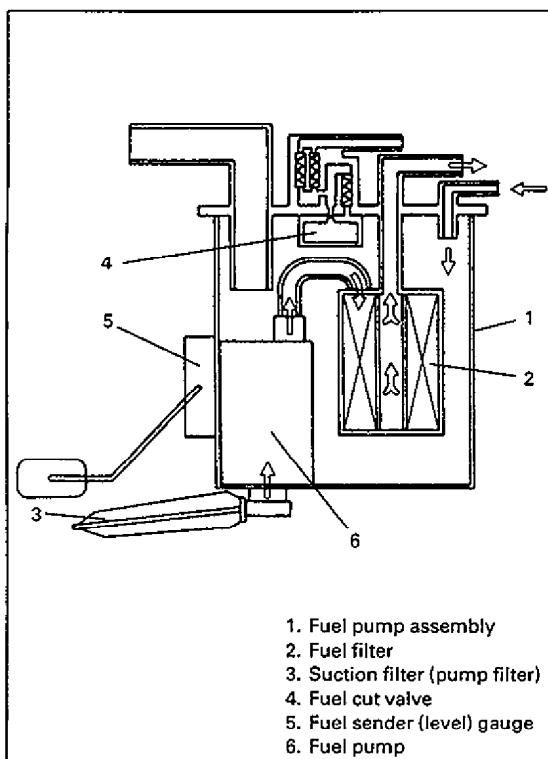


1. Fuel tank
2. Fuel pump assembly

75F00-6C-2-5

FUEL TANK

The fuel tank is located under the rear section of the vehicle. The fuel pump assembly is installed in fuel tank. Whenever servicing the fuel pump assembly, the fuel tank must be removed from the vehicle.



75F00-6C-3-1

FUEL PUMP ASSEMBLY (WITH FUEL FILTER, LEVEL GAUGE (SENSOR) AND FUEL CUT VALVE)

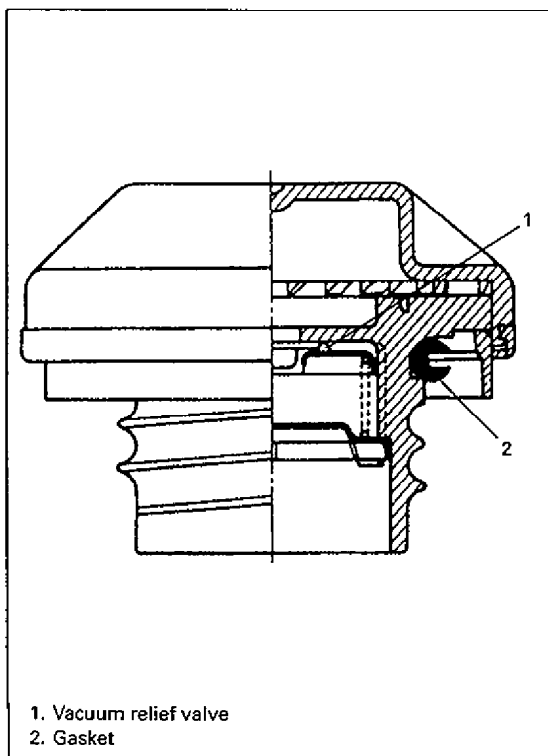
The fuel pump assembly consists of fuel pump, fuel filter, fuel sender (level) gauge (sensor) and fuel cut valve.

Fuel Pump

For structure and operation of the fuel pump, refer to Section 6E1.

Fuel Cut Valve

The fuel cut valve consists of a float and a spring. It allows only the fuel vapor to flow into the canister and prevents the fuel from flowing into the canister.



75F00-6C-3-4

FUEL FILLER CAP

The fuel tank filler neck has a vacuum cap.

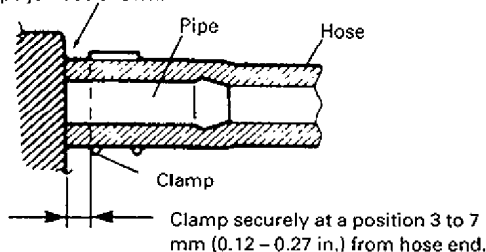
A ratchet tightening device on the threaded fuel filler cap reduces the chances of incorrect installation, which would prevent sealing fuel vapors.

After the gasket on fuel filler cap and the filler neck flange contact, the ratchet produces a loud clicking noise, indicating the seal has been set.

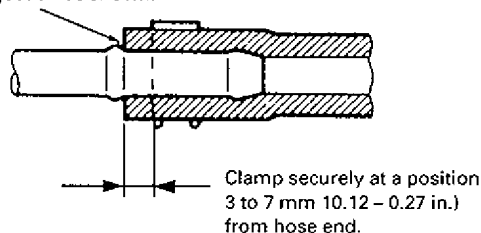
This cap has a vacuum relief valve inside.

The vacuum relief valve opens to relieve the vacuum created in the fuel tank.

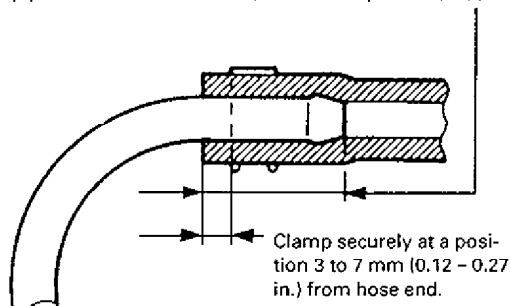
With short pipe, fit hose as far as it reaches pipe joint as shown.



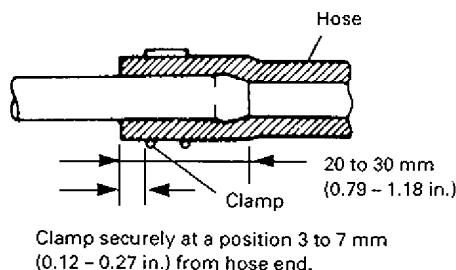
With following type pipe, fit hose as far as its peripheral projection as shown.



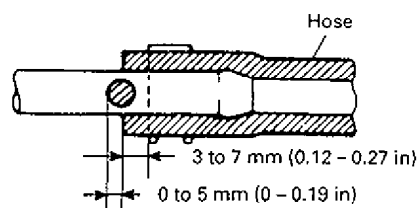
With bent pipe, fit hose as far as its bent part as shown or till pipe is about 20 to 30 mm (0.79-1.18 in.) into the hose.



With straight pipe, fit hose till pipe is about 20 to 30 mm (0.79-1.18 in.) in the hose.



With red marked pipe, fit hose till hose end reaches red mark on pipe.

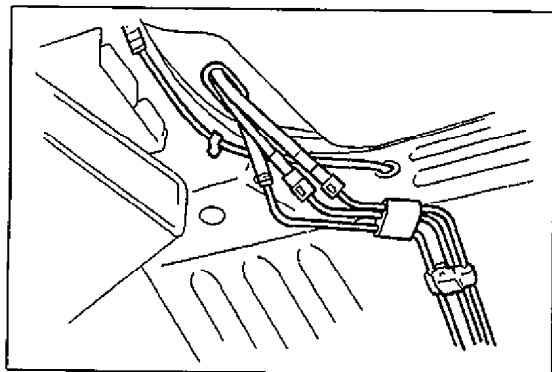


ON-VEHICLE SERVICE

WARNING:

Before attempting service of any type on fuel system, following cautions should be always observed.

- Disconnect negative cable at battery.
 - DO NOT smoke, and place "NO SMOKING" signs near work area.
 - Be sure to have CO₂ fire extinguisher handy.
 - Be sure to perform work in a well-ventilated area and away from any open flames (such as gas hot heater).
 - Wear safety glasses.
 - To relieve fuel vapor pressure in fuel tank, remove fuel filler cap from fuel filler neck and then reinstall it.
 - As fuel feed line is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected.
- Before loosening or disconnecting fuel feed line, make sure to relieve fuel pressure according to procedure described on p. 6-4.
- A small amount of fuel may be released after the fuel line is disconnected. In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Be sure to put that cloth in an approved container when disconnection is completed.
 - Note that fuel hose connection varies with each type of pipe. Be sure to connect and clamp each hose correctly referring to the left figure.



75F00-6C-5-1

FUEL LINES

Due to the fact that fuel feed line is under high pressure, use special care when servicing it.

INSPECTION

Visually inspect fuel lines for evidence of fuel leakage, hose crack and deterioration, or damage.

Make sure all clamps are secure.

Replace parts as needed.

FUEL PIPE

REMOVAL

- 1) Relieve fuel pressure in fuel feed line according to procedure on Section 6 p. 6-4.
- 2) Disconnect negative cable at battery.
- 3) Remove steering gear box ass'y. Refer to Section 3B of this manual for details.
- 4) Remove pipe cover from vehicle.
- 5) Disconnect fuel pipe joint and fuel hose from fuel pipe at the front and rear of each fuel pipe.

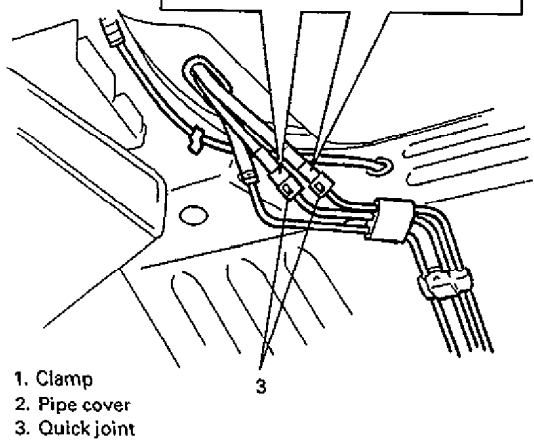
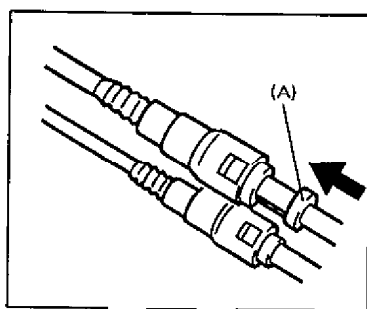
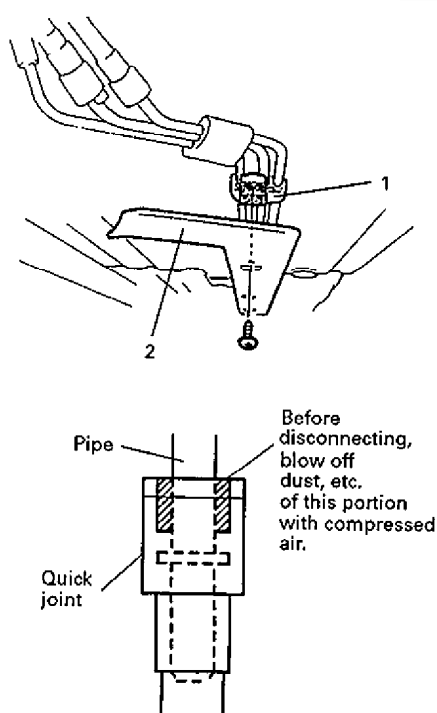
For quick joint, disconnect it as follows:

- a) Remove mud, dust and/or foreign material between pipe and joint by blowing compressed air.
- b) Unlock joint lock by inserting special tool between pipe and joint.

Special Tool

(A): 09919-47020

- c) Disconnect joint from pipe.



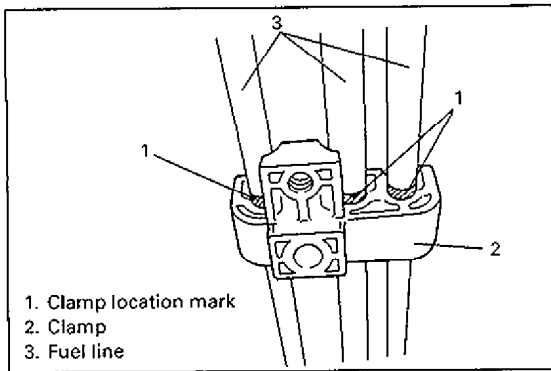
1. Clamp
2. Pipe cover
3. Quick joint

75F00-6C-5-5

WARNING:

A small amount of fuel may be released after fuel hose is disconnected. In order to reduce the chance of personal injury, cover hose and pipe to be disconnected with a shop cloth.

Be sure to put that cloth in an approved container when disconnection is completed.



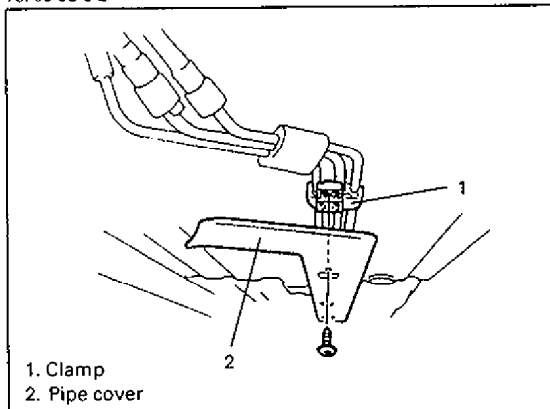
75F00-6C-6-1

- 6) Mark the location of clamps on fuel pipes, so that the clamps can be reinstalled to where they were.
- 7) Remove pipes with clamp from vehicle.
- 8) Remove clamp from pipes.

INSTALLATION

- 1) Install clamps to marked location on pipes. If clamp is deformed or its claw is bent or broken, replace it with new one.
- 2) Install pipes with pipe clamps to vehicle.

75F00-6C-6-2



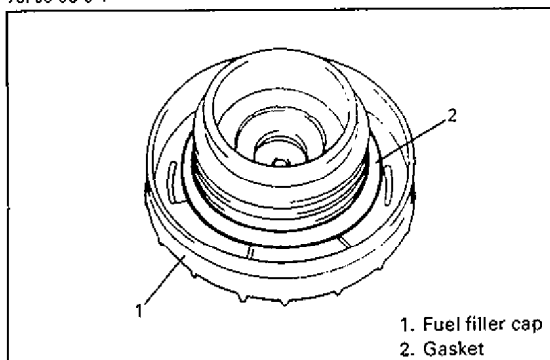
- 3) Connect fuel hoses and pipes to each pipe.

CAUTION:

When connecting joint, clean outside surfaces of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.

- 4) Install pipe cover to vehicle.
- 5) Install steering gear box. Refer to Section 3B of this manual for details.
- 6) With engine "OFF" and ignition switch "ON", check for fuel leaks.

75F00-6C-6-4



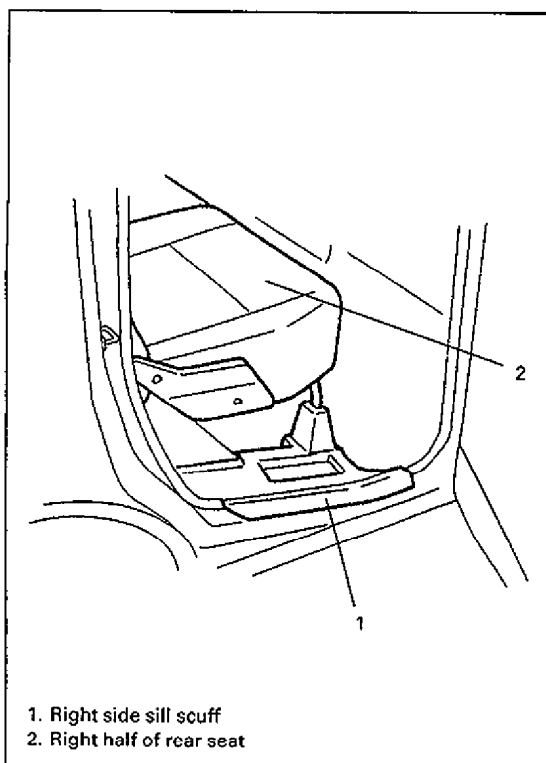
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FUEL FILLER CAP

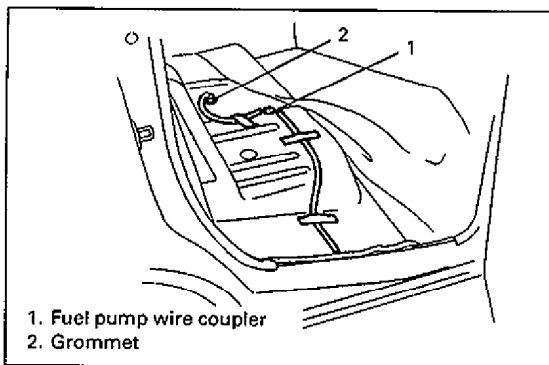
Remove cap, and check gasket for even filler neck imprint, and deterioration or any damage. If gasket is in malcondition, replace cap.

NOTE:

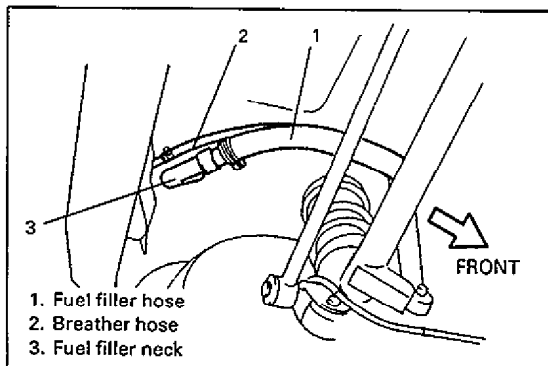
If cap requires replacement, only a cap with the same features should be used. Failure to use correct cap can result in critical malfunction of system.



75F00-6C-7-2



75F00-6C-7-3



75F00-6C-7-4

FUEL TANK

REMOVAL

WARNING:

Refer to the **WARNING** at the beginning of **ON-VEHICLE SERVICE** in this section.

- 1) Relieve fuel pressure in fuel feed line according to procedure described in Section 6 page 6-4.
- 2) Disconnect negative cable at battery.
- 3) Remove right rear side sill scuff and right half of rear seat assembly.
- 4) Peel rear end of the carpet.

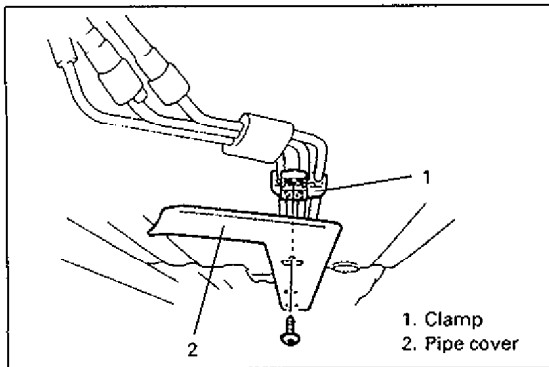
- 5) Disconnect fuel pump wire coupler and undo grommet.
- 6) Hoist vehicle.

- 7) Disconnect fuel filler hose and breather hose from filler neck.

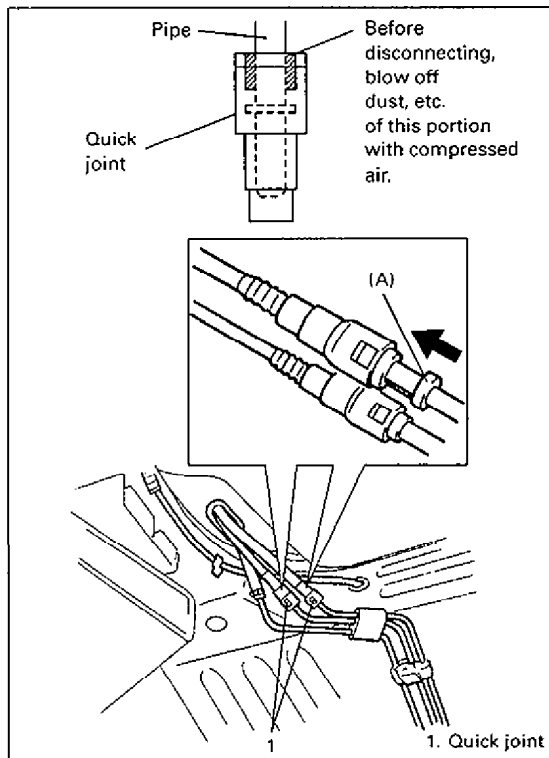
- 8) Due to absence of fuel tank drain plug, drain fuel tank by pumping fuel out through fuel tank filler.
Use hand operated pump device to drain fuel tank.

CAUTION:

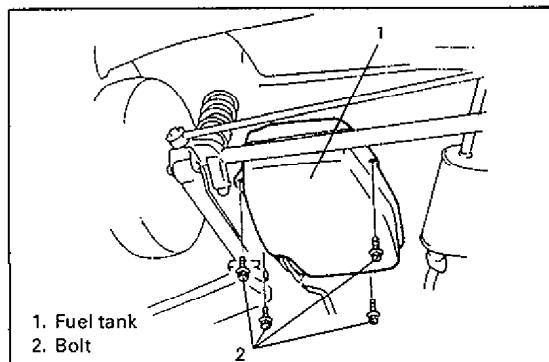
Never drain or store fuel in an open container due to possibility of fire or explosion.



75F00-6C-8-1



75F00-6C-8-3



75F00-6C-8-4

9) Remove fuel pipe cover.

10) Disconnect fuel pipe joint and fuel hoses from pipes.

For quick joint, disconnect it as follows:

- Remove mud, dust and/or foreign material between pipe and joint by blowing compressed air.
- Unlock joint lock by inserting special tool between pipe and joint.

Special Tool

(A): 09919-47020

- Disconnect joint from pipe.

WARNING:

A small amount of fuel may be released after the fuel hose is disconnected. In order to reduce the chance of personal injury, cover the hose and pipe to be disconnected with a shop cloth. Be sure to put that cloth in an approved container when disconnection is completed.

11) Remove fuel tank from vehicle.

INSPECTION

After removing fuel tank, check hoses and pipes connected to fuel tank for leaks, loose connections, deterioration or damage. Also check fuel pump assembly gaskets for leaks, visually inspect fuel tank for leaks and damage.

Replace any damaged or malconditioned parts.

FUEL TANK PURGING PROCEDURE

WARNING:

This purging procedure will NOT remove all fuel vapor. Do not attempt any repair on tank using heat of flame as an explosion resulting in personal injury could occur.

Following procedure is used purging fuel tank.

- 1) After removing fuel tank, remove all hoses, pipes, fuel pump assembly from fuel tank.
- 2) Drain all remaining fuel from tank.
- 3) Move tank to flushing area.
- 4) Fill tank with warm water or tap water, and agitate vigorously and drain. Repeat this washing until inside of tank is clean.
Replace tank if its inside is rusty.
- 5) Completely flush out remaining water after washing.

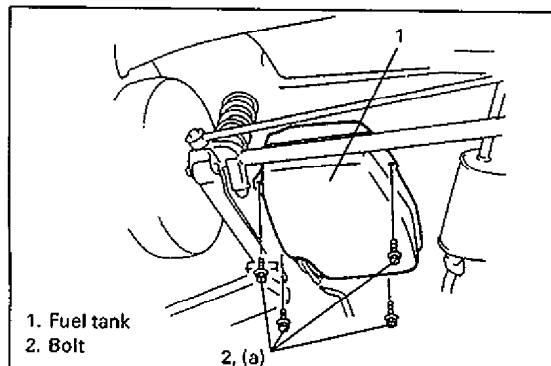
CAUTION:

Never remain water in fuel tank after washing, or fuel tank inside will get corrosion.

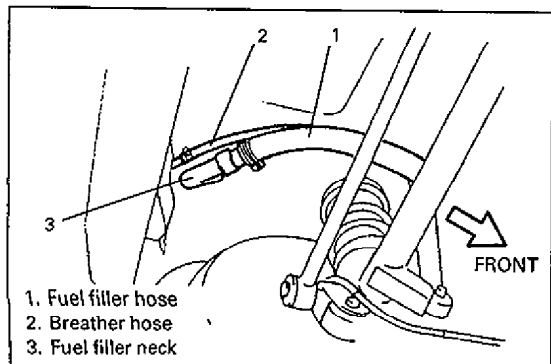
INSTALLATION

- 1) If parts have been removed from fuel tank, install them before installing fuel tank to vehicle.

75F00-6C-9-3



75F00-6C-9-4



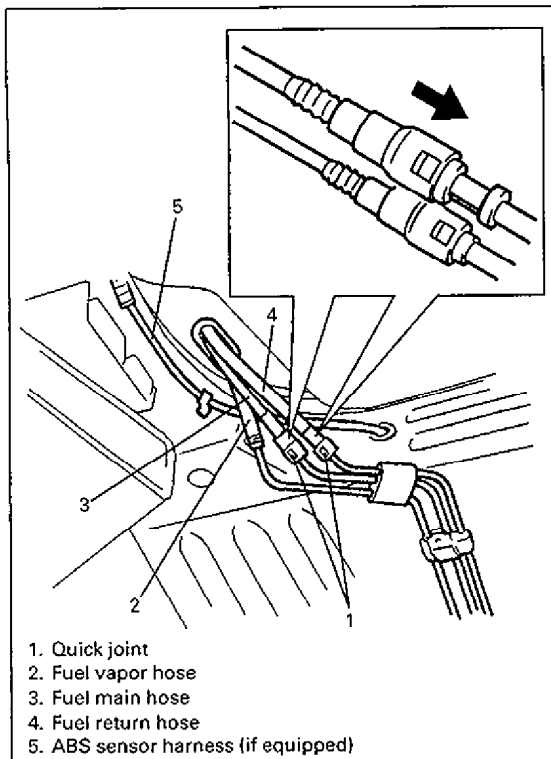
75F00-6C-9-5

- 2) Install fuel tank to vehicle.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 3) Connect fuel filler hose and breather hose to filler neck as shown in figure and clamp them securely.

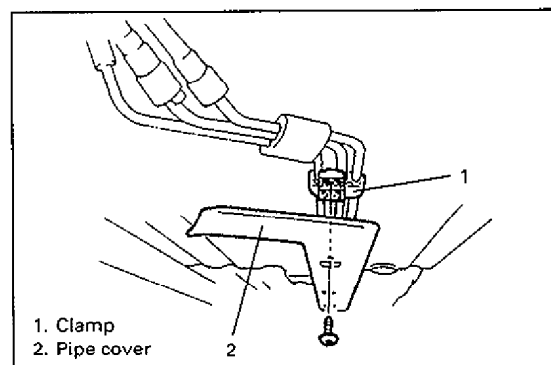


75F00-6C-10-2

- 4) Connect fuel, fuel return and vapor hoses to pipes as shown in figure and clamp them securely.

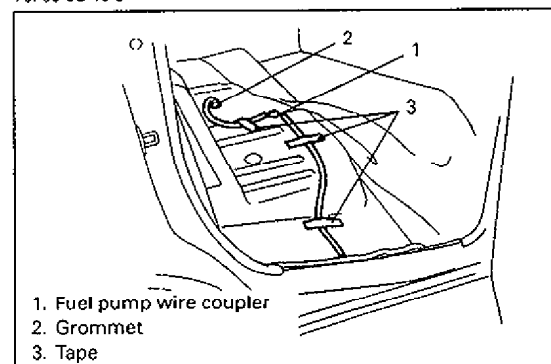
CAUTION:

- When connecting joint, clean outside surfaces of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.
- Never let the fuel hoses touch the ABS sensor harness (if equipped).



75F00-6C-10-3

- 5) Install fuel pipe cover.



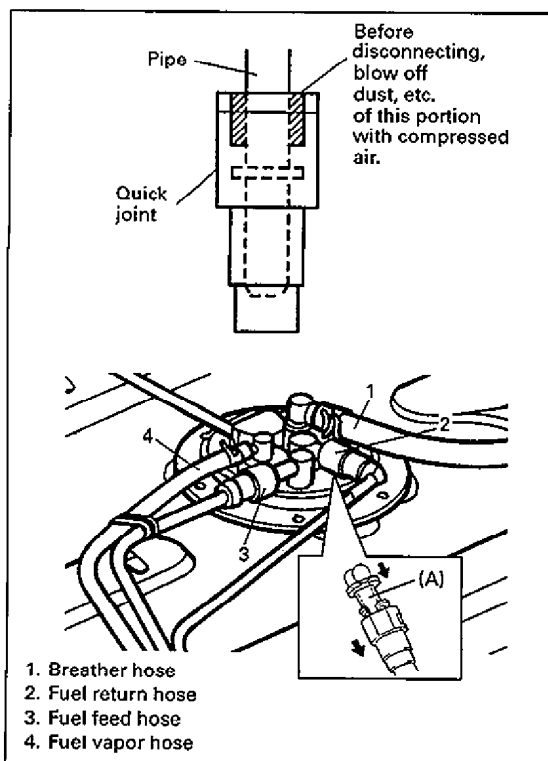
75F00-6C-10-4

- 6) Connect fuel pump wire coupler and install grommet securely.

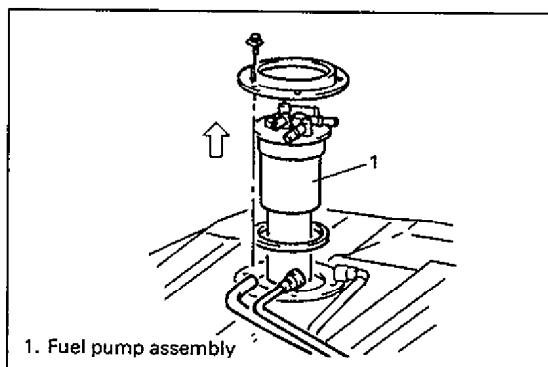
Fix wire harness with tape as shown.

- 7) Have the carpet back in place and install right half of rear seat and right rear side sill scuff.

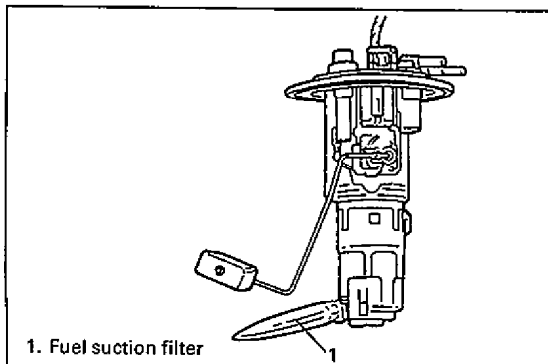
- 8) Connect negative cable at battery.
With engine "OFF" and ignition switch "ON", check for fuel leaks.



75F00-6C-11-2



75F00-6C-11-3



75F00-6C-11-4

FUEL PUMP ASSEMBLY (WITH FUEL FILTER, FUEL LEVEL GAUGE AND FUEL CUT VALVE)

WARNING:

Refer to the **WARNING** at the beginning of **ON-VEHICLE SERVICE** in this section.

REMOVAL

1) Remove fuel tank from vehicle. Refer to **FUEL TANK REMOVAL** in this section.

2) Disconnect fuel breather hose, fuel vapor hose and pipes from fuel pump assembly.

When disconnecting joint of fuel feed line or return line from pipe, unlock joint by inserting special tool between pipe and joint lock first.

Special Tool

(A): 09919-47020

3) Remove fuel pump assembly from fuel tank.

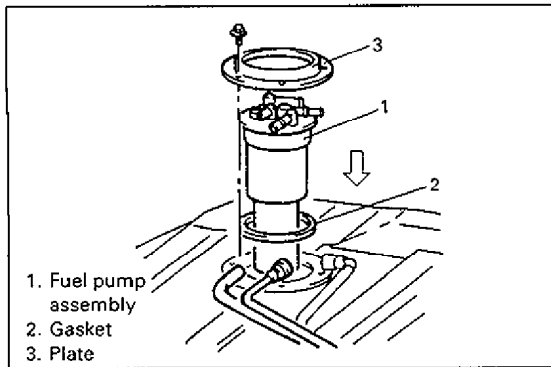
INSPECTION

Check fuel pump assembly for damage.

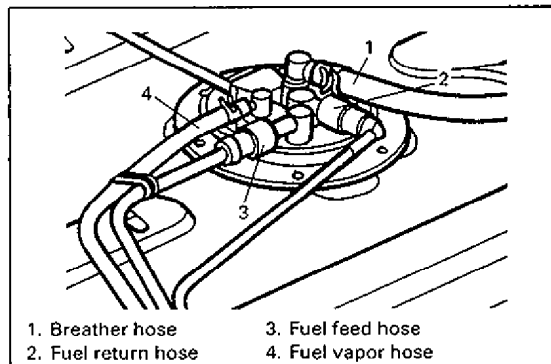
Check fuel suction filter for evidence of dirt and contamination. If present, replace or clean and check for presence of dirt in fuel tank.

For inspection of fuel pump itself, refer to Section 6E1 of this manual.

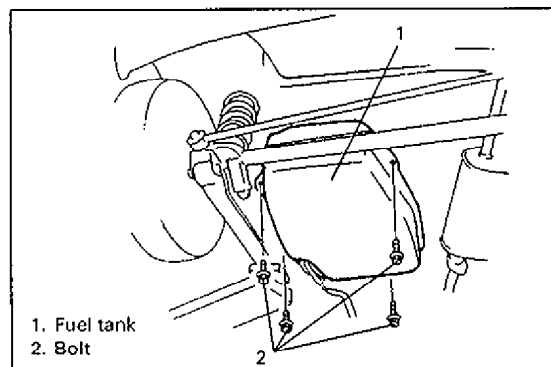
For inspection of fuel level gauge, refer to Section 8B of this manual.



75F00-6C-12-1



75F00-6C-12-2



75F00-6C-12-3

INSTALLATION

- 1) Clean mating surfaces of fuel pump assembly and fuel tank.
- 2) Install new gasket and plate to fuel pump assembly then install fuel pump assembly to fuel tank.

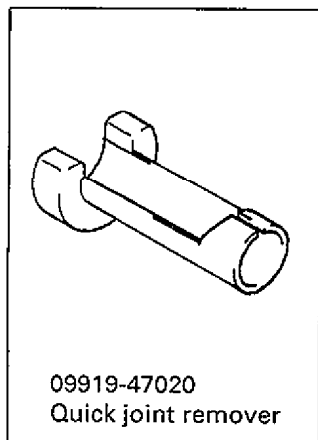
- 3) Connect fuel breather hose, fuel vapor hose and pipe joints to fuel pump assembly.

CAUTION:

When connecting joint, clean outside surface of pipe where joint is to be inserted, push joint into pipe till joint lock clicks and check to ensure that pipes are connected securely, or fuel leak may occur.

- 4) Install fuel tank to vehicle. Refer to FUEL TANK INSTALLATION in this section.

SPECIAL TOOL



SECTION 6E1

ENGINE AND EMISSION CONTROL SYSTEM (SEQUENTIAL MULTIPOINT FUEL INJECTION FOR K10A TYPE)

6E1

WARNING:**For vehicles equipped with Air Bag System**

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

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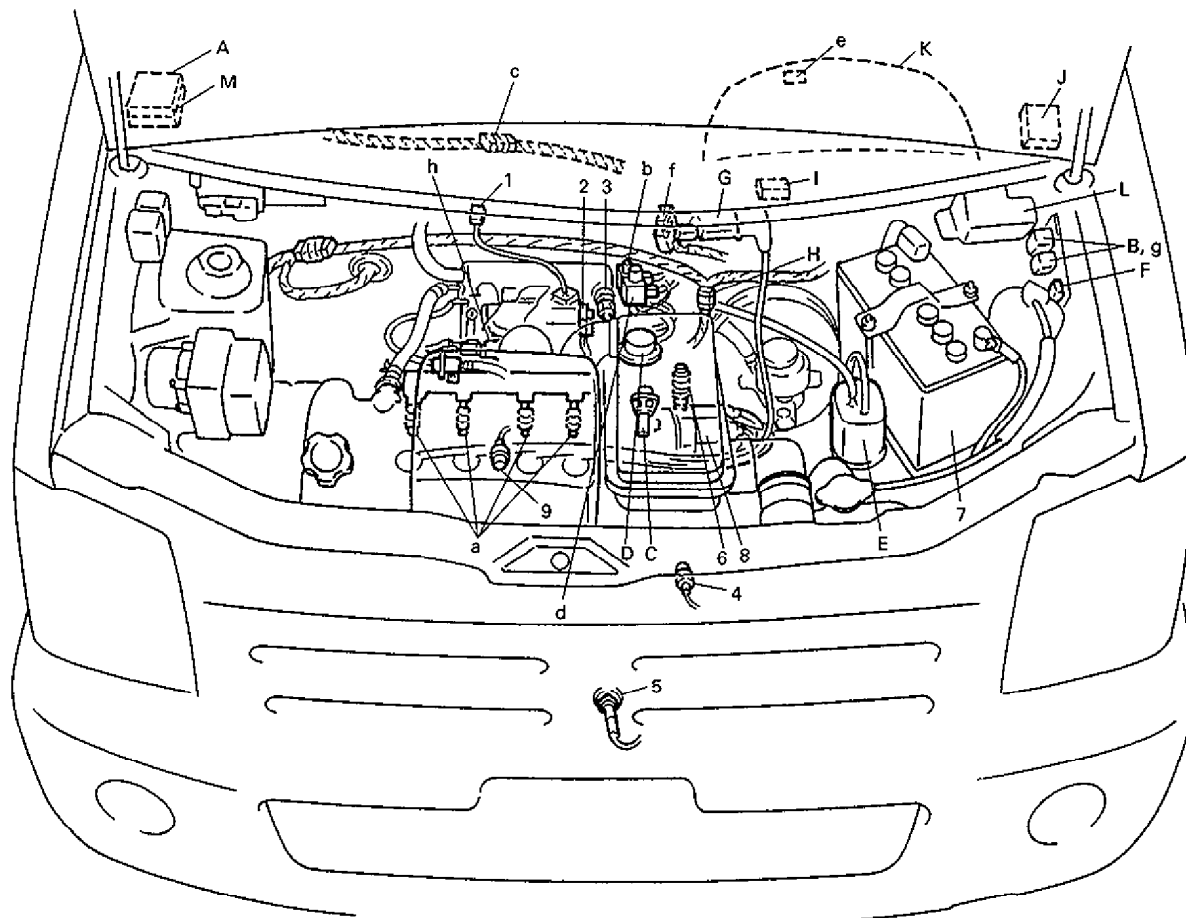
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GENERAL DESCRIPTION

The Electronic Fuel Injection System in this vehicle supplies the combustion chambers with air/fuel mixture of optimized ratio under widely varying driving conditions. It uses the sequential multiport fuel injection system which injects fuel into each intake port of the cylinder head.

SYSTEM COMPONENTS



NOTE:

Above figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the other side.

INFORMATION SENSORS

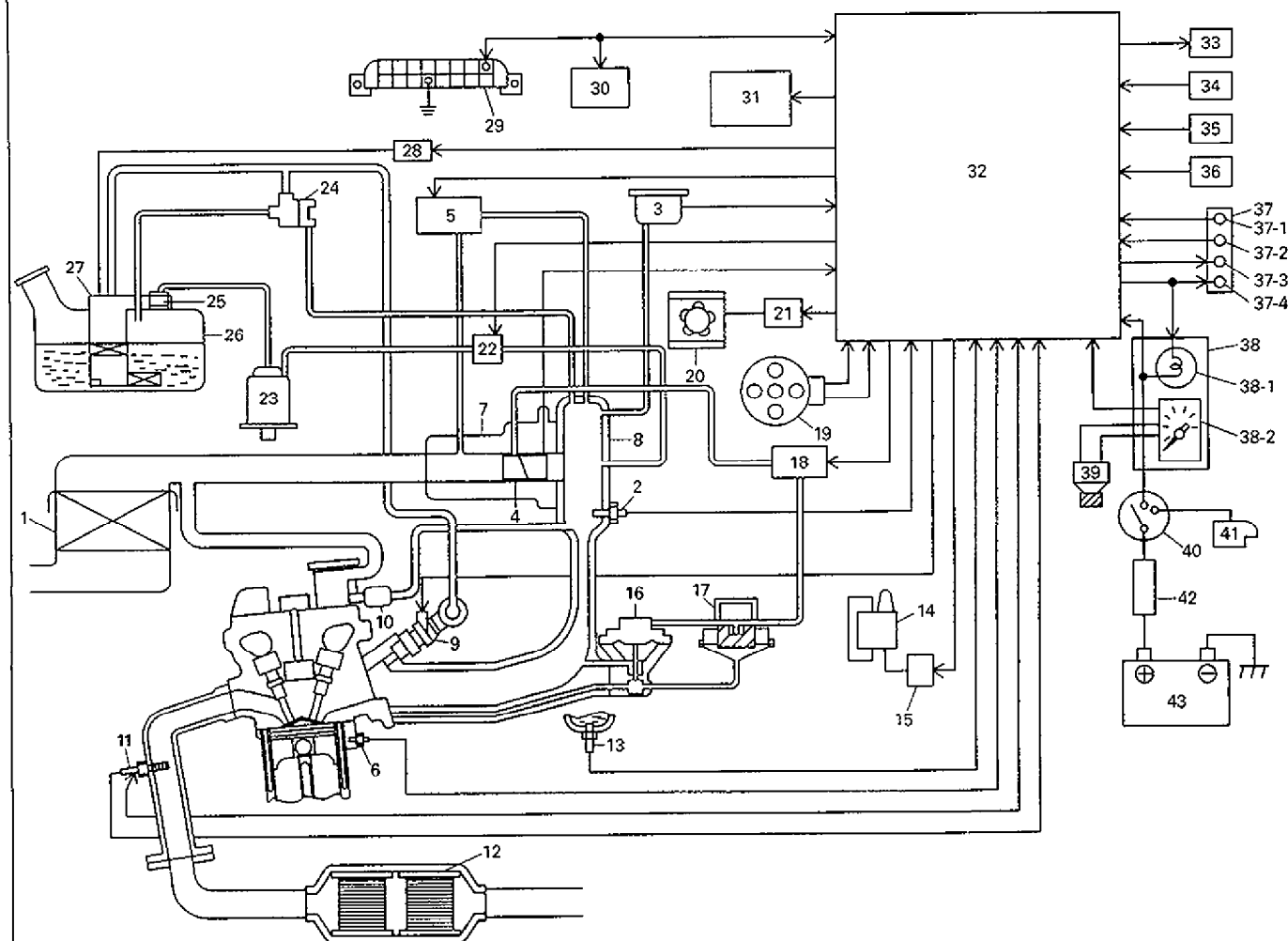
1. MAP sensor
2. TP sensor
3. IAT sensor
4. ECT sensor
5. Heated oxygen sensor
6. VSS
7. Battery
8. CMP sensor (in distributor)
9. Knock sensor

CONTROL DEVICES

- a: Fuel injector
- b: EVAP canister purge valve
- c: Fuel pump relay
- d: EGR solenoid vacuum valve
- e: Malfunction indicator lamp ("CHECK ENGINE" light) (*)
- f: Ignitor
- g: Radiator fan control relay
- h: IAC valve

OTHERS

- A: ECM (*)
- B: Main relay
- C: EGR valve
- D: EGR pressure transducer
- E: EVAP canister
- F: Monitor coupler
- G: Ignition coil
- H: Noise suppressor
- I: Data link connector (DLC) (*)
- J: J/B (*)
- K: Speedometer (*)
- L: Main fuse box
- M: TCM (A/T vehicle only) (*)



- | | |
|-----------------------------------|--|
| 1. Air cleaner | 26. Fuel tank |
| 2. IAT sensor | 27. Fuel pump assembly |
| 3. MAP sensor | 28. Fuel pump relay |
| 4. TP sensor | 29. DLC |
| 5. IAC valve | 30. TCM (A/T vehicle only), SDM (if equipped), ICM (if equipped) and
ABS controller (if equipped) |
| 6. Knock sensor | 31. TCM |
| 7. Throttle body | 32. ECM |
| 8. Intake manifold | 33. A/C compressor (if equipped) |
| 9. Injector | 34. A/C switch and A/C evapo temp. sensor (if equipped) |
| 10. PCV valve | 35. Electric load (Blower fan motor, rear defogger and clearance light) |
| 11. Heated oxygen sensor | 36. Transmission range switch (A/T vehicle only) |
| 12. Three way catalytic convertor | 37. Monitor coupler |
| 13. ECT sensor | 37-1. Diagnostic switch terminal |
| 14. Ignition coil | 37-2. Test switch terminal |
| 15. Ignitor | 37-3. Duty output terminal |
| 16. EGR valve | 37-4. Diagnostic monitor terminal |
| 17. EGR pressure transducer | 38. Combination meter |
| 18. EGR vacuum solenoid valve | 38-1. Malfunction indicator lamp ("CHECK ENGINE" light) |
| 19. CMP sensor | 38-2. Speedometer |
| 20. Radiator fan | 39. VSS (in transmission) |
| 21. Radiator fan control relay | 40. Ignition switch |
| 22. EVAP vacuum solenoid valve | 41. Starter |
| 23. EVAP canister | 42. Main fuse |
| 24. Fuel pressure regulator | 43. Battery |
| 25. Tank pressure control valve | |

Legend:

- ← Air
- ▨ Fuel
- Exhaust gas

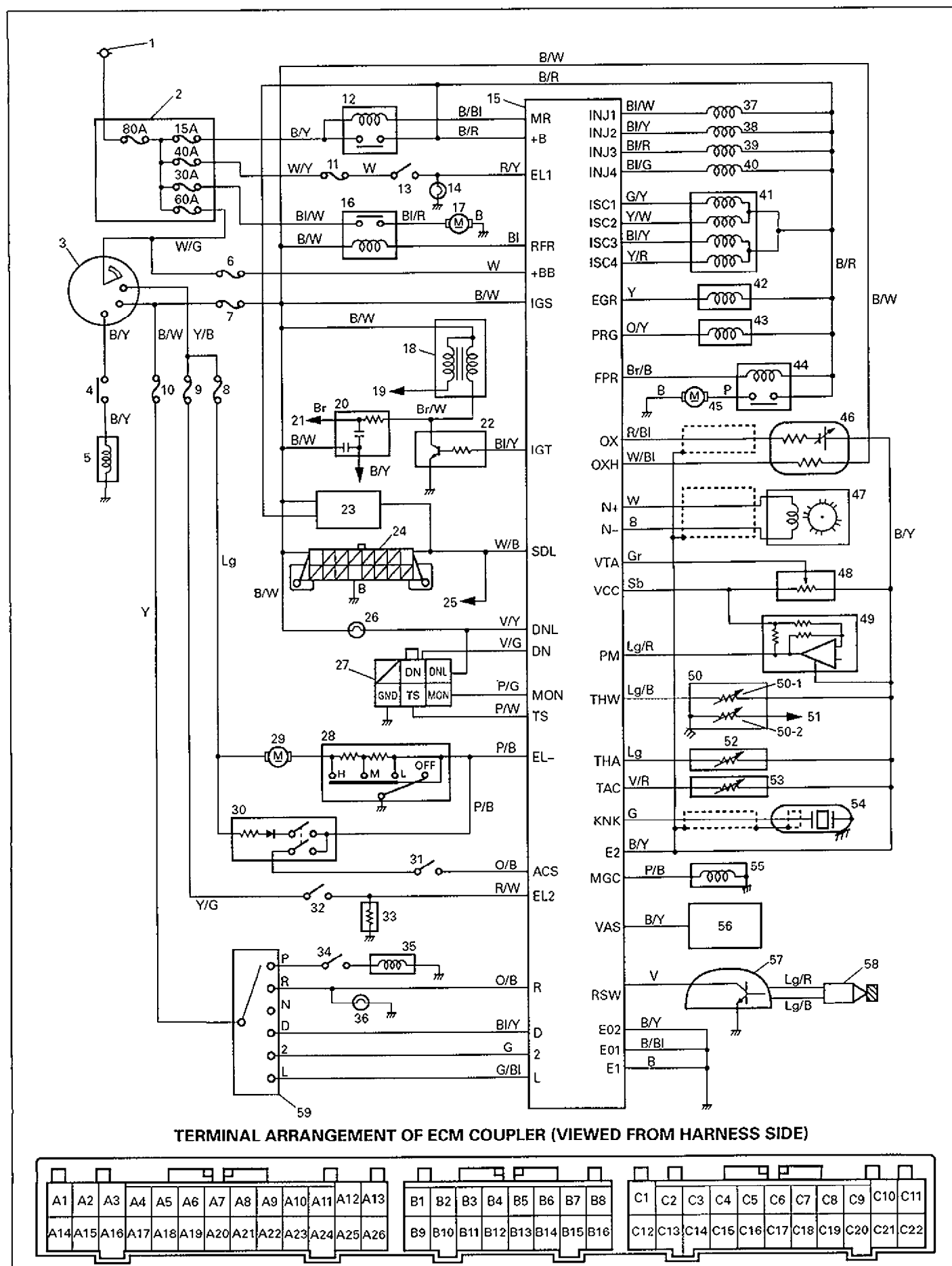
Components and Flow:

- Air Intake:** AIR CLEANER, IAT SENSOR, MAP SENSOR, THROTTLE BODY, TP SENSOR, Pressure in intake manifold, Throttle valve opening.
- Fuel System:** FUEL PUMP, FUEL PUMP RELAY, FUEL INJECTION Control, FUEL INJECTOR.
- Engine:** ECT SENSOR, CMP SENSOR, KNOCK SENSOR, Engine coolant temp., Camshaft and each piston position, Engine vibration.
- Exhaust System:** EXHAUST MANIFOLD, HEATED OXYGEN SENSOR, HEATED OXYGEN SENSOR HEATER, Exhaust oxygen concentration, HEATED oxygen sensor heater control, THREE WAY CATALYTIC CONVERTOR.
- Control and Monitoring:** IDLE AIR CONTROL VALVE, EGR VALVE, FUEL INJECTION Control, FUEL PUMP RELAY, ENGINE CONTROL MODULE, Indicator lamp control, Radiator fan control, EVAP control, Ignition control, A/C compressor control, MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT), RADIATOR FAN CONTROL RELAY, EVAP CANISTER PURGE VALVE, IGNITOR, TCM (A/T VEHICLE).

ECM Inputs:

- Idle air control
- EGR control
- ECT SENSOR
- CMP SENSOR
- KNOCK SENSOR
- Engine coolant temp.
- Camshaft and each piston position
- Engine vibration
- Exhaust oxygen concentration
- Heated oxygen sensor heater control
- ECM supply voltage
- Vehicle speed
- Electric load signals
- Diagnosis signal
- Test signal
- "R", "D", "2", "L" range signal (A/T vehicle)
- A/C switch signal (if equipped)
- A/C evaporator temp. signal (if equipped)

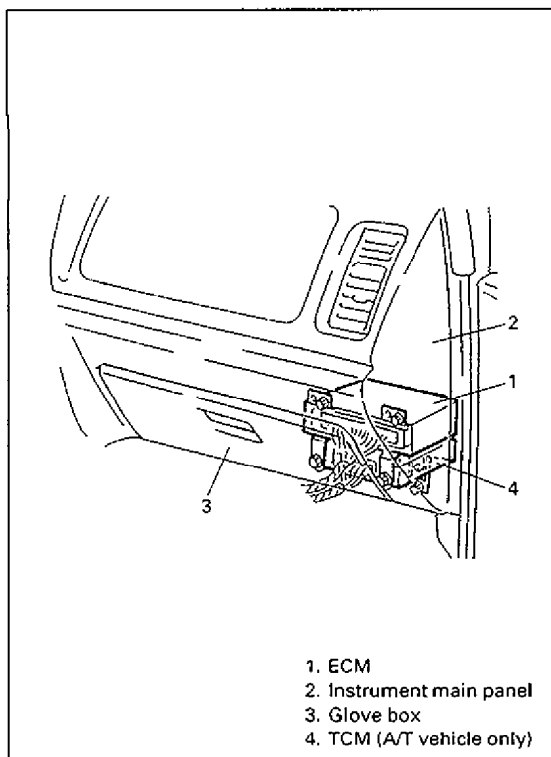
SYSTEM WIRING DIAGRAM



1. Battery positive voltage
2. Main fuse box
3. Ignition switch
4. Transmission range switch (A/T vehicle only)
5. Starter magnetic switch
6. "RADIO" fuse in J/B
7. "IG COIL-METER" fuse in J/B
8. "HEATER" fuse in J/B
9. "REAR DEFG" fuse in J/B
10. "TURN-BACK" fuse in J/B
11. "TAIL-STOP" fuse in J/B
12. Main relay
13. Clearance light switch
14. Clearance light
15. ECM
16. Radiator fan control relay
17. Radiator fan motor
18. Ignition coil
19. To distributor
20. Noise suppressor
21. To combination meter, TCM (A/T vehicle only) and EPS controller (if equipped)
22. Ignitor
23. ICM (if equipped)
24. DLC
25. To TCM (A/T vehicle only), ABS controller (if equipped) and SDM (if equipped)
26. Malfunction indicator lamp ("CHECK ENGINE" light)
27. Monitor coupler
28. Blower fan switch and resister
29. Blower fan motor
30. A/C switch (if equipped)
31. A/C dual pressure switch (if equipped)
32. Rear defogger switch
33. Rear defogger
34. Brake switch
35. Shift lock solenoid (A/T vehicle only)
36. Backup light
37. No.1 injector
38. No.2 injector
39. No.3 injector
40. No.4 injector
41. IAC valve
42. EGR valve
43. EVAP canister purge valve
44. Fuel pump relay
45. Fuel pump
46. Heated oxygen sensor
47. CMP sensor
48. TP sensor
49. MAP sensor
50. ECT sensor and gauge
- 50-1. ECT sensor
- 50-2. ECT gauge
51. To combination meter
52. IAT sensor
53. A/C evaporator temp. sensor (if equipped)
54. Knock sensor
55. A/C compressor (if equipped)
56. TCM (A/T vehicle only)
57. Combination meter
- 57-1. IC
58. VSS (on transmission)
59. Transmission range switch (A/T vehicle only)

TERMINAL		CIRCUIT
POSITION	NAME	
A1	INJ1	No.1 injector
A2	INJ3	No.3 injector
A3	E02	Ground
A4	EGR	EGR solenoid vacuum valve
A5	-	Blank
A6	-	Blank
A7	DNL	Diagnosis output terminal and "CHECK ENGINE" light
A8	-	Blank
A9	RFR	Radiator fan control relay
A10	FPR	Fuel pump relay (without immobilizer)
	-	Blank (with immobilizer)
A11	IGT	Ignitor (without immobilizer)
	-	Blank (with immobilizer)
A12	PRG	EVAP canister purge valve
A13	E1	ECM ground
A14	INJ2	No.2 injector
A15	INJ4	No.4 injector
A16	OXH	Heated oxygen sensor heater
A17	-	Blank
A18	MON	Duty output terminal
A19	ACS	A/C switch (with A/C)
A20	EL-	Electric load (blower fan)
A21	EL1	Electric load (small lamp)
A22	EL2	Electric load (rear defogger)
A23	FPR	Fuel pump relay (with immobilizer)
	-	Blank (without immobilizer)
A24	IGT	Ignitor (with immobilizer)
	-	Blank (without immobilizer)
A25	-	Blank
A26	E2	Sensor ground
B1	VAS	Throttle valve opening signal output (A/T vehicle only)
B2	-	Not used

TERMINAL		CIRCUIT
POSITION	NAME	
B3	ISC1	IAC valve (stepping motor coil 1)
B4	-	Blank
B5	R	Transmission range switch ("R" range) (A/T vehicle only)
B6	-	Blank
B7	D	Transmission range switch ("D" range) (A/T vehicle only)
B8	DN	Diagnosis switch terminal
B9	-	Blank
B10	ISC2	IAC valve (stepping motor coil 2)
B11	ISC3	IAC valve (stepping motor coil 3)
B12	ISC4	IAC valve (stepping motor coil 4)
B13	2	Transmission range switch ("2" range) (A/T vehicle only)
B14	L	Transmission range switch ("L" range) (A/T vehicle only)
B15	SDL	Data link connector
B16	TS	Test switch terminal
C1	-	Blank
C2	N+	CMP sensor (+)
C3	N-	CMP sensor (-)
C4	PM	MAP sensor
C5	OX	Heated oxygen sensor
C6	VTA	TP sensor
C7	KNK	Knock sensor
C8	TAC	A/C evaporator temp. sensor (with A/C)
C9	THW	ECT sensor
C10	IGS	Ignition switch signal
C11	+B	Power source
C12	MR	Main relay
C13	+BB	Power source for back-up
C14	-	Blank
C15	VCC	Power supply (for sensors)
C16	RSW	VSS
C17	-	Blank
C18	-	Blank
C19	THA	IAT sensor
C20	-	Blank
C21	E01	Ground
C22	MGC	A/C compressor magnet clutch (with A/C)



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ECM

ECM is installed to the underside of the instrument panel at the passenger's seat side.

ECM is a precision unit consisting of microcomputer, A/D (Analog/Digital) converter, I/O (Input/Output) unit, etc.

It is an essential part of the engine and emission control system, for its functions include not only such a major function as to control fuel injector, idle air control valve, fuel pump relay, etc. but also on-board diagnostic system (self-diagnosis function) and fail-safe function as described in the following section.

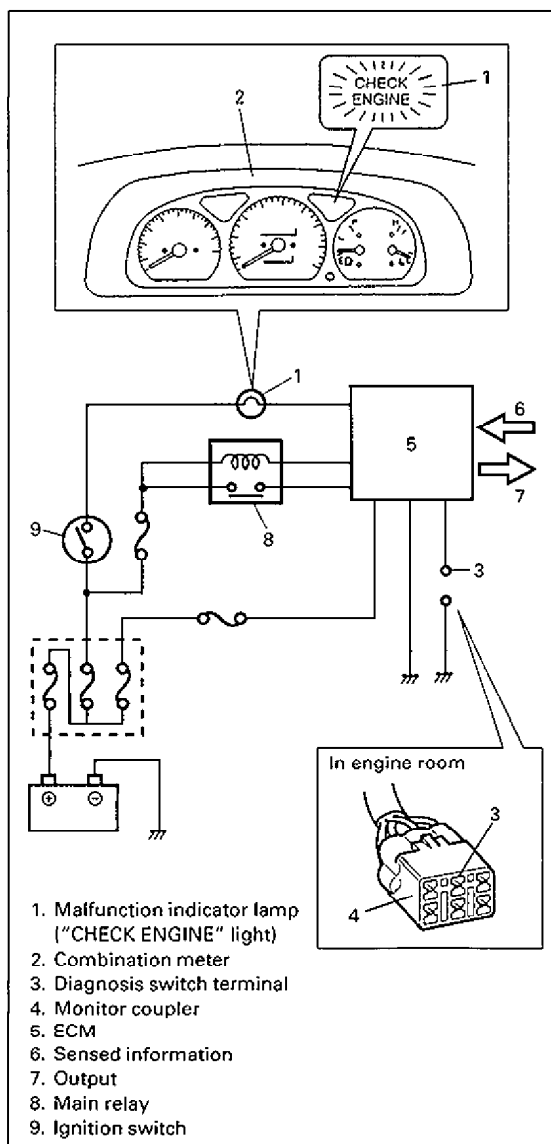
ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION)

ECM diagnoses troubles which may occur in the areas including the following parts when the ignition switch is ON or the engine is running, and indicates the result by turning on or flashing malfunction indicator lamp ("CHECK ENGINE" light).

- Heated oxygen sensor
- IAT sensor
- ECT sensor
- TP sensor
- VSS
- MAP sensor
- Knock sensor
- CPU (Central Processing Unit) of ECM

ECM 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 engine and emission control system. This is only to check the malfunction indicator lamp ("CHECK ENGINE" light) bulb and its circuit.
- If the above areas of engine and emission control system is free from any trouble after the engine start (while engine is running), malfunction indicator lamp ("CHECK ENGINE" light) turns OFF.



75F00-6E1-8-5

- When ECM detects a trouble which has occurred in the above areas, it makes malfunction indicator lamp ("CHECK ENGINE" light) turn ON while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the exact trouble area in ECM back-up memory.

(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 ECM is shut off for specified time as shown below or "Trouble Code Clear" is commanded by using SUZUKI scan tool (Tech 1).)

AMBIENT TEMPERATURE	TIME TO CUT POWER TO ECM
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.

NOTE:

When a trouble occurs in the above areas and disappears soon while the diagnosis switch terminal is ungrounded and the engine is running, malfunction indicator lamp ("CHECK ENGINE" light) lights and remains ON as long as the trouble exists but it turns OFF when the normal condition is restored.

- ECM 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).

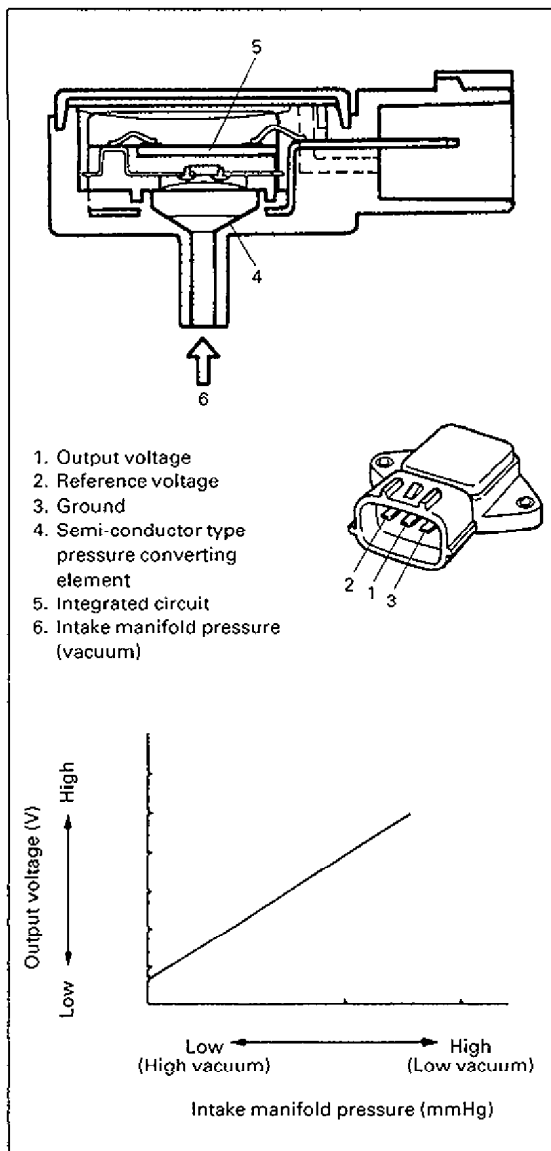
75F00-6E1-9-3

FAIL-SAFE FUNCTION

Even when a trouble has occurred in such areas of engine and emission control system that include the following parts and a failure signal is sent to ECM, control over the injector, idle air control valve and other is maintained on the basis of the standard signals and/or back-up program prestored in the ECM while ignoring that failure signal and/or CPU. This function is called "fail-safe function". Thus, with this function, a certain level of engine performance is available even when some failure occurs in such areas so that disability in running is avoided.

- ECT sensor
- IAT sensor
- TP sensor
- MAP sensor
- VSS
- CPU in ECM

75F00-6E1-9-5



75F00-6E1-10-3

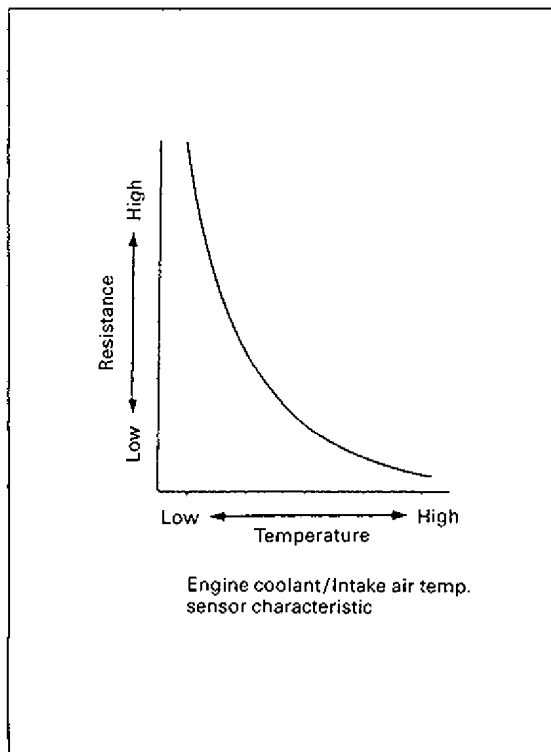
SENSOR AND SIGNAL

MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

This sensor senses pressure change in the intake manifold and converts it into voltage change. It consists of a semi-conductor type pressure converting element which converts a pressure change into an electrical change and an electronic circuit which amplifies and corrects the electric change. The ECM sends a 5-volt reference voltage to the pressure sensor. As the manifold pressure changes, the output voltage of the sensor also changes.

By monitoring the sensor output voltage, ECM knows the manifold pressure (intake air volume).

ECM uses the voltage signal from the pressure sensor as one of the signals to control fuel injector, EVAP canister purge valve and EGR solenoid vacuum valve.



75F00-6E1-10-3

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

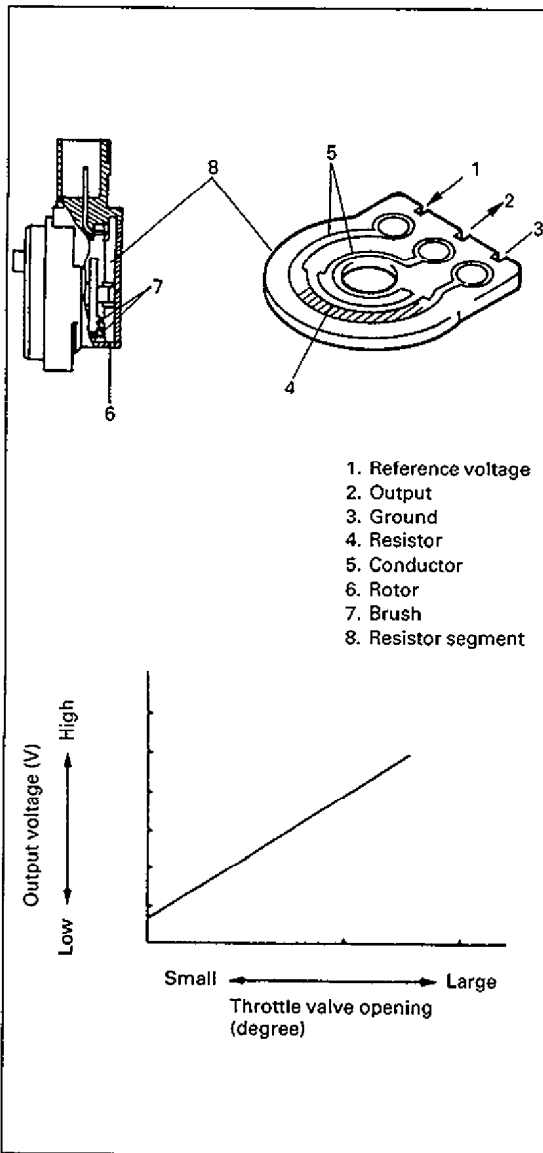
Incorporated with engine coolant temp. gauge and located at the thermostat case, this sensor measures the temperature of the engine coolant and converts its change into that in resistance through the thermister.

By monitoring the resistance of the coolant temperature sensor, ECM detects the engine coolant temperature and that affects most systems under the control of ECM.

INTAKE AIR TEMPERATURE (IAT) SENSOR

Located on the intake manifold, this sensor measures the temperature of the intake air and converts its change into that in resistance through the thermister like the ECT sensor.

By monitoring the resistance of the IAT sensor, ECM detects the intake air temperature and use it as one of the signals to control fuel injectors, ignition timing and EGR solenoid vacuum valve.



75F00-6E1-11-3

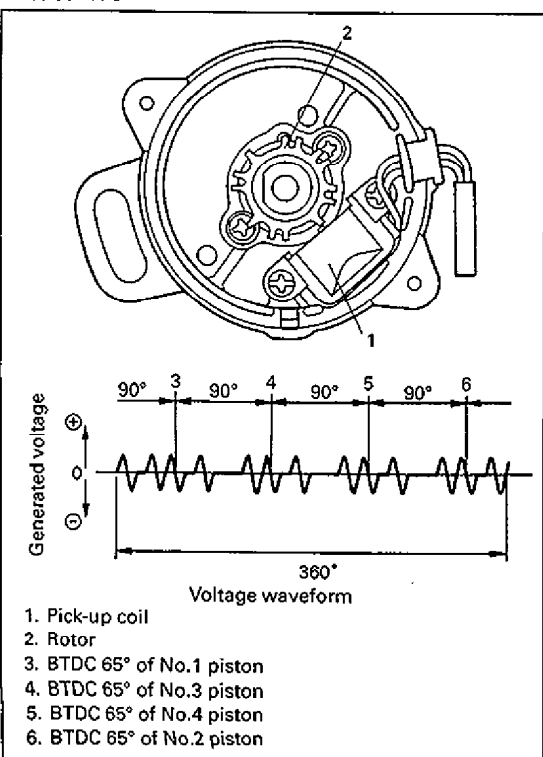
THROTTLE POSITION (TP) SENSOR

The throttle position sensor consisting of a potentiometer is installed on the throttle body, and detects the throttle valve opening.

A 5-volt reference voltage is applied to the sensor from ECM and as its brush moves over the print resistance according to the throttle valve opening, the output voltage varies accordingly.

By monitoring the sensor output voltage, ECM detects the throttle valve opening.

ECM uses the signal from TP sensor as one of the signals to control fuel injector, idle air control valve, ignition timing, EVAP canister purge valve and EGR solenoid vacuum valve.

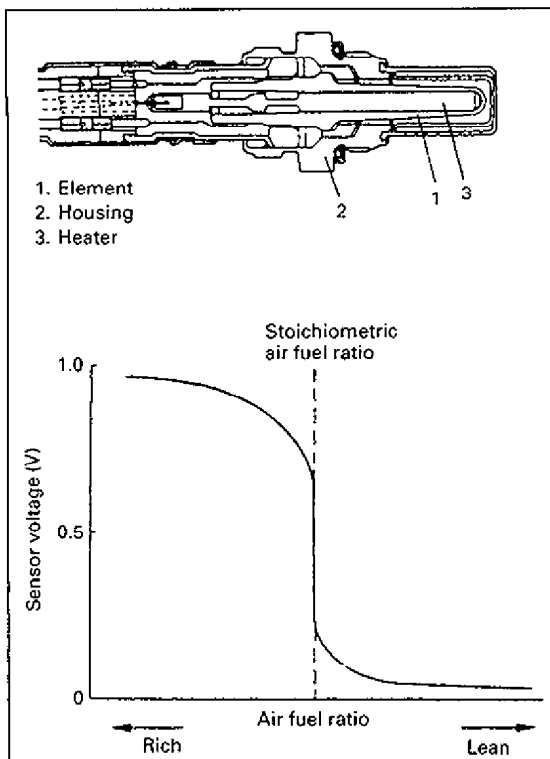


75F00-6E1-11-5

CAMSHAFT POSITION (CMP) SENSOR

The camshaft position sensor located in the distributor consists of the signal generator (pick-up coil and magnet) and signal rotor.

As the signal rotor turns, AC voltage is generated in the pick-up coil which varies in pulsatory way as shown. This pulse signal is sent to ECM where it is used to calculate the engine speed and the piston position of each cylinder and that information is also used as one of the signals to control various devices.

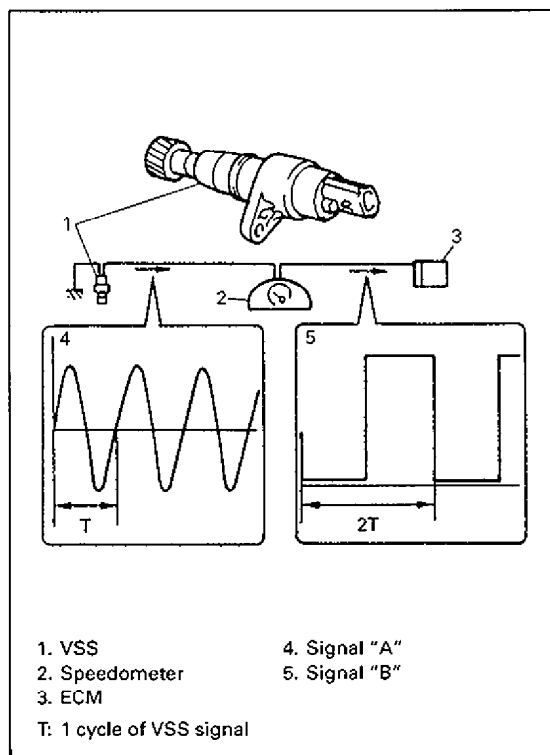


75F00-6E1-12-2

HEATED OXYGEN SENSOR (HO2S)

The heated oxygen sensors are installed on the exhaust manifold to detect the concentration of oxygen in the exhaust gases.

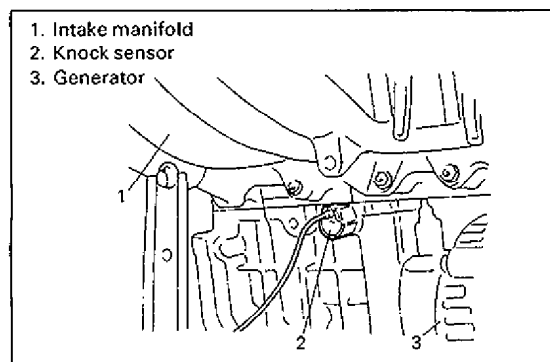
The oxygen sensor heater promotes activation of the oxygen sensor.



75F00-6E1-12-4

VEHICLE SPEED SENSOR (VSS)

The vehicle speed sensor, located on the transmission, generates a signal in proportion to the vehicle speed (Signal "A"). Receiving this signal, the speedometer uses it for operation of its indicator and also converts it into the ON/OFF signal by doubling the cycle (Signal "B"). This signal is sent to ECM where it is used as one of the signals to control various devices.

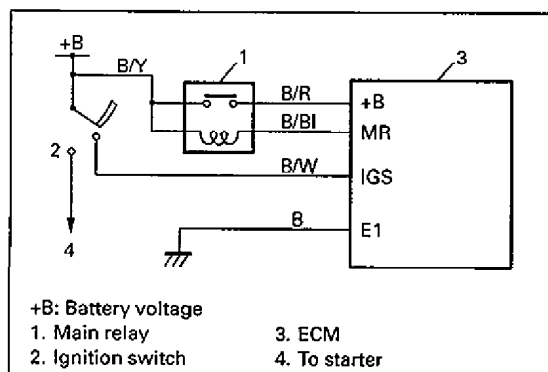


75F00-6E1-12-5

KNOCK SENSOR

Knock sensor uses a piezoelectric ceramics element which converts engine vibration into voltage signals and detects knocking from them.

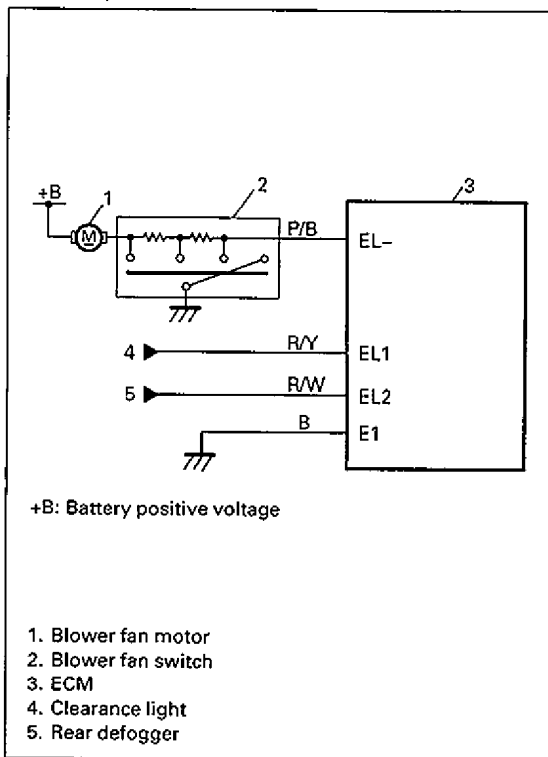
Receiving signals from the knock sensor, ECM controls the ignition timing to prevent knocking.



75F00-6E1-13-1

IGNITION SWITCH SIGNAL

This signal is sent from ignition switch. Receiving it, ECM judges whether ignition switch is at ON position or not. As it changes from OFF to ON or ON to OFF, ECM uses it for correction of standard position of IAC valve.

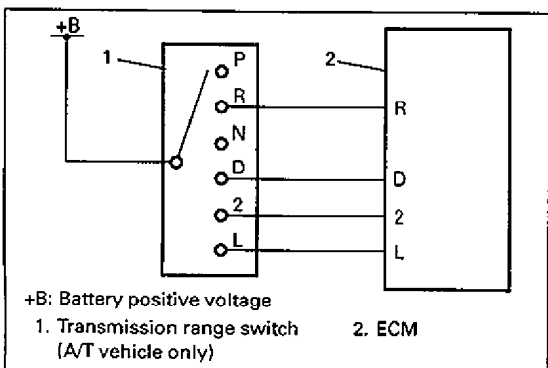


75F00-6E1-13-3

ELECTRIC LOAD SIGNALS

These signals are sent from each circuit of head & small (or clearance) lights, heater (blower motor) fan and rear window defogger.

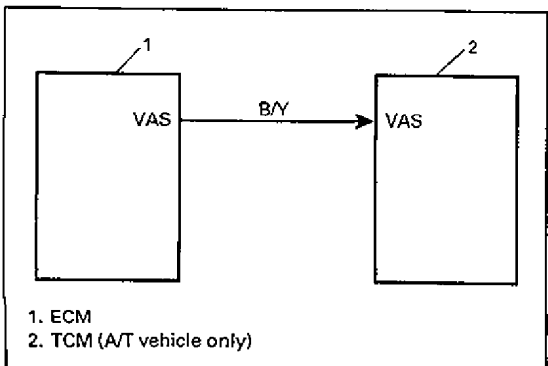
ECM uses them as one of the factors for controlling idle air control valve.



75F00-6E1-13-4

TRANSMISSION RANGE ("R", "D", "2" OR "L" RANGE) SIGNALS (A/T VEHICLE ONLY)

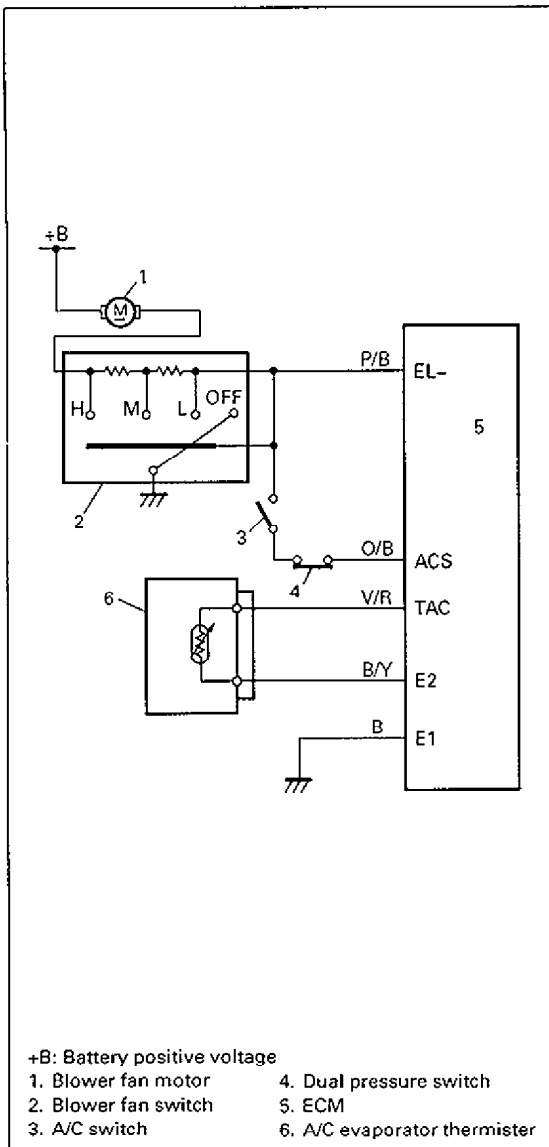
This signal is sent from transmission range switch as a battery voltage signal only when A/T is in "R", "D", "2" or "L" range. Thus, ECM judges whether transmission range is in one of the above range or otherwise (i.e. in "P" or "N" range) and uses it as one of the signals to control the fuel injector, idle air control valve and ignition timing.



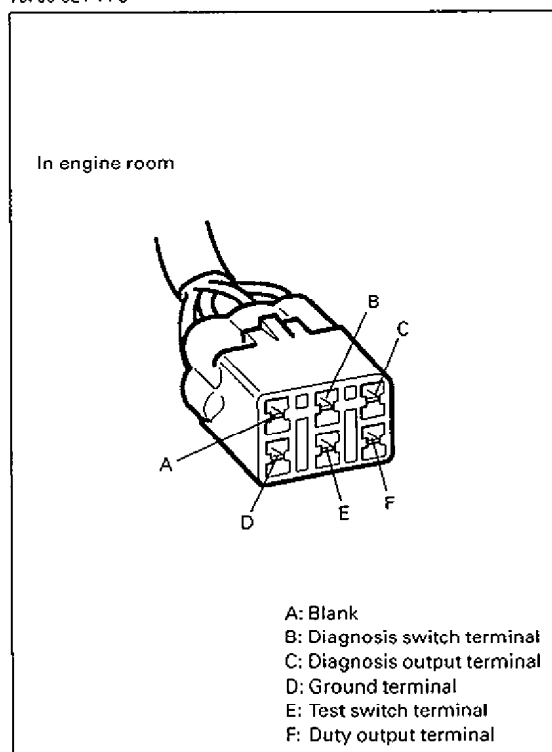
75F00-6E1-13-5

THROTTLE VALVE OPENING SIGNAL (A/T VEHICLE ONLY)

Receiving the throttle valve opening signal from the TP sensor, ECM converts it into the duty signal (voltage signal) and sends it from "VAS" terminal in ECM to TCM. Then TCM uses it as the signal to control the automatic transmission.



75F00-6E1-14-3



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A/C SWITCH SIGNAL (VEHICLE WITH A/C)

When all of the A/C switch, blower fan switch and dual pressure switch turn ON, this signal is sent to ECM. Receiving this signal, ECM judges whether A/C operation has been requested or not.

A/C EVAPORATOR THERMISTER SIGNAL (VEHICLE WITH A/C)

When the evaporative temperature of a refrigerant drops to 2.5°C (36.5°F) or below, the evaporator fins get stuck with frost or ice, reducing the air flow, lowering the cooling capacity. The A/C evaporator thermister is a sensor which is used to prevent this frosting or icing.

The A/C evaporator thermister installed to A/C evaporator converts the evaporative temperature into a resistance value and send it to ECM.

DIAGNOSIS SWITCH TERMINAL

The diagnosis switch terminal is included in the monitor coupler in the engine room. When this terminal is grounded, a diagnosis signal is sent to ECM which then outputs diagnostic trouble code and at the same time outputs idle air control valve position through duty output terminal.

TEST SWITCH TERMINAL

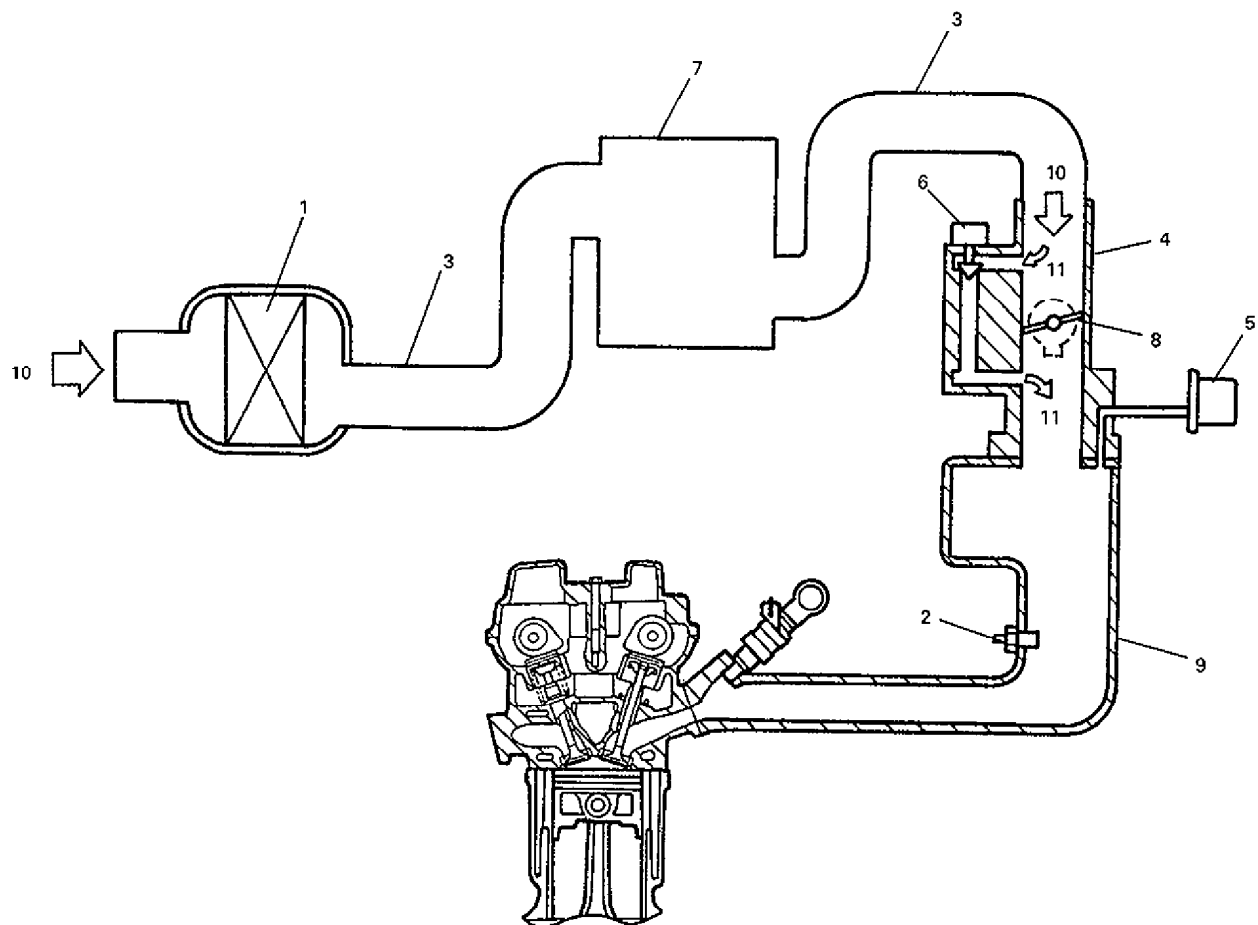
The test switch terminal is included in the monitor coupler in the engine room. When this terminal is grounded, ECM sets the ignition timing to the initial ignition timing. When both test switch terminal and diagnosis switch terminal are grounded, ECM outputs A/F duty through the duty output terminal.

AIR INTAKE SYSTEM

The main components of the air intake system are air cleaner, resonator, air cleaner outlet hose, throttle body and intake manifold.

The air (by the amount corresponding to the throttle valve opening and engine speed) is filtered by the air cleaner, passes through the throttle body, is distributed by the intake manifold and finally drawn into each combustion chamber.

When the engine is idling, when it is cold or when the idle air control valve is opened according to the signal from ECM, the air bypasses the throttle valve through bypass passage which varies in each case and is finally drawn into the intake manifold.



1. Air cleaner
2. IAT sensor
3. Air cleaner outlet hose
4. Throttle body
5. MAP sensor
6. IAC valve
7. Resonator
8. Throttle valve
9. Intake manifold
10. Intake air
11. Bypass air

IDLE AIR CONTROL (IAC) SYSTEM

This system controls the bypass air flow by means of ECM and idle air control (IAC) valve for the following four purposes.

- To keep the engine idle speed as specified at all time.

The engine idle speed can vary due to following reasons.

- * Load applied to engine (when electric load is applied, A/C is turned ON, etc.)
- * Variation in atmospheric pressure
- * Change in engine itself with passage of time
- * Other factors causing idle speed to change
- To improve starting performance of engine
- To compensate air/fuel mixture ratio when decelerating (Dash-pot effect)
- To improve driveability when while engine is warmed up.

OPERATION

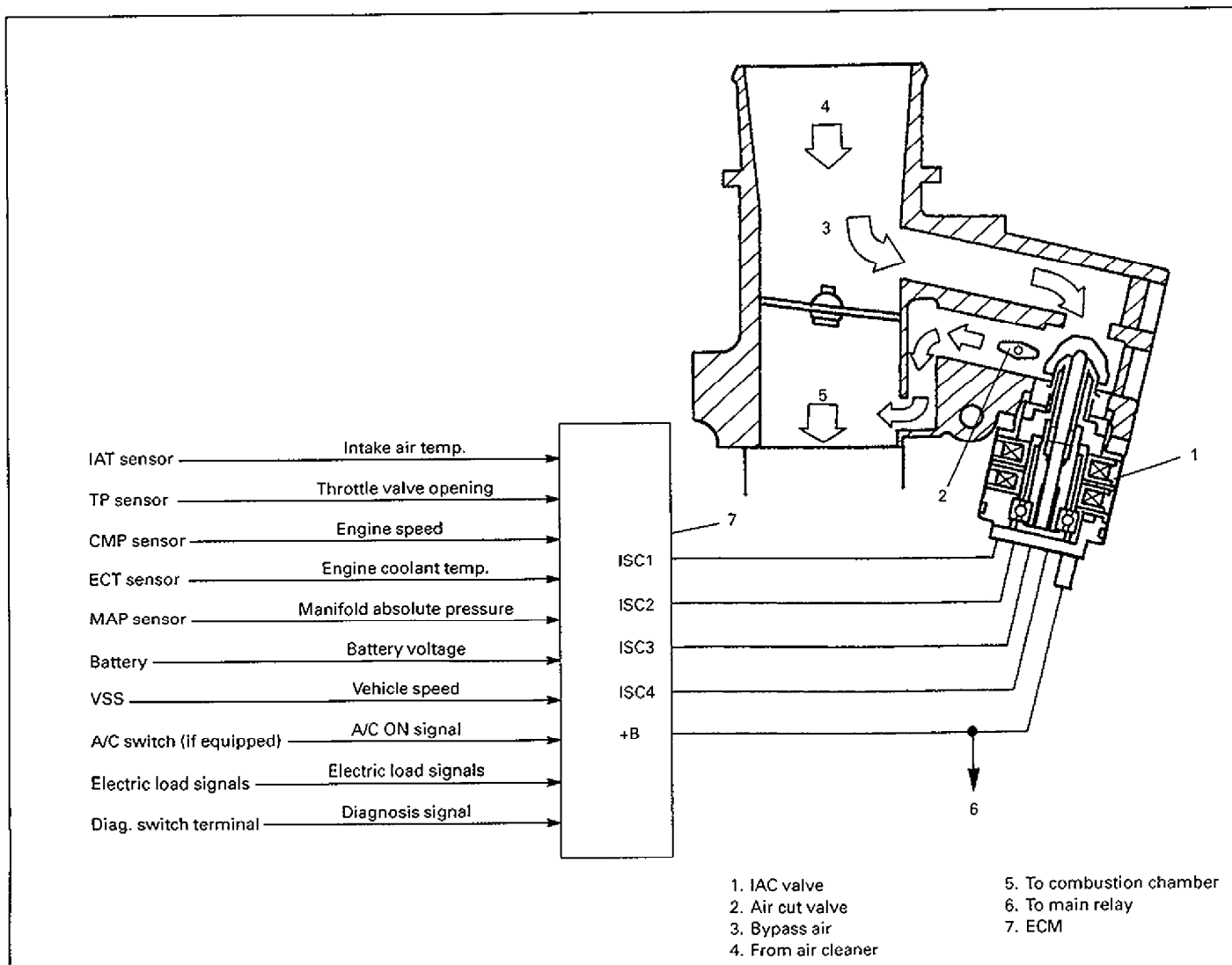
When the IAC valve stepper motor receives

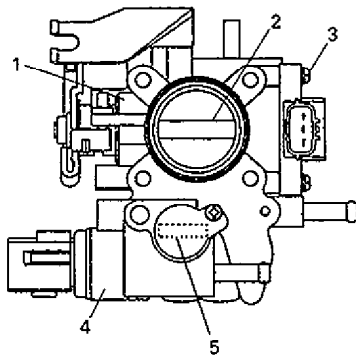
"open" signal from ECM, it turns in the "open" direction according to the number of steps and pulls up the rod which is in mesh with the worm of the stepper motor. As the rod installed to the IAC valve is pulled by this rod, the IAC valve opens by the amount corresponding to the number of steps of the "open" signal from ECM to let the bypass air flow.

To close the IAC valve, the stepper motor turns in the "close" direction according to the number of steps of the "close" signal from ECM and pushes out the rod.

When the vehicle is at a stop, the throttle valve is at the idle position and the engine is running, the engine speed is kept at a specified idle speed.

	A/C OFF	A/C ON
Engine idle speed specification	800 $\pm$ 50 r/min. (rpm)	950 $\pm$ 50 r/min. (rpm)





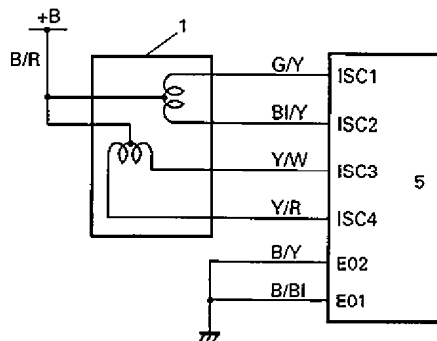
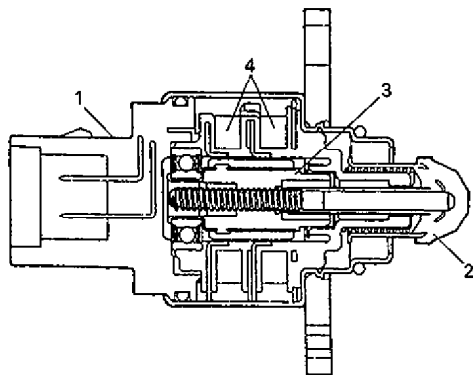
1. Throttle body
2. Throttle valve
3. TP sensor
4. IAC valve
5. Air cut valve

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THROTTLE BODY

The throttle body consists of the main bore, air bypass passage, and the following parts.

- Throttle valve which is interlocked with the accelerator pedal and controls the amount of the intake air.
- TP sensor which detects the throttle valve opening and sends a signal to ECM.
- IAC valve which supplies the bypass air depending on engine condition.
- An air cut valve is provided to control bypass air flow according to the engine coolant temperature. When the engine coolant temperature is high, it restricts bypass air flow but it does not at a low engine coolant temperature. Also, it has a fail-safe function not to allow excessive bypass air to flow even if IAC valve should get stuck in the full open state.



+B: Battery positive voltage

1. IAC valve
2. Valve
3. Rotor
4. Coil
5. ECM

IDLE AIR CONTROL (IAC) VALVE

The IAC valve controls opening of the bypass air passage (i.e., bypass air flow). The IAC valve consists of a step motor, rod, valve and other parts. As step motor is controlled by signals from ECM, valve position changes to increase and reduce bypass air flow.

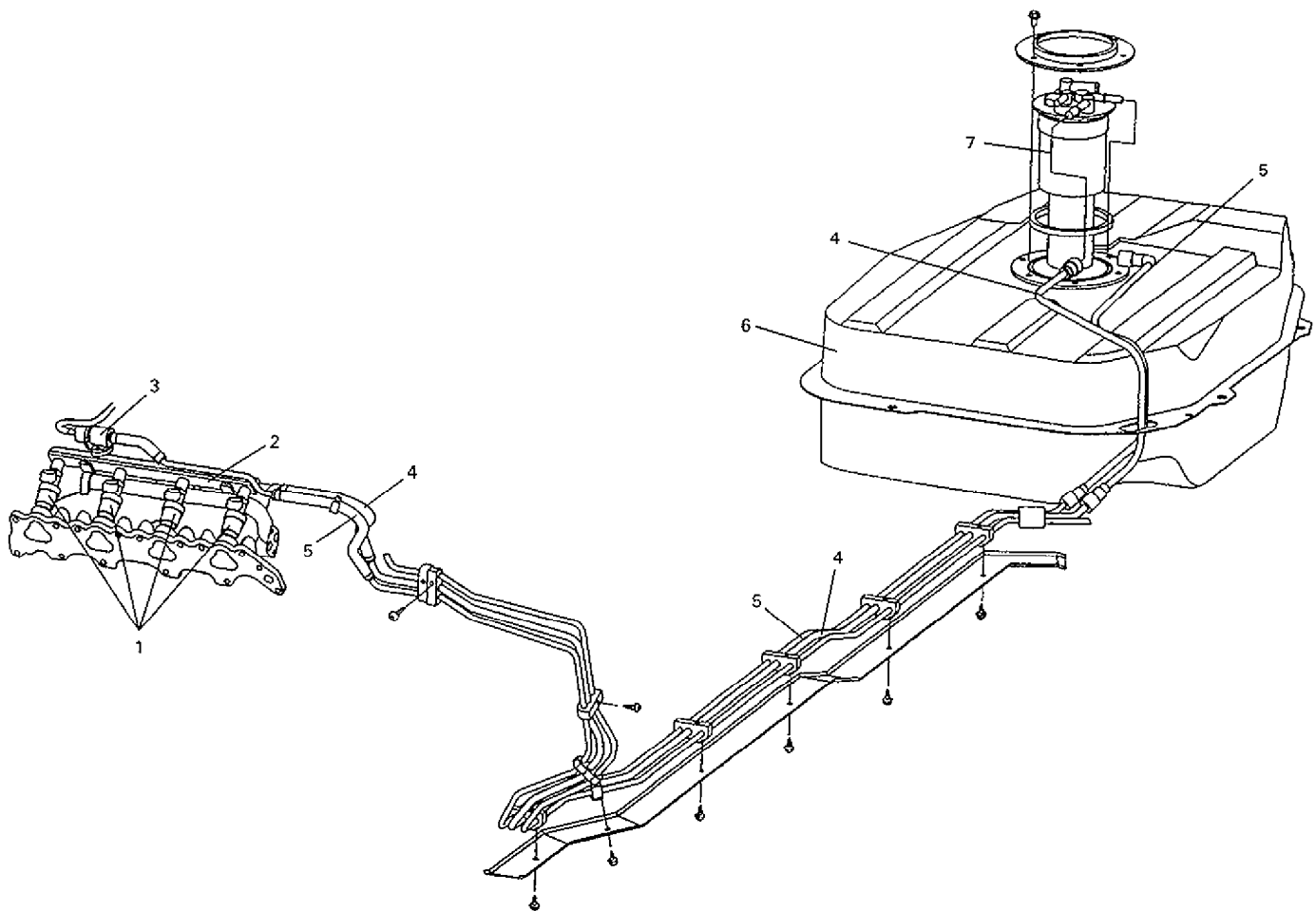
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FUEL DELIVERY SYSTEM

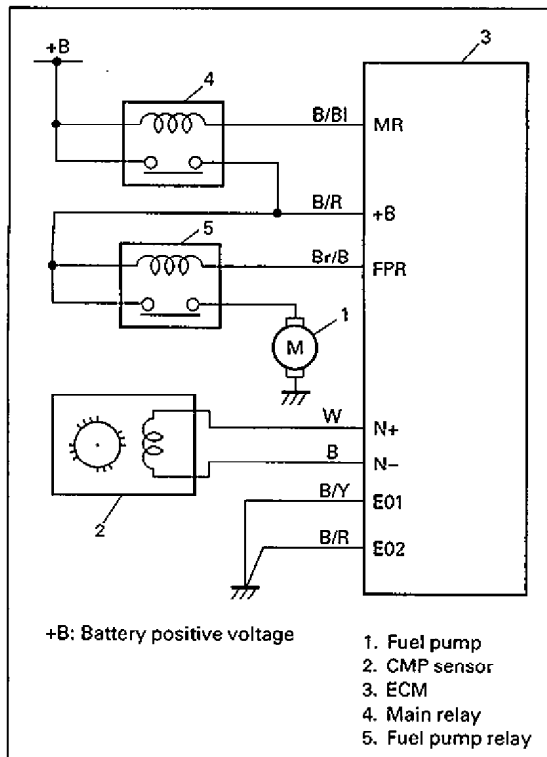
The fuel delivery system consists of the fuel tank, fuel pump assembly (with fuel filter), fuel pressure regulator, delivery pipes, and fuel injectors.

The fuel in the fuel tank is pressurized by the fuel pump, filtered by the fuel filter and fed under pressure to each injector through the delivery pipes. As the fuel pressure applied to the injector (the fuel pressure in the fuel feed line) is always kept a certain amount higher than the pressure in the intake manifold by the fuel pressure regulator, the fuel is injected into the intake port of the cylinder head when the injector opens according to the injection signal from ECM.

The fuel relieved by the fuel pressure regulator returns through the fuel return line to the fuel tank. For the structure and operation of the fuel tank, refer to SECTION 6C "Engine Fuel".



1. Fuel injector
2. Delivery pipe
3. Fuel pressure regulator
4. Fuel feed line
5. Fuel return line
6. Fuel tank
7. Fuel pump assembly



75F00-6E1-19-2

FUEL PUMP CONTROL SYSTEM

ECM controls ON/OFF operation of the fuel pump by turning it ON via the fuel pump relay under one of the following conditions.

- For 3 seconds after ignition switch ON.
- While CMP sensor signal is inputted to ECM.

FUEL PUMP ASSEMBLY

The electric fuel pump assembly located in the fuel tank consists of fuel pump, fuel filter, fuel level gauge, tank pressure control valve, etc..

• Fuel pump

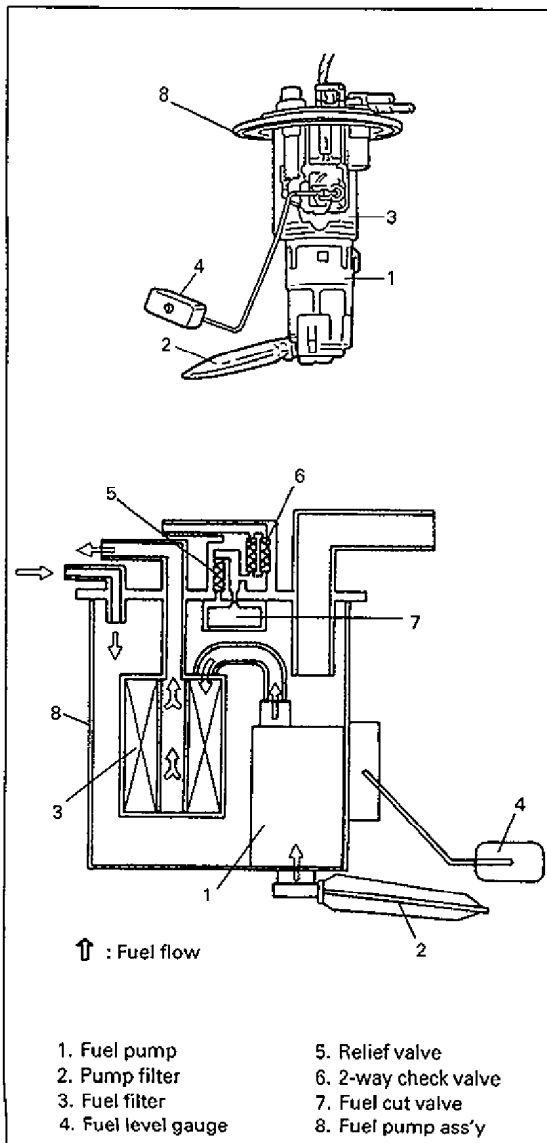
When power is supplied to the fuel pump, the motor in the pump assembly rotates the impeller.

This causes a pressure difference to occur between both sides of the impeller as there are many grooves around it. Then the fuel is drawn through the inlet port, and with its pressure increased it is discharged through the outlet port.

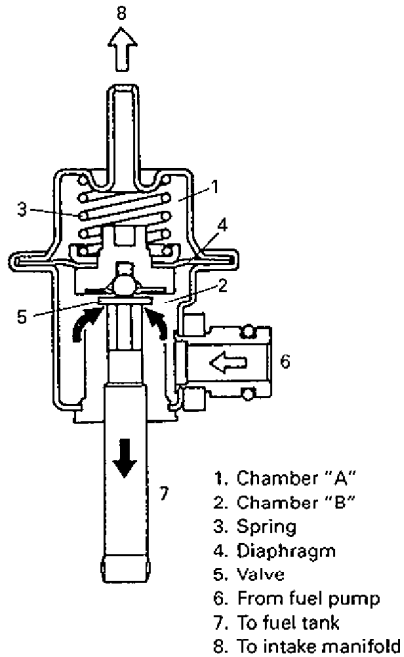
• Fuel filter – filters fuel.

• Tank pressure control valve (relief valve and 2-way check valve) – maintains inner pressure of fuel tank constant to prevent fuel from blowing out and fuel tank from being deformed. The relief valve is provided to prevent discharged pressure in fuel tank from rising excessively and 2-way check valve is provided to maintain pressure in fuel tank at a constant level so that fuel will not blow out or tank will not be deformed.

• Fuel cut valve – prevents fuel from flowing into canister.



75F00-6E1-19-5



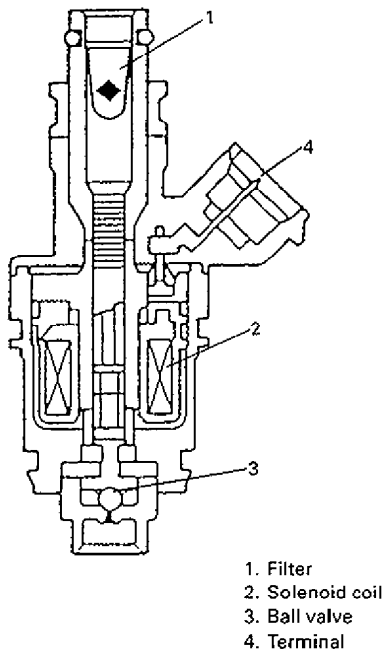
75F00-6E1-20-2

FUEL PRESSURE REGULATOR

The fuel pressure regulator is diaphragm-operated relief valve consisting of diaphragm, spring and valve. It keeps the fuel pressure applied to the injector 2.55 kg/cm^2 (255 kPa, 36.3 psi) higher than that in the intake manifold at all times.

The pressure applied to the chamber "A" of fuel pressure regulator is intake manifold pressure and that to the chamber "B" is fuel pressure.

When the fuel pressure rises more than 2.55 kg/cm^2 (255 kPa, 36.3 psi) higher than the intake manifold pressure, the fuel pushes the valve in the regulator open and excess fuel returns to the fuel tank via the return line.



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FUEL INJECTOR

There are 4 injectors (one for each cylinder), each of which is installed between the intake manifold and delivery pipe, it is an electromagnetic type injection nozzle which injects fuel into the intake port of the cylinder head according to the signal from ECM.

OPERATION

When the solenoid coil of the injector is energized by ECM, it becomes an electromagnet and attracts the plunger. At the same time, the needle valve which is incorporated with the plunger opens and the injector which is under the fuel pressure injects fuel. As the lift stroke of the ball valve of the injector is set constant, the amount of fuel injected at one time is determined by the length of time during which the solenoid coil is energized (injection time).

FUEL INJECTION CONTROL SYSTEM

In this system, ECM controls the time (amount) and timing of the fuel injection from the fuel injector into the cylinder head intake port according to the signals from the various sensors so that suitable air/fuel mixture is supplied to the engine in each driving condition.

INJECTION TIMING

There are 3 modes of fuel injection timing as described below.

Simultaneous injection at engine start

When the engine is starting, ECM judges the crank angle (BTDC 65°) instantly on the basis of the REF signal from the CMP sensor and causes all the injectors to inject fuel. (This type of injection is performed only once after judging the initial crank angle (BTDC 65°)).

Synchronous injection

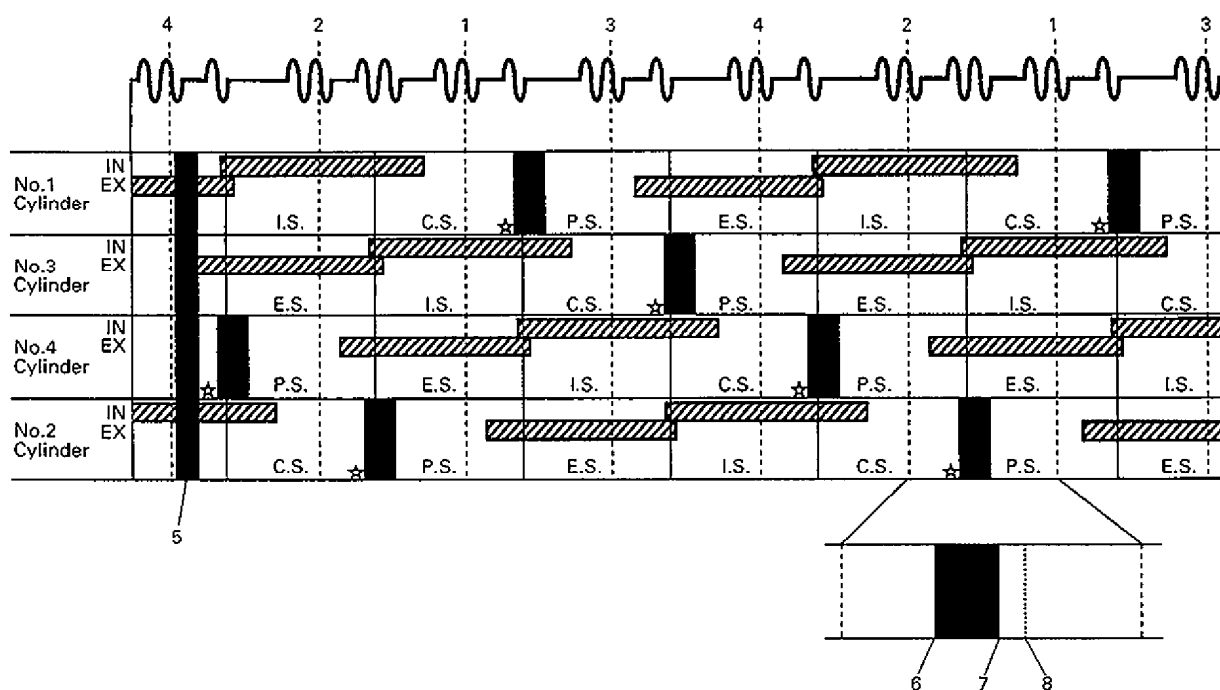
In this mode, fuel is injected sequentially in synchronization with the signal from the CMP sensor. This mode of injection is performed after the simultaneous injection at engine start till the engine stop.

Asynchronous injection

After the synchronous injection has started, if either of the following states is detected while fuel is not being injected, fuel is injected asynchronously.

- The throttle valve opens at a larger change rate than the specified value (the throttle valve is opened quickly)

The asynchronous injection is canceled immediately when neither of the above conditions is applicable.



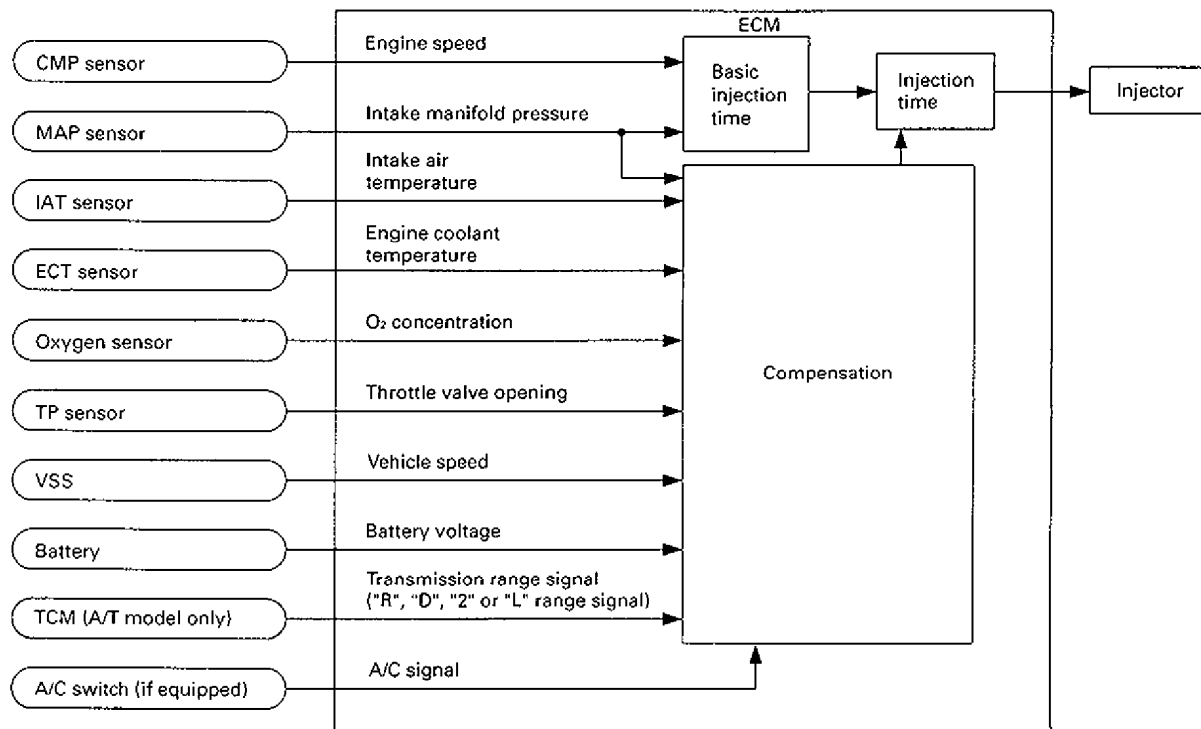
I.S. : Intake stroke
C.S. : Compression stroke
P.S. : Power stroke
E.S. : Exhaust stroke
■ : Injection
☆ : Ignition
▨ : Valve open

1. B.T.D.C. 65° of No.1 piston
2. B.T.D.C. 65° of No.2 piston
3. B.T.D.C. 65° of No.3 piston
4. B.T.D.C. 65° of No.4 piston
5. Injection at start (only once)

6. Injector open
7. Injector close at low load
(Injection volume little)
8. Injector close at high load
(injection volume large)

INJECTION TIME (AMOUNT OF INJECTION)

The factors to determine the injection time are the basis injection time which is calculated on the basis of the engine speed and the intake manifold pressure (amount of the intake air) and various compensations which are determined according to the signals from various sensors that detect the state of the engine and driving conditions.



Main compensation times are as follows.

Enriching compensation after engine start

For a certain time after the engine is started, air/fuel mixture enriching compensation is made so as to stabilize the engine speed. The amount of compensation varies depending on the engine coolant temperature and it is the largest immediately after the engine start and after that, it reduces gradually.

Enriching compensation while warming up

When the engine is cold, enriching compensation is made to ensure good driveability till the engine coolant temperature reaches the specified level. The amount to enrich the air/fuel mixture is decreased as the temperature rises.

Power enriching compensation

To ensure smooth acceleration and good driveability under the high load driving condition, enriching compensation is carried out when the throttle valve opening is larger than specification.

Enriching compensation when accelerating

When the accelerator pedal is depressed, the enriching compensation takes place to obtain smooth acceleration performance. The amount of compensation depends on the engine coolant temperature, engine speed and acceleration.

Battery voltage compensation

A power voltage drop delays the mechanical operation of the injector. Then the actual injection time becomes shorter for the time that electricity is supplied to the injector. To compensate this, the electricity supply time is made longer when the voltage is lower.

Base air/fuel ratio compensation

The air/fuel ratio may vary due to such factors as variation in each engine itself and aging. To compensate such variation, feed back compensation is used and base air/fuel mixture ratio is adjusted to a proper level for feed back compensation.

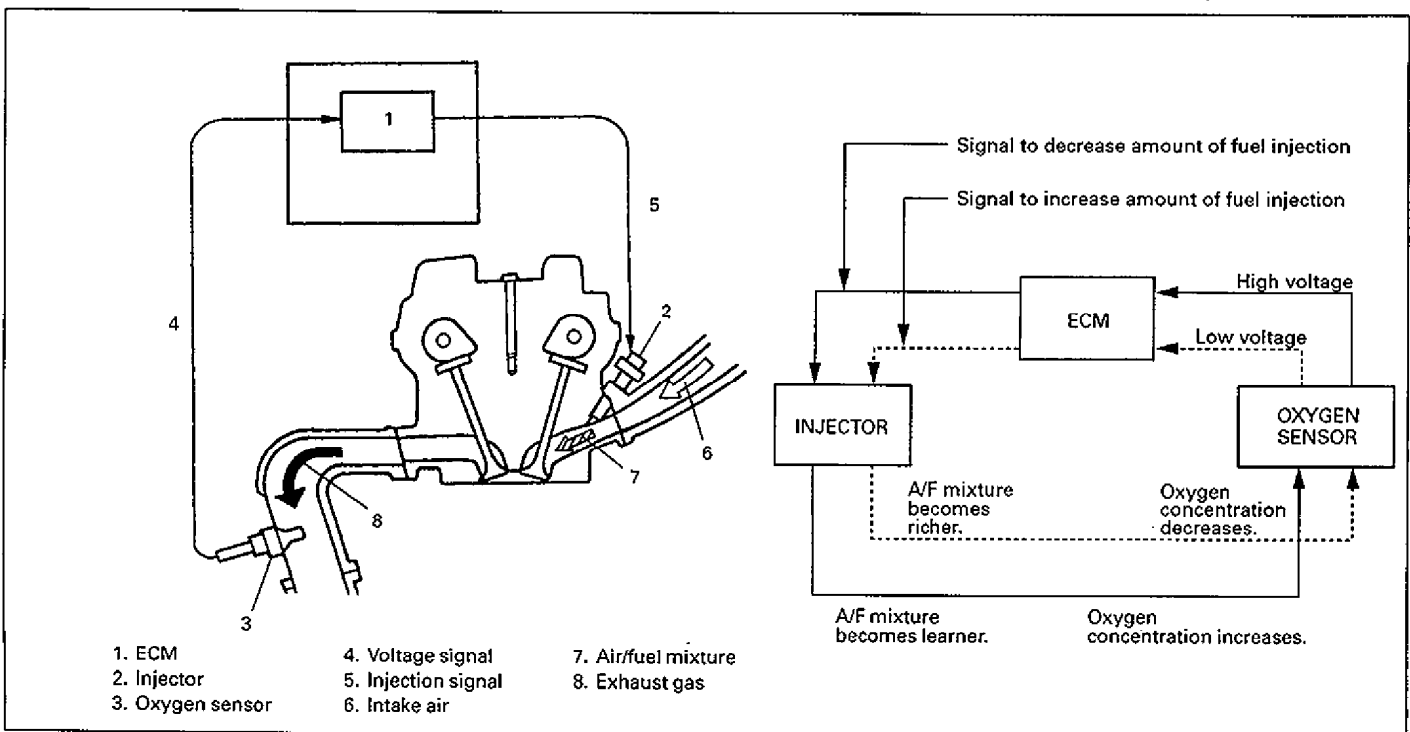
Air/fuel ratio feed back compensation (Closed loop system)

It is necessary to keep the air/fuel mixture close to the theoretical air/fuel ratio (14.7) to obtain efficient performance of the three-way catalytic converter and high clarification rate of CO, HC and NO_x in the exhaust gas. For that purpose, ECM operates as follows. It first compares the signal from the oxygen sensor with a specified reference voltage and if the signal is higher, it detects that the air/fuel ratio is richer than the theoretical air/fuel ratio and reduces fuel. On the other hand, if the signal is lower, it detects that the air/fuel ratio is leaner and increases fuel. By repeating these operations, it adjusts the air/fuel ratio closer to the theoretical air/fuel ratio.

- 1) When oxygen concentration in the exhaust gas is low, that is, when the air/fuel ratio is smaller than the theoretical air/fuel ratio (fuel is richer), electromotive force of the oxygen sensor increases and a rich signal is sent to ECM.
- 2) Upon receipt of the rich signal, ECM decreases the amount of fuel injection, which causes oxygen concentration in the exhaust gas to increase and electromotive force of the oxygen sensor to decrease. Then a lean signal is sent to ECM.
- 3) As ECM increases the amount of fuel injection according to the lean signal, oxygen concentration in the exhaust gas decreases and the situation is back to above 1).

This control process, however, will not take place under any of the following conditions.

- At engine start
- When engine coolant temperature is low
- When oxygen sensor is cold
- At fuel cut
- When highly loaded and fuel injection is increased
- When engine is running at high speed (higher than about 6400 r/min. (rpm))



FUEL CUT

When one of the following states is detected, ECM will stop operation of the injector and cuts the fuel supply.

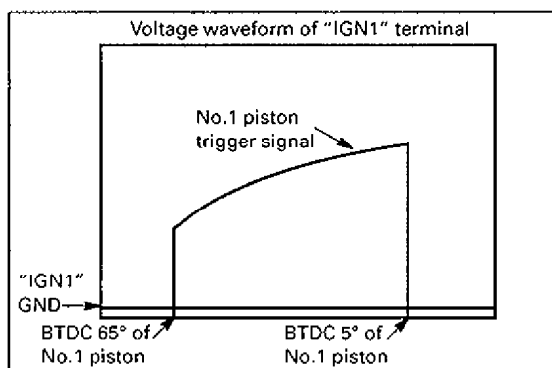
- Fuel injection stops when decelerating (i.e. when the throttle valve is at idle position and the engine speed is high), so that unburned gas will not be exhausted and it starts again when above conditions are not met.
- The fuel injection stops when the engine speed exceeds about 7700 rpm to prevent over-run which affects the engine adversely and it starts again when the engine speed reduces to less than about 7600 rpm

IGNITION CONTROL SYSTEM

This system controls electronically the time of electric current flow to ignition primary coils as well as ignition timing.

ECM judges the engine condition by using signals from various sensors, selects the most suitable electric current flow time and ignition timing for that engine condition and sends an ignition signal to the igniter. The igniter turns ON and OFF the primary current of the ignition coil according to the signal from ECM. Control of the system includes three different types as follows.

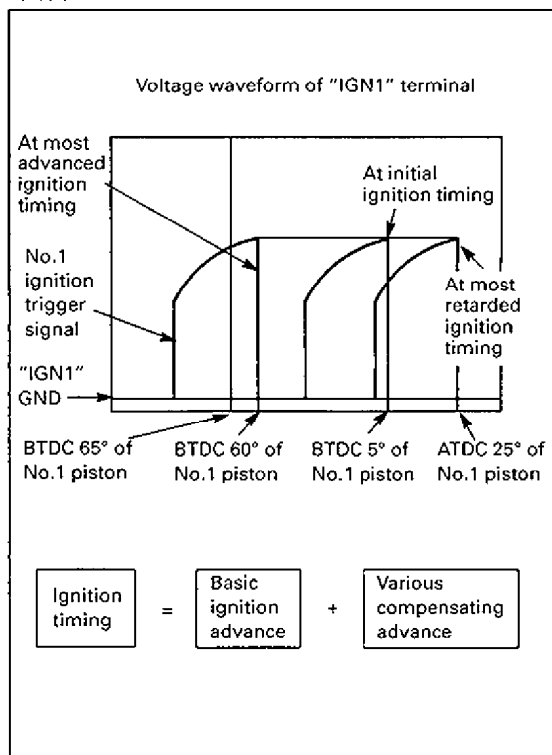
- Ignition timing control at engine start
- Ignition timing control after engine start
- Electric current flow time control



75F00-6E1-24-2

IGNITION TIMING CONTROL AT ENGINE START (WHEN THE ENGINE SPEED IS ABOUT 500 RPM OR LOWER)

To obtain better starting performance of the engine at the engine start, ignition control system sets the ignition timing to the initial ignition timing (5° BTDC).



75F00-6E1-24-4

IGNITION TIMING CONTROL AFTER ENGINE START (WHEN THE ENGINE SPEED IS HIGHER THAN ABOUT 500 RPM)

While the engine is idling, the ignition timing is determined by adding the engine coolant temperature compensation and compensation for idle speed stability to the basic ignition advance which varies according to the engine speed.

When the engine is not idling, the ignition timing is determined by adding the engine coolant temperature compensation and knock control compensation to the basic ignition advance.

Engine coolant temperature compensation

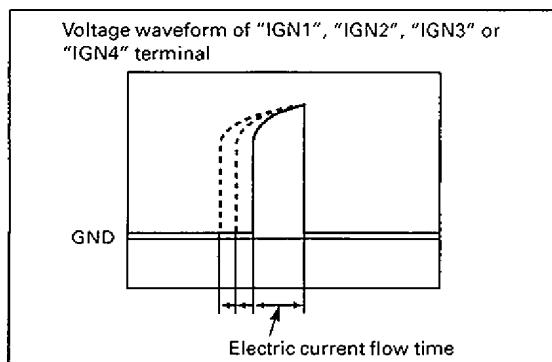
This compensation is added according to the signal from ECT sensor which detects the engine coolant temperature.

Compensation for idle speed stability

This compensation is added to stabilize the engine idle speed.

Knock control compensation

This compensation is added when knocking is detected so as to recover from knocking state immediately.



75F00-6E1-24-5

ELECTRIC CURRENT FLOW TIME CONTROL

To stabilize the secondary voltage generated in the ignition coil to a proper level, ignition control system controls the time of primary current flow to the ignition coil.

NOTE:

The ignition timing is controlled by ECM as described above. Therefore, when checking or adjusting the ignition timing, the ignition timing must be fixed to the initial one by grounding the test switch terminal.

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

An evaporative emission control system is used to prevent emission of fuel vapor.

The vapor generated in the fuel tank while driving or the engine at a stop passes through a tank pressure control valve and enters the EVAP canister where the charcoal absorbs and stores the fuel vapor.

The EVAP canister purge valve is controlled by ECM according to signals from various sensors. When none of the following conditions exists, ECM controls ON/OFF (open/close) switching of the canister purge valve at a constant rate and its opening (amount of purge air) by increasing and decreasing its ON time.

- When engine is running at idle speed (throttle valve at idle position).
- When engine coolant temperature is low.
- When engine speed is 1500 r/min. (rpm) or below.
- When vehicle is stopped.

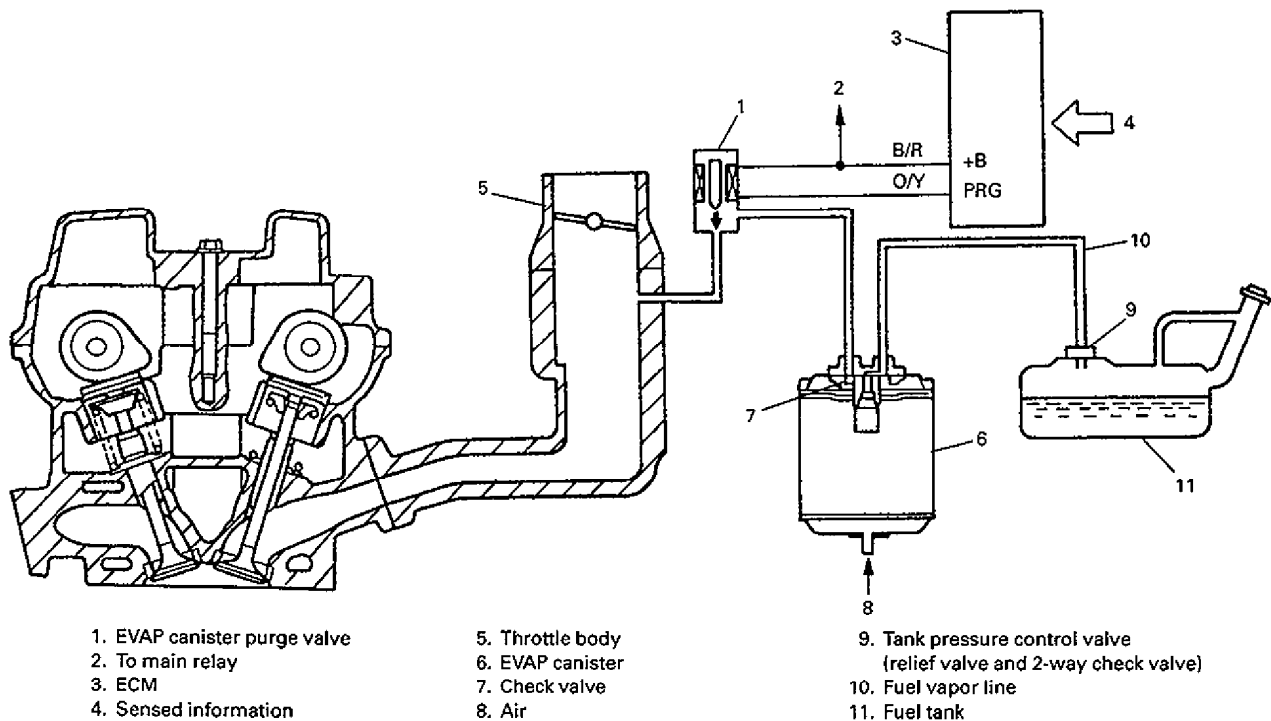
- When engine speed is 6000 r/min. (rpm) or more.

The higher the engine speed rises and the more fuel mixture is drawn in, the larger amount of air is purged.

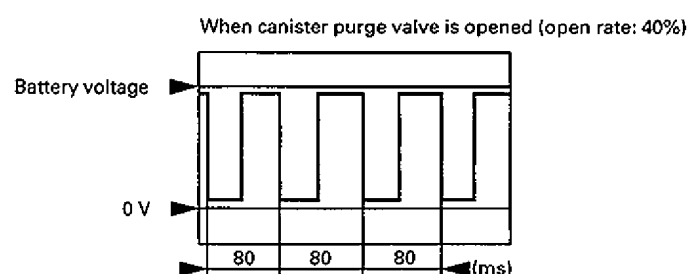
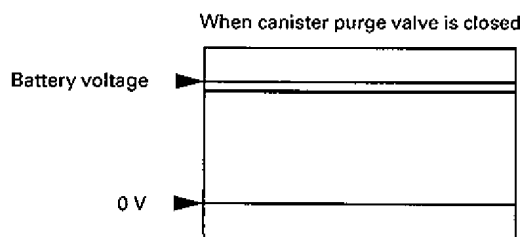
When the solenoid valve opens, fuel vapor in the canister is sucked into intake manifold.

In this state, the canister is purged or cleaned by air drawn through the filter at the bottom of the canister.

The tank pressure control valve (relief valve and 2-way check valve) is provided to keep the pressure in the fuel tank constant. When the pressure in the fuel tank becomes positive and reaches its specified value, it opens the valve to let the vapor flow into the EVAP canister. On the other hand, when the pressure in the fuel tank becomes negative and reaches its specified value, it opens the valve to let the air flow into the fuel tank.



REFERENCE (VOLTAGE WAVEFORM OF "PRG" TERMINAL)



EXHAUST GAS RECIRCULATION (EGR) SYSTEM

This system controls the formation of NO_x emission by recirculating the exhaust gas into the combustion chamber through the intake manifold.

The EGR valve is controlled by EGR pressure transducer and solenoid vacuum valve controlled by ECM according to signals from various sensors.

The diaphragm mounted in the EGR pressure transducer is operated by back pressure of the exhaust gas to open and close the valve. By this opening and closing action of the valve, the EGR pressure transducer controls the vacuum transmitted to the EGR valve.

Under a low load condition such as low speed driving, the exhaust pressure is low. In this state, the diaphragm in the EGR pressure transducer is pushed down by the spring force and the pressure transducer valve opens to allow the air into the vacuum passage from the outside.

As a result, the vacuum transmitted to the EGR valve becomes smaller and so does the opening of the EGR valve.

Thus, less amount of exhaust gas is recirculated to the intake manifold.

Under a high load condition such as high speed

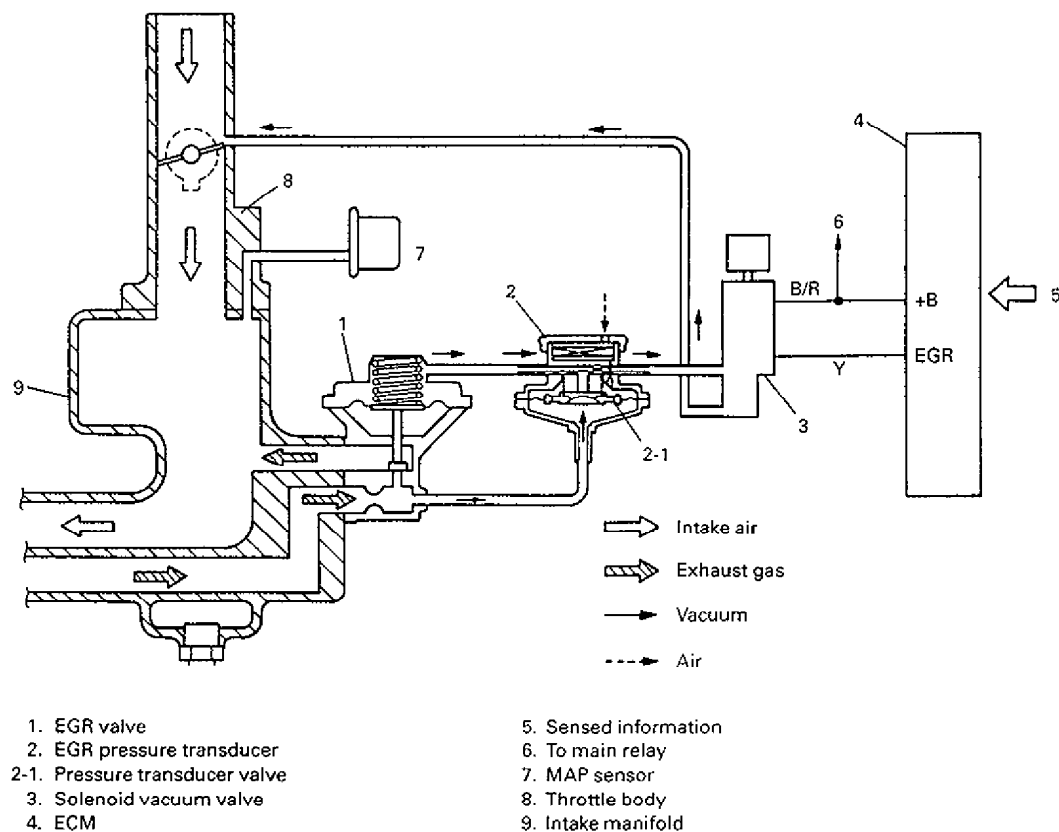
driving, on the other hand, the exhaust pressure is high. By the high exhaust pressure, the diaphragm in the pressure transducer is pushed up and closes its valve. As the air does not enter the vacuum passage in this state, the vacuum transmitted to the EGR valve grows larger and so does the opening of the EGR valve.

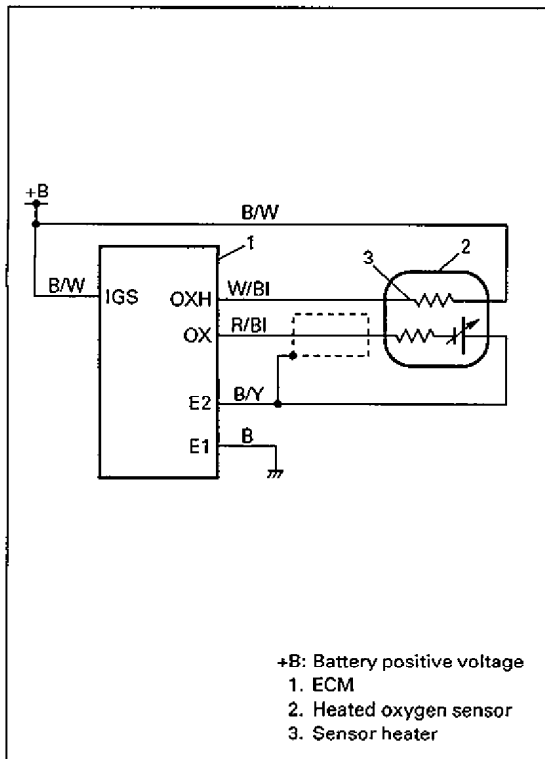
Thus, larger amount of exhaust gas is recirculated to the intake manifold.

Under any one of the following conditions, ECM closes the vacuum passage of solenoid vacuum valve. In this state, as the vacuum is not transmitted to the EGR valve, it remains closed.

- When engine coolant temperature is low.
- When engine is running at idle speed.
- When engine is running under high load.
- When intake air temperature is low.
- When vehicle is stopped.
- When engine speed is 1500 r/min. (rpm) or below.
- When engine speed is 4500 r/min. (rpm) or more.

Other than the above, EGR valve opens and closes in accordance with the EGR pressure transducer operation.

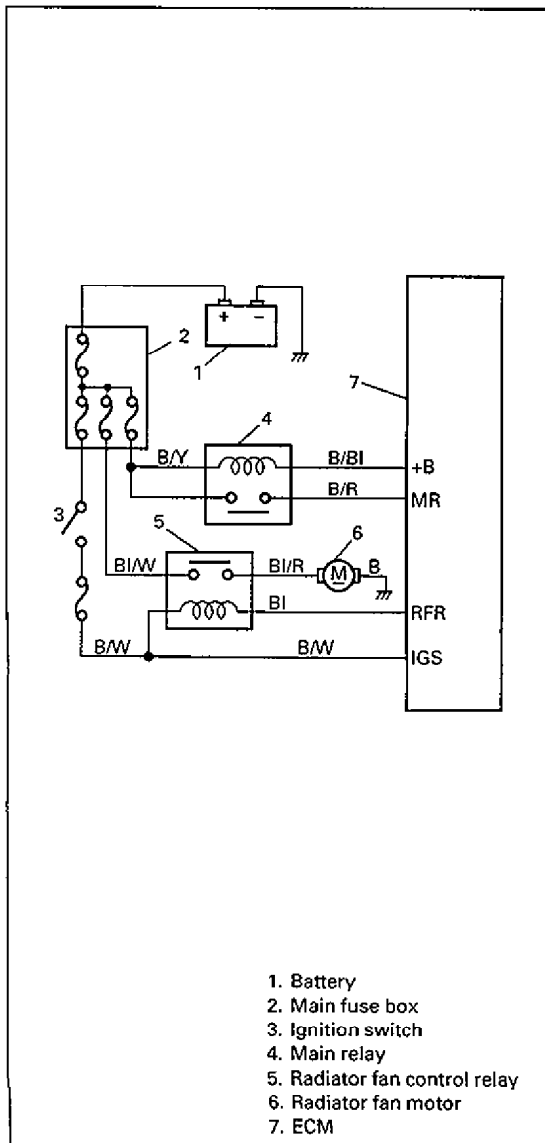




75F00-6E1-27-2

HEATED OXYGEN SENSOR HEATER CONTROL SYSTEM

This system controls operation (ON/OFF) of the heater which assists activation of the oxygen sensor. ECM turns ON oxygen sensor heater (to allow the electric current to flow to the oxygen sensor heater) when engine is not in high-load and high-speed state.



75F00-6E1-27-5

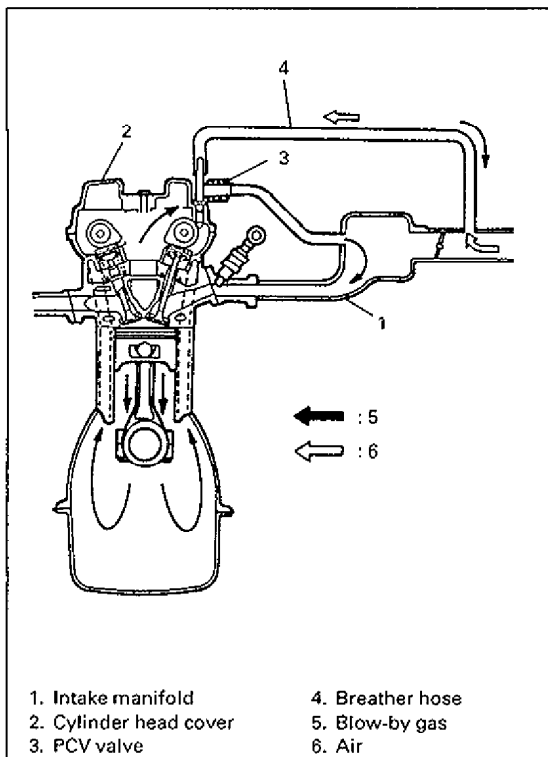
RADIATOR FAN CONTROL SYSTEM

This system controls operation (ON/OFF) of the radiator fan motor. Radiator fan motor is turned ON and OFF by its relay which ECM controls.

Radiator fan motor is turned ON/OFF under following engine coolant temp.

Radiator fan motor	Engine coolant temperature
OFF→ON	above 96 – 98°C (205 – 208°F)
ON→OFF	below 91 – 93°C (196 – 199°F)

But when ECT sensor is failed and A/C system is at work, radiator fan motor is turned ON irrespective of engine coolant temp.



75F00-6E1-28-2

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

The term "blow-by gas" stands for the compressed gas and exploded gas which blow through cylinder-to-piston clearance, which contain a large amount of unburned gases such as CO and HC. The Positive Crankcase Ventilation (PCV) system is provided to prevent the blow-by gas from being emitted into atmosphere and it operates as follows.

When the vacuum in the intake manifold is low (throttle valve open), the PCV valve is wide open due to its spring force.

Thus a large amount of the blow-by gas is drawn into the intake manifold.

On the other hand, when the vacuum in the manifold is high, the PCV valve opening is limited due to the high vacuum. Thus the amount of the blow-by gas drawn into the intake manifold is small.

A/C CONTROL SYSTEM (IF EQUIPPED)

A/C IDLE-UP CONTROL

ECM increases engine speed under following conditions to prevent engine speed from dropping when A/C system is at work.

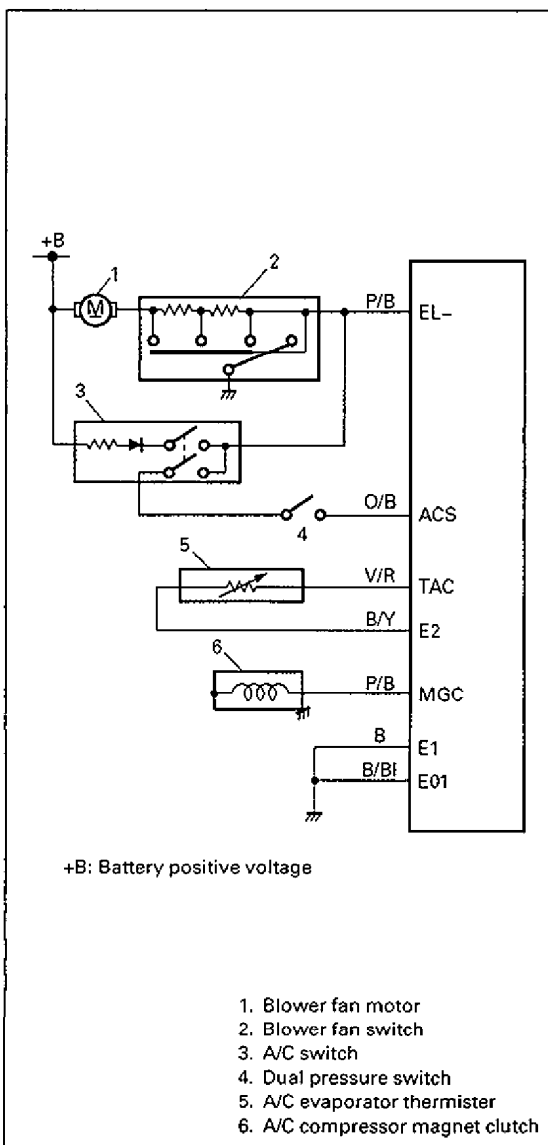
- A/C switch : ON
- A/C evaporator temperature $\geq 2.5^{\circ}\text{C}$
- $600 \text{ r/min. (rpm)} \leq \text{Engine speed} \leq 6500 \text{ r/min. (rpm)}$
- A/C cut control not functioning

A/C COMPRESSOR CONTROL

ECM turns the A/C compressor ON and OFF according to A/C evaporator temperature, engine speed and throttle valve opening.

A/C CUT CONTROL

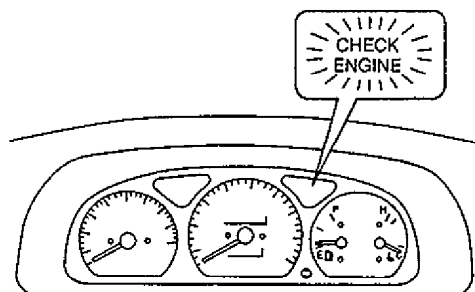
A/C compressor is turned OFF while accelerating at full open throttle and when starting (when vehicle speed is 0 km/h and throttle valve is opened fully from complete closure).



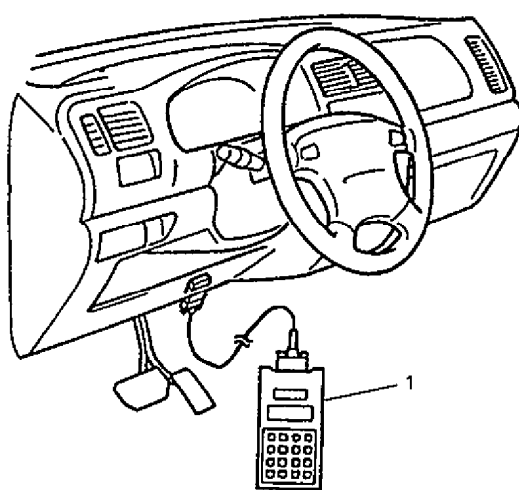
+B: Battery positive voltage

75F00-6E1-28-5

[Not using SUZUKI scan tool (Tech 1)]

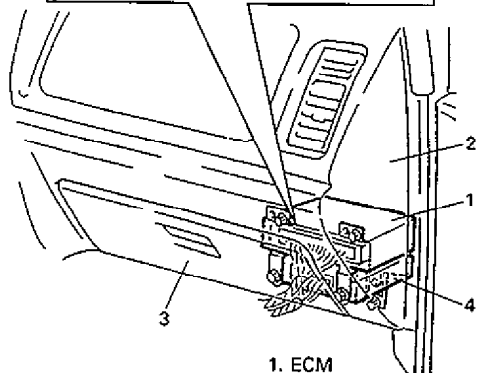
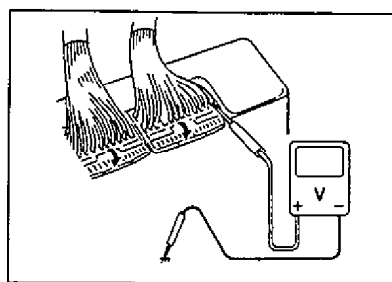


[Using SUZUKI scan tool (Tech 1)]



1. SUZUKI scan tool (Tech 1)

75F00-6E1-29-3



1. ECM
2. Instrument main panel
3. Glove box
4. TCM (A/T vehicle only)

75F00-6E1-29-5

DIAGNOSIS

TROUBLE DIAGNOSIS (BY ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION))

ECM has on-board diagnostic system (a system self-diagnosis function) as described previously (p. 6E1-8).

Investigate where the trouble is by referring to "Diagnostic Flow Table" and "Diagnostic Trouble Code Table" on later pages.

PRECAUTIONS IN DIAGNOSING TROUBLES

[PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

- Before identifying diagnostic trouble code, don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine. Such disconnection will erase memorized trouble in ECM 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.

[INTERMITTENT TROUBLE] and [NOTES ON SYSTEM CIRCUIT INSPECTION]

Refer to SECTION 0A.

- When checking voltage at each terminal of the coupler which is connected to ECM, 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 ECM to be shorted and damaged.

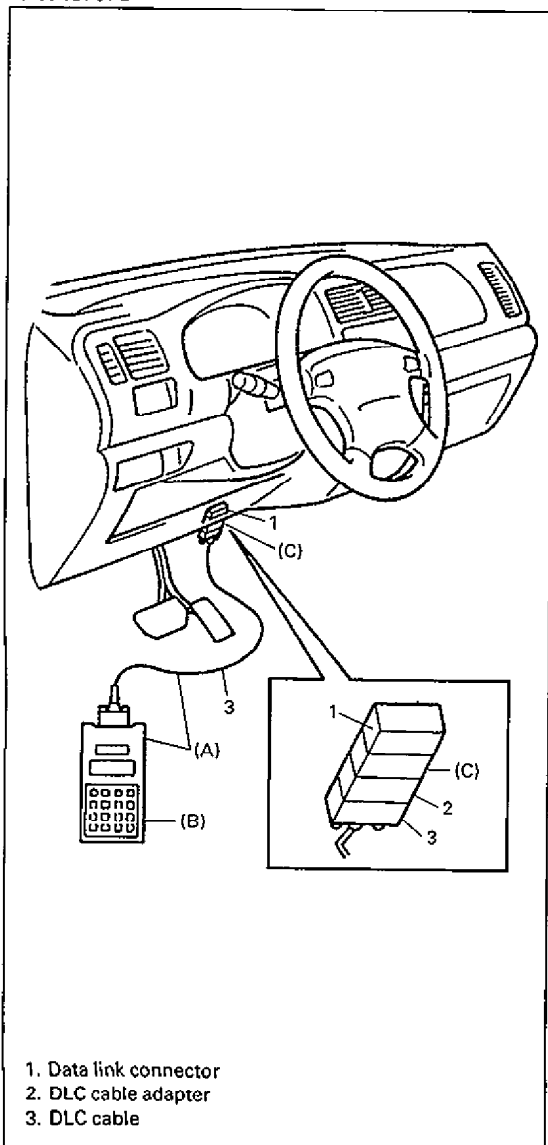
DIAGNOSTIC FLOW TABLE

STEP	ACTION	YES	NO
1	Does malfunction indicator lamp ("CHECK ENGINE" light) turn ON when ignition switch is turned ON (without starting engine)?	Go to step 2.	Go to step 3.
2	1) Start engine and check malfunction indicator lamp ("CHECK ENGINE" light). 2) Does malfunction indicator lamp ("CHECK ENGINE" light) turn OFF?	Normal operation.	Remains ON Proceed to Table A-3 (Malfunction Indicator lamp ("CHECK ENGINE" light) circuit check).
3	Does malfunction indicator lamp ("CHECK ENGINE" light) flash?	Flashes Go to step 4.	Remains OFF Go to step 5.
4	Is vehicle equipped with immobilizer control system?	Proceed to "Diagnosis" in SECTION 8C "Immobilizer Control System".	Diagnosis switch terminal (in monitor coupler) circuit shorted to ground. Repair or replace.
5	Does engine start?	Proceed to Table A-2 (Malfunction Indicator Lamp ("CHECK ENGINE" light) circuit check).	Proceed to Table A-1 (ECM power and ground circuit check).
6	1) Using service wire, ground diagnosis switch terminal in monitor coupler. 2) Does malfunction indicator lamp ("CHECK ENGINE" light) flash?	Go to step 7.	Remains ON Proceed to Table A-3 (Malfunction Indicator lamp ("CHECK ENGINE" light) circuit check).
7	1) Check DTC, referring to "Diagnostic Trouble Code (DTC) Check" on p.6E1-31. 2) [Using SUZUKI scan tool (Tech 1)] Is "NO CODES" displayed? [Not using SUZUKI scan tool (Tech 1)] Is DTC 12 indicated?	Go to step 8.	Go to step 9.
8	Are engine basic parts described "Engine Diagnosis" in SECTION 6 in good condition?	1) Proceed to "Trouble Diagnosis" on p.6E1-52. Check Engine and Emission Control system parts that are not indicated by self-diagnosis function. 2) Recheck this system.	Repair or replace.

DIAGNOSTIC FLOW TABLE (CONTINUED)

STEP	ACTION	YES	NO
9	1) Check and repair according to Flow Table corresponding to that DTC. 2) After repair, clear DTC, referring to "Diagnostic Trouble Code Clearance" on p.6E1-33. 3) Is trouble corrected? (Be sure to perform "FINAL CHECK" described in p.6E1-50 for checking.)	END	Recheck this system.

75F00-6E1-31-2



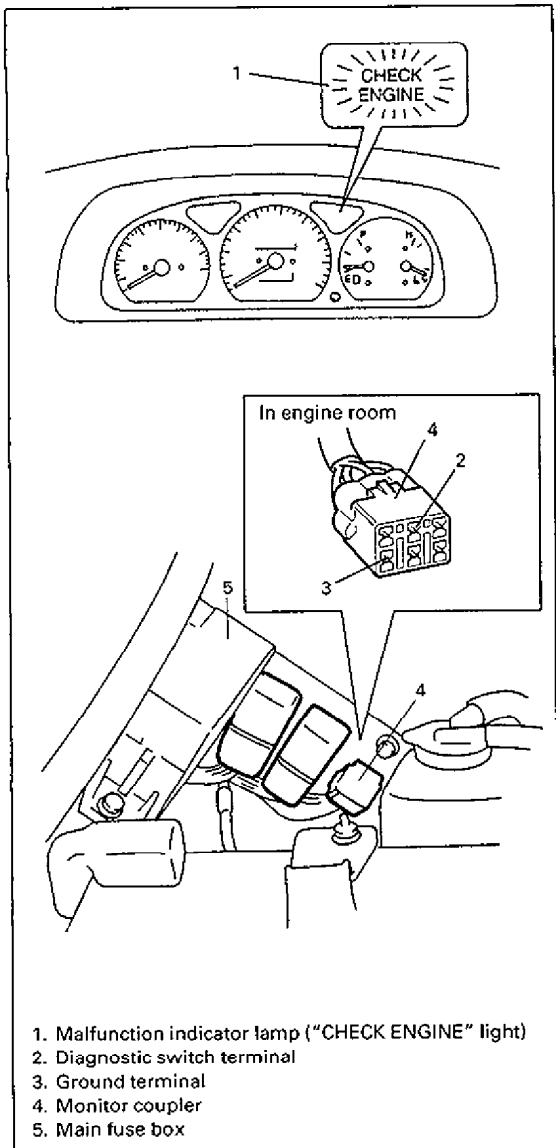
75F00-6E1-31-5

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 (including ECM 2.0 or later)****(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).

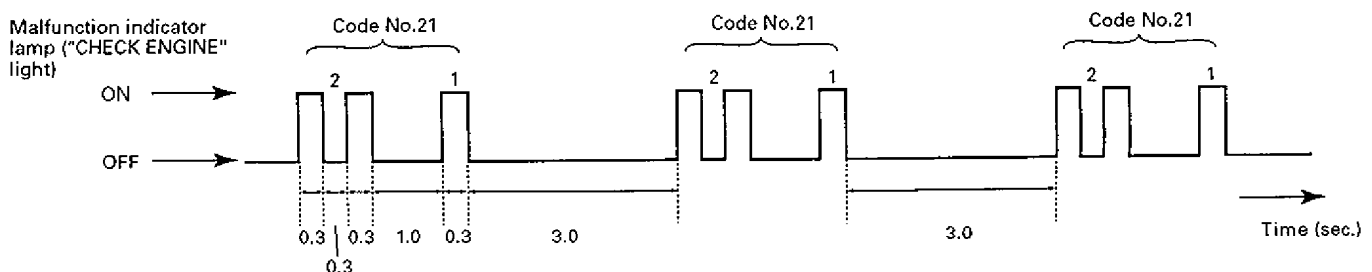


75F00-6E1-32-3

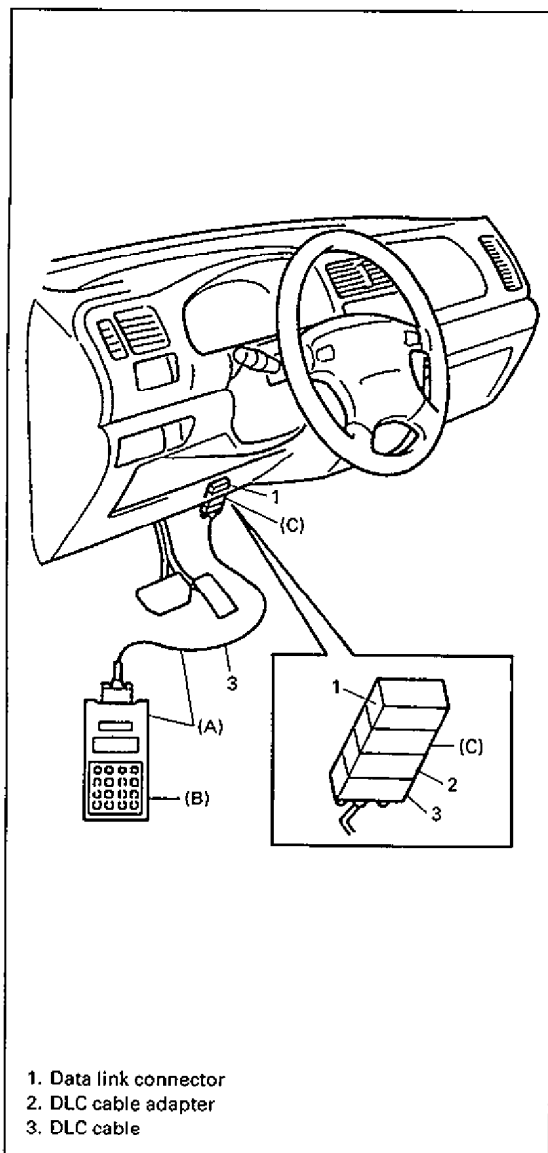
[Not using SUZUKI scan tool (Tech 1)]

- 1) Check malfunction indicator lamp ("CHECK ENGINE" light), referring to "Malfunction Indicator Lamp ("CHECK ENGINE" light) Check" on p.6E1-31.
- 2) Using service wire, ground diagnostic 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.6E1-34.
- 4) After completing the check, turn ignition switch OFF and disconnect service wire from monitor coupler.

EXAMPLE: When TP sensor is defective (Code No.21)



75F00-6E1-32-5



75F00-6E1-33-3

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.

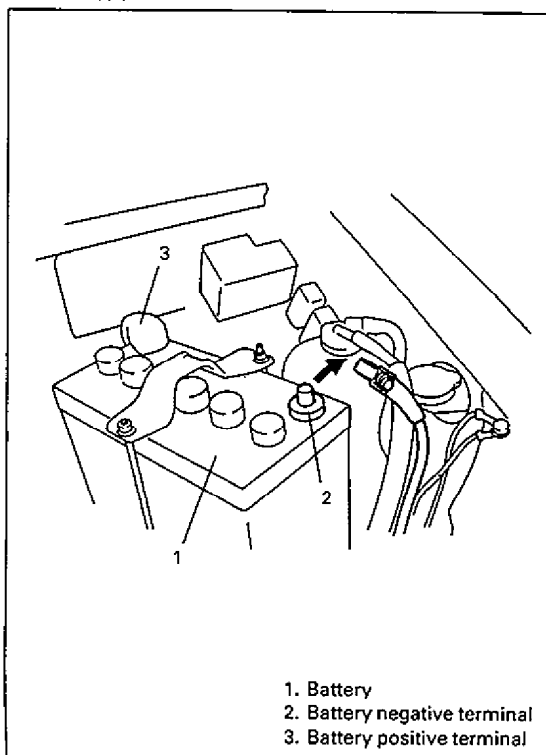
Special Tool

(A): 09931-76011 (Tech 1)

(B): Mass storage cartridge (including ECM 2.0 or later)

(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).



75F00-6E1-33-5

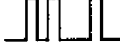
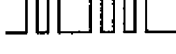
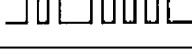
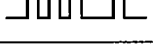
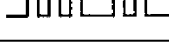
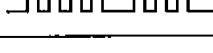
[Not using SUZUKI scan tool (Tech 1)]

- 1) Turn OFF ignition switch.
- 2) Disconnect battery negative cable for specified time below to erase diagnostic trouble code stored in ECM memory and reconnect it.

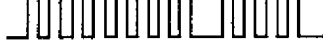
Time required to erase DTC

Ambient temperature	Time to cut power to ECM
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 (DTC) TABLE

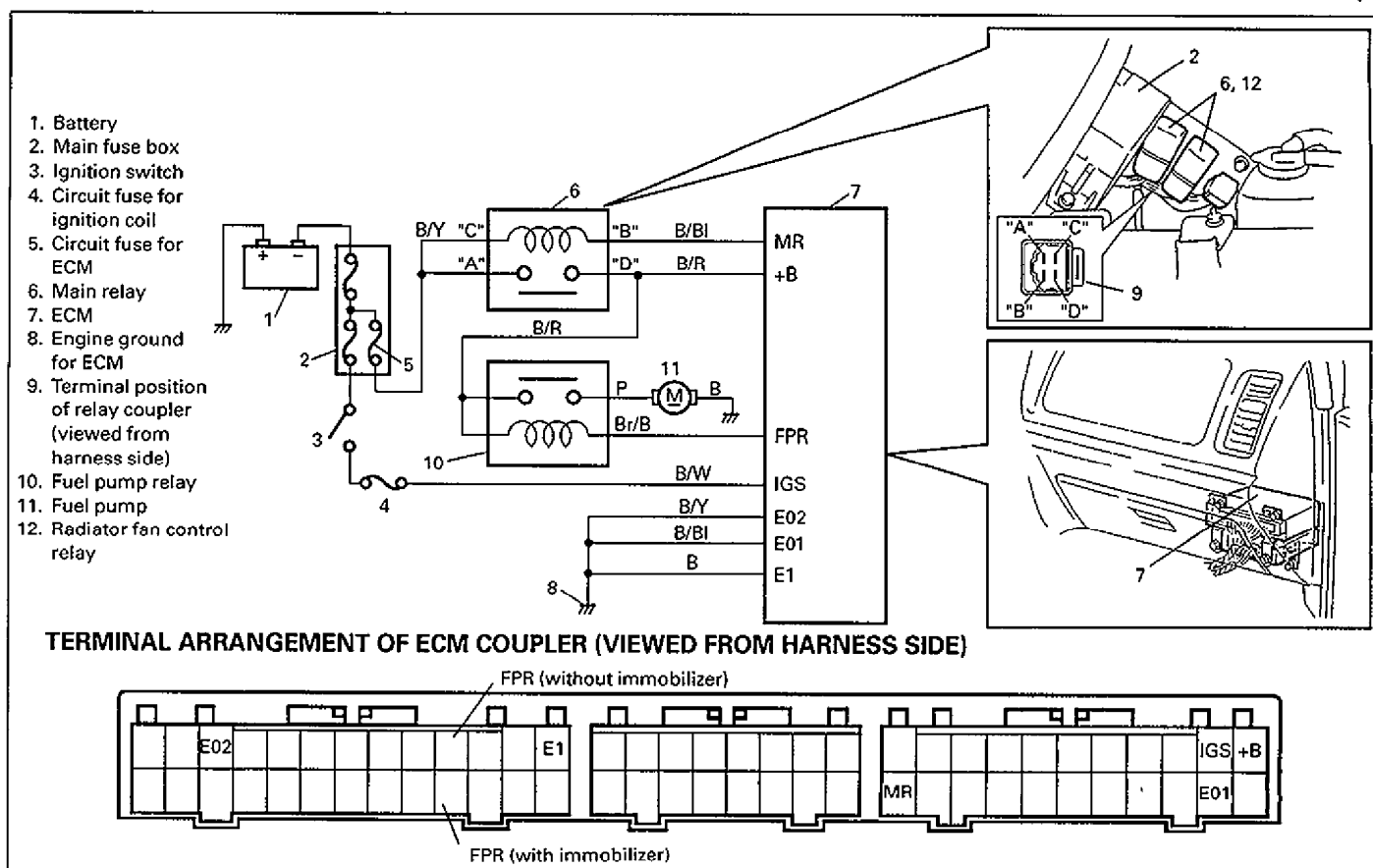
DIAGNOSTIC TROUBLE CODE NO.	MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) FLASHING PATTERN	DIAGNOSTIC ITEM	DIAGNOSIS
13		Heated oxygen sensor	Diagnose trouble according to "Diagnostic Flow Table" corresponding to each code No.
14		ECT sensor	
15			
21		TP sensor	
22			
23		IAT sensor	
25			
24		VSS	
31		MAP sensor	
32			
43		Knock sensor	
12		Normal	This code appears when none of the other codes (above codes) are identified.

For Vehicle Equipped With Immobilizer Control System Only

DIAGNOSTIC TROUBLE CODE NO.	MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) FLASHING PATTERN	DIAGNOSTIC ITEM	DIAGNOSIS
81		ECM/ICM code	Refer to SECTION 8C "Immobilizer Control System".
84			
82		ECM	
83		Serial data link	

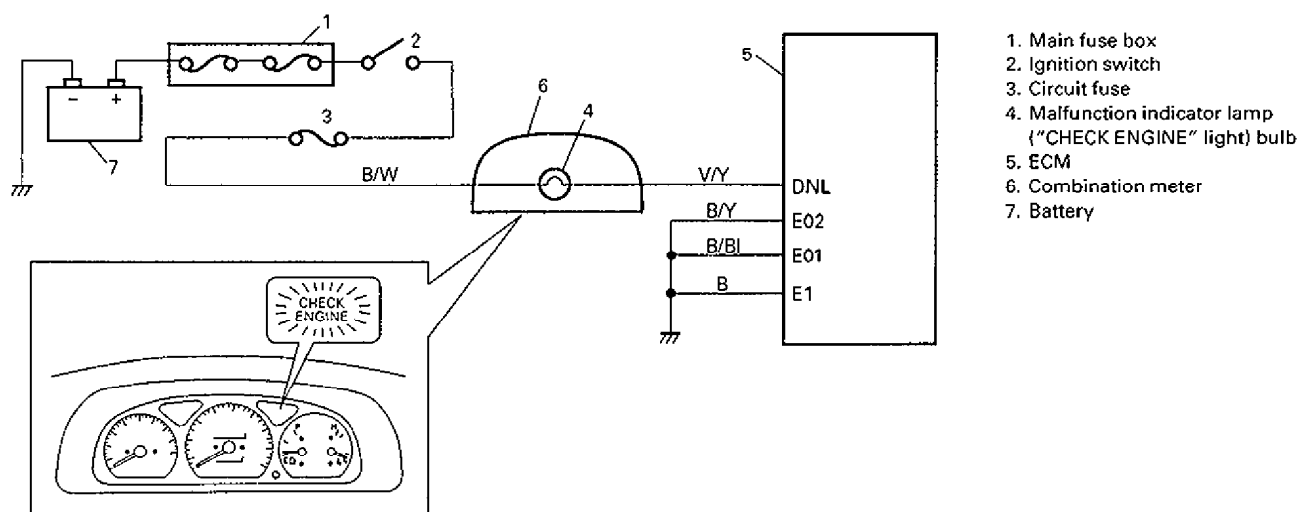
A-1 ECM POWER AND GROUND CIRCUIT CHECK

(MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T LIGHT AT IGNITION SWITCH ON AND ENGINE DOESN'T START THOUGH IT IS CRANKED UP.)

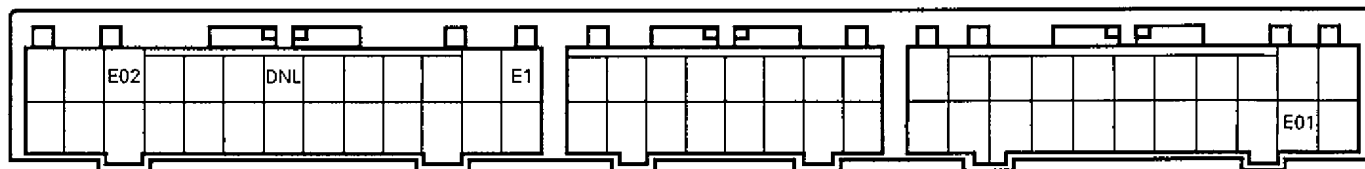


STEP	ACTION	YES	NO
1	Is operation of main relay heard at ignition switch ON?	Go to step 2.	Go to step 3.
2	Is operation of fuel pump relay heard at ignition switch ON?	Proceed to Table A-2 (Malfunction Indicator lamp ("CHECK ENGINE" light) circuit check).	Go to step 4.
3	Are main fuse and circuit fuses (for ignition coil and ECM) in good condition?	Go to step 5.	Repair or replace.
4	1) Disconnect ECM couplers with ignition switch OFF. 2) Using service wire, ground "MR" terminal. 3) Is battery voltage applied to "+B" terminal at ignition switch ON?	Poor connection at "+B" terminal. If connection is OK, check ECM and its circuit, referring to p.6E1-70.	"B/R" wire open or poor relay-to-coupler connection. If all above are OK, check main relay.
5	Is main relay in good condition, referring to p.6E1-83?	Go to step 6.	Replace.
6	1) Check voltage between "IGS" terminal and body ground with ignition switch ON. 2) Is it 10 – 14 V?	Poor relay-to-coupler connection, "B/Y" wire open, "B/BI" wire open, poor "MR" terminal circuit connection or poor engine ground. If all above are OK, substitute a known-good ECM and recheck.	"B/W" wire open.

A-2 MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) CIRCUIT CHECK (MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T LIGHT AT IGNITION SWITCH ON THOUGH ENGINE STARTS.)

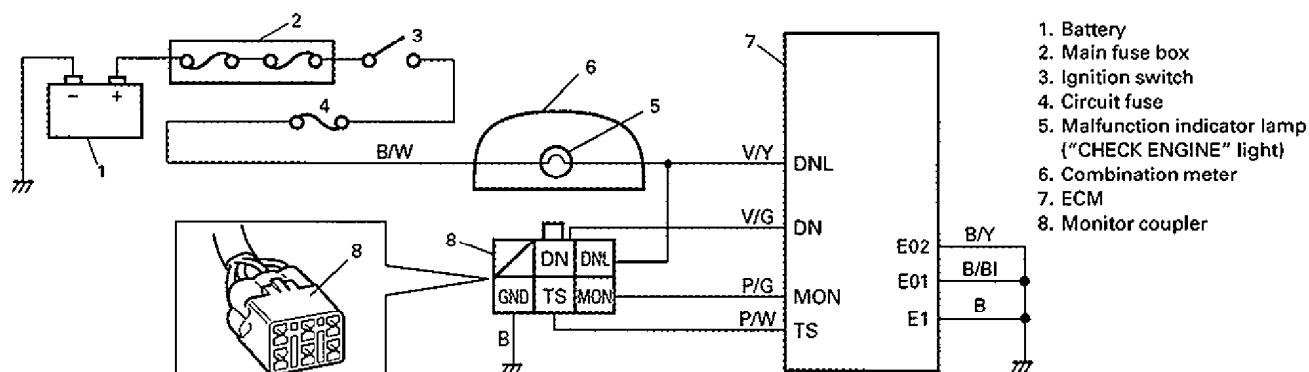


TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

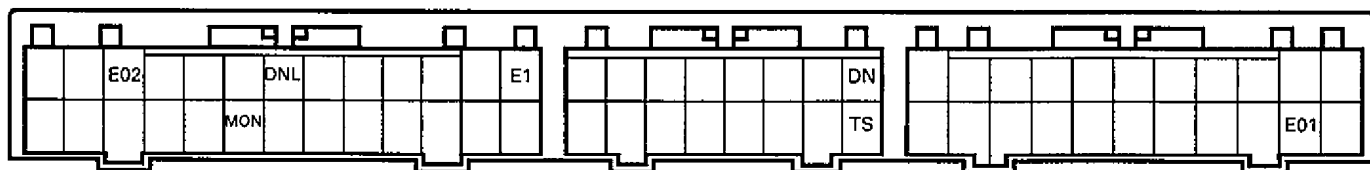


STEP	ACTION	YES	NO
1	1) With ignition switch turned OFF, disconnect couplers from ECM. 2) Ground "DNL" terminal in coupler disconnected. 3) Does malfunction indicator lamp ("CHECK ENGINE" light) turn ON at ignition switch ON?	Poor "DNL" connection. If connection is OK, substitute a known-good ECM and recheck.	Bulb burned out, "V/Y" wire open or "B/W" wire open.

A-3 MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) CIRCUIT CHECK (MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LIGHT) DOESN'T FLASH JUST REMAINS ON EVEN WITH GROUNDING DIAGNOSIS SWITCH TERMINAL.)

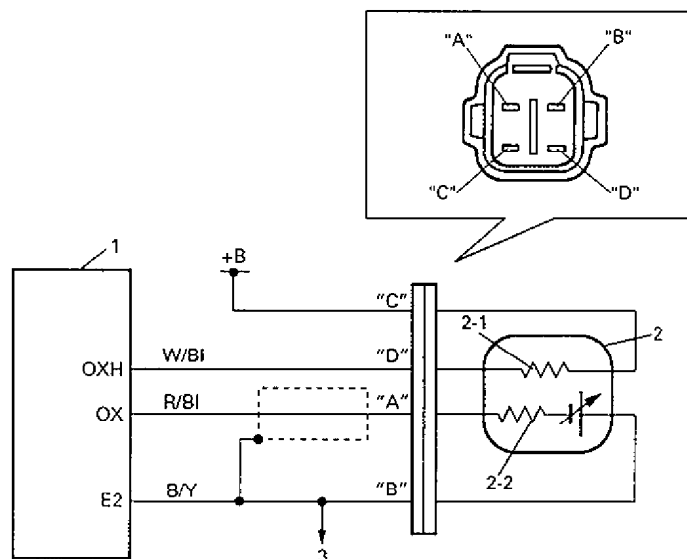


TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



STEP	ACTION	YES	NO
1	1) With ignition switch turned OFF, disconnect couplers from ECM. 2) Does malfunction indicator lamp ("CHECK ENGINE" light) turn ON at ignition switch ON?	"V/Y" wire shorted to ground.	Go to step 2.
2	Is coupler ("DN" terminal) connected to ECM properly?	Go to step 3.	Poor "DN" connection.
3	1) Using service wire, ground "DN" terminal with couplers connected to ECM. 2) Does malfunction indicator lamp ("CHECK ENGINE" light) flash at ignition switch ON?	Poor "DNL" connection. Substitute a known-good ECM and recheck.	Poor grounding, "V/G" wire open or "B" wire open.

CODE NO.13 HEATED OXYGEN SENSOR CIRCUIT (OXYGEN SENSOR OUTPUT VOLTAGE LOW)

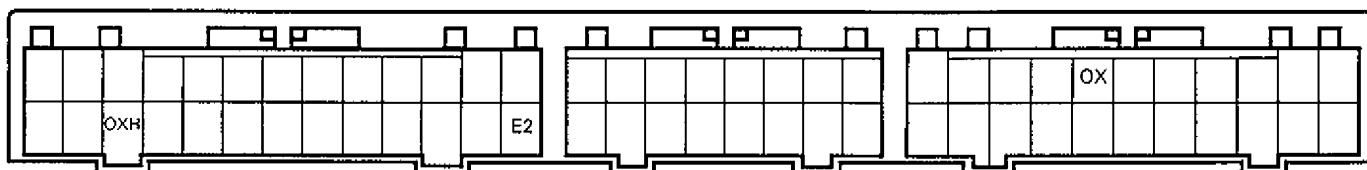


1. ECM
2. Heated oxygen sensor
2-1. Oxygen sensor heater
2-2. Oxygen sensor
3. To other sensors

NOTE:

- Before diagnosing trouble according to flow chart given below, check to make sure that following system and parts other than electronic control system are in good condition.
 - Air cleaner (clogged)
 - Vacuum leaks (air inhaling)
 - Spark plugs (contamination, gap)
 - Ignition coil assembly
 - Ignition timing
 - Engine compression
 - Any other system and parts which might affect A/F mixture or combustion.
- If code No.13 and another code No. are indicated together, the later has priority. Therefore, check and correct what is represented by that code No. first and then proceed to the following check.
- Be sure to use a voltmeter with high impedance ($M\Omega/V$ minimum) or digital type voltmeter for accurate measurement.

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



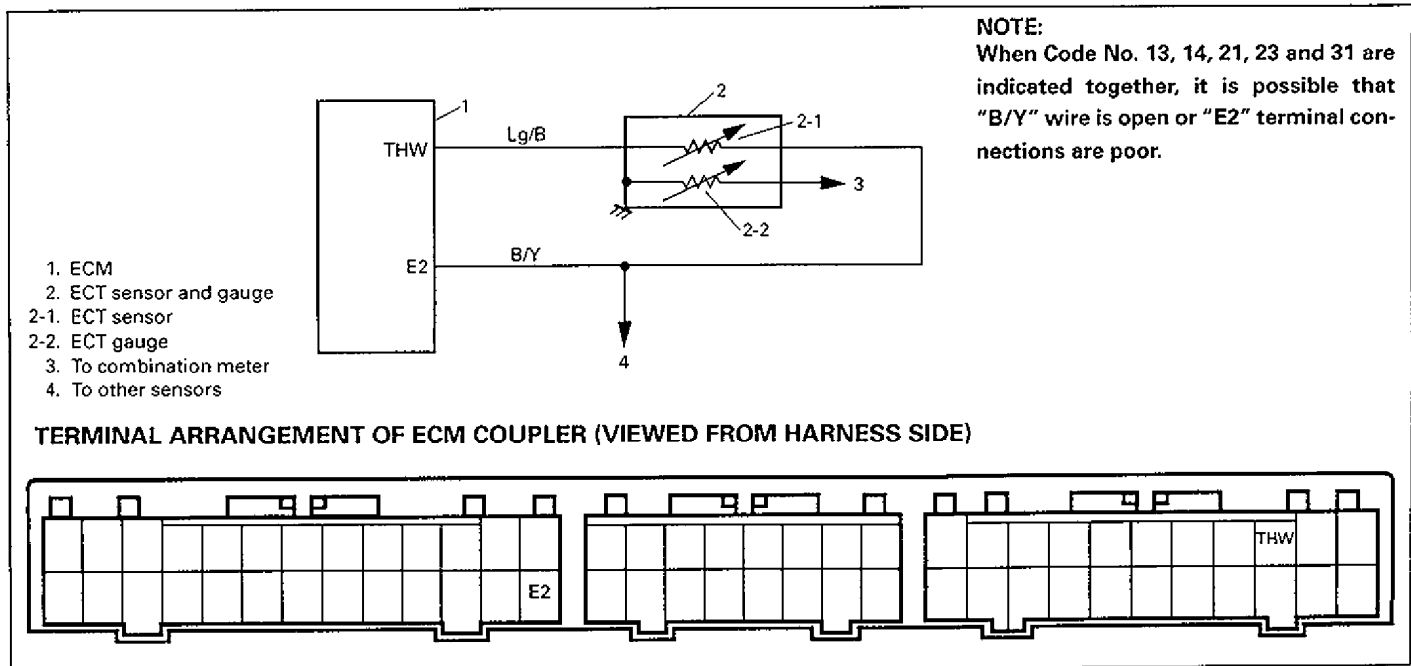
STEP	ACTION	YES	NO
1	1) Remove ECM and connect couplers to ECM. 2) Warm up engine to normal operating temperature. 3) Connect voltmeter between "OX" terminal of ECM coupler and body ground. 4) Maintain engine speed at 2000 rpm and after 60 seconds, check voltmeter. 5) Does the voltage deflect between above and below 0.45 V repeatedly?	Heated oxygen sensor and its circuit (closed loop system, A/F ratio feed back system) are in good condition. Intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Go to step 2.
2	Does the voltage remain unchanged at 0.45 V above?	Check for a short to power circuit in "R/BI" wire circuit. Check MAP sensor, ECT sensor, fuel pressure, injectors and their circuit. If all above are OK, check ECM and its circuit, referring to p.6E1-70.	Go to step 3 on the next page.

CODE NO.13 HEATED OXYGEN SENSOR CIRCUIT (CONTINUED)

STEP	ACTION	YES	NO
3	Does the voltage remain unchanged at below 0.45 V?	Go to step 4.	Substitute a known-good heated oxygen sensor and recheck.
4	1) Maintain engine speed at 2000 rpm for 60 seconds. 2) Check voltmeter while repeating racing engine. 3) Does it indicate 0.45 V or more even once?	Poor "OX" connection of ECM coupler or lean A/F mixture. Check MAP sensor, ECT sensor, fuel pressure, injectors and their circuit. If all above are OK, check ECM and its circuit, referring to p.6E1-70.	Replace heated oxygen sensor and recheck.

NOTE:

Upon completion of inspection and repair work, perform **FINAL CHECK**, referring to p.6E1-50 to confirm that the trouble has been corrected.

CODE NO.14 ECT SENSOR CIRCUIT**(LOW TEMPERATURE INDICATED, SIGNAL VOLTAGE HIGH)**

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect ECT sensor coupler. 2) With ignition switch ON, check voltage at "Lg/B" wire terminal of ECT sensor coupler. 3) Is it about 4 – 5 V?	Go to step 2.	"Lg/B" wire open, poor "THW" connection or "Lg/B" wire shorted to power circuit. If wire and connection are OK, substitute a known-good ECM and recheck.
2	1) Using service wire, connect "Lg/B" and "B/Y" wire terminal of ECT sensor coupler. 2) Check voltage at "Lg/B" wire terminal of ECT sensor coupler with ignition switch ON. 3) Is it below 0.15 V?	Poor ECT sensor-to-coupler connection of faulty ECT sensor. If connection and ECT sensor are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	"B/Y" wire open or poor "E2" connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. for STEP 1

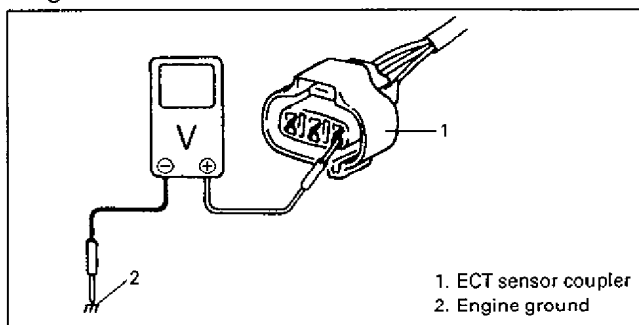
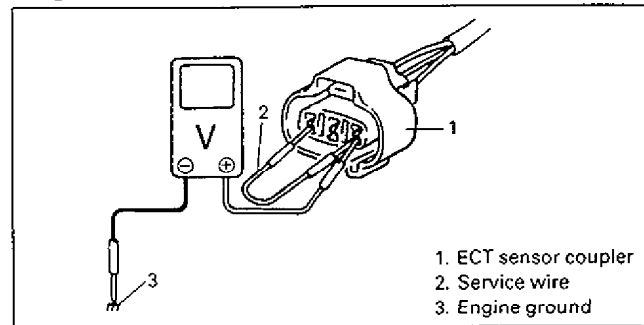
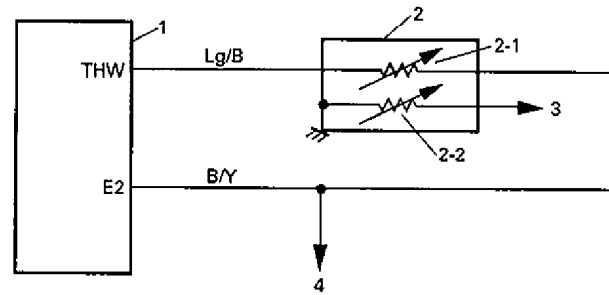


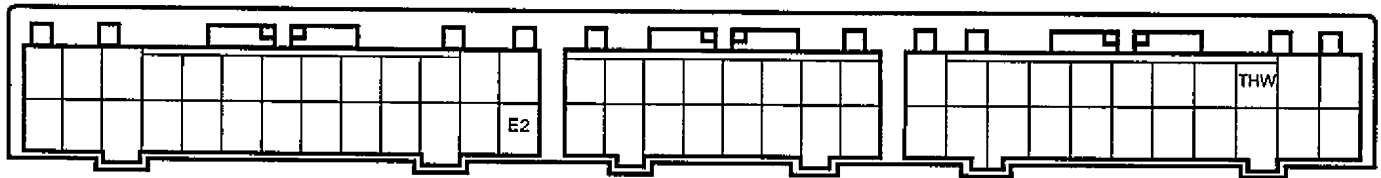
Fig. for STEP 2

**NOTE:**

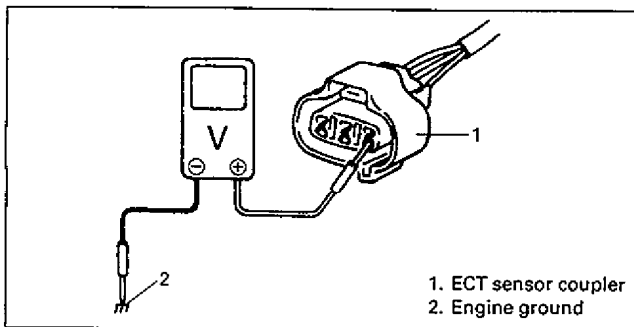
Upon completion of inspection and repair work, perform FINAL CHECK, referring to p.6E1-50 to confirm that the trouble has been corrected.

CODE NO.15 ECT SENSOR CIRCUIT**(HIGH TEMPERATURE INDICATED, SIGNAL
CIRCUIT VOLTAGE LOW)**

- 1. ECM
- 2. ECT sensor and gauge
- 2-1. ECT sensor
- 2-2. ECT gauge
- 3. To combination meter
- 4. To other sensors

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

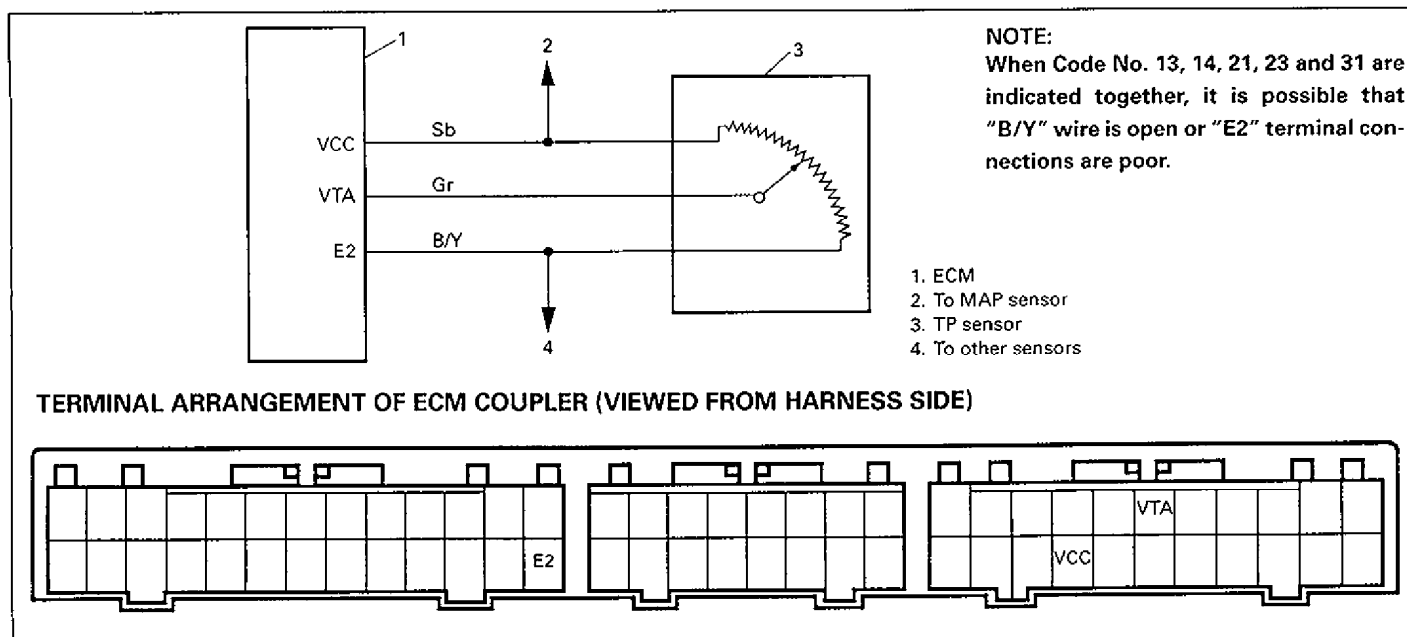
STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect ECT sensor coupler. 2) With ignition switch ON, is voltage applied to "Lg/B" wire terminal of ECT sensor coupler 4 V or more?	Go to step 2.	"Lg/B" wire shorted to "B/Y" wire or ground circuit. If wire is OK, substitute a known-good ECM and recheck.
2	1) Check ECT sensor, referring to p.6E1-78. 2) Is it in good condition?	Poor ECT sensor coupler connection, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Faulty ECT sensor.

Fig. for STEP 1**NOTE:**

Upon completion of inspection and repair work, perform **FINAL CHECK**, referring to p.6E1-50 to confirm that the trouble has been corrected.

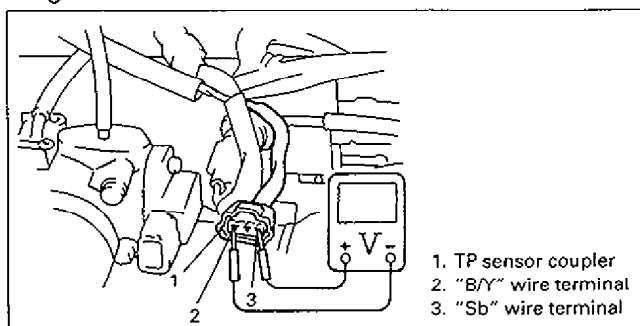
CODE NO.21 TP SENSOR CIRCUIT

(SIGNAL VOLTAGE HIGH)

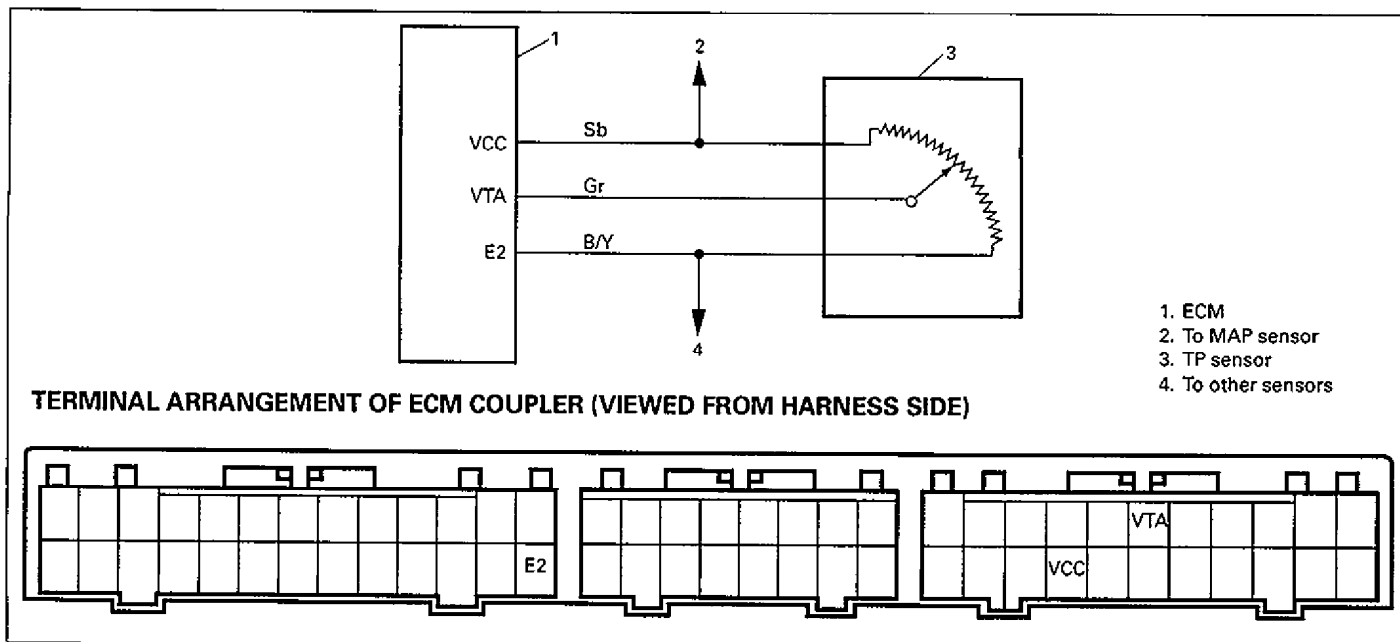


STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect TP sensor coupler. 2) Check voltage between "Sb" wire terminal and "B/Y" wire terminal of disconnected TP sensor coupler with ignition switch ON. 3) Is it about 4 – 5 V?	Go to step 2.	"B/Y" wire open, poor "E2" connections, or "Sb" wire shorted to power circuit.
2	1) Connect TP sensor coupler with ignition switch OFF. 2) Remove ECM and connect ECM couplers with ignition switch OFF. 3) Check voltage between "VTA" terminal and "E2" terminal with ignition switch ON? 4) Is "VTA" terminal voltage 0.50 ± 0.15 V at throttle valve is fully closed and 4.2 ± 0.5 V at throttle valve is fully open?	Poor "VTA" connection. If connection is OK, substitute a known-good ECM and recheck.	Go to step 3.
3	Is "VTA" terminal voltage about 4 – 5 V?	"Gr" wire open or shorted to "Sb" wire or poor TP sensor coupler connection.	Maladjusted TP sensor or faulty TP sensor.

Fig. for STEP 1

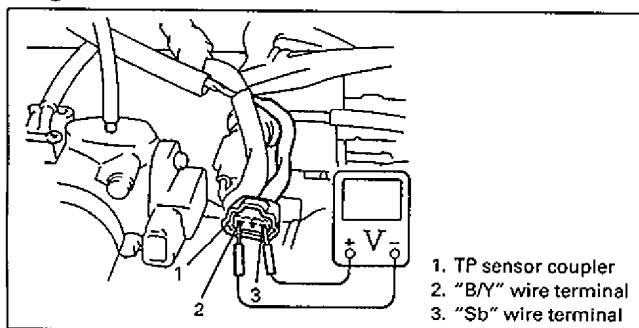
**NOTE:**

Upon completion of inspection and repair work, perform FINAL CHECK, referring to p.6E1-50 to confirm that the trouble has been corrected.

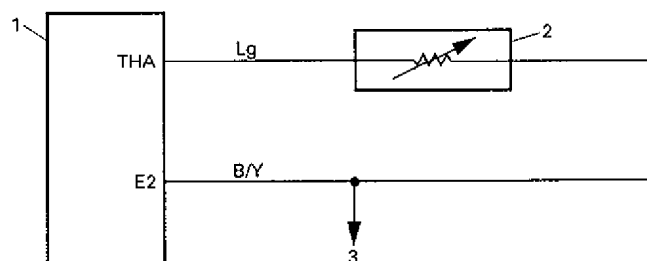
CODE NO.22 TP SENSOR CIRCUIT**(SIGNAL VOLTAGE LOW)**

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect TP sensor coupler. 2) Check voltage between "Sb" wire terminal and "B/Y" wire terminal of disconnected TP sensor coupler with ignition switch ON. 3) Is it about 4 – 5 V?	Go to step 2.	"Sb" wire open, "Sb" wire shorted to ground circuit or poor "VCC" connection. If wire and connection are OK, substitute a known-good ECM and recheck.
2	1) Check TP sensor, referring to p.6E1-77. 2) Is it in good condition?	If connection and TP sensor are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Poor TP sensor coupler connection or faulty TP sensor.

Fig. for STEP 1

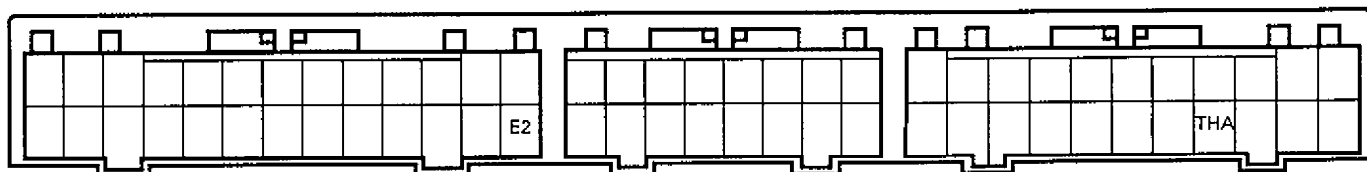
**NOTE:**

Upon completion of inspection and repair work, perform **FINAL CHECK**, referring to p.6E1-50 to confirm that the trouble has been corrected.

CODE NO.23 IAT SENSOR CIRCUIT(LOW TEMPERATURE INDICATED, SIGNAL
VOLTAGE HIGH)**NOTE:**

When Code No. 13, 14, 21, 23 and 31 are indicated together, it is possible that "B/Y" wire is open or "E2" terminal connections are poor.

1. ECM
2. IAT sensor
3. To other sensors

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect IAT sensor coupler. 2) With ignition switch ON, check voltage at "Lg" wire terminal of IAT sensor coupler. 3) Is it about 4 – 5 V?	Go to step 2.	"Lg" wire open, poor "THA" connection or "Lg" wire shorted to power circuit. If wire and connection are OK, substitute a known-good ECM and recheck.
2	1) Using service wire, connect two terminals in IAT sensor coupler. 2) Check voltage at "Lg" wire terminal of IAT sensor coupler with ignition switch ON. 3) Is it below 0.15 V?	Poor IAT sensor coupler connection or faulty ECT sensor. If connection and IAT sensor are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	"B/Y" wire open or poor "E2" connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. for STEP 1

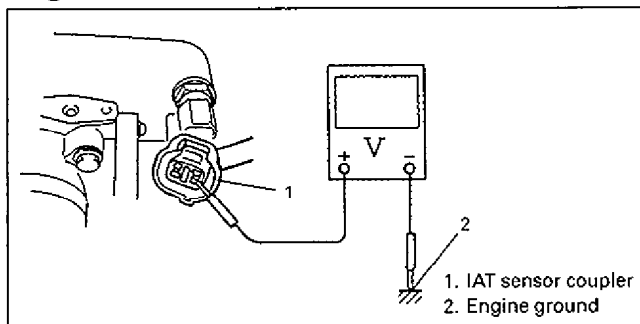
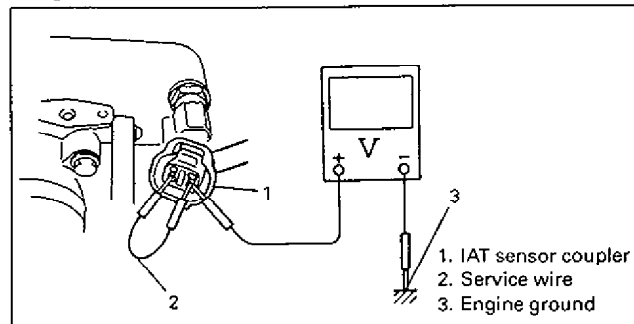
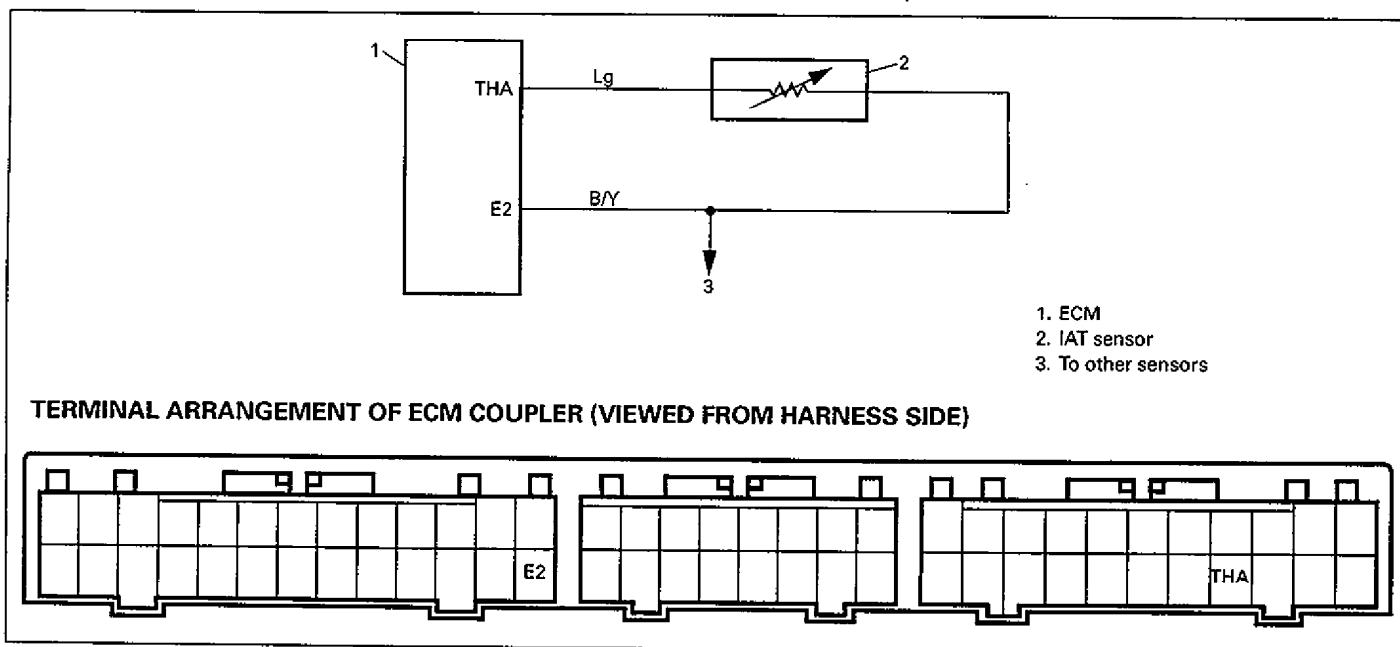


Fig. for STEP 2

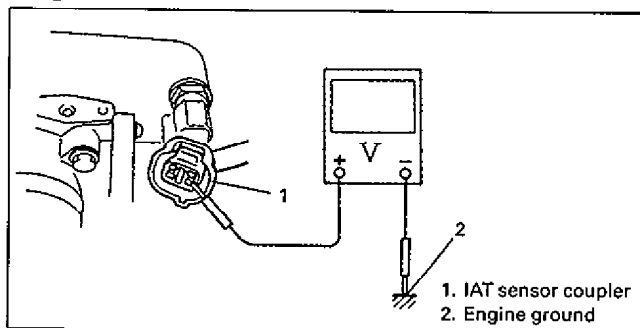
**NOTE:**

Upon completion of inspection and repair work, perform FINAL CHECK, referring to p.6E1-50 to confirm that the trouble has been corrected.

CODE NO.25 IAT SENSOR CIRCUIT**(HIGH TEMPERATURE INDICATED, SIGNAL VOLTAGE LOW)**

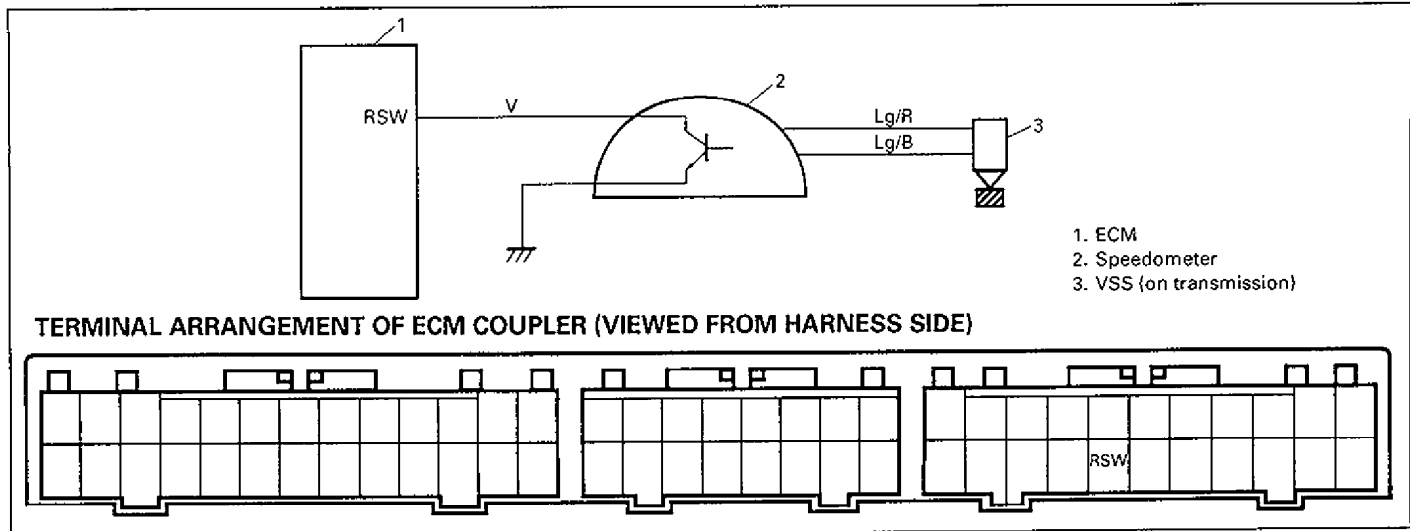
STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect IAT sensor coupler. 2) With ignition switch ON, is voltage applied to "Lg" wire terminal of IAT sensor coupler 4 V or more?	Go to step 2.	"Lg" wire shorted to "B/Y" wire or ground circuit. If wire is OK, substitute a known-good ECM and re-check.
2	1) Check IAT sensor, referring to p.6E1-79. 2) Is it in good condition?	Poor IAT sensor coupler connection, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Faulty IAT sensor.

Fig. for STEP 1

**NOTE:**

Upon completion of inspection and repair work, perform **FINAL CHECK**, referring to p.6E1-50 to confirm that the trouble has been corrected.

(VEHICLE SPEED SIGNAL NOT INPUTTED ALTHOUGH FUEL IS KEPT CUT FOR LONGER THAN 5 SECONDS)



NOTE:

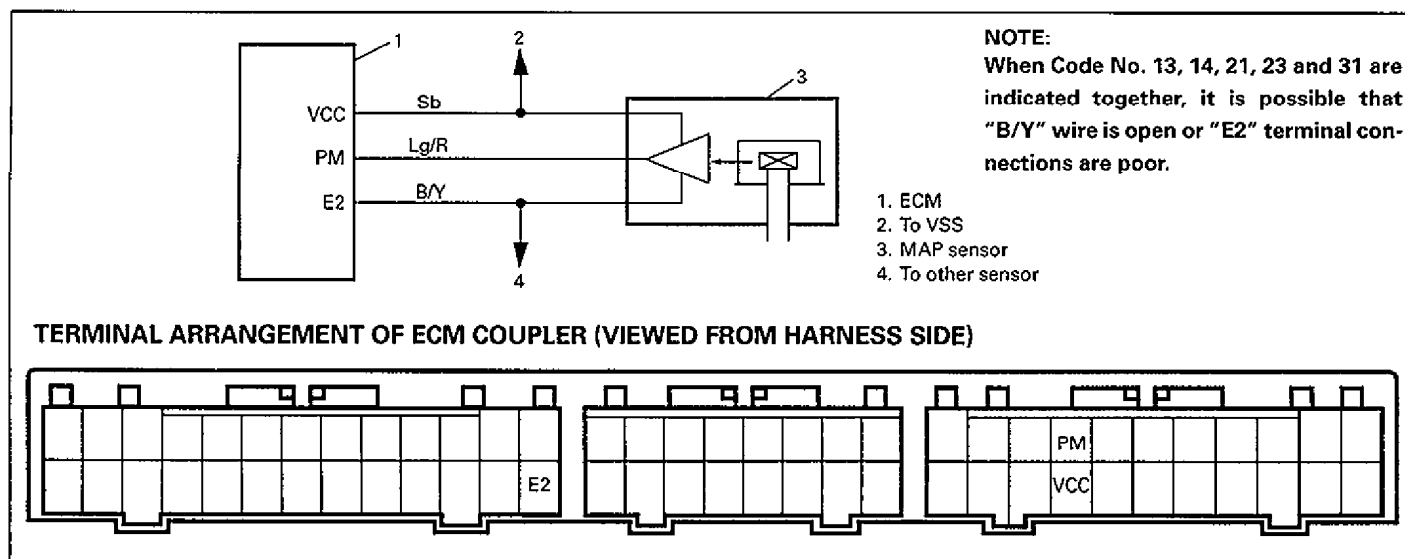
Be sure to turn OFF ignition switch for this check.

STEP	ACTION	YES	NO
1	Does speedometer indicate vehicle speed?	Go to step 2.	Go to step 3.
2	1) Remove ECM and connect coupler to ECM with ignition switch OFF. 2) Connect voltmeter between "RSW" terminal of ECM coupler and body ground. 3) Hoist front end of vehicle and lock front right tire. 4) Turn front left tire quickly with ignition switch ON. 5) Does voltmeter indicate deflection between 0 – 1 V and 4 – 6 V a few times while tire is turned one revolution?	Intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Go to step 4.
3	1) Check VSS, referring to p.6E1-82. 2) Is it in good condition?	Poor VSS sensor coupler connection, wire harness between VSS and speedometer or faulty speedometer.	Faulty VSS.
4	Does voltmeter indicate 0 – 1 V?	Poor "RSW" connection or "V" wire shorted to ground. If wire and connection are OK, substitute a known-good speedometer and recheck.	Go to step 5.
5	Does voltmeter indicate 4 – 6 V?	"V" wire open or poor connection of "V" wire terminal in combination meter. If wire and connection are OK, substitute a known-good speedometer and recheck.	Substitute a known-good speedometer and recheck.

NOTE:

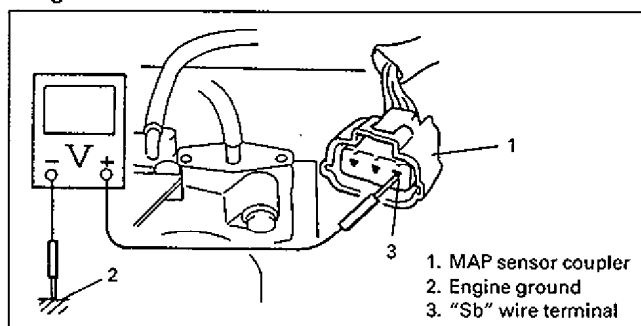
Upon completion of inspection and repair work, perform FINAL CHECK, referring to p.6E1-50 to confirm that the trouble has been corrected.

CODE NO.31 MAP SENSOR CIRCUIT (LARGE SIGNAL CURRENT FLOW, SIGNAL VOLTAGE HIGH)



STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect MAP sensor coupler. 2) With ignition switch ON, check voltage at "Sb" wire terminal of MAP sensor coupler. 3) Is it about 4 – 5 V?	Go to step 2.	"Sb" wire open, "Sb" wire shorted to ground circuit or poor "VCC" connection. If wire and connection are OK, substitute a known-good ECM and recheck.
2	1) Check MAP sensor, referring to p.6E1-75. 2) Is it in good condition?	Go to step 3.	Faulty MAP sensor.
3	1) Disconnect MAP sensor hose from MAP sensor. 2) Place finger against end of disconnected hose and check that vacuum is felt there when engine is running. 3) Is vacuum felt there?	"Lg/R" wire shorted to ground circuit or poor MAP sensor-to-coupler connection. If wire and connection are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Clogged or broken MAP sensor hose or pipe between throttle body and MAP sensor.

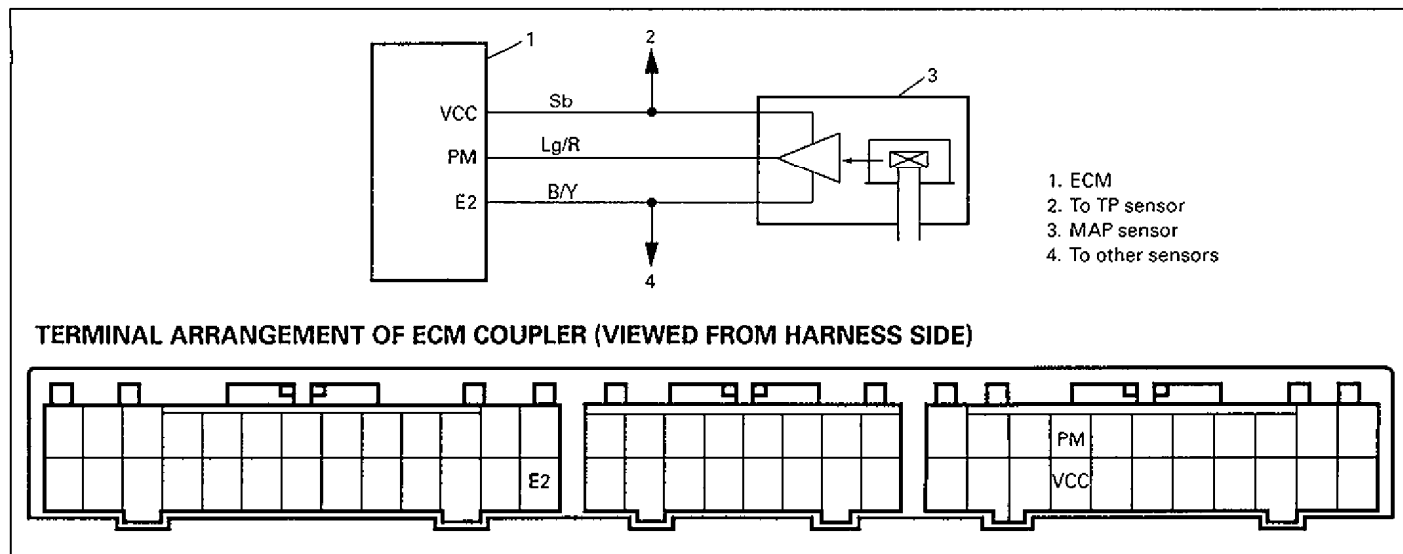
Fig. for STEP 1



NOTE:

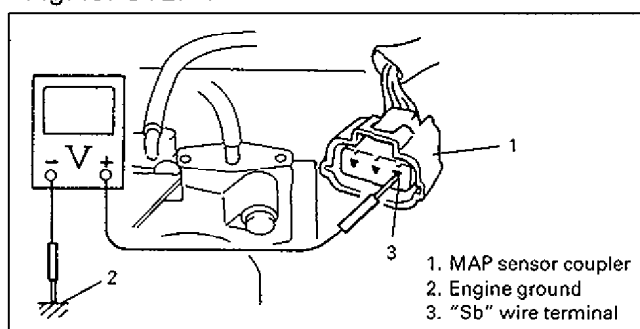
Upon completion of inspection and repair work, perform FINAL CHECK, referring to p.6E1-50 to confirm that the trouble has been corrected.

CODE NO.32 MAP SENSOR CIRCUIT (SMALL SIGNAL CURRENT FLOW, SIGNAL VOLTAGE LOW)



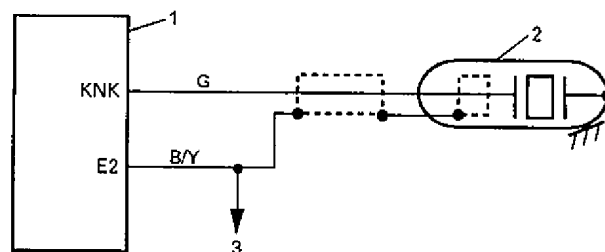
STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect MAP sensor coupler. 2) With ignition switch ON, is voltage applied to "Sb" wire terminal of MAP sensor coupler about 4 – 5 V?	Go to step 2.	"Sb" wire shorted to power circuit. If wire is OK, substitute a known-good ECM and recheck.
2	1) Check MAP sensor, referring to p.6E1-75. 2) Is it in good condition?	"Sb" wire shorted to "Lg/R" wire, "B/Y" wire open, poor "E2" connection, poor "PM" connection, "Lg/R" wire open or poor MAP sensor-to-coupler connection. If wire and connection are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Faulty MAP sensor.

Fig. for STEP 1

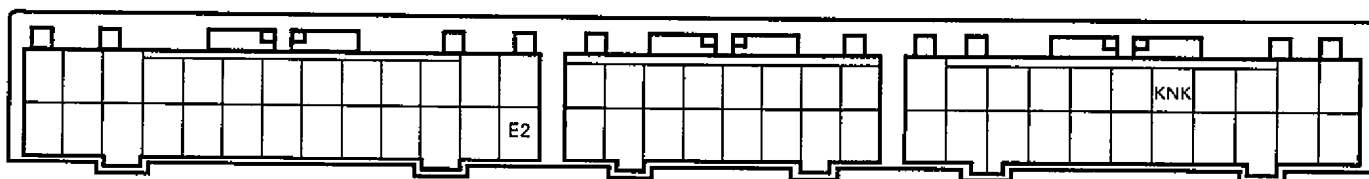


NOTE:

Upon completion of inspection and repair work, perform **FINAL CHECK**, referring to p.6E1-50 to confirm that the trouble has been corrected.

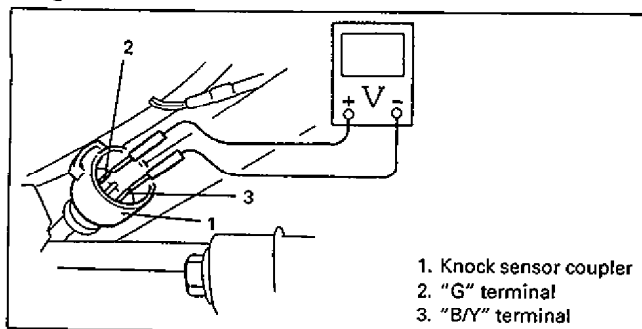
CODE NO.43 KNOCK SENSOR CIRCUIT**(SIGNAL VOLTAGE HIGH OR LOW)**

1. ECM
2. Knock sensor
3. To other sensor

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

STEP	ACTION	YES	NO
1	1) Remove ECM and connect couplers to ECM. 2) With engine running, check voltage between "KNK" terminal of ECM coupler and body ground. 3) Is it about 2 V?	Knock sensor and its circuit are in good condition. Intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Go to step 2.
2	1) Stop engine. 2) With ignition switch OFF, disconnect knock sensor coupler. 3) With ignition switch ON, check voltage between "G" and "B/Y" wire terminal of knock sensor coupler. 4) Is it 4 – 5 V?	Faulty knock sensor. Substitute a known-good knock sensor and recheck.	"G" wire open, "G" wire shorted to ground circuit or poor "KNK" connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. for STEP 2

**NOTE:**

Upon completion of inspection and repair work, perform FINAL CHECK, referring to p.6E1-50 to confirm that the trouble has been corrected.

FINAL CHECK

Upon completion of inspection and repair work related to the above DTC, perform the final check as described below.

WARNING:

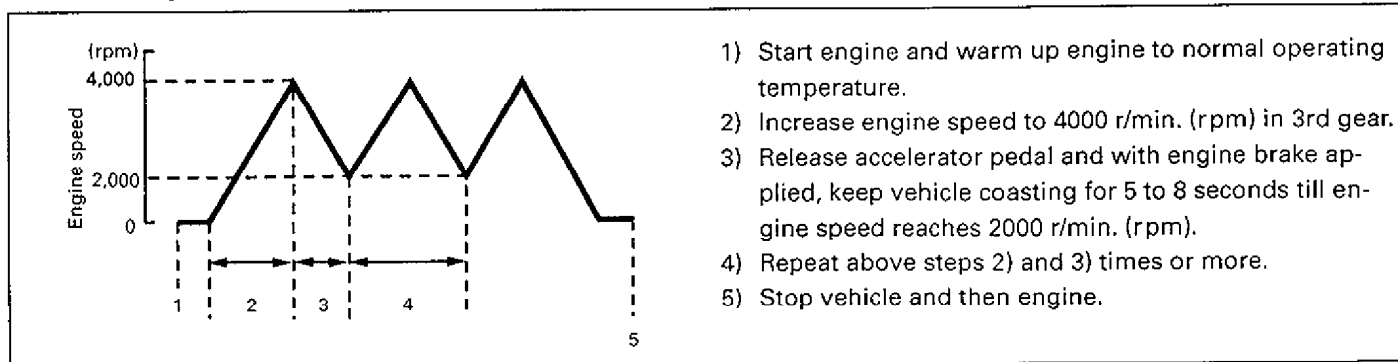
- When performing a road test, select a place where there is not traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

STEP	ACTION	YES	NO
1	1) Clear DTC stored in ECM memory, referring to p.6E1-33. 2) Perform test under the following conditions. 3) Check that malfunction indicator lamp ("CHECK ENGINE" light) does not light during test. 4) Check DTC, referring to "Diagnostic Trouble Code (DTC) Check" on p.6E1-31. 5) [Using SUZUKI scan tool (Tech 1)] Was "NO CODES" displayed? [Not using SUZUKI scan tool (Tech 1)] Was DTC12 displayed when diagnosis switch terminal is grounded?	END.	Recheck and repair according to previous flow chart corresponding to that DTC No.

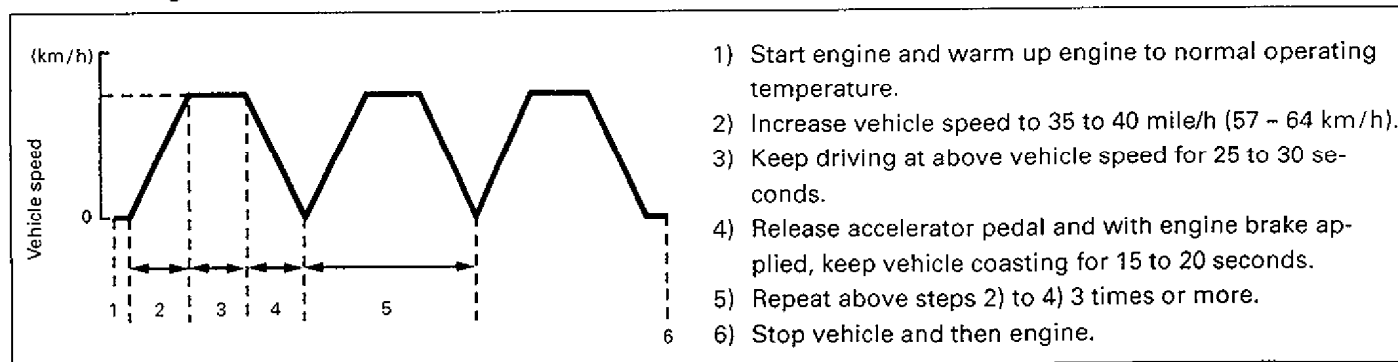
Final Test Condition for Code No. 14, 15, 21, 22, 23, 25, 31, 32, 43

Turn ignition switch ON.

Final Driving Test Condition for Code No.24



Final Driving Test Condition for Code No.13



TROUBLE DIAGNOSIS (FOR TROUBLE NOT INDICATED BY ON-BOARD DIAGNOSTIC SYSTEM (SELF-DIAGNOSIS FUNCTION))

This section describes trouble diagnosis of engine and emission control system parts whose trouble is not indicated by the on-board diagnostic system (self-diagnosis function).

When diagnostic trouble code No. 12 is indicated by the on-board diagnostic system (self-diagnosis function) and assuredly those engine basic parts as described in "Engine Diagnosis" are all in good condition, check engine and emission control system parts which may be a possible cause for each symptom of the engine.

DIAGNOSTIC TABLE

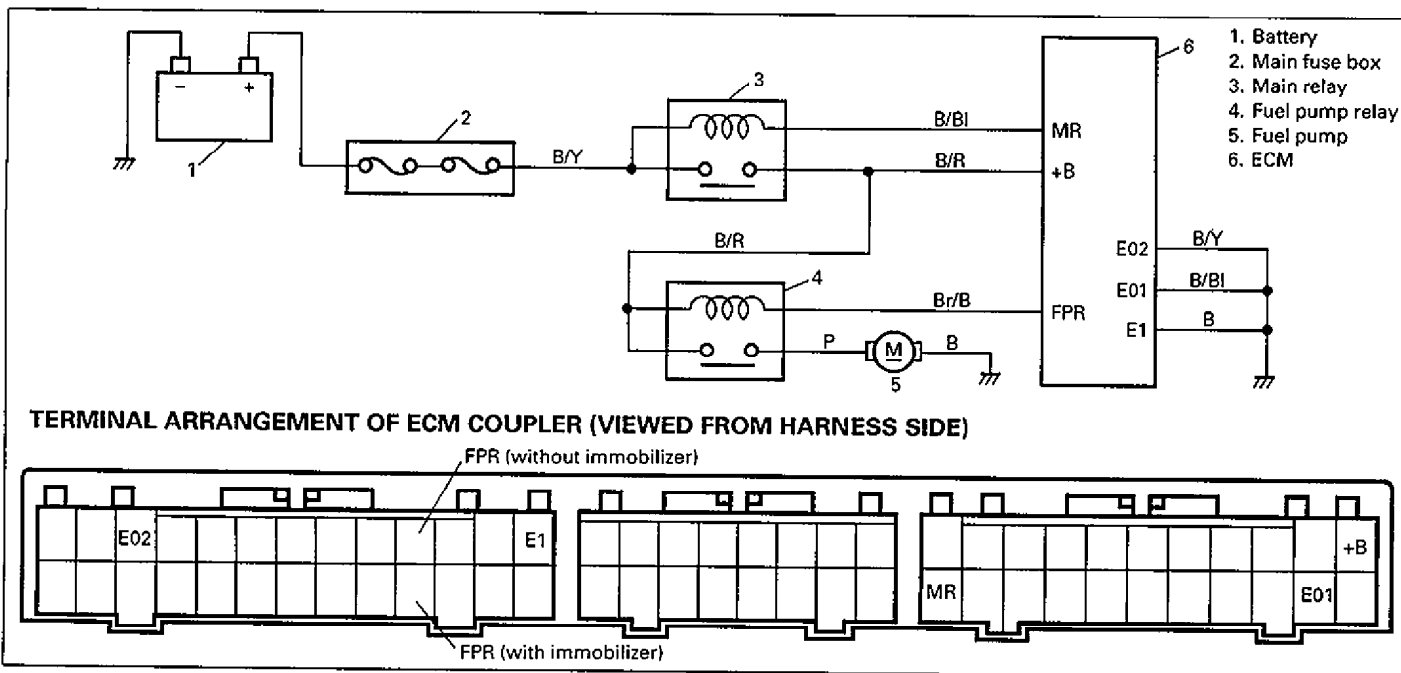
SYMPTOM	POSSIBLE CAUSE	INSPECTION
Hard or no starting (Engine cranks OK)	• Shortage of fuel in fuel tank • Vacuum leaks (or air inhaled) in air intake system • Faulty fuel pump or its circuit open • Fuel injector or its circuit faulty • Fuel pressure out of specification • Poor performance of IAT sensor, ECT sensor or MAP sensor • Faulty CMP sensor • Faulty ECM	Check if fuel pressure is felt at fuel return hose for 3 seconds after ignition switch ON. If not, advance to Diagnostic Flow Table B-1. Diagnostic Flow Table B-2. Diagnostic Flow Table B-4. See p.6E1-79, 6E1-78 or 6E1-75. Diagnostic Flow Table B-3. See p.6E1-70.
NOTE: If engine is warm and hard to start but starts easily with accelerator pedal depressed, check idle air control valve and its circuit first. (Advance to "Diagnostic Flow Table B-5".)		
Engine fails to idle	• Shortage of fuel in fuel tank • Vacuum leaks (or air inhaled) in air intake system • Faulty idle air control valve or its circuit • Faulty EGR system • Fuel pressure out of specification • Faulty injector or its circuit faulty • Poor performance of IAT sensor, ECT sensor or MAP sensor • Faulty ECM	Check idle air control valve or its circuit. Diagnostic Flow Table B-6. Diagnostic Flow Table B-4. See p.6E1-92. See p.6E1-79, 6E1-78 or 6E1-75. See p.6E1-70.

SYMPTOM	POSSIBLE CAUSE	INSPECTION
Improper engine idle speed	● Maladjusted accelerator cable play ● Clogged MAP sensor vacuum passage ● Vacuum leaks (or air inhaled) in air intake system ● Maladjusted TP sensor installation angle ● Faulty idle air control system ● Faulty evaporative emission control system ● Faulty A/C signal circuit ● Faulty electric load signals circuit ● Fuel pressure out of specification ● Faulty injector or its circuit ● Poor performance of IAT sensor, ECT sensor, TP sensor or MAP sensor ● Faulty ECM	See p.6E1-84. Check vacuum hose and filter. See p.6E1-77. Diagnostic Flow Table B-5. Diagnostic Flow Table B-7. Diagnostic Flow Table B-12. Diagnostic Flow Table B-9. Diagnostic Flow Table B-4. See p.6E1-92. See p.6E1-79, 6E1-78, 6E1-77 or 6E1-75. See p.6E1-70.
NOTE: ● With engine warmed up, if engine idle speed is high, check accelerator cable play and idle air control system in that order. ● If engine idle speed lowers below specification only when electric load is applied (e.g. headlight ON), check idle air control system first.		
Engine has no or poor power	● Maladjusted accelerator cable play ● Vacuum leaks (or air inhaled) in air intake system ● Maladjusted TP sensor installation angle ● Faulty EGR system ● Fuel pressure out of specification ● Faulty injector or its circuit ● Poor performance of IAT sensor, TP sensor, ECT sensor or MAP sensor ● Faulty ECM	See p.6E1-84. See p.6E1-77. Diagnostic Flow Table B-6. Diagnostic Flow Table B-4. See p.6E1-92. See p.6E1-79, 6E1-78, 6E1-77 or 6E1-75. See p.6E1-70.
Engine hesitates when accelerating	● Vacuum leaks (or air inhaled) in air intake system ● Clogged MAP sensor vacuum passage ● Faulty TP sensor ● Faulty EGR system ● Fuel pressure out of specification ● Faulty injector or its circuit ● Poor performance of IAT sensor, TP sensor, ECT sensor or MAP sensor ● Faulty ECM	Check vacuum hose and filter. See p.6E1-77. Diagnostic Flow Table B-6. Diagnostic Flow Table B-4. See p.6E1-92. See p.6E1-79, 6E1-78, 6E1-77 or 6E1-75. See p.6E1-70.

SYMPTOM	POSSIBLE CAUSE	INSPECTION
Surges (Variation in vehicle speed is felt although accelerator pedal is not operated)	• Faulty EGR system • Variable fuel pressure (clogged fuel filter, faulty fuel pressure regulator, etc.) • Poor performance of MAP sensor • Faulty injector or its circuit • Faulty ECM	Diagnostic Flow Table B-6. Diagnostic Flow Table B-4. See p.6E1-75. See p.6E1-92. See p.6E1-70.
Poor gasoline mileage	• High idle speed • Fuel pressure out of specification or fuel leakage • Poor performance of IAT sensor, TP sensor, ECT sensor or MAP sensor • Faulty EGR system • Faulty injector or its circuit • Faulty ECM	Refer to item "Idle Air Control System" previously outlined. Diagnostic Flow Table B-4. See p.6E1-79, 6E1-78, 6E1-77 or 6E1-75. Diagnostic Flow Table B-6. See p.6E1-92. See p.6E1-70.
Excessive hydrocarbon (HC) emission	• Engine not at normal operating temperature • Vacuum leaks (or air inhaled) in air intake system • Clogged air cleaner • Faulty ignition system • Low compression • Lead contamination of three way catalytic converter • Fuel pressure out of specification • Closed loop system (A/F feed back compensation) fails – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor • Poor performance of IAT sensor • Faulty injector or its circuit • Faulty ECM	Air cleaner cleaning. See SECTION 6F1. See p.6-6 in SECTION 6. Check for absence of filler neck restrictor. Diagnostic Flow Table B-4. See p.6E1-77. See p.6E1-78 or 6E1-75. See p.6E1-79. See p.6E1-92. See p.6E1-70.
Excessive carbon monoxide (CO)	• Engine not at normal operating temperature • Clogged air cleaner • Faulty ignition system • Low compression • Lead contamination of three way catalytic converter • Faulty EVAP system • Fuel pressure out of specification • Closed loop system (A/F feed back compensation) fails – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor • Poor performance of IAT sensor • Faulty injector or its circuit • Faulty ECM	Air cleaner cleaning. See SECTION 6F1. See p.6-6 in SECTION 6. Check for absence of filler neck restrictor. Diagnostic Flow Table B-7. Diagnostic Flow Table B-4. See p.6E1-77. See p.6E1-78 or 6E1-75. See p.6E1-79. See p.6E1-92. See p.6E1-70.

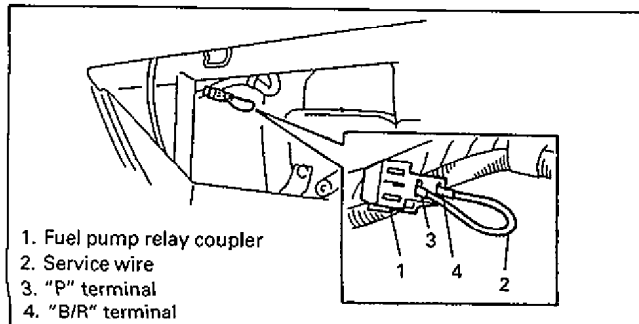
SYMPTOM	POSSIBLE CAUSE	INSPECTION
Excessive nitrogen oxides (NOx) emission	● Vacuum leaks (or air inhaled) in air intake system ● Improper ignition timing ● Lead contamination of three way catalytic converter ● Faulty EGR system ● Fuel pressure out of specification ● Closed loop system (A/F feed back compensation) fails – Faulty TP sensor – Poor performance of ECT sensor or MAP sensor ● Poor performance of IAT sensor ● Faulty injector or its circuit ● Faulty ECM	See SECTION 6F1. Check for absence of filler neck restrictor. Diagnostic Flow Table B-6. Diagnostic Flow Table B-4. See p.6E1-77. See p.6E1-78 or 6E1-75. See p.6E1-79 See p.6E1-92. See p.6E1-70.

B-1 FUEL PUMP CIRCUIT CHECK



STEP	ACTION	YES	NO
1	Is fuel pump heard to operate 3 seconds after ignition switch ON?	Fuel pump and its circuit are in good condition.	Go to step 2.
2	1) With ignition switch OFF, remove fuel pump relay from main harness. 2) Using service wire, connect "P" and "B/R" wire terminals. 3) If fuel pump heard to operate when connecting terminals?	Go to step 3.	"P" wire open, poor fuel pump relay-to-coupler connection or faulty fuel pump.
3	1) Check fuel pump relay, referring to p.6E1-89. 2) Is it in good condition?	Poor fuel pump relay-to-coupler connection, "Br/B" wire open or poor "FPR" connection. If wire and connection are OK, substitute a known-good ECM and re-check. NOTE: Before substituting a known-good ECM, check to make sure that resistance of coil in relay is as specified.	Faulty fuel pump relay.

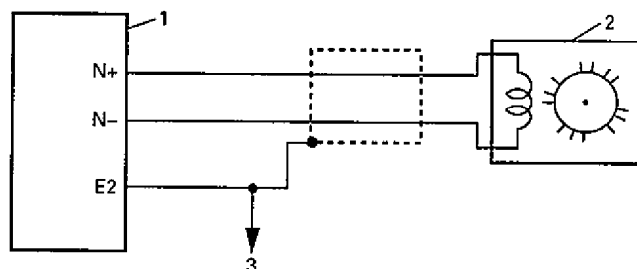
Fig. for STEP 2



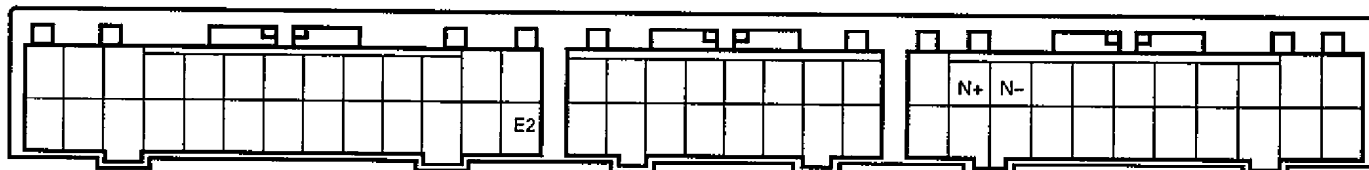
[illegible]

STEP	ACTION	YES	NO
1	1) Using sound scope, check each injector for operating sound at engine cranking. 2) Do all 4 injectors make operating sound?	Fuel injector and its circuit are in good condition.	Go to step 2.
2	Does none of 4 injectors make operating sound?	Go to step 4.	Go to step 3.
3	1) Check coupler connection and wire harness of fuel injector not making operating sound and fuel injector itself. 2) Are all above OK?	Substitute a known-good ECM and recheck.	Faulty injector or its circuit.
4	1) With ignition switch OFF, disconnect coupler from No.1 injector. 2) Check voltage at "B/R" wire terminal with ignition switch ON. 3) Is it battery voltage?	Go to step 5.	Power circuit open.
5	1) Disconnect ECM couplers with ignitions switch OFF and check all 4 injectors for resistance respectively, referring to p.6E1-92. 2) Is each resistance 7.8 – 9.5 Ω ?	Substitute a known-good ECM and recheck.	Faulty injector or its circuit.

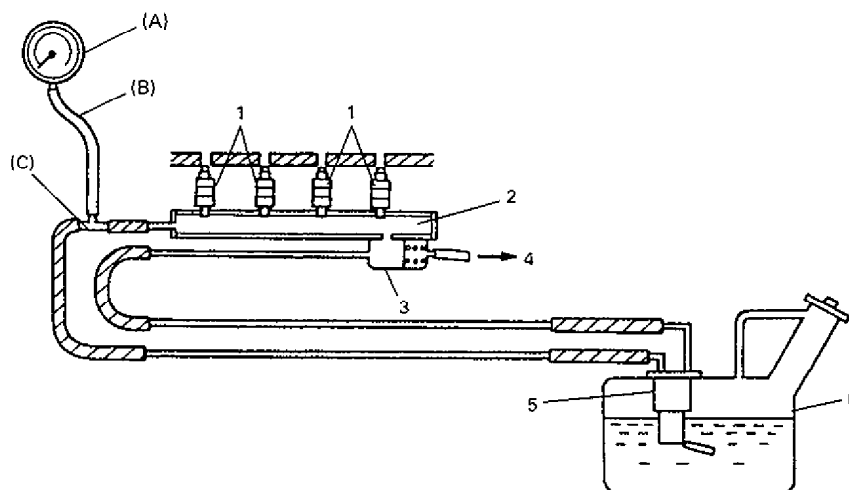
1. Injector coupler
2. "8/R" wire terminal

B-3 CMP SENSOR CIRCUIT CHECK

1. ECM
2. CMP sensor (in distributor)
3. To other sensor

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

STEP	ACTION	YES	NO
1	1) Check signal rotor air gap, referring to "Distributor" in SECTION 6F1. 2) Is it in good condition?	Go to step 2.	Maladjusted air gap.
2	1) Check CMP sensor, referring to "Distributor" in SECTION 6F1. 2) Is it in good condition?	Open wire between CMP sensor and ECM, poor "N+" connection, poor "N-" connection or sensor wires shorted to each other. If wire and connection are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Faulty CMP sensor.

B-4 FUEL PRESSURE CHECK

1. Injector
2. Delivery pipe
3. Fuel pressure regulator
4. To intake manifold
5. Fuel pump assembly
6. Fuel tank

(A): Gauge (09912-58441)
 (B): Hose (09912-58431)
 (C): 3-way joint (09912-58490)

NOTE:

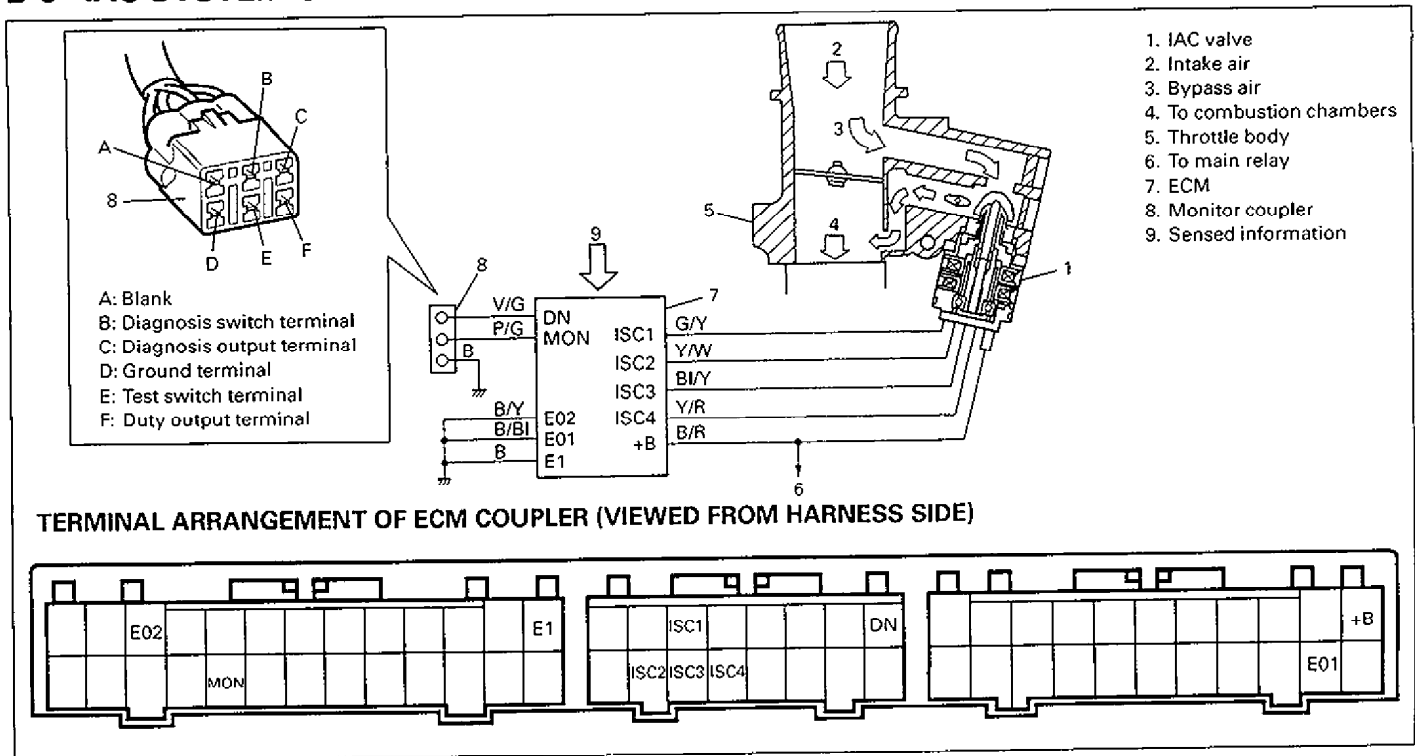
Before using following flow table, check to make sure that battery voltage is higher than 11V. If battery voltage is low, pressure becomes lower than specification even if fuel pump and line are in good condition.

STEP	ACTION	YES	NO
1	1) Install fuel pressure gauge, referring to p.6E1-88. 2) Operate fuel pump, referring to p.6E1-88. 3) Is fuel pressure then 220-300 kPa (2.2-3.0 kg/cm ² , 31.3-42.7 psi)?	Go to step 2.	Go to step 5.
2	Is 160 kPa (1.6 kg/cm ² , 22.8 psi) or higher fuel pressure retained for 1 minute after fuel pump is stopped at step 1?	Go to step 3.	Go to step 4.
3	1) Start engine and warm it up to normal operating temperature. 2) Keep it running at specified idle speed. 3) Is fuel pressure then within 170-230 kPa (1.7-2.3 kg/cm ² , 24.2-32.7 psi)?	Normal fuel pressure.	Clogged vacuum passage for fuel pressure regulator or faulty fuel pressure regulator.
4	Is there fuel leakage from fuel feed line hose, pipe or joint?	Fuel leakage from hose, pipe or joint.	Go to step 10 on the next page.
5	Is it high pressure measured at step 1?	Go to step 6.	Go to step 7.
6	1) Disconnect fuel return hose from fuel pipe and connect new hose to it. 2) Put the other end of new return hose into approved gasoline container. 3) Operate fuel pump. 4) Is specified fuel pressure obtained then?	Restricted fuel return hose or pipe.	Faulty fuel pressure regulator.
7	Is it no pressure measured at step 1?	Go to step 8 on the next page.	Go to step 9 on the next page. (Low pressure is measured.)

B-4 FUEL PRESSURE CHECK (CONTINUED)

STEP	ACTION	YES	NO
8	With fuel pump operated and fuel return hose blocked by pinching it, is fuel pressure applied?	Faulty fuel pressure regulator.	Shortage of fuel or fuel pump or its circuit defective (Refer to Table B-1 "Fuel Pump Circuit Inspection").
9	1) Operate fuel pump. 2) With fuel return hose blocked by pinching it, check fuel pressure. 3) Is it 450 kPa (4.5kg/cm ² , 64.0 psi) or more?	Faulty fuel pressure regulator.	Clogged fuel filter, restricted fuel feed hose or pipe, faulty fuel pump or fuel leakage from hose connection in fuel tank.
10	1) Disconnect fuel return hose from fuel pipe and connect new hose to it. 2) Put the other end of new return hose into approved gasoline container. 3) Operate fuel pump, If specified fuel pressure is retained. While doing so, does fuel come out return hose?	Faulty fuel pressure regulator.	Fuel leakage from injector, faulty fuel pump (faulty check valve in fuel pump) or fuel leakage from fuel pressure regulator.

B-5 IAC SYSTEM CHECK

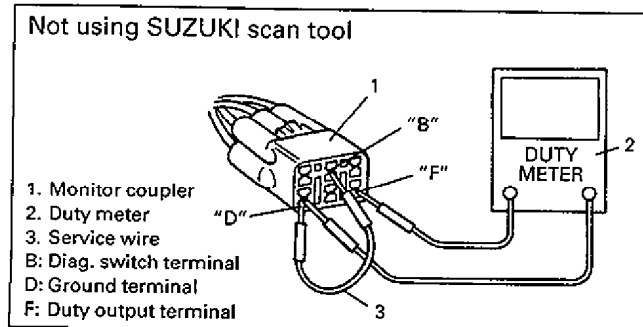


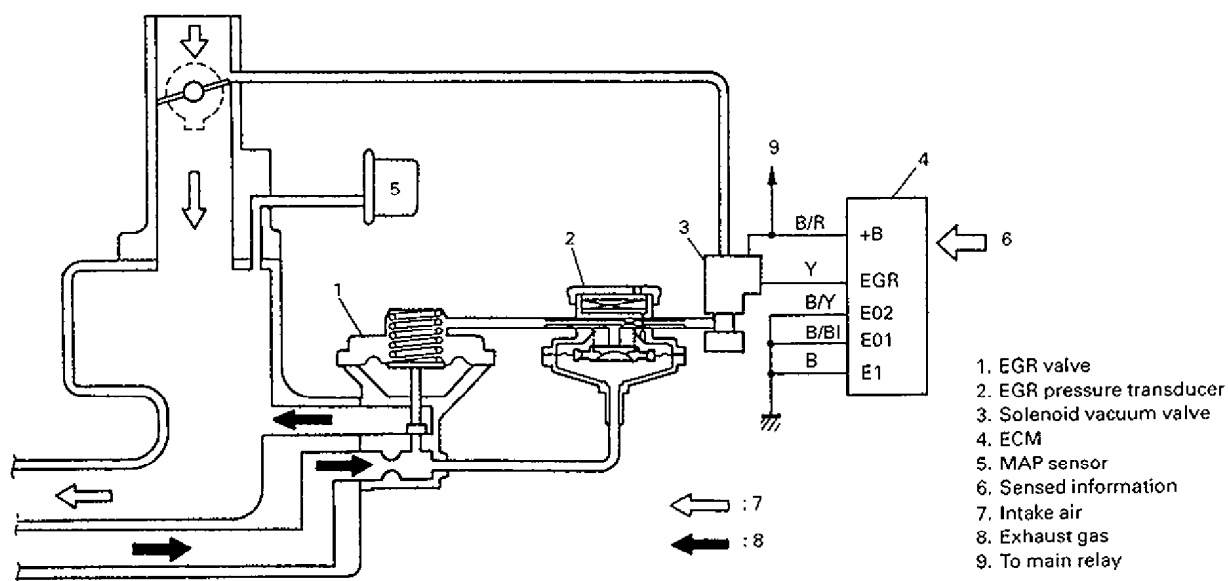
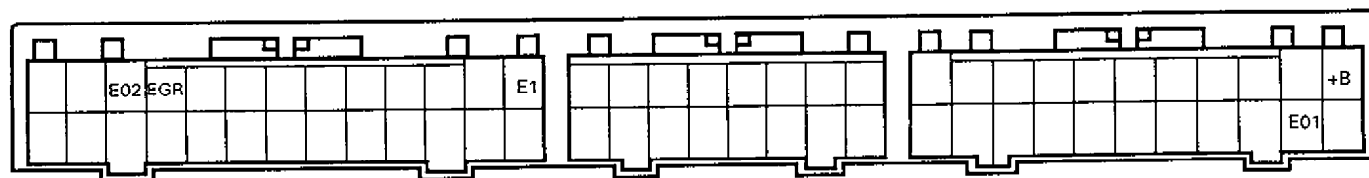
STEP	ACTION	YES	NO
1	1) Check DTC, referring to "Diagnostic Trouble Code Check" on p.6E1-31. 2) [Using SUZUKI scan tool (Tech 1)] Was "NO CODES" displayed? [Not using SUZUKI scan tool (Tech 1)] Was DTC12 displayed when diagnosis switch terminal is grounded?	Go to step 2.	Go back to Flow Table corresponding to that DTC.
2	1) Warm up engine to normal operating temperature and keep it idling. 2) [Using SUZUKI scan tool (Tech 1)] Check "IAC MOTOR POS" and "ENGINE SPEED" value displayed on scan tool (Tech 1) by using "DATA LIST" mode. [Not using SUZUKI scan tool (Tech 1)] Using service wire, ground "Diag. switch terminal" in monitor coupler and connect duty meter between "Duty output ("F") terminal" and "Ground ("D") terminal" of monitor coupler. Check IAC motor position (value indicated duty meter) and engine speed. 3) Are they within specification? IAC motor position : 6 – 30 STEP (For Tech 1) 10 – 25 % (For duty meter) Engine idle speed : 750 – 800 rpm	Go to step 3.	Go to step 4.

B-5 IAC SYSTEM CHECK (CONTINUED)

STEP	ACTION	YES	NO
3	Is engine idle speed kept specified speed even with A/C switch ON? Engine idle speed : 900 – 1000 rpm	IAC system is in good condition.	Go to step 8.
4	1) Check IAC valve for its resistance, referring to p.6E1-87. 2) Is it in good condition?	Go to step 5.	Faulty IAC valve.
5	Is it high idle speed measured at step 2?	Go to step 6.	Go to step 7.
6	Does duty meter indicate less than about 6 % (or more than about 94 % for OFF duty meter)?	Proceed to "Improper Engine Idle Speed" in "Trouble Diagnosis" on p.6E1-52 and check item other than "Faulty idle air control system".	Substitute a known-good ECM and recheck.
7	Does duty meter indicate more than about 30 % (or less than about 70 % for OFF duty meter)?	Go to step 8.	Substitute a known-good ECM and recheck.
8	1) Disconnect at ECM couplers with ignition OFF. 2) Check resistance between following terminals. "ISC1" terminal - "+B" terminal "ISC2" terminal - "+B" terminal "ISC3" terminal - "+B" terminal "ISC4" terminal - "+B" terminal 3) Is each resistance 43.2 - 52.8 Ω ?	Proceed to "Improper Engine Idle Speed" in "Trouble Diagnosis" on p.6E1-52 and check item other than "Faulty idle air control system".	● Faulty IAC valve ● Poor coupler connection ● Open wire harness

Fig. for STEP 2

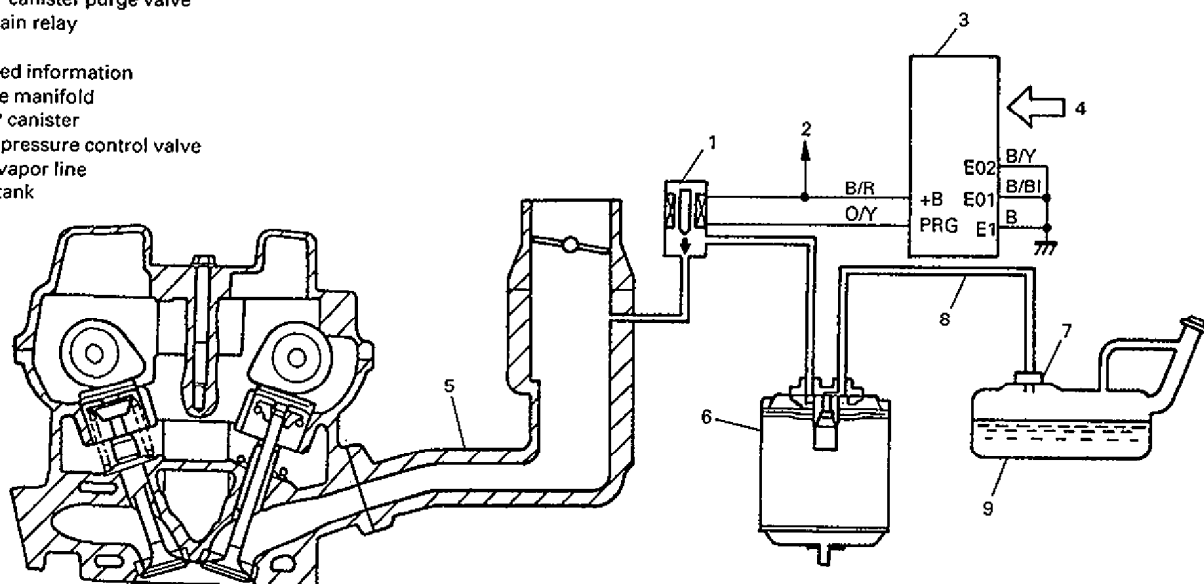


B-6 EGR SYSTEM CHECK**TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)**

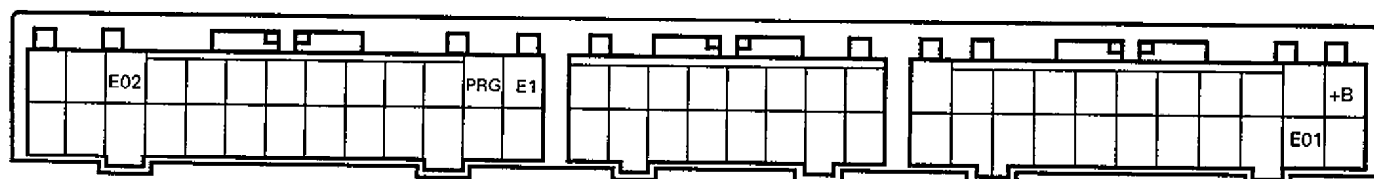
STEP	ACTION	YES	NO
1	1) Check EGR system, referring to p.6E1-96. 2) Is it in good condition?	EGR system is in good condition. If wire and connection are OK, intermittent trouble or faulty ECM. Recheck, referring to "Intermittent Trouble" in SECTION 0A.	Go to step 2.
2	1) Check vacuum hose, EGR valve and EGR pressure transducer, referring to p.6E1-97 and 96. 2) Is it in good condition?	Go to step 3.	• Vacuum hose mis-connection, leakage, clog or deterioration • Faulty EGR valve • Faulty EGR pressure transducer
3	1) Check EGR solenoid vacuum valve, referring to p.6E1-98. 2) Is it in good condition?	• "Y" wire open • "B/R" wire open • "Y" wire shorted to ground or power circuit • Poor EGR solenoid vacuum valve coupler connection • Poor "EGR" terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.	Faulty EGR solenoid vacuum valve

B-7 EVAP SYSTEM CHECK

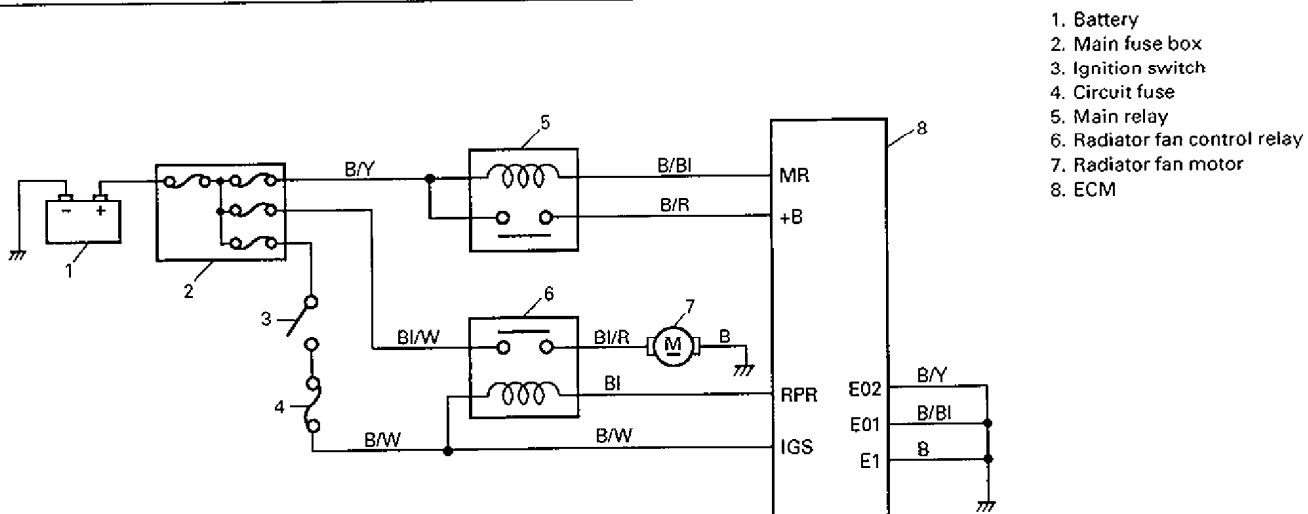
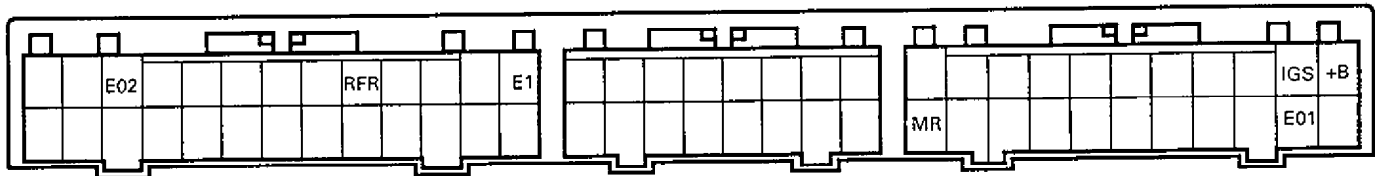
1. EVAP canister purge valve
2. To main relay
3. ECM
4. Sensed information
5. Intake manifold
6. EVAP canister
7. Tank pressure control valve
8. Fuel vapor line
9. Fuel tank



TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)

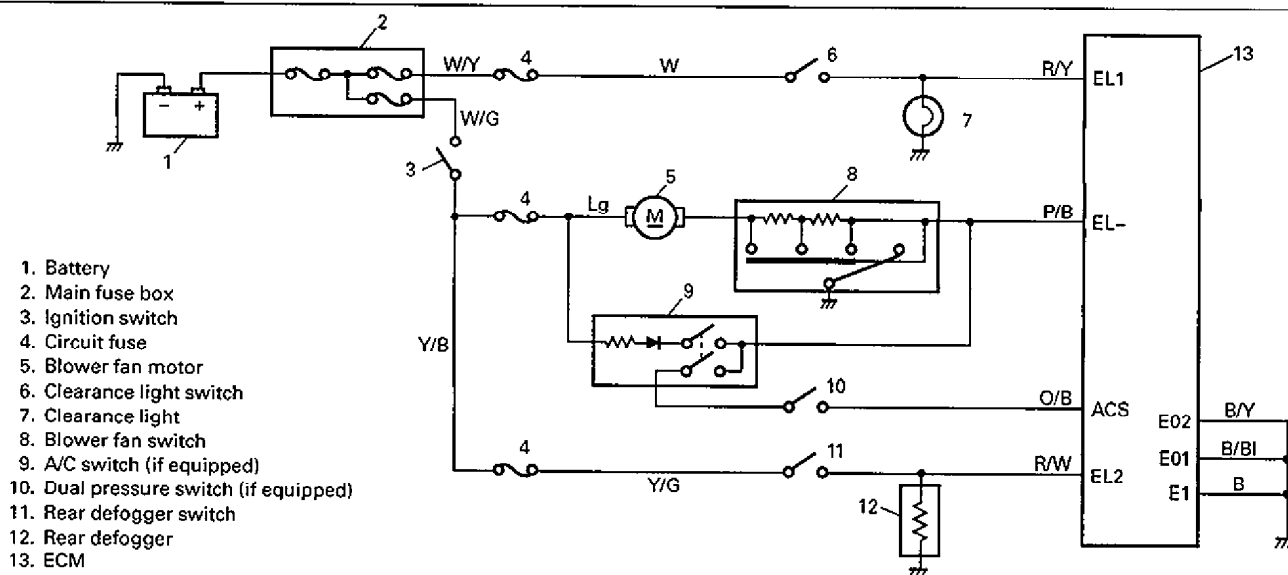


STEP	ACTION	YES	NO
1	1) Check EVAP canister purge system for operation, referring to p.6E1-99. 2) Is it in good condition?	EVAP canister purge system is in good condition. Check EVAP canister, tank pressure control valve and fuel filler cap.	Go to step 2.
2	1) Check EVAP canister purge solenoid valve, referring to p.6E1-100. 2) Are they in good condition?	• "O/Y" wire open • "B/R" wire shorted to ground • Poor EVAP canister purge solenoid valve coupler connection • Poor "PRG" terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.	• Vacuum passage clogged • Vacuum leakage • Faulty EVAP canister purge solenoid valve

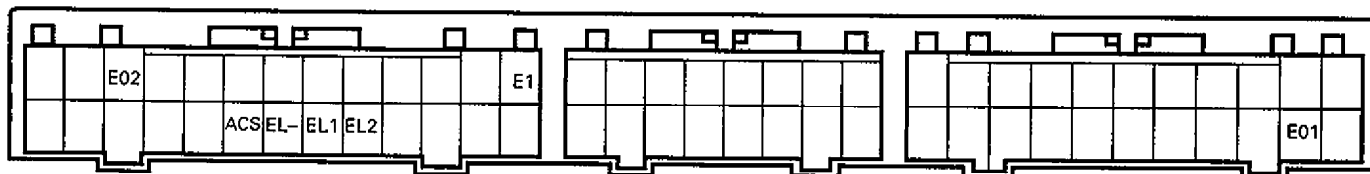
B-8 RADIATOR FAN CONTROL SYSTEM CHECK**TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)**

STEP	ACTION	YES	NO
1	1) Check radiator fan control system for operation, referring to p.6E1-95. 2) Is it in good condition?	Radiator fan control system is in good condition.	Go to step 2.
2	1) Check radiator fan control relay, referring to p.6E1-95. 2) Is it in good condition?	Go to step 3.	Faulty radiator fan control relay
3	1) Check wire harness and connection for open or short. 2) Are they in good condition?	Poor performance of ECT sensor. If ECT sensor is OK, substitute a known-good ECM and recheck.	• Wire open or short • Poor connection

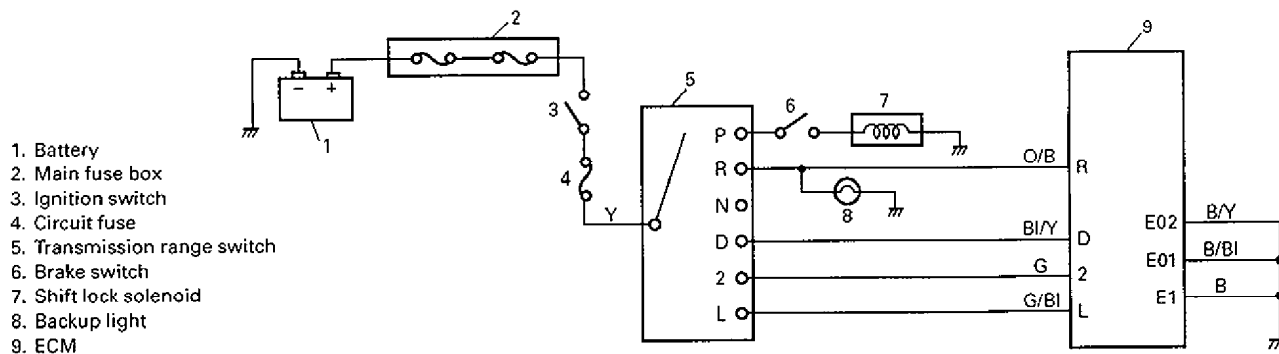
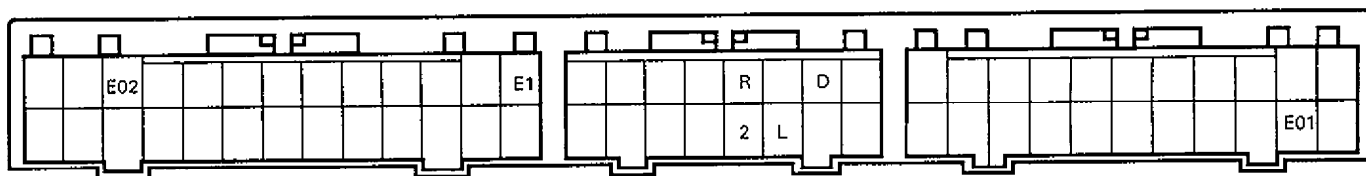
B-9 ELECTRIC LOAD SIGNALS CIRCUIT



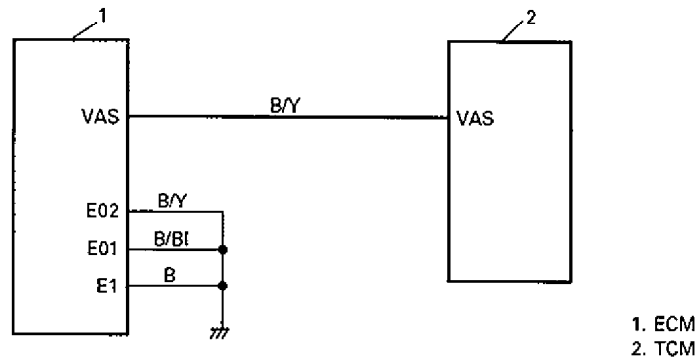
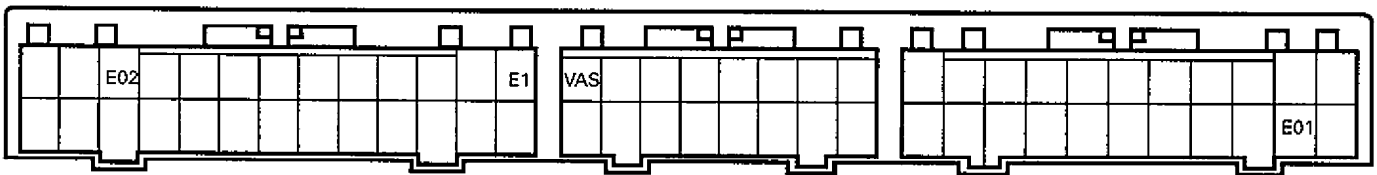
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



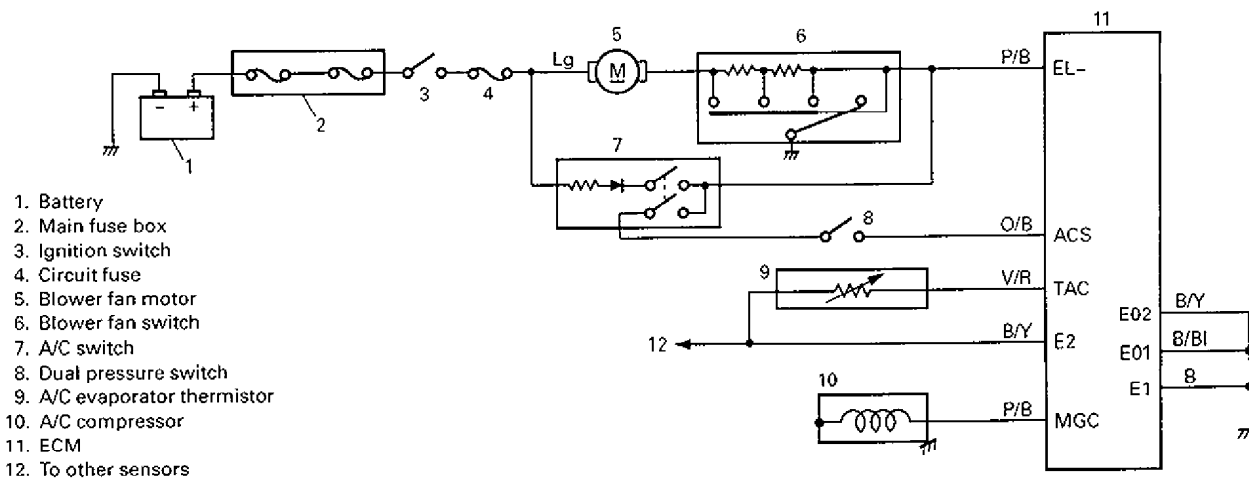
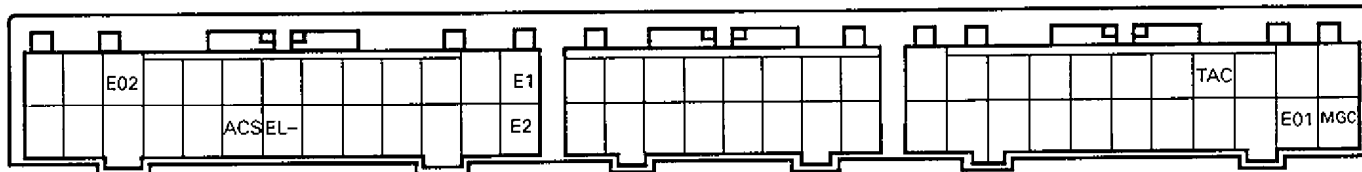
STEP	ACTION	YES	NO				
1	1) Check voltage at "EL-" terminal under each condition given in table below. <table><tr><td>Ignition switch ON Heated blower fan OFF</td><td>10 – 14 V</td></tr><tr><td>Ignition switch ON Heater blower fan ON</td><td>0 – 1 V</td></tr></table> 2) Is check result satisfactory?	Ignition switch ON Heated blower fan OFF	10 – 14 V	Ignition switch ON Heater blower fan ON	0 – 1 V	Go to step 2.	• "P/B" wire open or short • Poor "EL-" terminal connection After repair, go to step 2.
Ignition switch ON Heated blower fan OFF	10 – 14 V						
Ignition switch ON Heater blower fan ON	0 – 1 V						
2	1) Check voltage at "EL1" terminal under each condition given in table below. <table><tr><td>Ignition switch ON Clearance light OFF</td><td>0 – 1 V</td></tr><tr><td>Ignition switch ON Clearance light ON</td><td>10 – 14 V</td></tr></table> 2) Is check result satisfactory?	Ignition switch ON Clearance light OFF	0 – 1 V	Ignition switch ON Clearance light ON	10 – 14 V	Go to step 3.	• "R/Y" wire open or short • Poor "EL1" terminal connection After repair, go to step 3.
Ignition switch ON Clearance light OFF	0 – 1 V						
Ignition switch ON Clearance light ON	10 – 14 V						
3	1) Check voltage at "EL2" terminal under each condition given in table below. <table><tr><td>Ignition switch ON Rear defogger OFF</td><td>0 – 1 V</td></tr><tr><td>Ignition switch ON Rear defogger ON</td><td>10 – 14 V</td></tr></table> 2) Is check result satisfactory?	Ignition switch ON Rear defogger OFF	0 – 1 V	Ignition switch ON Rear defogger ON	10 – 14 V	Electric load signal circuit are in good condition.	• "R/W" wire open or short • Poor "EL2" terminal connection
Ignition switch ON Rear defogger OFF	0 – 1 V						
Ignition switch ON Rear defogger ON	10 – 14 V						

B-10 TRANSMISSION RANGE SIGNALS CHECK (A/T VEHICLE ONLY)**TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)**

STEP	ACTION	YES	NO								
1	1) Ignition switch ON and check voltage at each terminal in ECM coupler under each condition given in table below. <table><tr><td>Selector lever in "R" range position</td><td>10-14 V at "R" range terminal 0-1 V at other range terminal</td></tr><tr><td>Selector lever in "D" range position</td><td>10-14 V at "D" range terminal 0-1 V at other range terminal</td></tr><tr><td>Selector lever in "2" range position</td><td>10-14 V at "2" range terminal 0-1 V at other range terminal</td></tr><tr><td>Selector lever in "L" range position</td><td>10-14 V at "L" range terminal 0-1 V at other range terminal</td></tr></table> 2) Is check result satisfactory?	Selector lever in "R" range position	10-14 V at "R" range terminal 0-1 V at other range terminal	Selector lever in "D" range position	10-14 V at "D" range terminal 0-1 V at other range terminal	Selector lever in "2" range position	10-14 V at "2" range terminal 0-1 V at other range terminal	Selector lever in "L" range position	10-14 V at "L" range terminal 0-1 V at other range terminal	Transmission range signal circuits are in good condition.	• Wire open or short • Poor each terminal connection If wire and connection are OK, check transmission range switch, referring to SECTION 7B1.
Selector lever in "R" range position	10-14 V at "R" range terminal 0-1 V at other range terminal										
Selector lever in "D" range position	10-14 V at "D" range terminal 0-1 V at other range terminal										
Selector lever in "2" range position	10-14 V at "2" range terminal 0-1 V at other range terminal										
Selector lever in "L" range position	10-14 V at "L" range terminal 0-1 V at other range terminal										

B-11 THROTTLE VALVE OPENING SIGNAL CHECK (A/T VEHICLE ONLY)**TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)**

STEP	ACTION	YES	NO
1	1) Ignition switch ON and check voltage at each terminal in ECM coupler under each condition given in table below.	Throttle valve opening signal circuit is in good condition.	• Wire open or short • Poor each terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.
	Throttle valve at idle position		
	Throttle valve at full open position		
	2) Is check result satisfactory?		

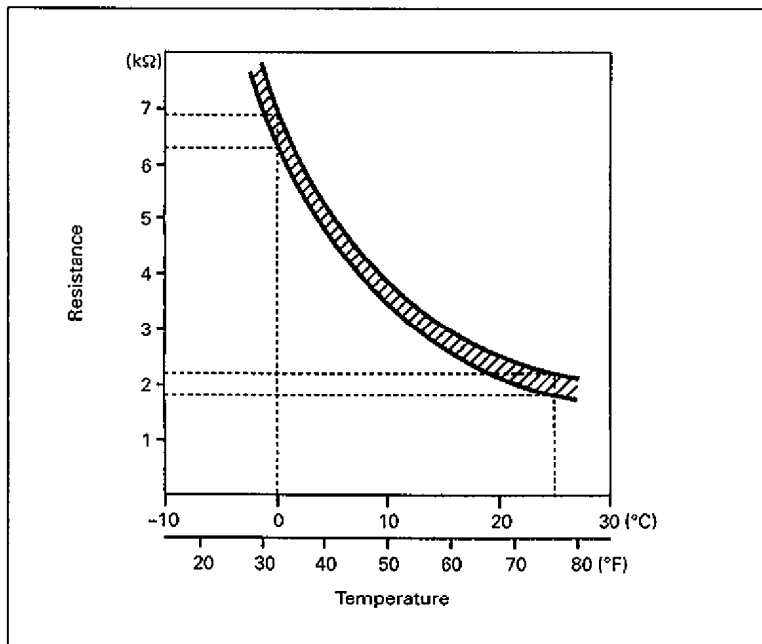
B-12 A/C CONTROL SIGNAL CHECK (IF EQUIPPED)**TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)**

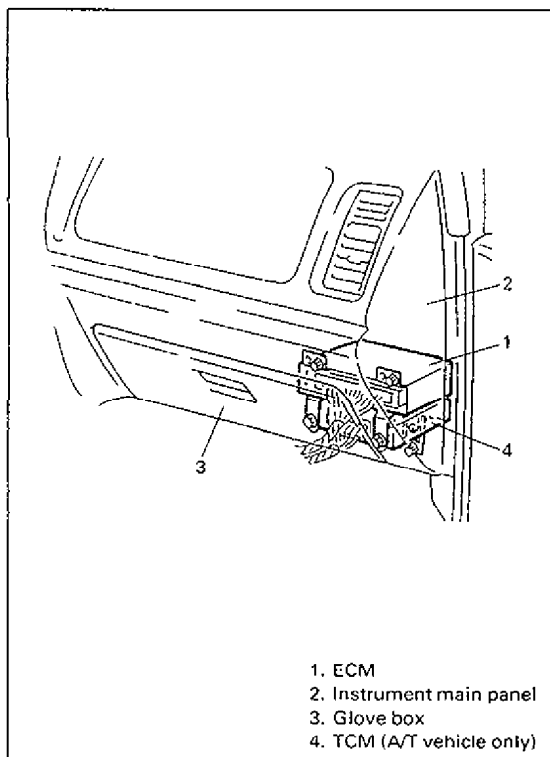
STEP	ACTION	YES	NO				
1	1) Disconnect ECM couplers with ignition switch OFF. 2) Check resistance between "TAC" terminal and "E2" terminal. 3) Is it within specification? Reference value (Refer to characteristic curve below) At 0°C 6.3 – 6.9 kΩ At 25°C 1.8 – 2.2 kΩ	Go to step 2.	Faulty A/C evaporator thermistor or its circuit.				
2	1) Check voltage at "ACS" terminal under each condition given in table below. <table border="1"><tr><td>Ignition switch ON A/C switch OFF</td><td>10 – 14 V</td></tr><tr><td>Ignition switch ON A/C switch ON</td><td>0 – 1 V</td></tr></table> NOTE: When A/C evaporator thermistor temp. is below 2.5°C (36.5°F), A/C remains OFF ("MGC" terminal voltage become 0 – 1 V). This condition is not abnormal. 2) Is check result satisfactory?	Ignition switch ON A/C switch OFF	10 – 14 V	Ignition switch ON A/C switch ON	0 – 1 V	Go to step 3.	• "O/B" wire open or short • Poor "ACS" terminal connection If wire and connection are OK, substitute a known-good ECM and recheck. Go to step 3.
Ignition switch ON A/C switch OFF	10 – 14 V						
Ignition switch ON A/C switch ON	0 – 1 V						

B-12 A/C CONTROL SIGNAL CHECK (IF EQUIPPED) (CONTINUED)

STEP	ACTION	YES	NO
3	1) Check voltage at "MGC" terminal under each condition given in table below.	A/C control system circuits are in good condition.	• "O/B" wire open or short • Poor "MGC" terminal connection If wire and connection are OK, substitute a known-good ECM and recheck.
	While engine running, A/C switch OFF		
	While engine running, A/C switch ON		
	2) Is check result satisfactory?		

Fig. for STEP 1





INSPECTION OF ECM AND ITS CIRCUITS

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

CAUTION:

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

VOLTAGE CHECK

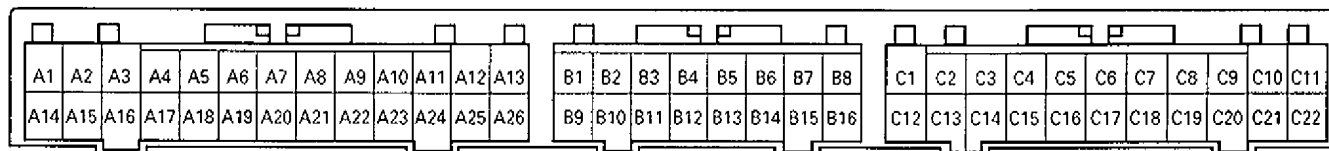
- 1) Remove ECM from body referring to p. 6E1-74.
- 2) Connect ECM couplers to ECM.
- 3) Check voltage at each terminal of couplers connected.

NOTE:

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

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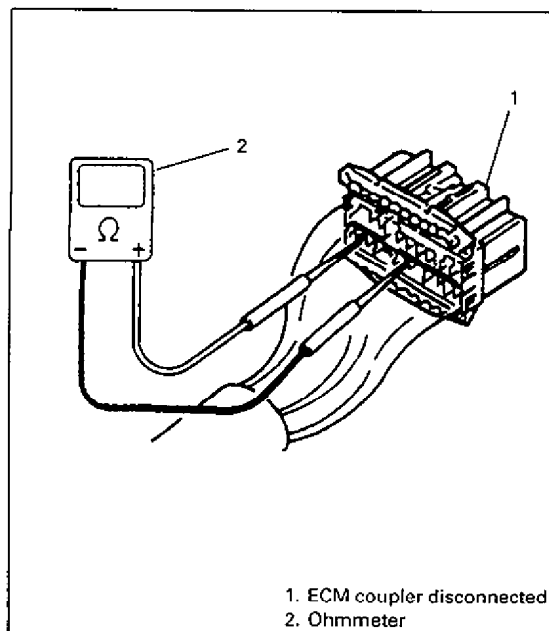
TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLOR			
INJ1	A1	BI/W	NO.1 injector	10-14V	Ignition switch ON
INJ3	A2	BI/R	NO.3 injector	10-14V	Ignition switch ON
E02	A3	B/Y	Ground	About 0V	_____
EGR	A4	Y	EGR solenoid vacuum valve	10-14V	Ignition switch ON
_____	A5	_____	Blank	_____	_____
_____	A6	_____	Blank	_____	_____
DNL	A7	V/Y	Diagnosis output terminal and "CHECK ENGINE" light	0-1V	Ignition switch ON and "CHECK ENGINE" light turned ON
				Deflects between 0-14V	Ignition switch ON and diagnosis switch terminal grounded
_____	A8	_____	Blank	_____	_____
RFR	A9	BI	Radiator fan control relay	About 0V	Engine cooling fan ON
				10-14V	Engine cooling fan OFF

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLOR			
FPR	A10	Br/B	Fuel pump relay (without immobilizer)	About 0V	Fuel pump ON (for about 3 seconds after ignition ON or while engine running)
				10-14V	Fuel pump OFF (after about 3 seconds from ignition switch ON with engine stopped)
IGT	A11	Bl/Y	Ignitor (without immobilizer)	0.3V	Engine running at idle speed
				2V	Engine running at about 8000 rpm
PRG	A12	O/Y	EVAP canister purge valve	10-14V	EVAP canister purge valve ON
				About 0V	EVAP canister purge valve OFF
E1	A13	B	ECM ground	About 0V	_____
INJ2	A14	Bl/Y	NO.2 injector	10-14V	Ignition switch ON
INJ4	A15	Bl/G	NO.4 injector	10-14V	Ignition switch ON
OXH	A16	W/Bl	Heated oxygen sensor heater	10-14V	Ignition switch ON
				About 0V	After engine warmed up
—	A17	—	Blank	—	_____
MON	A18	P/G	Duty output terminal	About 0V	Ignition switch ON
				4-5V	Ignition switch ON and diagnosis switch terminal grounded
ACS	A19	O/B	A/C switch (with A/C)	0-1V	A/C ON
				10-14V	A/C OFF
EL-	A20	P/B	Electric load (blower fan motor)	10-14V	Blower fan motor switch OFF
				About 0V	Blower fan motor switch ON
EL1	A21	R/Y	Electric load (small lamp)	10-14V	Small lamp switch ON
				About 0V	Small lamp switch OFF
EL2	A22	R/W	Electric load (rear defogger)	10-14V	Rear defogger switch ON
				About 0V	Rear defogger switch OFF
FPR	A23	Br/B	Fuel pump relay (with immobilizer)	0-1V	Fuel pump ON (for about 3 seconds after ignition ON or while engine running)
				10-14V	Fuel pump OFF (after about 3 seconds from ignition switch ON with engine stopped)
IGT	A24	Bl/Y	Ignitor (with immobilizer)	0.3V	Engine running at idle speed
				2V	Engine running at about 8000 rpm
—	A25	—	Blank	—	_____
E2	A26	B/Y	Sensor ground	About 0V	_____
VAS	B1	B/Y	Throttle valve opening signal output (A/T vehicle only)	About 12V	Throttle valve at idle position
				About 8V	Throttle valve at full open position
—	B2	B/G	Not used	—	_____
ISC	B3	G/Y	IAC valve (stepping motor coil 1)	10-14V or 0-1V	Ignition switch ON
—	B4	—	Blank	—	_____
R	B5	O/B	Transmission range switch ("R" range)	10-14V	Ignition switch ON and transmission range switch in "R" range
				About 0V	Ignition switch ON and transmission range switch in other than "R" range
—	B6	—	Blank	—	_____
D	B7	Bl/Y	Transmission range switch ("D" range)	10-14V	Ignition switch ON and transmission range switch in "D" range
				About 0V	Ignition switch ON and transmission range switch in other than "D" range

TERMINAL			CIRCUIT	NORMAL VOLTAGE	CONDITION
NAME	POSITION	WIRE COLOR			
DN	B8	V/G	Diagnosis switch terminal	10-14V	Ignition switch ON
				About 0V	Ignition switch ON and diagnosis switch terminal grounded
—	B9	—	Blank	—	—
ISC2	B10	Y/W	IAC valve (stepping motor coil 2)	10-14V or 0-1V	Ignition switch ON
ISC3	B11	BI/Y	IAC valve (stepping motor coil 3)	10-14V or 0-1V	Ignition switch ON
ISC4	B12	Y/R	IAC valve (stepping motor coil 4)	10-14V or 0-1V	Ignition switch ON
2	B13	G	Transmission range switch ("2" range)	10-14V	Ignition switch ON and transmission range switch in "2" range
				About 0V	Ignition switch ON and transmission range switch in other than "2" range
L	B14	G/BI	Transmission range switch ("L" range)	10-14V	Ignition switch ON and transmission range switch in "L" range
				About 0V	Ignition switch ON and transmission range switch in other than "L" range
SDL	B15	W/B	Data link connector	4-5V	Ignition switch ON and connect SUZUKI scan tool (Tech 1) to DLC
TS	B16	P/W	Test switch terminal	10-14V	Ignition switch ON
				About 0V	Ignition switch ON and test switch terminal grounded
—	C1	—	Blank	—	—
N+	C2	W	CMP sensor (+)	0-1V	Ignition switch ON
N-	C3	B	CMP sensor (-)	0-1V	Ignition switch ON
PM	C4	Lg/R	MAP sensor	About 2.0V	Ignition switch ON and engine stop
				About 1.0V	Engine running at idle speed
OX	C5	R/BI	Heated oxygen sensor	Deflects between 0 and 1V	After engine warmed up
				0-1V	Throttle valve at idle position
VTA	C6	Gr	TP sensor	About 4V	Throttle valve at full open position
				0-1V	Throttle valve at full open position
KNK	C7	G	Knock sensor	About 2.5V	Engine running at idle speed
TAC	C8	V/R	A/C evapo temp. sensor (with A/C)	About 2.4V	A/C ventilator outlet temp. : at 20°C
THW	C9	Lg/B	ECT sensor	About 2.9V	Engine coolant temp. : at 20°C
				About 0.8V	Engine coolant temp. : at 80°C
IGS	C10	B/W	Ignition switch signal	10-14V	Ignition switch ON
+B	C11	B/R	Power source	10-14V	Ignition switch ON
MR	C12	B/BI	Main relay	10-14V	Ignition switch OFF
				About 0V	Ignition switch ON
+BB	C13	W	Power source for back-up	10-14V	—
—	C14	—	Blank	—	—
VCC	C15	Sb	Power supply (for sensors)	About 5V	Ignition switch ON
RSW	C16	V	VSS	Deflects between 0 and 5V	Ignition switch ON and vehicle moved gradually (front axle turned)
				0 and 5V	Ignition switch ON and vehicle moved gradually (front axle turned)
—	C17	—	Blank	—	—
—	C18	—	Blank	—	—
THA	C19	Lg	IAT sensor	About 2.9V	IAT sensor ambient temp. : at 20°C
				About 0.8V	IAT sensor ambient temp. : at 80°C
—	C20	—	Blank	—	—
E01	C21	B/BI	Ground	About 0V	—
MGC	C22	P/B	A/C compressor magnet clutch (with A/C)	10-14V	A/C compressor : ON
				About 0V	A/C compressor : OFF



75F00-6E1-73-2

RESISTANCE CHECK

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

CAUTION:

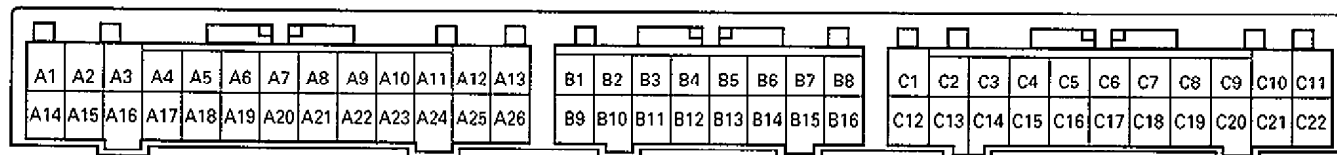
Never touch terminals of ECM itself or connect voltmeter or ohmmeter.

- 2) Check resistance between each pair of terminals of disconnected couplers as listed in following table.

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 represents that when parts temperature is 20°C (68°F).

TERMINAL ARRANGEMENT OF ECM COUPLER (VIEWED FROM HARNESS SIDE)



CIRCUIT	TERMINAL POSITION	STANDARD RESISTANCE	CONDITION
No.1 injector	A1-C11	7.8-9.5 Ω	_____
No.2 injector	A14-C11	7.8-9.5 Ω	_____
No.3 injector	A2-C11	7.8-9.5 Ω	_____
No.4 injector	A15-C11	7.8-9.5 Ω	_____
IAC valve (coil 1)	B3-C11	43.2-52.8 Ω	_____
IAC valve (coil 2)	B10-C11	43.2-52.8 Ω	_____
IAC valve (coil 3)	B11-C11	43.2-52.8 Ω	_____
IAC valve (coil 4)	B12-C11	43.2-52.8 Ω	_____
TP sensor	C6-A26	450-550 Ω	_____
MAP sensor	C4-A26	12-17k Ω	_____
ECT sensor	C9-A26	2.2-2.7k Ω	Engine coolant temp. : 20°C
IAT sensor	C19-A26	2.2-2.7k Ω	Intake air temp. : 20°C
Heated oxygen sensor heater	A16-C10	5.4-6.6 Ω	_____
Fuel pump relay	with immobilizer	90-110 Ω	_____
	without immobilizer		
Radiator fan relay	A9-C10	90-110 Ω	_____
EVAP canister purge valve	A12-C11	36-44 Ω	_____
EGR solenoid vacuum valve	A4-C11	36-44 Ω	_____
A/C compressor magnet clutch (if equipped)	C21-C22	3.6-4.4 Ω	_____
A/C evapo temp. sensor (if equipped)	C8-A26	2.2-2.7k Ω	_____

ON-VEHICLE SERVICE

GENERAL

When the emission control hoses are disconnected and the system's component is removed for service, reinstall the component properly, and route and connect hoses correctly after service. Refer to Emission Control Information Label (if equipped) for proper routing of hoses.

ECM

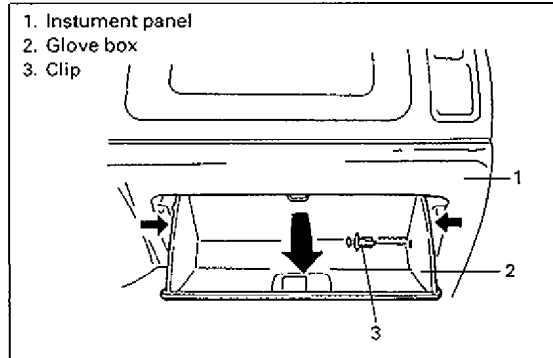
CAUTION:

As ECM (and TCM (for A/T vehicle)) consists of precision parts, be careful not to expose it to excessive shock.

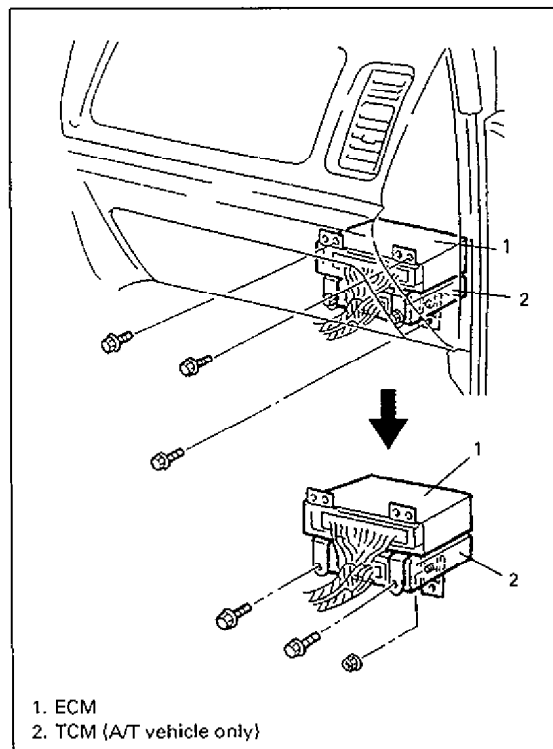
REMOVAL

- 1) Disconnect battery negative cable from battery.
- 2) If equipped with air bag system, disable air bag system (Refer to "Disabling Air Bag System" in SECTION 10B or 10B1).
- 3) Open glove box, then while pressing glove box stopper, pull out glove box from instrument panel.
- 4) Remove glove box.
- 5) Disconnect couplers from ECM (and TCM (for A/T vehicle)).

75F00-6E1-74-2



75F00-6E1-74-3



75F00-6E1-74-5

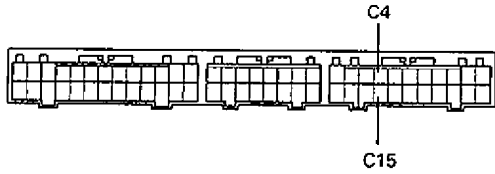
- 6) Remove ECM (with TCM (for A/T vehicle)) from body.
- 7) For A/T vehicle, separate ECM and TCM.

INSTALLATION

Reverse removal procedure noting the following.

- Connect couplers to ECM (and TCM (for A/T vehicle)) securely.
- If equipped with air bag system, be sure to enable air bag system after installing ECM (Refer to "Enabling Air Bag System" in SECTION 10B or 10B1).

TERMINAL ARRANGEMENT OF ECM COUPLER
(VIEWED FROM HARNESS SIDE)



C4 : "PM" terminal
C15 : "VCC" terminal

75F00-6E1-75-1

SENSOR

MAP SENSOR

OUTPUT VOLTAGE CHECK

- 1) Remove ECM according to previously outlined (Refer to p.6E1-74).
- 2) Connect couplers to ECM securely.
- 3) With coupler connected to ECM, connect digital type voltmeter as shown and check that ECM supply voltage 4.75 – 5.25V is applied to coupler terminal "VCC".
- 4) Check output voltage at coupler terminal "PM".
Note that it varies with atmospheric pressure and altitude. Also, start engine, if it can, and check if output voltage varies.

Output voltage (ECM supply voltage 4.75 – 5.25V, ambient temp. 10 – 40°C (50 – 104°F))

ALTITUDE (Reference)		BAROMETRIC PRESSURE	OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	(V)
0	0	760	1.85 – 2.43
1000	305	733	1.80 – 2.37
2000	610	707	1.75 – 2.31
3000	914	682	1.70 – 2.25
4000	1219	658	1.65 – 2.20
5000	1524	634	1.60 – 2.15
6000	1829	611	1.55 – 2.10
7000	2133	589	1.51 – 2.05
8000	2438	567	1.47 – 2.00
9000	2743	546	1.42 – 1.95
10000	3048	526	1.38 – 1.91

NOTE:

Note that atmospheric pressure varies depending on weather conditions as well as altitude.

Take that into consideration when performing above check.

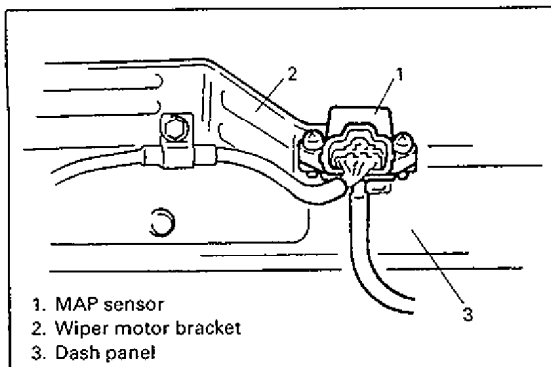
If check result is not satisfactory in previous step 3) or 4), check MAP sensor and its circuit according to Diagnostic Flow Table for Code No.31 or 32.

NOTE:

If output voltage does not vary when engine is started, it is possible that vacuum hose and/or filter are clogged. Clean them.

Another possibility is that filter in MAP sensor is clogged from freezing. If it is suspected, leave it at room temperature (20°C (68°F)) for a while and recheck.

- 5) Upon completion of checking, install ECM and connect ECM coupler securely.



75F00-6E1-76-1

REMOVAL

- 1) Disconnect MAP sensor vacuum hose from intake manifold.
- 2) Disconnect coupler from MAP sensor.
- 3) Remove MAP sensor.

INSPECTION

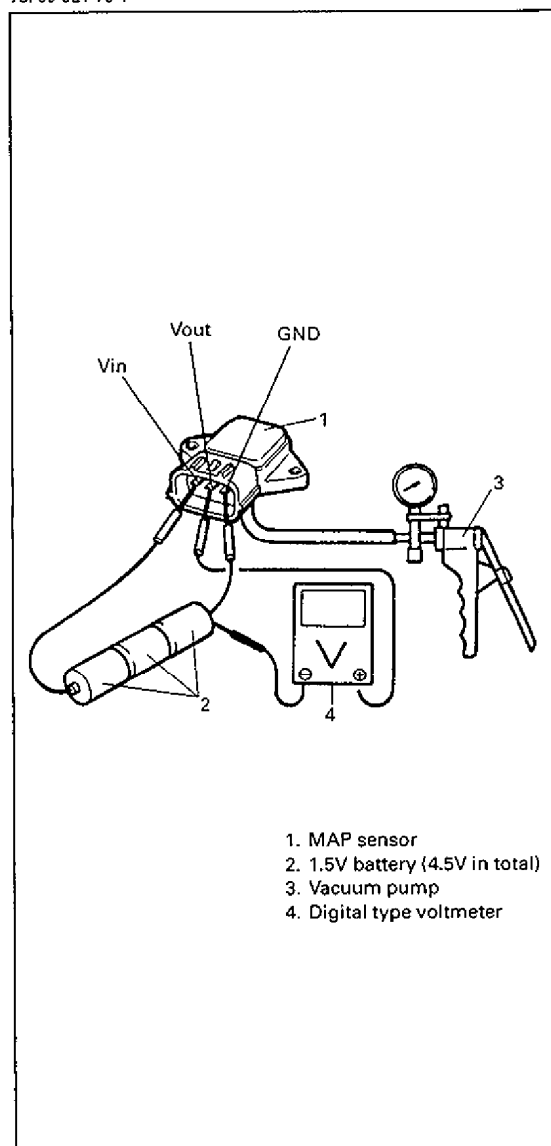
Arrange 3 new 1.5V batteries in series (check that total voltage is 4.5 – 5.0V) and connect its positive terminal to "Vin" terminal of sensor and negative terminal to "GND" terminal. Then check voltage between "Vout" and "GND".

Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump.

Output voltage (Vin voltage 4.75 – 5.25V, ambient temp. 20 – 30°C (68 – 86°F))

ALTITUDE (Reference)		BAROMETRIC PRESSURE	OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	(V)
0	0	760	1.75 – 2.43
2000	610	707	
2001	611	Under 707 over 634	1.60 – 2.31
5000	1524		
5001	1525	Under 634 over 567	1.47 – 2.15
8000	2438		
8001	2439	Under 567 over 526	1.38 – 2.00
10000	3048		

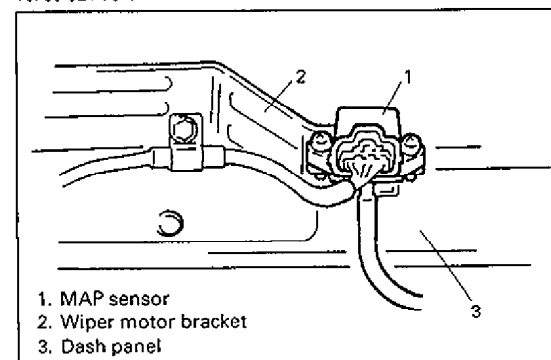
If check result is not satisfactory, replace MAP sensor.



75F00-6E1-76-4

INSTALLATION

- 1) Install MAP sensor and connect vacuum hose securely.
- 2) Connect MAP sensor coupler securely.



75F00-6E1-76-5

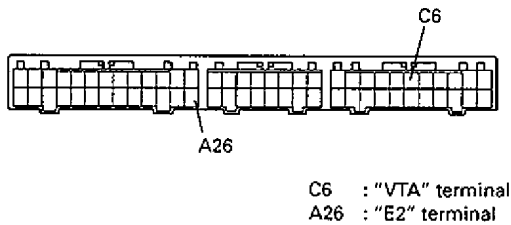
TP SENSOR ADJUSTMENT

- 1) Warm up engine to normal operating temperature.
- 2) Loosen TP sensor screws.

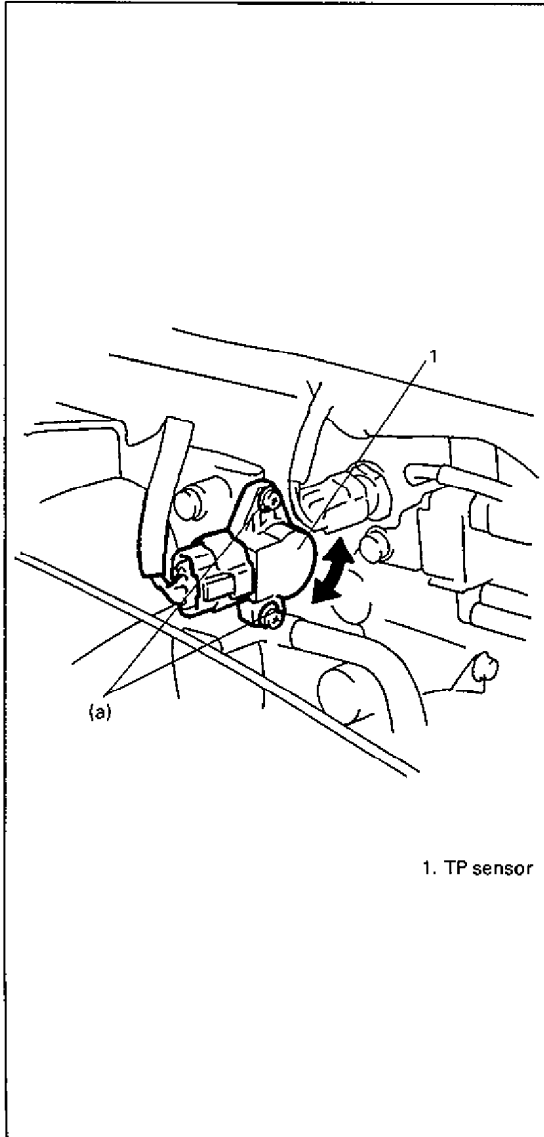
75F00-6E1-77-1

[Not using SUZUKI scan tool (Tech 1)]

TERMINAL ARRANGEMENT OF ECM COUPLER
(VIEWED FROM HARNESS SIDE)



75F00-6E1-77-2



- 3) [Using SUZUKI scan tool (Tech 1)]

Connect SUZUKI scan tool (Tech 1) to DLC with ignition switch OFF and check "THROT POS SENSOR" value displayed on scan tool (Tech 1) by using "DATA LIST" mode.

[Not using SUZUKI scan tool (Tech 1)]

Remove ECM as previously outlined and with couplers connected to ECM, connect digital type voltmeter between "VTA" and "E2" terminal.

- 4) Turn TP sensor clockwise or counterclockwise and tighten TP sensor screw at a position where voltage as specified below is obtained.

TP sensor output voltage when throttle is fully close:
 0.50 ± 0.15 V

- 5) Tighten TP sensor screw to specified torque.

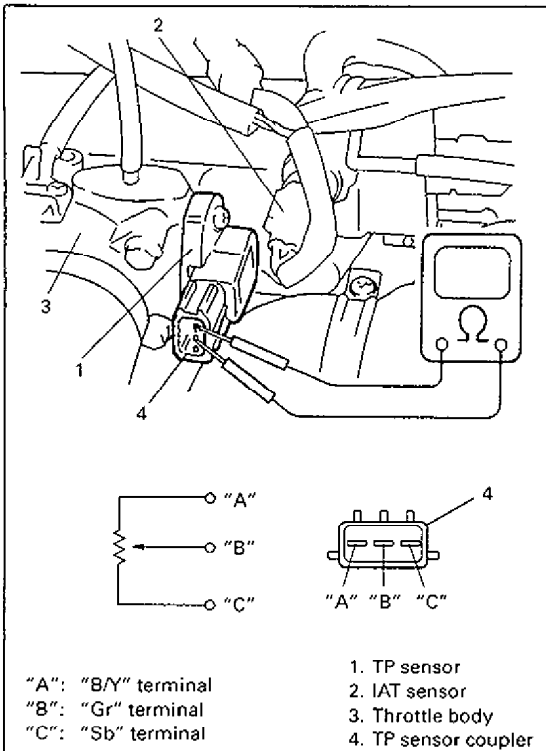
Tightening Torque
(a): 2.5 N·m (0.25 kg·m, 1.8 lb·ft)

- 6) Check to make sure that when throttle is fully open TP sensor voltage is as shown below.

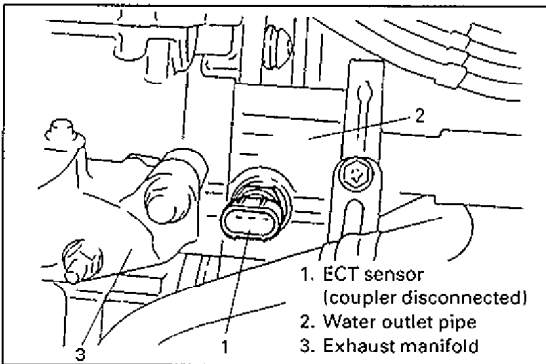
TP sensor output voltage when throttle is fully open:
 4.2 ± 0.5 V

- 7) Turn ignition switch off and disconnect battery cable from battery terminal for one minute or more.
- 8) Connect battery cable to battery terminal.
- 9) [Not using SUZUKI scan tool (Tech 1)]
Install ECM as previously outlined.

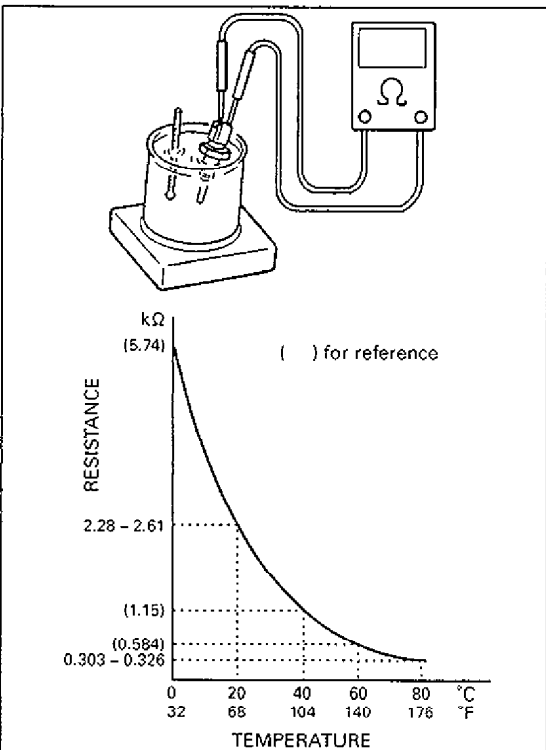
75F00-6E1-77-5



75F00-6E1-78-2



75F00-6E1-78-3



75F00-6E1-78-5

INSPECTION

- 1) Disconnect negative cable at battery and coupler from TP sensor.
- 2) Using ohmmeter, check resistance between terminals under each condition given in table below.

TERMINAL	CONDITION	RESISTANCE
Between "A" and "C" terminals	—	3.5 - 6.5 kΩ
Between "A" and "B" terminals	Throttle valve is at idle position	2.65 - 6.20 kΩ
	Throttle valve is fully opened	0.25 - 0.85 kΩ

NOTE:

There should be more than 2 kΩ resistance difference between when throttle valve is at idle position and when it is fully open.

If check result is not satisfactory, adjust installation angle of TP sensor and if found defective in the other check, replace TP sensor.

ECT SENSOR REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Drain cooling system.
- 3) Disconnect coupler from ECT sensor.
- 4) Remove ECT sensor from water outlet pipe.

INSPECTION

Immerse temperature sensing part of ECT sensor in water and measure resistance between sensor terminals while heating water gradually.

If measured resistance doesn't show such characteristic as shown in left figure, replace ECT sensor.

INSTALLATION

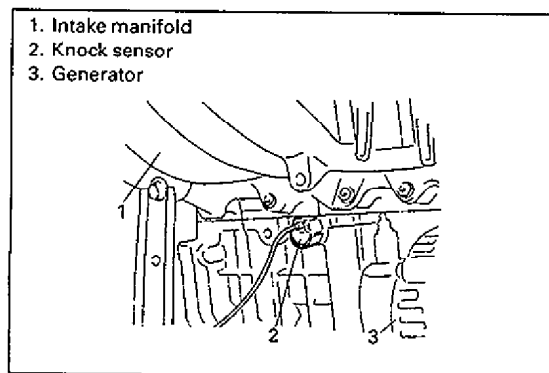
Reverse removal procedure noting the following.

- Clean mating surfaces of sensor and water outlet pipe.
- Tighten ECT sensor to specified torque.

Tightening Torque for ECT sensor

15 N·m (1.5 kg-m, 11.0 lb-ft)

- Connect coupler to sensor securely.
- Refill cooling system.



75F00-6E1-79-1

KNOCK SENSOR REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Disconnect coupler of knock sensor.
- 3) Remove knock sensor from cylinder block.

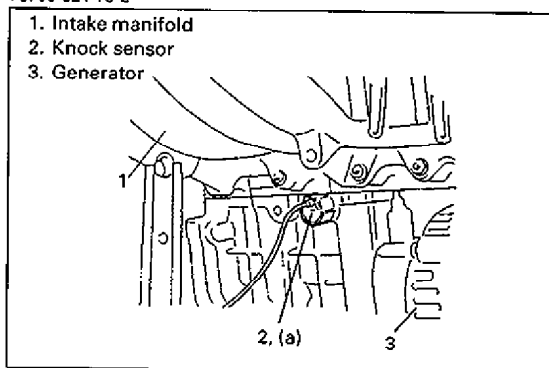
NOTE:

Be careful not to expose it to excessive shock.

INSPECTION

Inspect knock sensor, referring to flow table of diagnostic trouble code No.43 in p.6E1-50.

75F00-6E1-79-2



75F00-6E1-79-3

INSTALLATION

Reverse removal procedure noting the followings.

- Tighten knock sensor to specified torque.

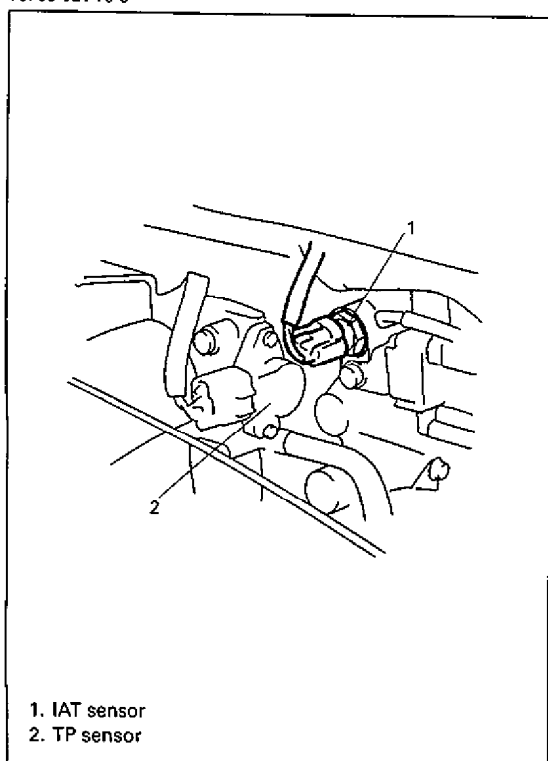
Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

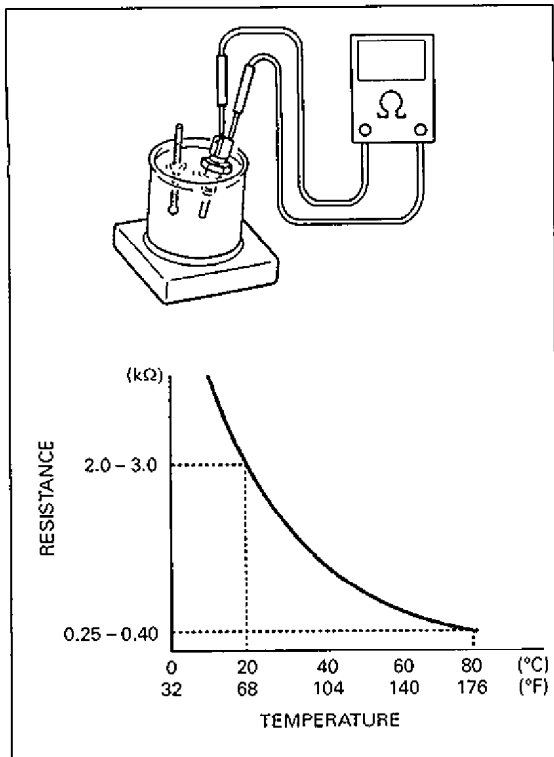
- Connect coupler of knock sensor and clamp wire harness securely.

IAT SENSOR REMOVAL

- 1) Disconnect negative cable from battery.
- 2) Disconnect IAT sensor coupler.
- 3) Remove IAT sensor from intake manifold.



75F00-6E1-79-5



75F00-6E1-80-2

INSPECTION

Immerse temperature sensing part of IAT sensor in water and measure resistance between sensor terminals while heating water gradually.

If measured resistance doesn't show such characteristic as shown in left figure, replace IAT sensor.

INSTALLATION

Reverse removal procedure noting the following.

- Clean mating surface of sensor and intake manifold.
- Install IAT sensor to intake manifold case securely.

Tightening Torque for IAT sensor

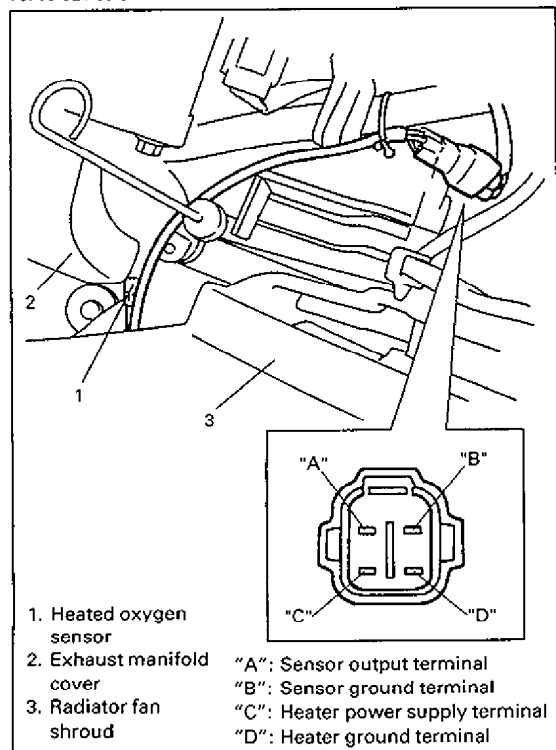
15 N·m (1.5 kg-m, 11.0 lb-ft)

- Connect coupler to sensor securely.

HEATED OXYGEN SENSOR**OXYGEN SENSOR INSPECTION**

Inspect oxygen sensor and its circuit, referring to flow table of diagnostic trouble code No.13 in p.6E1-38.

75F00-6E1-80-3



75F00-6E1-80-5

OXYGEN SENSOR HEATER INSPECTION

- 1) Disconnect sensor coupler.
- 2) Using ohmmeter, measure resistance between terminals "C" and "D" or sensor coupler.

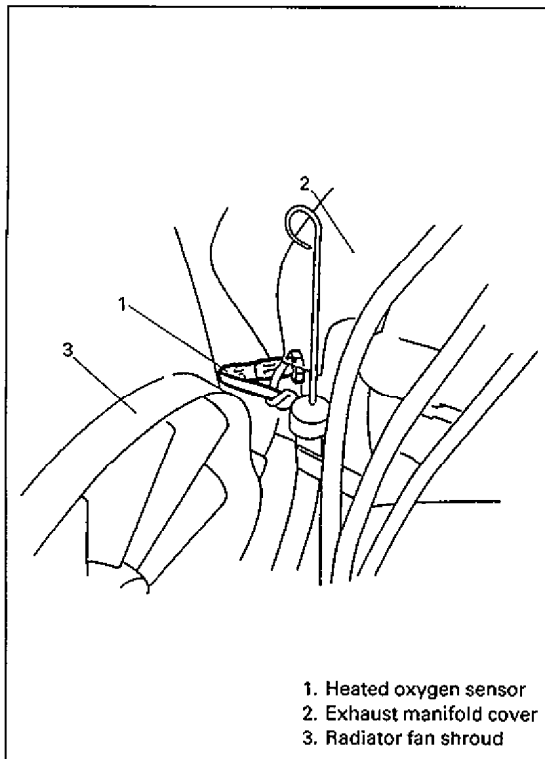
NOTE:

Temperature of sensor affects resistance value largely.
Make sure that sensor heater is at correct temperature.

Resistance: 4.0 – 5.0 Ω at 20°C (68°F)

If found faulty, replace oxygen sensor.

- 3) Connect coupler to sensor securely.



75F00-6E1-81-2

REMOVAL

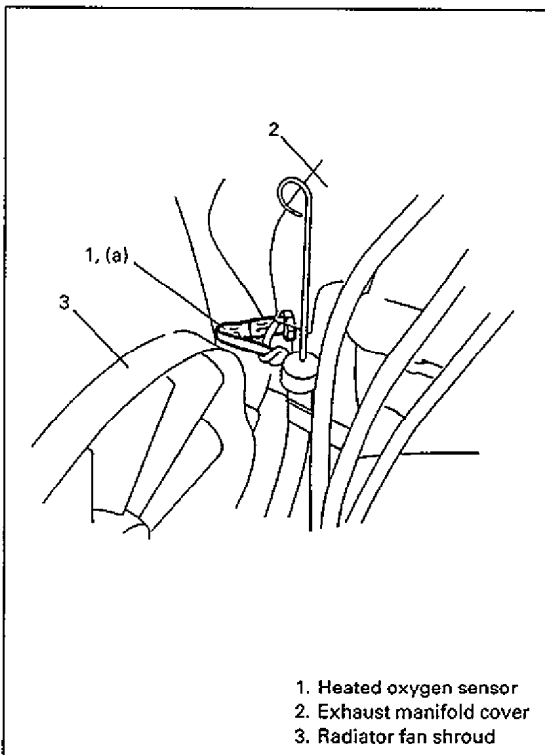
WARNING:

To avoid danger of being burned, do not touch exhaust system when system is hot. Oxygen sensor removal should be performed when system is cool.

- 1) Disconnect negative cable from battery.
- 2) Disconnect coupler of oxygen sensor.
- 3) Remove oxygen sensor from exhaust manifold.

NOTE:

Be careful not to expose it to excessive shock.



75F00-6E1-81-4

INSTALLATION

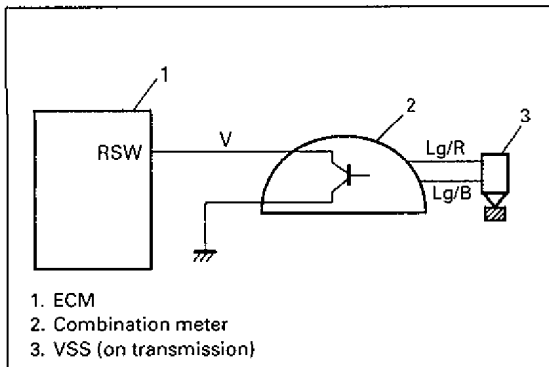
Reverse removal procedure noting the followings.

- Tighten oxygen sensor to specified torque.

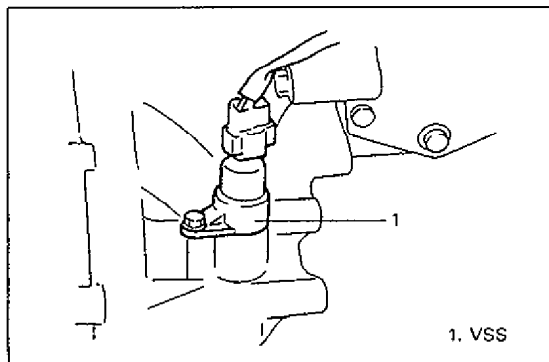
Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)

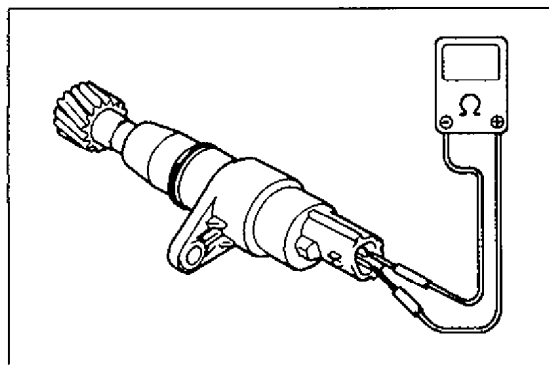
- Connect coupler of oxygen sensor and clamp wire harness securely.
- After installing oxygen sensor, start engine and check that no exhaust gas leakage exists.



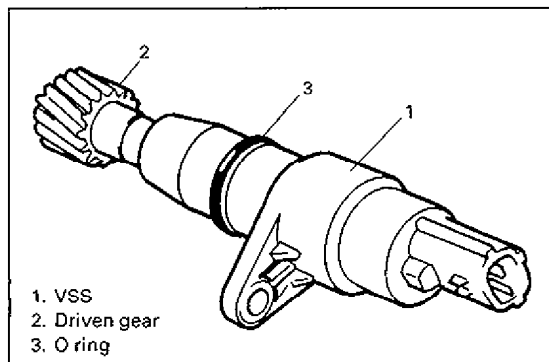
77E00-6E5-82-1



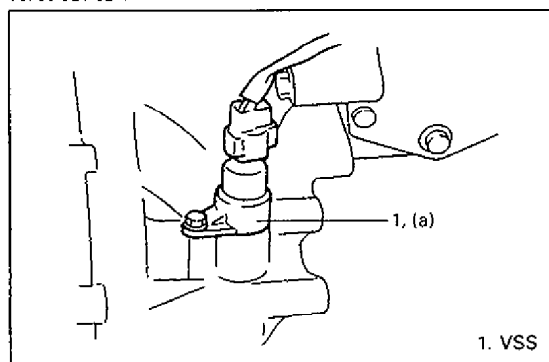
75F00-6E1-82-2



75F00-6E1-82-3



75F00-6E1-82-4



75F00-6E1-82-5

VSS

ON-VEHICLE INSPECTION

Inspect VSS and its circuit, referring to flow table of diagnostic trouble code No.24 in p.6E1-46.

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect coupler from VSS.
- 3) Remove VSS from transmission.

INSPECTION

Check resistance between two terminals of VSS.

Resistance: 300 – 450 Ω (at 20 – 30°C (68 – 86°F))

If check result is not satisfactory, replace VSS.

INSTALLATION

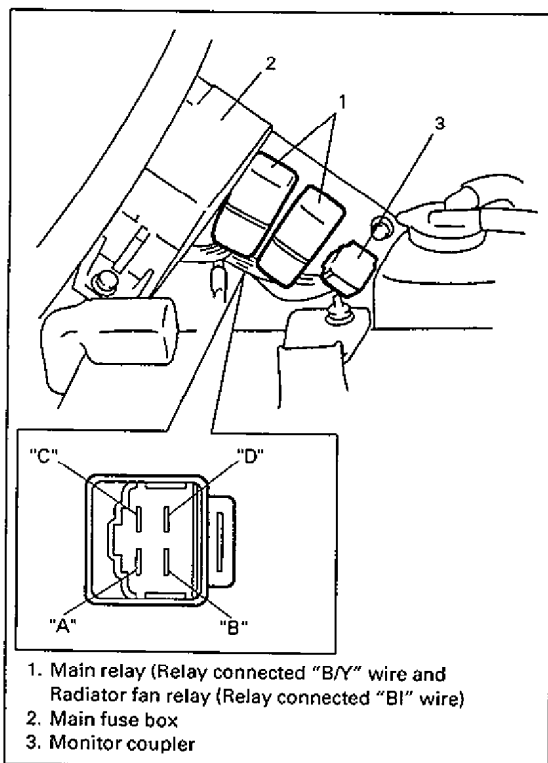
- 1) Check O ring and VSS surface for their flawlessness, apply oil to O ring and driven gear.

- 2) Install VSS to transmission.

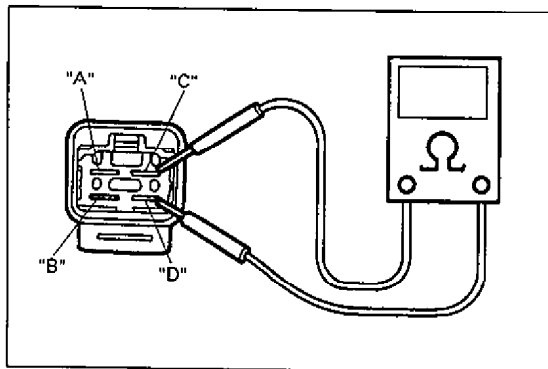
Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

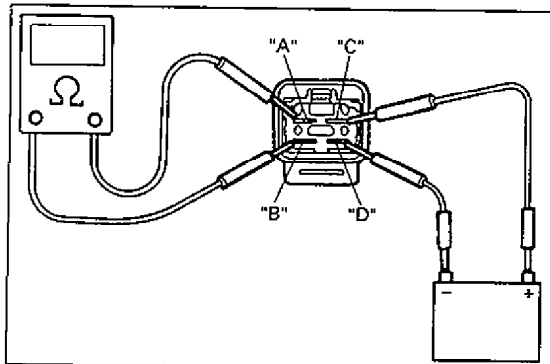
- 3) Connect VSS coupler.
- 4) Connect negative cable at battery.



75F00-6E1-83-2



75F00-6E1-83-3



75F00-6E1-83-4

ECM POWER SUPPLY SYSTEM

MAIN RELAY

NOTE:

Distinguish between main relay and radiator fan control relay by wire colors.

INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove main relay from its bracket after disconnection its coupler.

- 3) Check resistance between each two terminals as in table below.

If check results are as specified, proceed to next operation check. If not, replace.

TERMINALS	RESISTANCE
Between "A" and "B"	∞ (infinity)
Between "C" and "D"	80 – 100 Ω at 20°C (68°F)

- 4) Check that there is continuity between terminals "A" and "B" when battery is connected to terminals "C" and "D". If found defective, replace.

- 5) Install relay and connect its coupler securely.

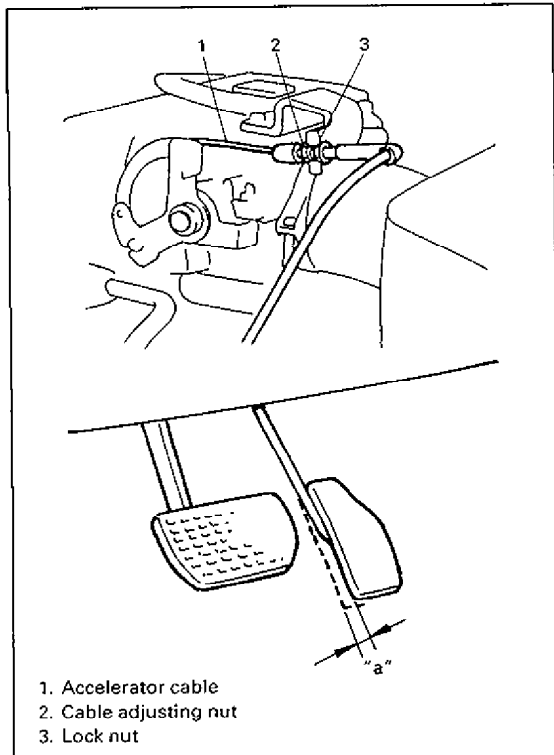
AIR INTAKE SYSTEM

ACCELERATOR CABLE ADJUSTMENT

- 1) With throttle valve closed, check accelerator pedal play which should be within following specification.

Pedal play "a": 2 – 7 mm (0.08 – 0.27 in.)

If measured value is out of specification, adjust it to specification with cable adjusting nut.



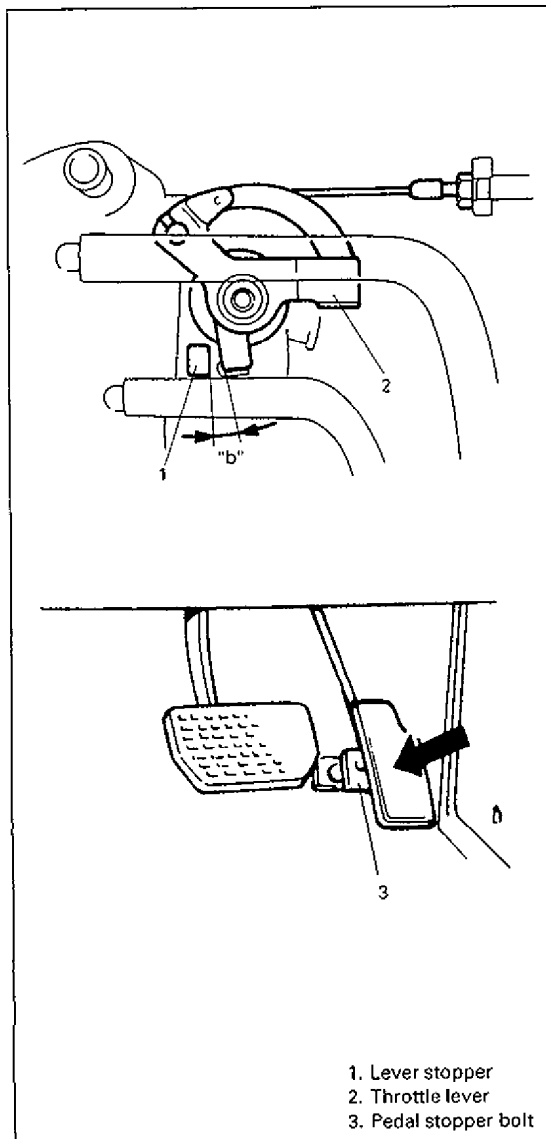
75F00-6E1-84-2

- 2) With accelerator pedal depressed fully, check clearance between throttle lever and lever stopper (throttle body) which should be within following specification.

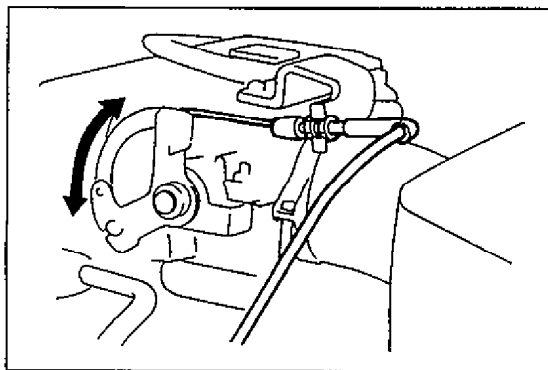
Clearance "b": 0.5 – 2.0 mm (0.02 – 0.07 in.)

(With pedal depressed fully)

If measured value is out of specification, adjust it to specification by changing height of pedal stopper bolt.



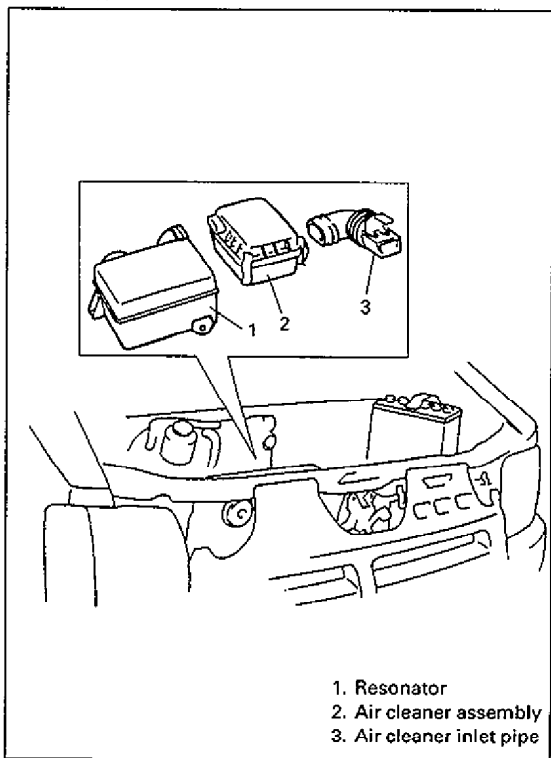
75F00-6E1-84-5



75F00-6E1-85-1

THROTTLE BODY ON-VEHICLE INSPECTION

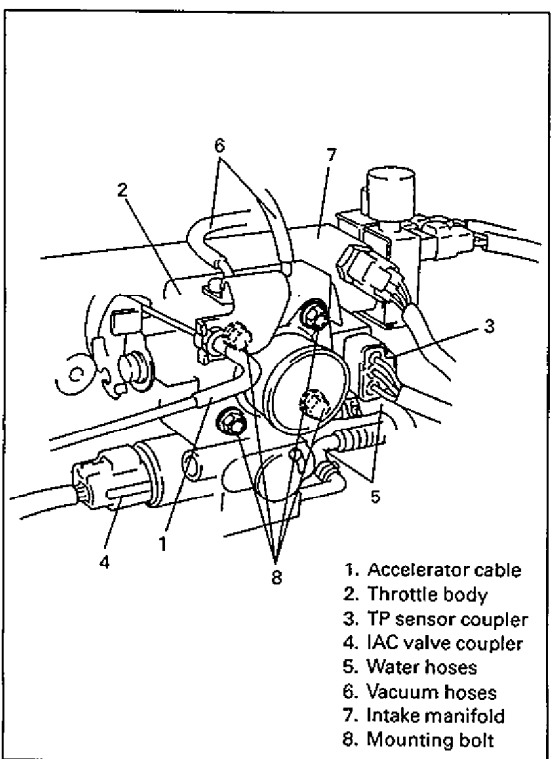
Check that throttle valve lever moves smoothly.



75F00-6E1-85-3

REMOVAL

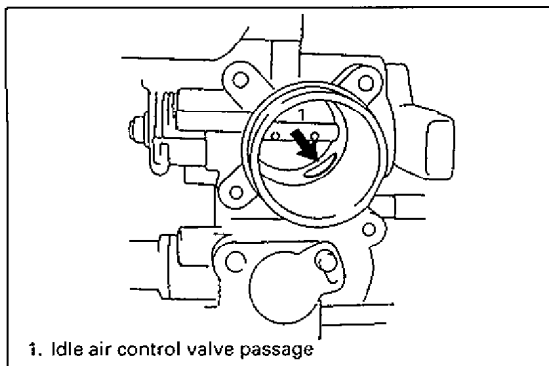
- 1) Disconnect negative cable at battery.
- 2) Drain cooling system, referring to SECTION 6B.
- 3) Remove air cleaner inlet pipe, air cleaner assembly and resonator.



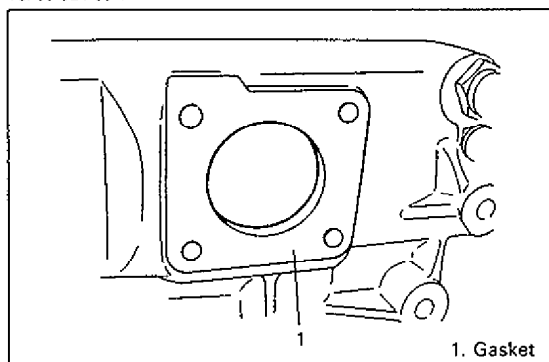
75F00-6E1-85-5

- 4) Disconnect accelerator cable from throttle body.
- 5) Disconnect couplers of TP sensor and IAC valve.
- 6) Disconnect water hoses and vacuum hose from throttle body.
- 7) Remove throttle body from intake manifold.

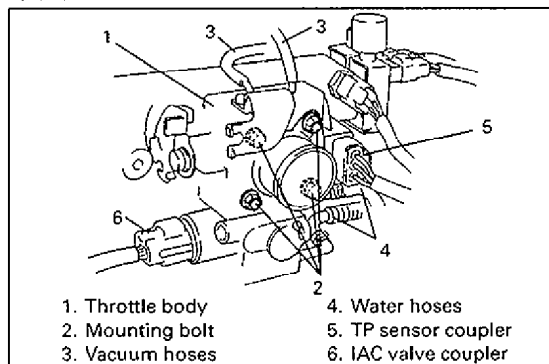
1. Accelerator cable
2. Throttle body
3. TP sensor coupler
4. IAC valve coupler
5. Water hoses
6. Vacuum hoses
7. Intake manifold
8. Mounting bolt



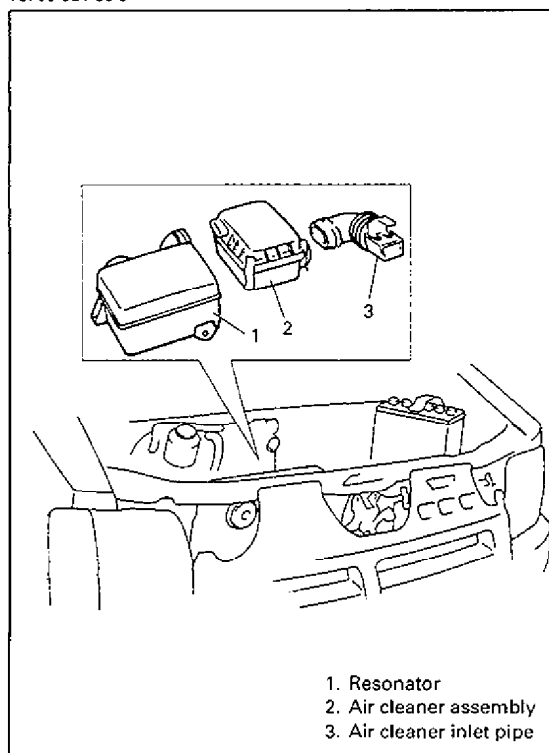
75F00-6E1-86-1



75F00-6E1-86-2



75F00-6E1-86-3



75F00-6E1-86-5

CLEANING

Clean passages by blowing compressed air.

NOTE:

- MAF sensor, TP sensor, or other components containing rubber must not be placed in a solvent or cleaner both. A chemical reaction will cause these parts to swell, harden or get distorted.
- Don't put drills or wires into passages for cleaning. It causes damages in passages.

INSTALLATION

- 1) Clean mating surfaces and install throttle body gasket to intake manifold.

NOTE:

Use new gasket.

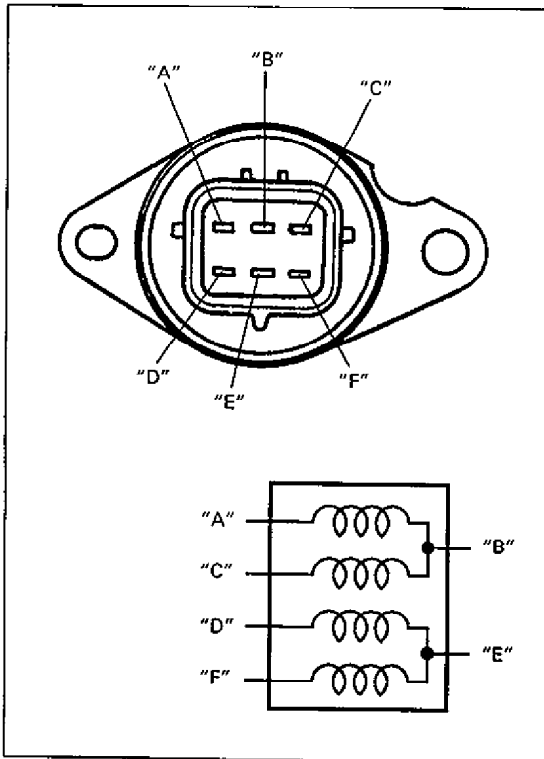
- 2) Install throttle body to intake manifold and tighten bolts.
- 3) Connect water hoses and vacuum hose.
- 4) Connect couplers of TP sensor and IAC valve.

- 5) Install resonator, air cleaner assembly and air cleaner inlet pipe.
- 6) Connect accelerator cable and adjust cable play to specification, referring to p.6E1-84.
- 7) Refill cooling system.
- 8) Connect negative cable at battery.

IAC VALVE**ON-VEHICLE INSPECTION**

Inspect IAC valve, referring to "B-5 IAC System Check" in p.6E1-60.

75F00-6E1-87-1



75F00-6E1-87-3

INSPECTION

Check resistance between following terminals of IAC valve.

Terminal	Standard resistance
"A" – "B"	43.2 – 52.8 Ω
"B" – "C"	
"D" – "E"	
"E" – "F"	

If found faulty, replace IAC valve.

FUEL DELIVERY SYSTEM

FUEL PRESSURE INSPECTION

- 1) Relieve fuel pressure in fuel feed line referring to p.6-4.
- 2) Connect special tools and hose between fuel feed hose and fuel feed pipe as shown in figure, and clamp hose securely to ensure no leaks occur during checking.

Special Tool

(A): 09912-58441

(B): 09912-58431

(C): 09912-58490

CAUTION:

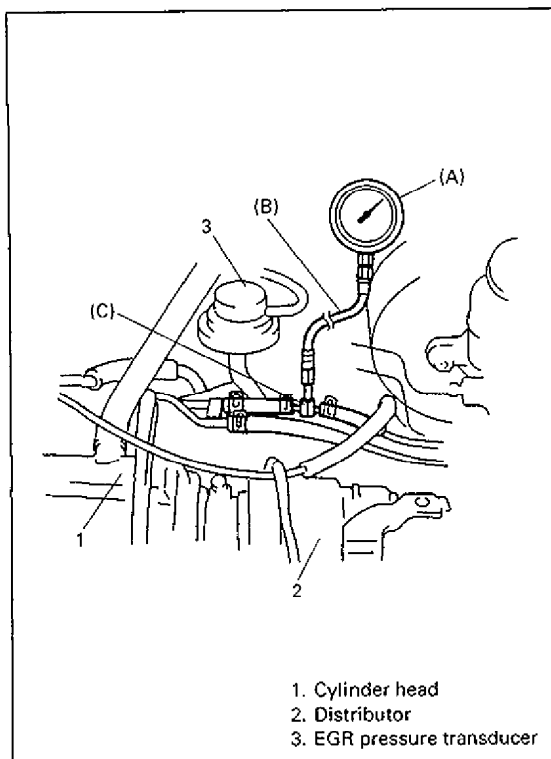
A small amount of fuel may be released when the fuel feed hose is disconnected. Place container under the fuel feed hose or fuel feed pipe with a shop cloth so that released fuel is caught in container or absorbed in cloth. Place that cloth in an approved container.

- 3) Check that battery voltage is above 11V.
- 4) Turn ignition switch ON to operate fuel pump and after 3 seconds turn it OFF. Repeat this 3 or 4 times and then check fuel pressure.
- 5) Start engine.
- 6) Measure fuel pressure at idling.
If measured pressure doesn't satisfy specification, refer to "Diagnostic Flow Table B-4" in p.6E1-58 and check each possibly defective part. Replace if found defective.
- 7) After checking fuel pressure, remove fuel pressure gauge.

CAUTION:

As fuel feed line is still under high fuel pressure, make sure to release fuel pressure according to following procedures.

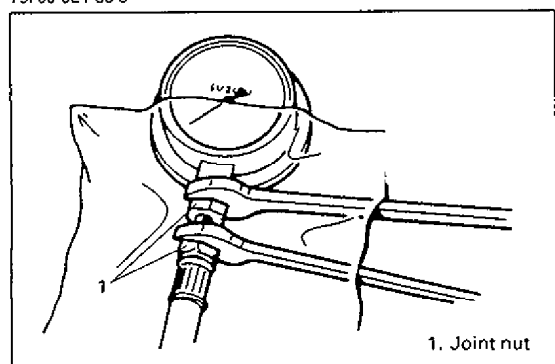
- Place fuel container under joint.
- Cover joint with rag and loosen joint nut slowly to release fuel pressure gradually.



75F00-6E1-88-2

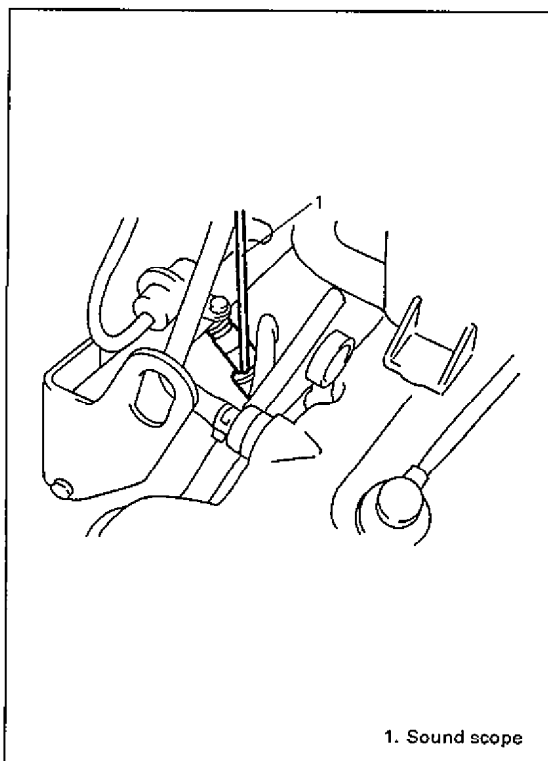
CONDITION	FUEL PRESSURE
With fuel pump operating and engine stopped	220 – 300 kPa (2.2 – 3.0 kg/cm ²) (31.3 – 42.7 psi)
At specified idle speed	170 – 230 kPa (1.7 – 2.3 kg/cm ²) (24.2 – 32.7 psi)
With 1 min. after engine (fuel pump) stop (pressure reduces as time passes)	over 160 kPa (1.6 kg/cm ²) (22.8 psi)

75F00-6E1-88-3



75F00-6E1-88-4

- 8) Remove fuel pressure gauge and attachment.
- 9) With engine "OFF" and ignition switch "ON", check for fuel leaks.



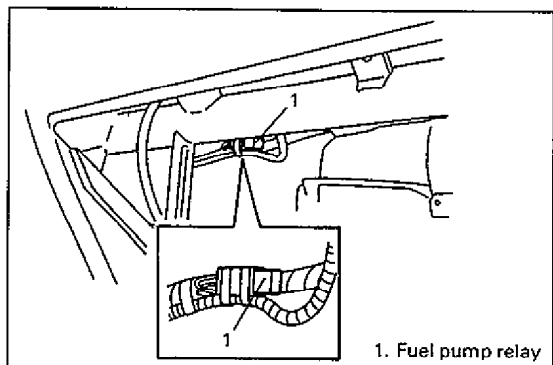
75F00-6E1-89-2

FUEL CUT OPERATION INSPECTION

NOTE:

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.

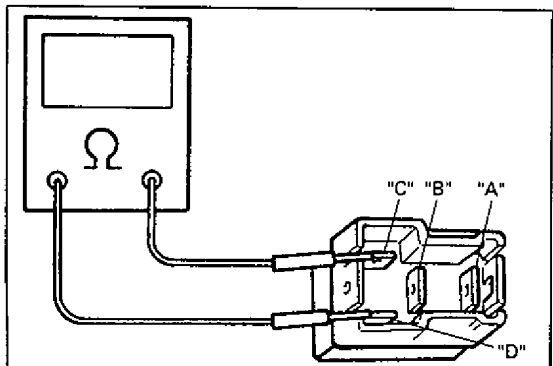
- 1) Warm up engine to normal operating temperature.
And check that A/C switch is OFF.
- 2) While listening to sound of injector by using sound scope or such, increase engine speed to higher than 3000 r/min. (rpm).
- 3) Check to make sure that sound to indicate operation of injector stops when throttle valve is closed instantly and it is heard again when engine speed is reduced to less than about 2500 r/min. (rpm).



75F00-6E1-89-3

FUEL PUMP RELAY INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove glove box.
- 3) Disconnect fuel pump relay.

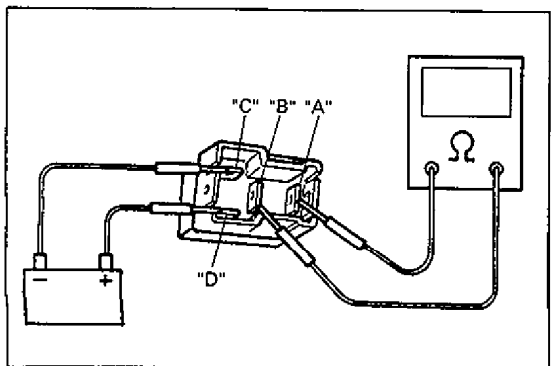


75F00-6E1-89-4

- 4) Check resistance between each two terminals as in table below.

If check results are as specified, proceed to next operation check. If not, replace.

TERMINALS	RESISTANCE
Between "A" and "B"	∞ (infinity)
Between "C" and "D"	80 – 100 Ω at 20°C (68°F)



75F00-6E1-89-5

- 5) Check that there is continuity between terminals "A" and "B" when battery is connected to terminals "C" and "D".

If found defective, replace.

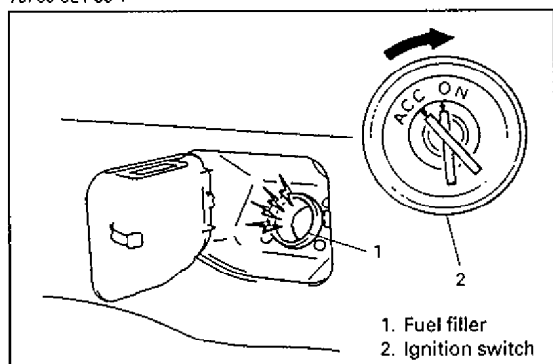
FUEL PUMP

ON-VEHICLE INSPECTION

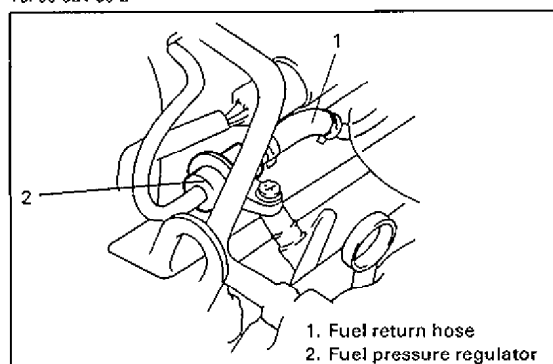
CAUTION:

When fuel filler cap is removed in any procedure, work must be done in a well-ventilated area, keep away from any open flames and without smoking.

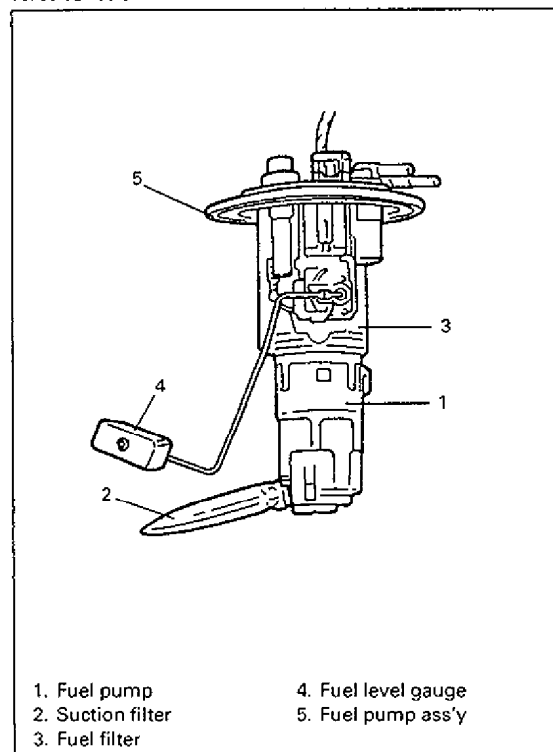
75F00-6E1-90-1



75F00-6E1-90-2



75F00-6E1-90-3



75F00-6E1-90-5

- 1) Remove filler cap and turn ON ignition switch. Then fuel pump operating sound should be heard from fuel filler for about 3 seconds and stop. Be sure to reinstall fuel filler cap after checking.

If above check result is not satisfactory, advance to "Diagnostic Flow Table B-1" in p.6E1-55.

- 2) Fuel pressure should be felt at fuel return hose for 3 seconds after ignition switch ON.

If fuel pressure is not felt, advance to "Diagnostic Flow Table B-4" in p.6E1-58.

REMOVAL

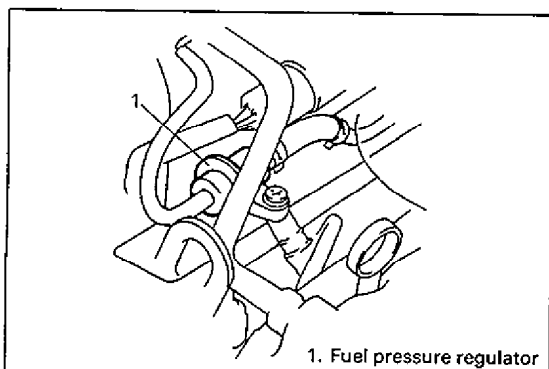
Remove fuel tank from vehicle body according to procedure described in SECTION 6C and remove fuel pump assembly from fuel tank.

INSPECTION

Check suction filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in fuel tank.

INSTALLATION

Install fuel pump assembly to fuel tank and then install fuel tank to vehicle body according to procedure described in SECTION 6C.



75F00-6E1-91-1

FUEL PRESSURE REGULATOR REMOVAL

- 1) Relieve fuel pressure according to procedure described on p.6-4.
- 2) Disconnect battery negative cable from battery.

- 3) Remove fuel pressure regulator from delivery pipe.

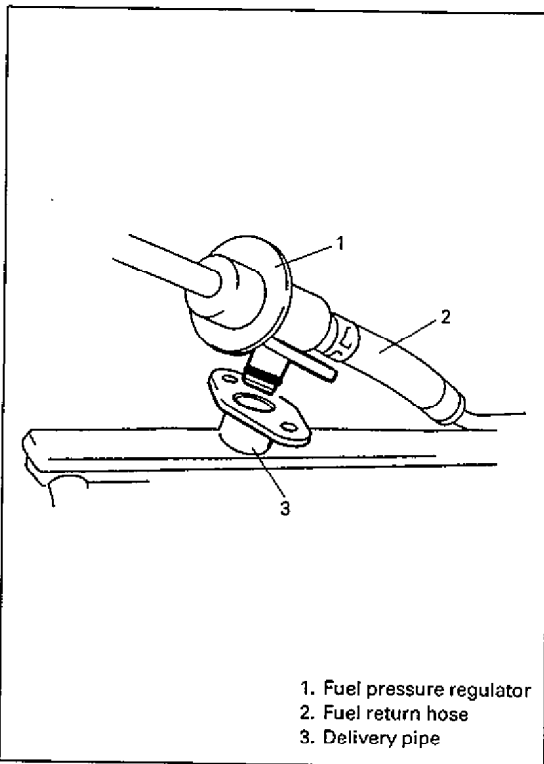
CAUTION:

A small amount of fuel may be released when the fuel pressure regulator is disconnected from delivery pipe. Place a shop cloth under delivery pipe so that released fuel is absorbed in it.

- 4) Disconnect fuel return hose and vacuum hose from pressure regulator.

CAUTION:

A small amount of fuel may be released when the fuel return hose is disconnected. Cover the hose to be disconnected with a shop cloth.

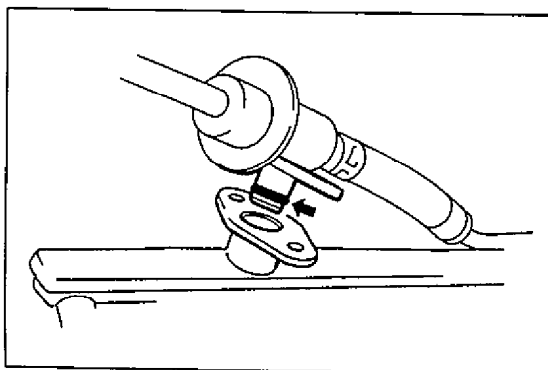


75F00-6E1-91-3

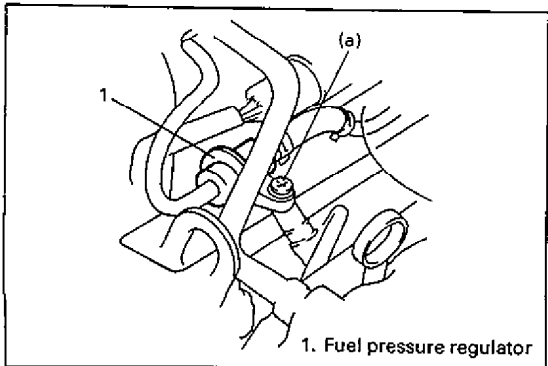
INSTALLATION

For installation, reverse removal procedure and note following precaution.

- Apply thin coat of spindle oil or gasoline to O ring to facilitate installation.



75F00-6E1-91-4



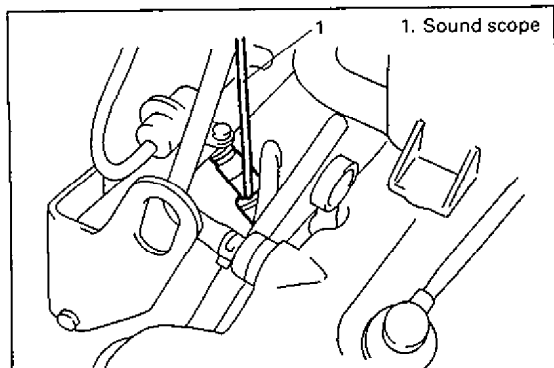
75F00-6E1-91-5

- Tighten fuel pressure regulator bolts to specified torque.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

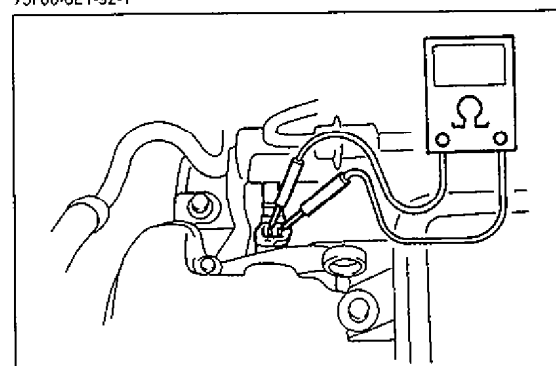
- With engine "OFF" and ignition switch "ON", check for fuel leaks around fuel line connection.



75F00-6E1-92-1

FUEL INJECTOR ON-VEHICLE INSPECTION

- 1) Using sound scope or such, check operating sound of injector when engine is running or cranking.
Cycle of operating sound should vary according to engine speed.
If no sound or an unusual sound is heard, check injector circuit (wire or coupler) or injector.



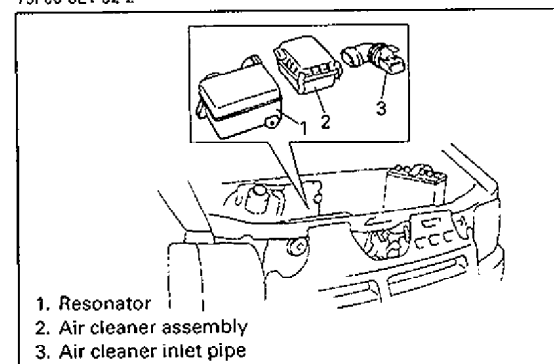
75F00-6E1-92-2

- 2) Disconnect coupler from injector, connect ohmmeter between terminals of injector and check resistance.

Resistance of injector: 7.8 – 9.5 Ω

If resistance is out of specification, replace.

- 3) Connect coupler to injector securely.



1. Resonator
2. Air cleaner assembly
3. Air cleaner inlet pipe

75F00-6E1-92-3

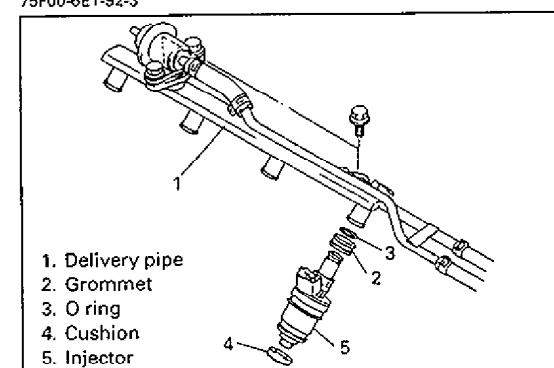
REMOVAL

- 1) Relieve fuel pressure according to procedure described on p.6-4.
- 2) Disconnect couplers from each injector.
- 3) Remove air cleaner inlet pipe, air cleaner assembly and resonator.

- 4) Remove delivery pipe from intake manifold and remove fuel injector.

CAUTION:

A small amount of fuel may be released when the fuel injector is disconnected from delivery pipe.
Place a shop cloth under delivery pipe so that released fuel is absorbed in it.



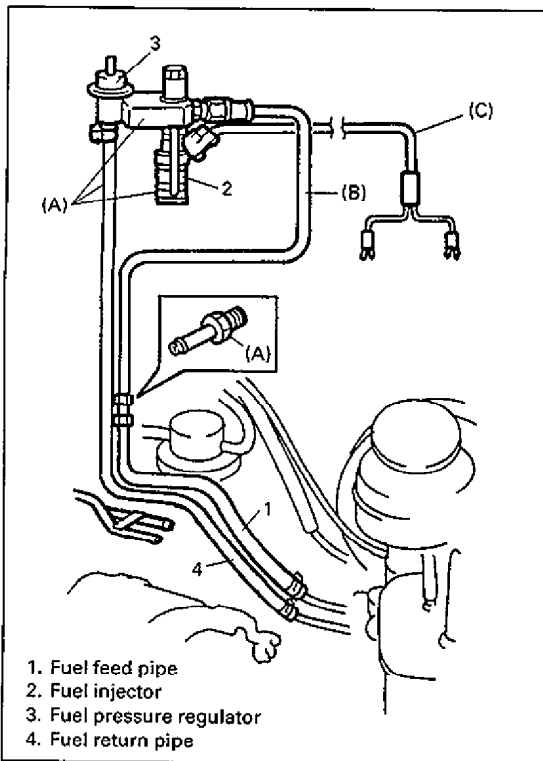
1. Delivery pipe
2. Grommet
3. O ring
4. Cushion
5. Injector

75F00-6E1-92-4

INSPECTION

WARNING:

As fuel is injected in this inspection, perform in a well ventilated area and away from open flames.
Use special care to prevent sparking when connecting and disconnecting test lead to and from battery.



75F00-6E1-93-2

- 1) Install injector and fuel pressure regulator to special tool (injector checking tool).

NOTE:

Remove grommet from injector, then install injector to special tool and tighten bolts by hand.

Special Tool

(A): 09912-58421

- 2) Connect special tools (hoses and attachment) to pipes of vehicle.

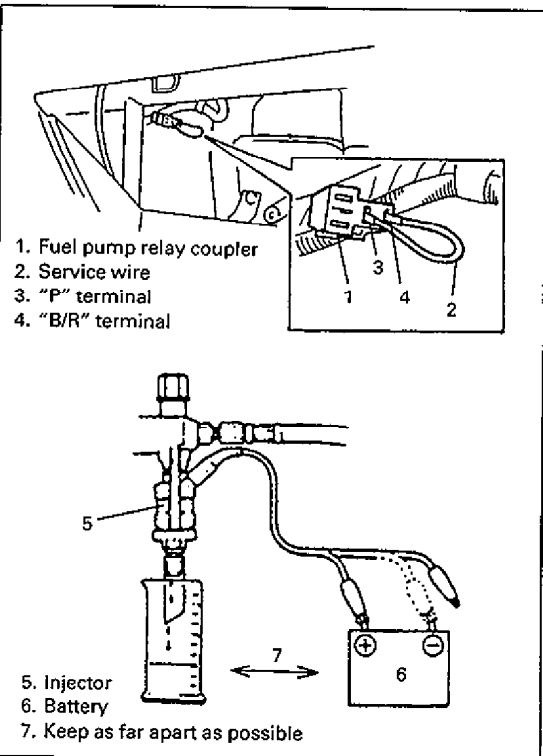
Special Tool

(B): 09912-58431

- 3) Connect special tool (test lead) to injector.

Special Tool

(C): 09930-88521

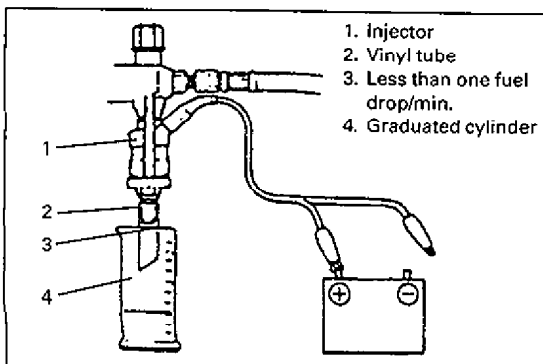


75F00-6E1-93-4

- 4) Install suitable vinyl tube onto injector nozzle to prevent fuel from splashing out when injecting.
- 5) Put graduated cylinder under injector as shown in figure.
- 6) Disconnect coupler from fuel pump relay.
- 7) To operate fuel pump and apply fuel pressure to injector, using wire harness as thick as the one used for fuel pump circuit, connect "Black/Red" and "Pink" wire harness terminals of fuel pump relay coupler.
- 8) Apply battery voltage to injector for 15 seconds and measure injected fuel volume with graduated cylinder. Test each injector two or three times. If not within specification, replace injector.

Injected fuel volume:

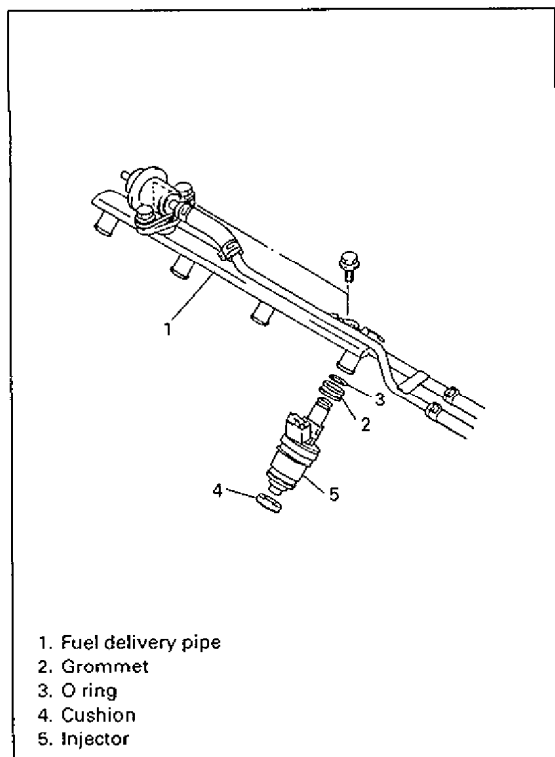
About 35.3 – 38.7 cc/15 sec. (1.19 – 1.31/1.24 – 1.36 US/Imp. oz/15 sec.)



75F00-6E1-93-5

- 9) Check fuel leakage from injector nozzle. Do not operate injector for this check (but fuel pump should be at work). If fuel leaks more than following specifications, replace.

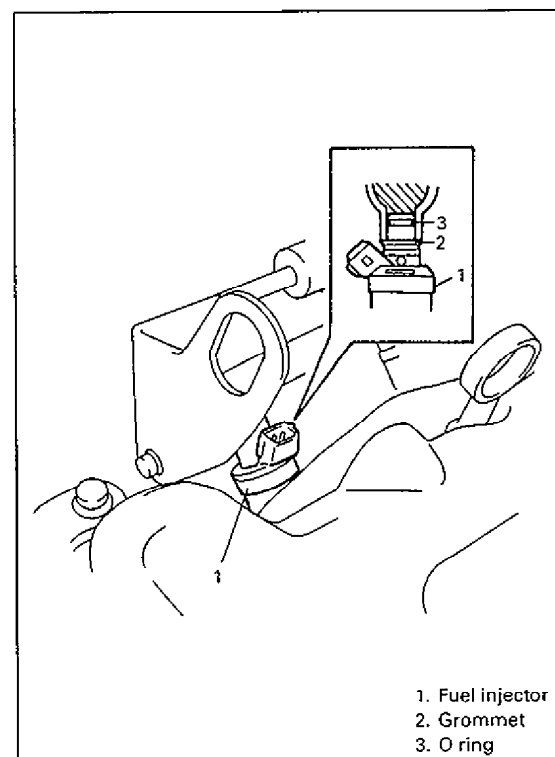
Fuel leakage: Less than 1 drop/min.



75F00-6E1-94-2

INSTALLATION

- 1) Replace injector O ring with new one using care not to damage it. Install grommet to injector.
- 2) Check if insulator is scored or damaged. If it is, replace with new one.
- 3) Install insulators and cushions to intake manifold.



75F00-6E1-94-4

- 4) Apply thin coat of fuel to O rings and then install injectors into delivery pipe and intake manifold. Make sure that injectors rotate smoothly. If not, probable cause is incorrect installation of O ring. Replace O ring with new one.
- 5) Tighten delivery pipe bolts and make sure that injectors rotate smoothly.
- 6) Connect couplers to injector securely and clamp injector wire.
- 7) With engine "OFF" and ignition switch "ON", check for fuel leaks around fuel line connection.

RADIATOR FAN CONTROL SYSTEM SYSTEM INSPECTION

WARNING:

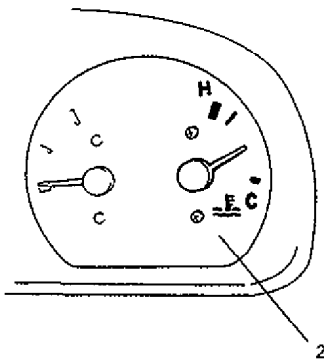
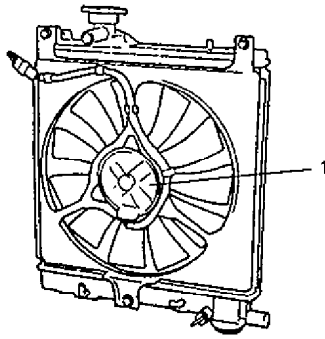
Keep hands, tools, and clothing away from engine cooling fan to help prevent personal injury. This fan is electric and can come on whether or not the engine is running. The fan can start automatically in response to the ECT sensor with the ignition switch in the "ON" position.

Start engine and keep it running to warm it up.

Now check to ensure that radiator fan is started when indicator of coolant temp. meter moves to as shown in figure.

If check result is not satisfactory, check radiator fan control relay, wire harness, ECT sensor, ECM, coolant temp. meter and sender gauge unit.

Refer to "Table B-8 Radiator Fan Control system Check" in p.6E1-64 and "Coolant Temp. Meter and Sender Gauge Inspection" in SECTION 8B.



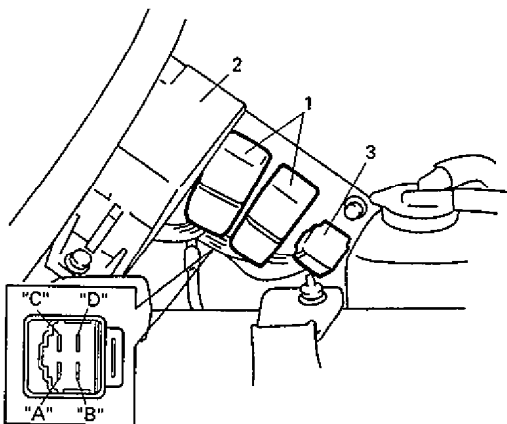
1. Radiator fan motor
2. Coolant temp. meter

75F00-6E1-95-3

RADIATOR FAN CONTROL RELAY INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Remove radiator fan control relay from its bracket after disconnecting its coupler.
- 3) Structure of radiator fan control relay is the same as that of main relay. (Refer to p.6E1-83.)

Check its resistance and operation using the same procedure as that for main relay. If found defective, replace.



1. Main relay (Relay connected "B/Y" wire) and radiator fan control relay (Relay connected "BI" wire)
2. Main fuse box
3. Monitor coupler

75F00-6E1-95-5

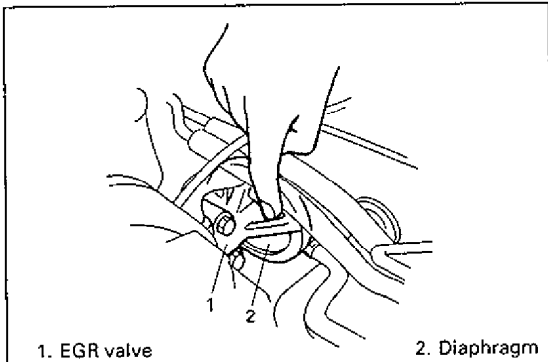
EGR SYSTEM

SYSTEM INSPECTION

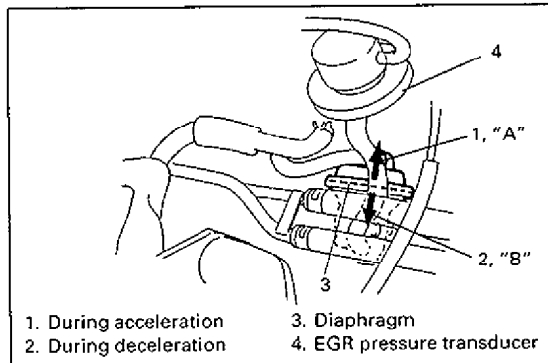
NOTE:

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.

75F00-6E1-96-1



75F00-6E1-96-2



75F00-6E1-96-3

- 1) When engine is cool (coolant temperature is below 40°C (104°F)), start engine and race it (higher than about 2000 rpm), and check that EGR valve diaphragm is not operating in this state.

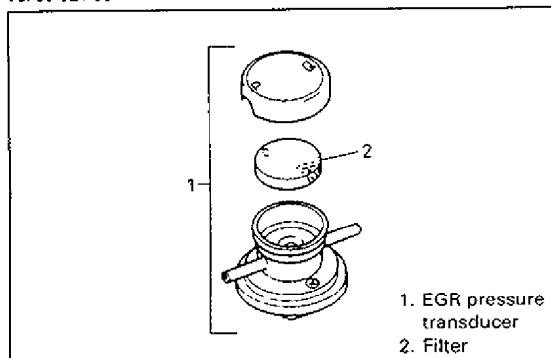
CAUTION:

If EGR valve is hot, it may be necessary to wear gloves to avoid burning fingers.

- 2) Warm up engine to normal operating temperature and race it after warming up. Then check to be sure that diaphragm moves toward "A" in left figure during acceleration and toward "B" during deceleration. If EGR valve fails to operate properly, check vacuum hoses, EGR valve, EGR pressure transducer and EGR solenoid vacuum valve.

- 3) Keep engine running at idle speed and open EGR valve by hand, and engine should either stop or reduce its speed. If neither occurs, EGR passage is clogged. Clean it.

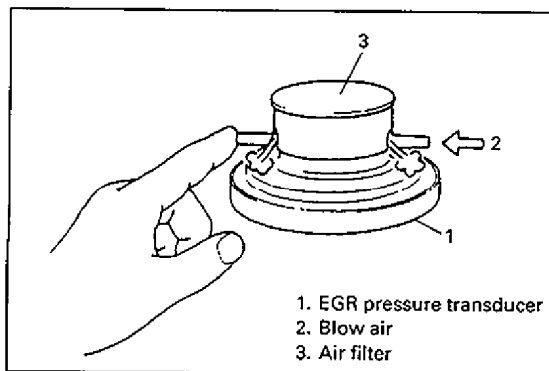
75F00-6E1-96-4



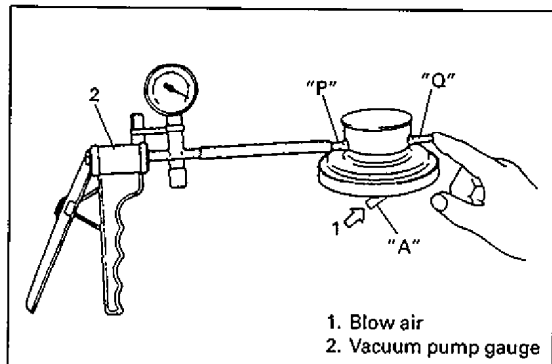
75F00-6E1-96-5

EGR PRESSURE TRANSDUCER INSPECTION

- 1) Check filter for contamination and damage. Using compressed air, clean filter.



75F00-6E1-97-1



75F00-6E1-97-2

- 2) Remove EGR pressure transducer and plug nozzle with finger. Blow air into another nozzle and check that air passes through to air filter side freely.

- 3) Connect vacuum pump gauge to nozzle "P" and plug nozzle "Q" with finger.

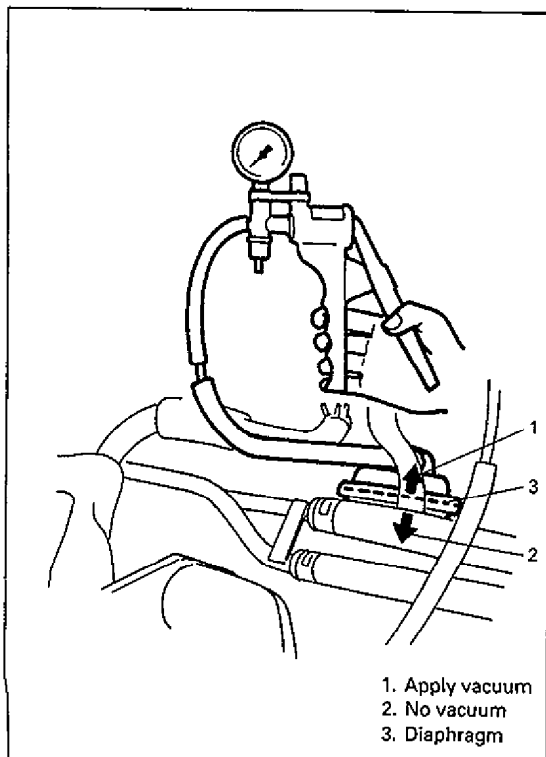
While blowing air into nozzle "A", operate vacuum pump gauge and check that vacuum is applied to pressure transducer.

Then stop blowing nozzle "A" and check that vacuum pump gauge indicates "0" (zero).

If check result is not satisfactory, replace EGR pressure transducer.

- 4) After checking, install EGR pressure transducer and connect hoses securely. Refer to emission control information label (if equipped) for connection.

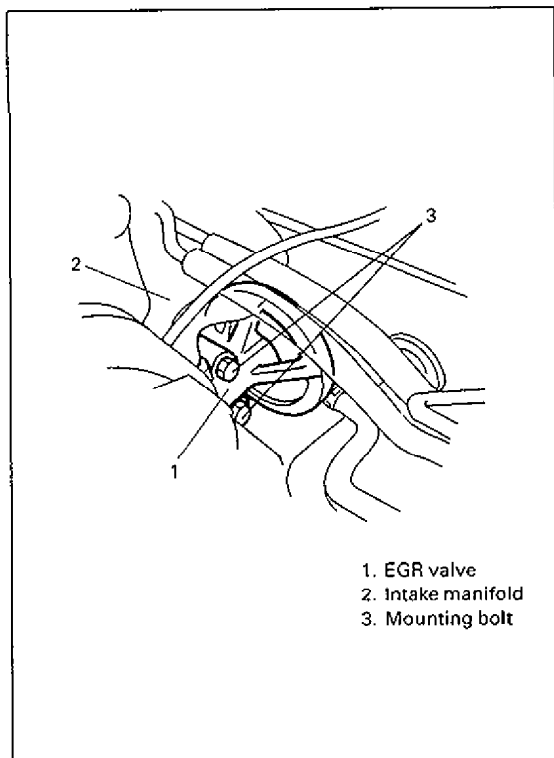
75F00-6E1-97-3



75F00-6E1-97-5

EGR VALVE INSPECTION

- 1) Disconnect vacuum hose from EGR pressure transducer.
- 2) Connect vacuum pump gauge to its hose.
- 3) Check that EGR valve diaphragm moves smoothly and that it is held at the same position when 15 cmHg vacuum is applied to EGR valve.
If diaphragm doesn't move smoothly, or it isn't held at the same position, replace EGR valve.
- 4) After checking, be sure to connect vacuum hose.



75F00-6E1-98-2

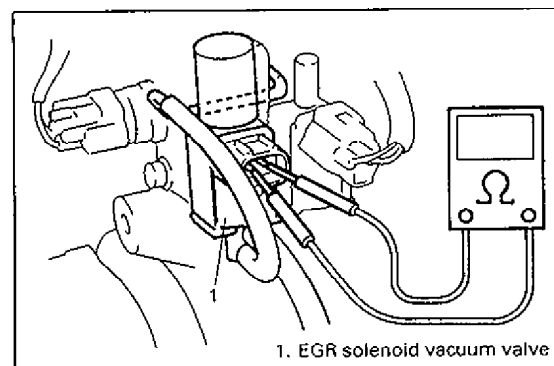
REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect vacuum hose from EGR valve.
- 3) Remove EGR valve and gasket from intake manifold.

INSTALLATION

Reverse removal procedure noting following.

- Clean mating surface of valve and intake manifold.
- Use new gasket.



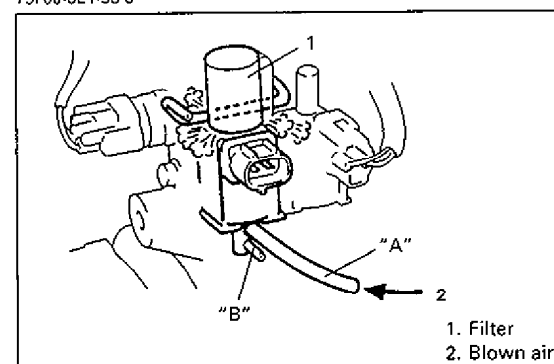
75F00-6E1-98-3

EGR SOLENOID VACUUM VALVE INSPECTION

- 1) With ignition switch OFF, disconnect coupler from EGR solenoid vacuum valve.
- 2) Check resistance between two terminals of solenoid vacuum valve.

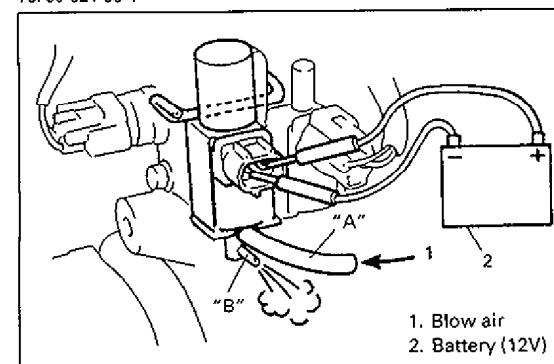
Resistance: 36 – 44 Ω at 20°C (68°F)

If resistance is as specified, proceed to next operation check, If not, replace.



75F00-6E1-98-4

- 3) Disconnect vacuum hoses from EGR pressure transducer and throttle body.
- 4) Blow into hose "A". Air should come out of filter and not out of nozzle "B".



75F00-6E1-98-5

- 5) Connect 12V-battery to EGR solenoid vacuum valve terminals. In this state, blow hose "A". Air should come out of nozzle "B" and not out of filter. If check result is not as described above, replace EGR solenoid vacuum valve.
- 6) Connect solenoid vacuum valve coupler securely.
- 7) Connect vacuum hoses securely.

EVAPORATIVE EMISSION CONTROL SYSTEM

SYSTEM INSPECTION

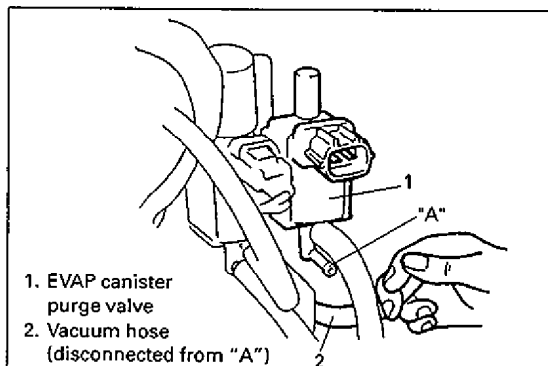
NOTE:

Before inspection, check to make sure that gear shift lever is in neutral position (with A/T model, selector lever in "P" range) and that parking brake lever is pulled all the way up.

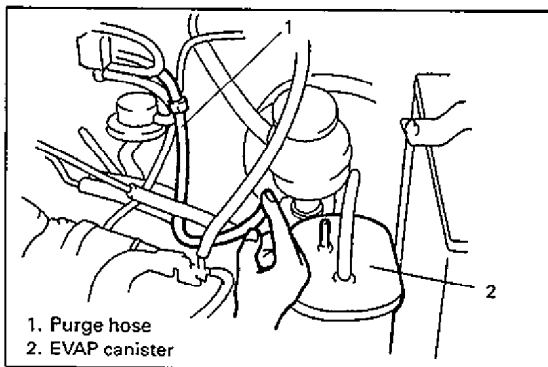
- 1) Warm up engine to normal operating temperature.
- 2) Disconnect vacuum hose from EVAP canister purge valve. With finger placed against hose disconnected, check that vacuum is applied when engine speed is running at idle speed. If it is not applied, check hoses for connection, leakage, clog and deterioration. Clean vacuum passage by blowing compressed air. Replace as necessary.
- 3) If it is applied, connect vacuum hose to EVAP canister purge valve.
- 4) Disconnect purge hose from EVAP canister.
- 5) Place finger against the end of disconnected hose and check that vacuum is not felt there when engine is running at idle speed.
- 6) Also check that vacuum is felt when engine speed is increased to higher than about 3200 r/min. (rpm).

If check result is not satisfactory, check vacuum passage, hoses, EVAP canister purge valve, wire harness and ECM. Refer to "Diagnostic Flow Table B-7" in p.6E1-63.

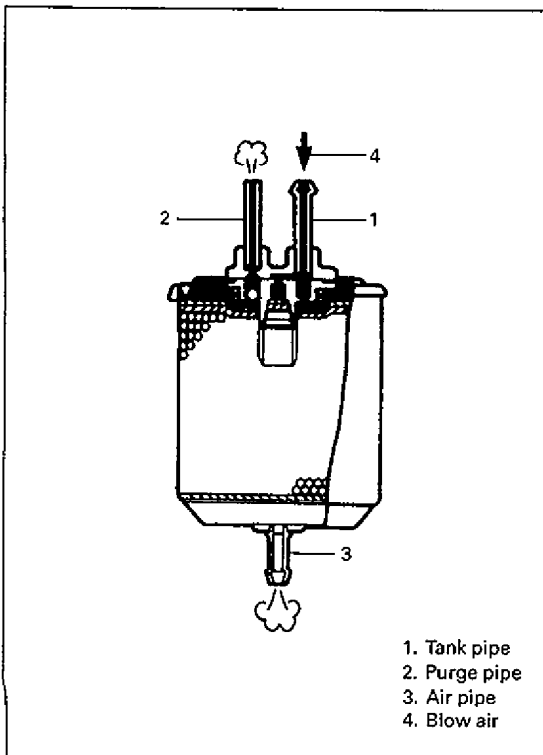
75F00-6E1-99-1



75F00-6E1-99-2



75F00-6E1-99-3



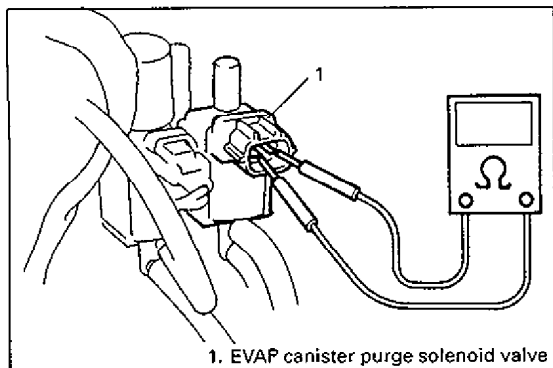
75F00-6E1-99-5

EVAP CANISTER INSPECTION

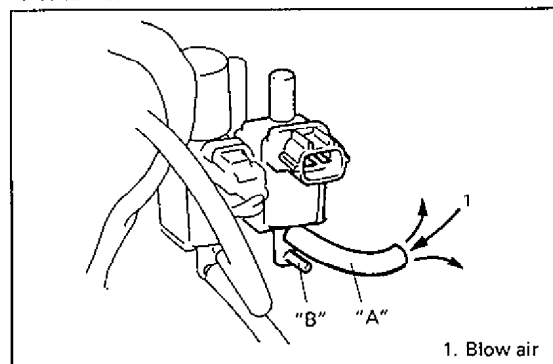
WARNING:

DO NOT SUCK nozzles on EVAP canister. Fuel vapor inside EVAP canister is harmful.

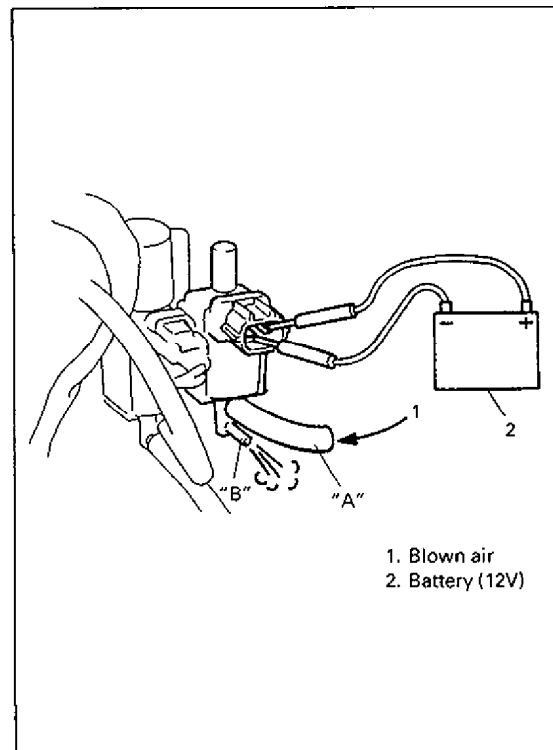
- 1) Disconnect vacuum hoses from EVAP canister.
- 2) When air is blown into tank pipe, there should be no restriction of flow through purge pipe and air pipe.
- 3) If operation differs from above description, EVAP canister must be replaced.
- 4) Connect hoses to EVAP canister.



75F00-6E1-100-1



75F00-6E1-100-2



75F00-6E1-100-4

EVAP CANISTER PURGE SOLENOID VALVE INSPECTION

- 1) With ignition switch OFF, disconnect coupler from EVAP canister purge solenoid valve.
- 2) Check resistance between two terminals of EVAP canister purge solenoid valve.

Resistance: 36 – 44 Ω at 20°C (68°F)

If resistance is as specified, proceed to next operation check. If not, replace.

- 3) Disconnect vacuum hoses from intake manifold and nozzle of EVAP canister purge solenoid valve.
- 4) With coupler disconnected, blow into hose "A". Air should not come out of nozzle "B".

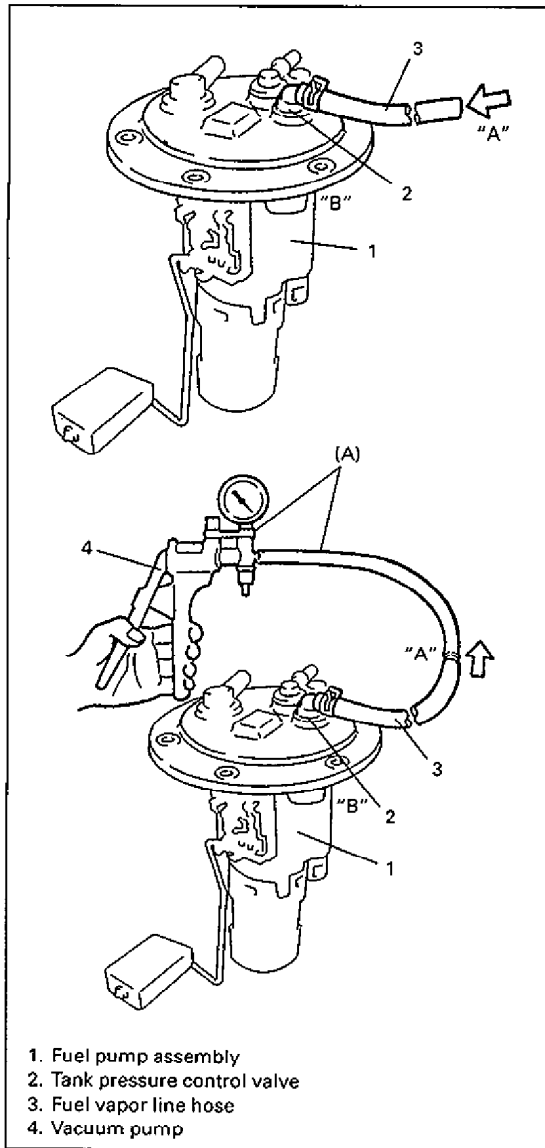
- 5) Connect 12V-battery to EVAP canister purge solenoid valve terminals. In this state, blow hose "A". Air should come out of nozzle "B".

WARNING:

Do not suck the air through valve. Fuel vapor inside valve is harmful.

If check result is not as described, replace EVAP canister purge solenoid valve.

- 6) Connect vacuum hoses.
- 7) Connect EVAP canister purge solenoid valve coupler securely.



75F00-6E1-101-3

TANK PRESSURE CONTROL VALVE INSPECTION

- 1) Remove fuel pump assembly installed on fuel tank, referring to SECTION 6C.
- 2) Air should pass through valve smoothly from fuel vapor line hose "A" to "B" when blown hard.
- 3) Also, when vacuum pump is connected to fuel vapor hose and load is applied gradually, air should pass from "B" to "A".

Special Tool

(A): 09917-47910

- 4) If air doesn't pass through valve in step 2) or hard blow is required in step 3), replace fuel pump assembly.

WARNING:

DO NOT SUCK air through fuel vapor line hose. Fuel vapor inside valve is harmful.

- 5) Install fuel pump assembly to fuel tank, referring to SECTION 6C.

PCV SYSTEM

NOTE:

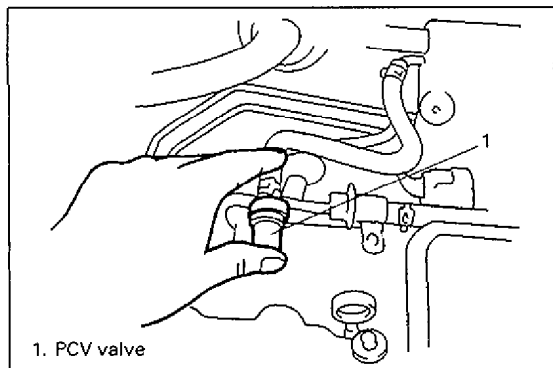
Be sure to check that there is no obstruction in PCV valve or its hoses before checking engine idle speed, for obstructed PCV valve or hose hampers its accurate inspection.

75F00-6E1-101-4

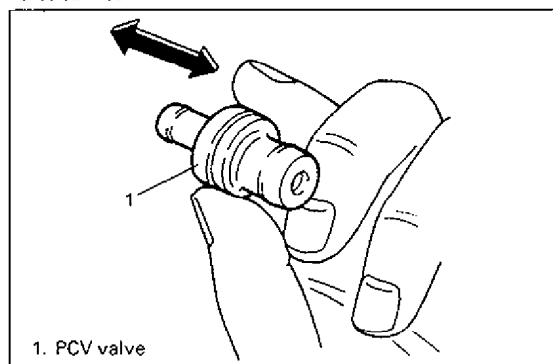
PCV HOSE INSPECTION

Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

75F00-6E1-101-5



75F00-6E1-102-1



75F00-6E1-102-2

PCV VALVE INSPECTION

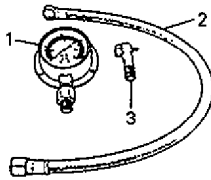
- 1) Disconnect PCV valve from cylinder head cover and install plug to head cover hole.
- 2) Run engine at idle.
- 3) Place your finger over end of PCV valve to check for vacuum.
If there is no vacuum, check for clogged valve. Replace as necessary.
- 4) After checking vacuum, stop engine and remove PCV valve. Shake valve and listen for the rattle of check needle inside the valve.
If valve does not rattle, replace valve.
- 5) After checking, remove plug and install PCV valve.

TIGHTENING TORQUE SPECIFICATIONS

Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
TP sensor	2.5	0.25	1.8
IAC valve	2.5	0.25	1.8
Heated oxygen sensor	50	5.0	36.5
Fuel pressure regulator	10	1.0	7.5
Fuel pump assembly	10	1.0	7.5
ECT sensor	15	1.5	11.0
IAT sensor	15	1.5	11.0
Knock sensor	23	2.3	17.0
VSS	10	1.0	7.5

75F00-6E1-102-4

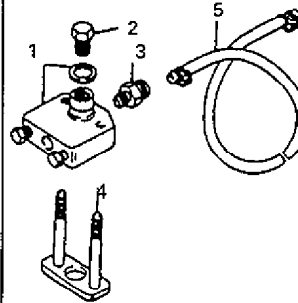
SPECIAL TOOLS



09912-58412

Fuel pressure gauge set

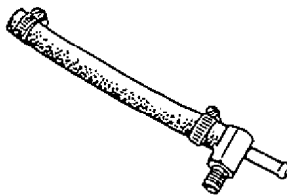
1. 09912-58441 Pressure gauge
2. 09912-58431 Pressure hose
3. 09912-58450 Attachment



09912-58421

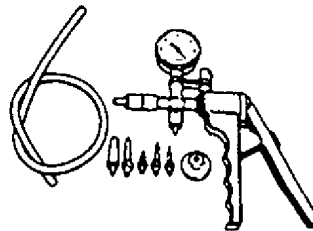
Injector checking tool set

1. Tool body & washer
2. Body plug
3. Body attachment
4. Holder
5. Return hose & clamp
6. Body attachment -2 & washer
7. Hose attachment -1
8. Hose attachment -2



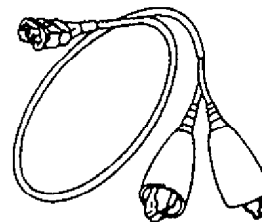
09912-58490

3 way joint and hose



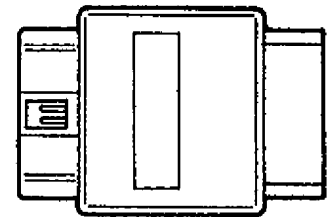
09917-47910

Vacuum pump gauge



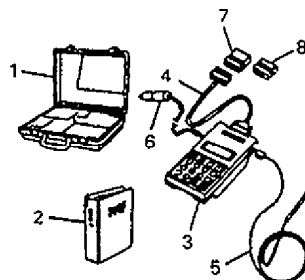
09930-88521

Injector test lead



09931-96020

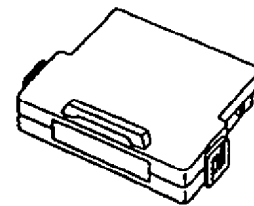
16/12 pin DLC adapter



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 (including ECM 2.0 or later)

SECTION 6F1

IGNITION SYSTEM

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

6F1

CONTENTS

GENERAL DESCRIPTION	6F1- 2	Power Unit (Igniter)	6F1- 7
DIAGNOSIS	6F1- 4	Ignition Coil	6F1- 8
ON-VEHICLE SERVICE	6F1- 5	Distributor	6F1- 8
Ignition Spark Test	6F1- 5	Ignition Timing	6F1- 9
High-Tension Cords	6F1- 5	DISTRIBUTOR UNIT	6F1-11
Spark Plugs	6F1- 6	SPECIAL TOOLS	6F1-13
Noise Suppressor	6F1- 7		

GENERAL DESCRIPTION

The ignition system used for this vehicle has an electronic ignition control system and consist of the following parts.

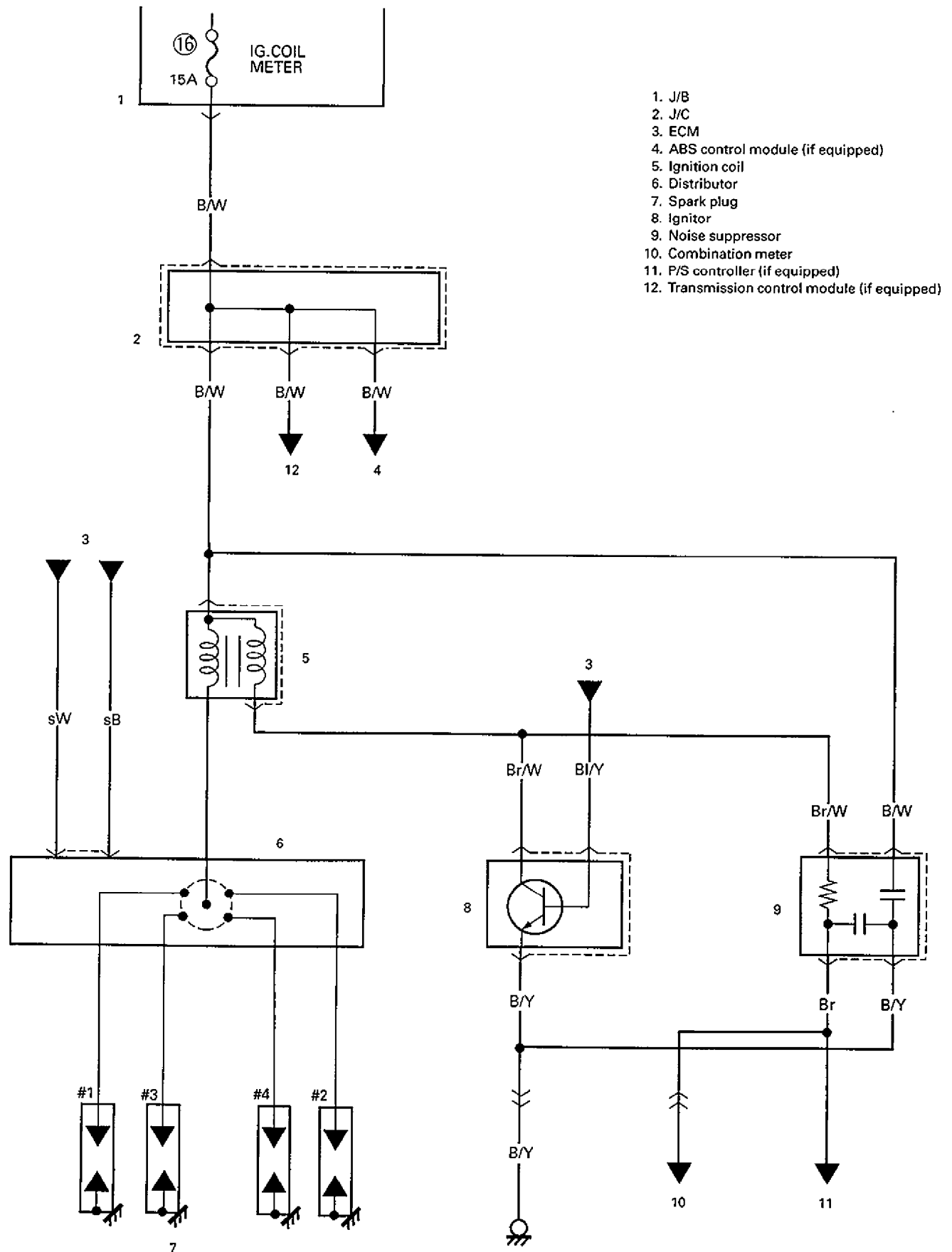
- ECM
It detects the engine condition through the signals from the sensors, determines the most suitable ignition timing and time for electricity to flow to the primary coil and sends a signal to the power unit.
- Power unit (Igniter)
It turns ON and OFF the primary current of the ignition coil according to the signal from ECM.
- Ignition coil
When the ignition coil primary current is turned OFF, a high voltage is induced in the secondary winding.
- Distributor
It distributes a high voltage current to each plug.

- High-tension cords and spark plugs.
- CMP sensor (Camshaft position Sensor)
Located in the distributor, it converts the crank angle into voltage variation and sends it to ECM. For its details, refer to Section 6E1.
- TP sensor, ECT sensor and MAP sensor
For their details, refer to Section 6E1.

In electronic ignition control system, the ECM is programmed for the best ignition timing under every engine condition. Receiving signals which indicate the engine condition from the sensors, e.g., engine revolution, intake air pressure, coolant temperature, etc., it selects the most suitable ignition timing from its memory and operates the power unit.

Thus ignition timing is controlled to yield the best engine performance.

For more information, refer to Section 6E1.

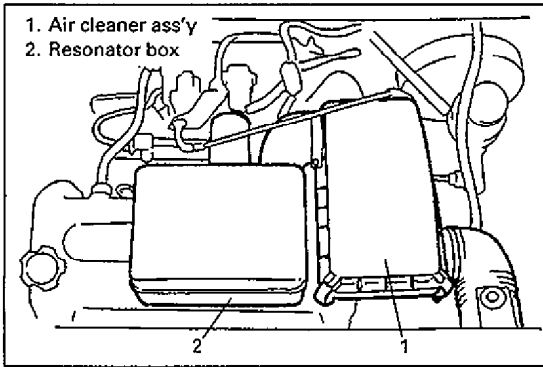


DIAGNOSIS

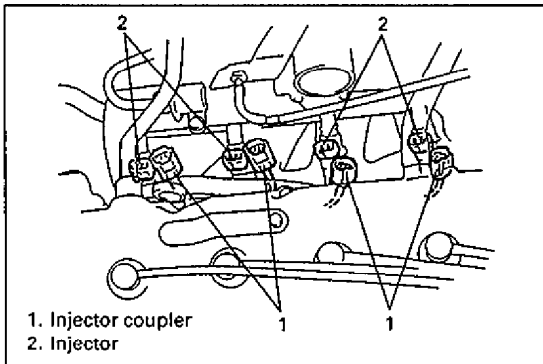
Condition	Possible Cause	Correction
Engine cranks, but will not start or hard to start	No spark • Blown fuse for ignition coil • Loose connection or disconnection of lead wire or high-tension cord(s) • Faulty high-tension cord(s) • Faulty spark plug(s) • Cracked rotor or cap • Maladjusted signal rotor air gap • Faulty ignition coil • Faulty noise suppressor • Faulty CMP sensor • Faulty igniter • Faulty ECM	Replace Connect securely Replace Adjust, clean or replace Replace Adjust Replace Replace Replace Replace Replace
	Maladjusted ignition timing	Adjust
Poor fuel economy or engine performance	• Incorrect ignition timing • Faulty spark plug(s) or high-tension cord(s) • Faulty ECM	Adjust Adjust, clean or replace Replace

DIAGNOSTIC FLOW TABLE (When engine cranks but does not start)

STEP	ACTION	YES	NO
1	Check ignition spark. Is it OK?	Go to Section 6 DIAGNOSIS.	Go to Step 2.
2	Check following system parts. • Fuses • High-tension cords • Spark plugs • Noise suppressor • Distributor (distributor cap) • Ignition coil • Signal rotor air gap • CMP sensor (pick-up coil) Are they OK?	Go to Step 3.	Adjust, repair or replace the malfunction part(s).
3	Check electric wire and connections. Are they OK?	Go to Step 4.	Repair or replace.
4	Substitute a known-good igniter and recheck ignition spark. Is it OK?	Faulty igniter. Replace faulty igniter.	Substitute a known-good ECM and restart the flow table.



75F00-6F1-5-1



75F00-6F1-5-2

ON-VEHICLE SERVICE

IGNITION SPARK TEST

- 1) Remove air cleaner assembly and resonator box.
- 2) Remove cylinder head upper cover.

- 3) Disconnect all injector couplers from injectors.

WARNING:

Without disconnection of injector coupler, combustible gas may come out from spark plug holes during this test and may get ignited in engine room.

- 4) Disconnect all high-tension cords from spark plugs.

NOTE:

Always grip high-tension cord cap when disconnecting high-tension cords.

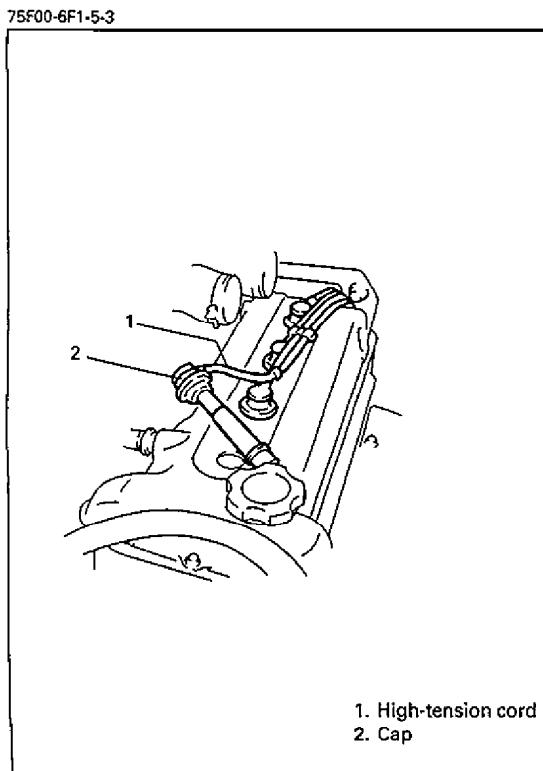
- 5) Remove spark plugs and connect them to high-tension cords, and then ground spark plugs.
- 6) Crank engine and check if each spark plug sparks.
- 7) If no spark is emitted, inspect high-tension cords, spark plugs, ignition coil, distributor, igniter and other related parts.

HIGH-TENSION CORDS

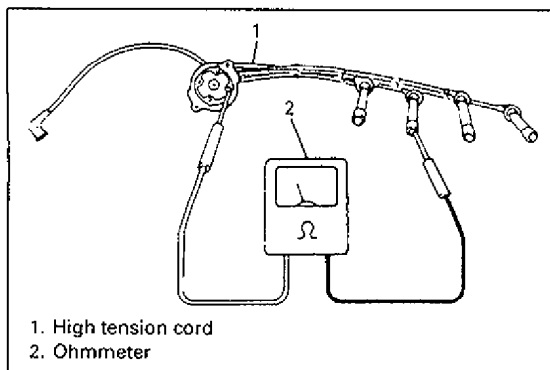
- 1) Remove air cleaner assembly and resonator box.
- 2) Remove cylinder head upper cover.
- 3) Remove high-tension cord at ignition coil while gripping its cap.
- 4) Remove distributor cap installed with high-tension cords.
- 5) Remove high-tension cord clamp from cylinder head cover.
- 6) Pull out high-tension cords from spark plugs while gripping each cap.

CAUTION:

- Removal of high-tension cords together with clamps will be recommended so as not to damage their inside wire (resistive conductor).
- For the same reason, pull out each connection by gripping cap portion.



75F00-6F1-5-5



75F00-6F1-6-1

- 6) Measure resistance of high-tension cord by using ohmmeter.

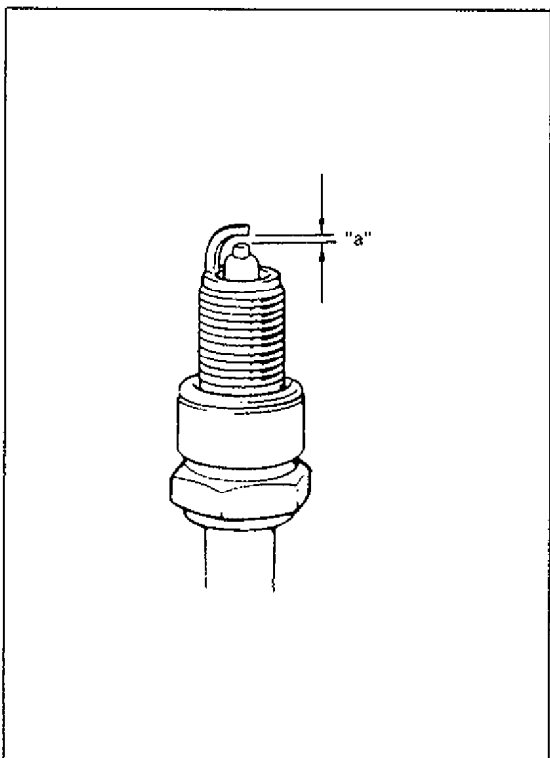
High-tension cord resistance: 4 – 10 kΩ/m (1.2 – 3.0 kΩ/ft)

- 7) If resistance exceeds specification, inspect distributor terminal and replace high-tension cord(s) and /or distributor cap as required.

CAUTION:

- Never attempt to use metal conductor high-tension cords as replacing parts.
- Insert each cap portion fully when installing high-tension cords.

75F00-6F1-6-2



75F00-6F1-6-4

SPARK PLUGS

- 1) Pull out high-tension cords by gripping their caps and then remove spark plugs.
- 2) Inspect them for:
 - Electrode wear
 - Carbon deposits
 - Insulator damage
- 3) If any abnormality is found, adjust air gap, clean with spark plug cleaner or replace them with specified new plugs.

Spark plug air gap "a": 0.8 – 0.9 mm (0.031 – 0.035 in.)

Spark plug type: NGK DCPR7E

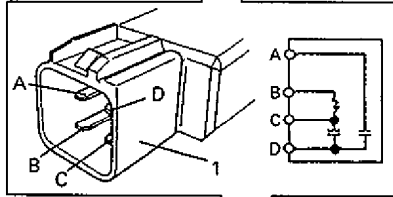
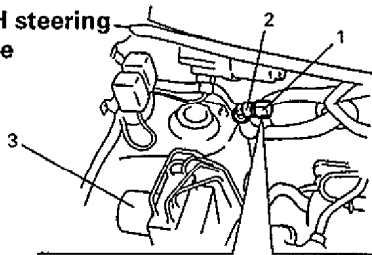
- 4) Install spark plugs and torque them to specification.

Tightening Torque for spark plug

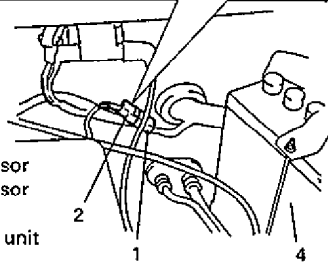
15 N·m (1.5 kg-m, 10.5 lb-ft)

- 5) Install high-tension cords securely by gripping their caps.

For LH steering vehicle



For RH steering vehicle



1. Noise suppressor
2. Noise suppressor coupler
3. ABS hydraulic unit (if equipped)
4. Battery

75F00-6F1-7-2

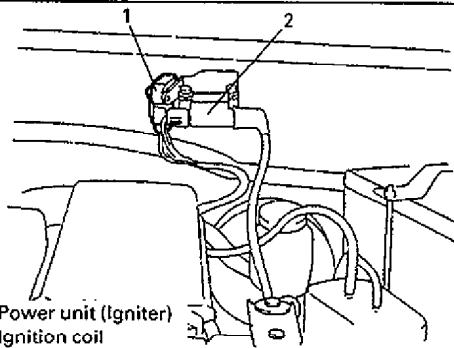
NOISE SUPPRESSOR

- 1) Disconnect coupler of noise suppressor.
- 2) Using ohmmeter, check to be sure that condensers are not conductive and resistor has resistance of about 2.2 kΩ.
- 3) If check result is not satisfactory, replace noise suppressor.

POWER UNIT (IGNITER)

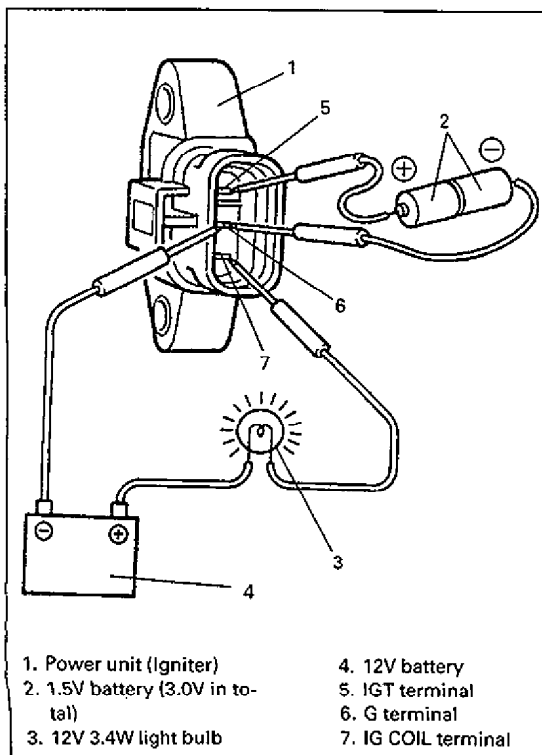
Before this inspection, prepare two new 1.5V batteries, one 12V 3.4W light bulb and one 12V battery (fully charged).

- 1) Remove ignition coil/power unit assembly from vehicle.
- 2) Remove power unit from bracket.



1. Power unit (Igniter)
2. Ignition coil

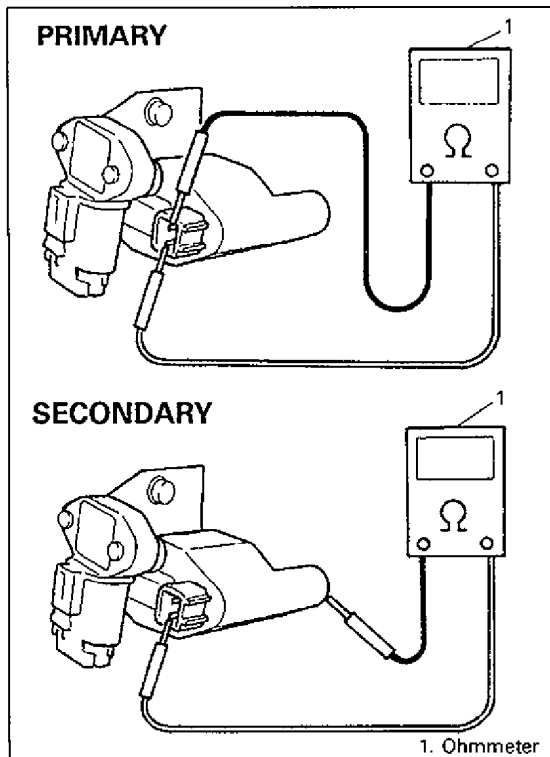
75F00-6F1-7-3



1. Power unit (Igniter)
2. 1.5V battery (3.0V in total)
3. 12V 3.4W light bulb
4. 12V battery
5. IGT terminal
6. G terminal
7. IG COIL terminal

75F00-6F1-7-5

- 3) Arrange 2 new 1.5V batteries in series (check that total voltage is about 3.0V).
- 4) Connect light bulb between "IG COIL" terminal of power unit and battery positive (+) terminal, then connect battery negative (-) terminal to "G" terminal.
Check that the light bulb DOES NOT illuminate.
- 5) Connect positive (+) side of "two 1.5V batteries in series" to "IGT" terminal and negative (-) side to "G" terminal of power unit.
Check that the light bulb DOES illuminate.
- If inspection result is not satisfactory, replace power unit.
- 6) Install power unit.



75F00-6F1-8-2

IGNITION COIL

- 1) Pull out high-tension cord by gripping its cap.
- 2) Disconnect ignition coil coupler.
- 3) Measure primary and secondary coil resistances.

Ignition coil resistance (at 20°C, 68°F)

Primary : 0.81 – 1.00 Ω

Secondary: about 27 k Ω

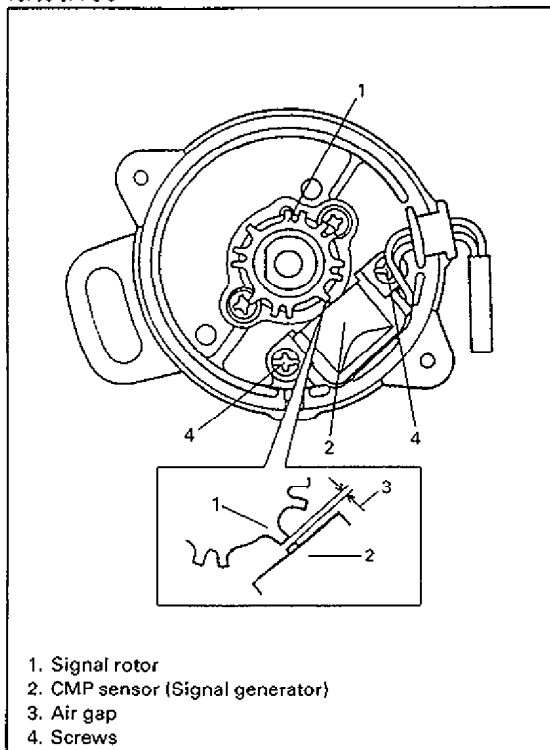
- 4) If resistance is out of specification, replace coil with new one.

DISTRIBUTOR

Distributor Cap and Rotor

Check cap and rotor for crack and their terminals for corrosion and wear. Replace as necessary.

75F00-6F1-8-3



1. Signal rotor
2. CMP sensor (Signal generator)
3. Air gap
4. Screws

75F00-6F1-8-5

Signal Rotor Air Gap

- 1) Remove distributor cap and rotor.
- 2) Using thickness gauge, measure air gap, between signal rotor tooth and CMP sensor (generator).

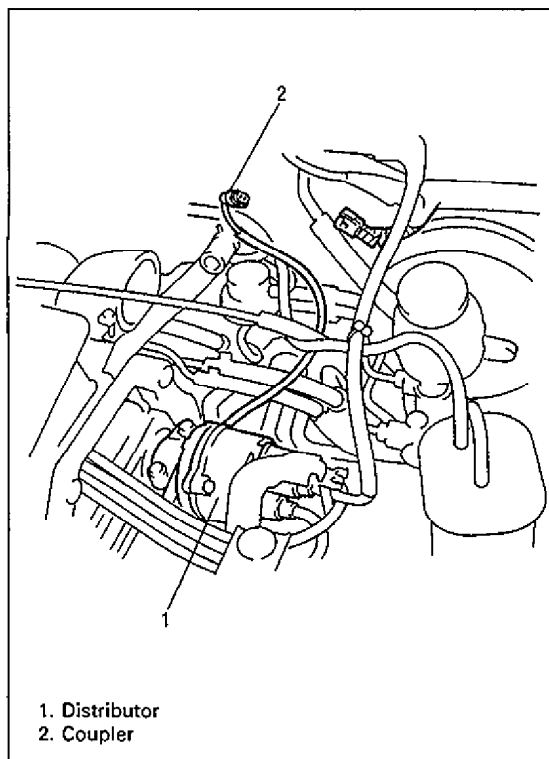
Signal rotor air gap "a": 0.2 – 0.4 mm (0.008 – 0.016 in.)

- 3) If gap is out of specification, loosen CMP sensor (signal generator) securing screws. Using blade (–) screw driver, move CMP sensor (signal generator) and adjust gap to specification. After adjustment, tighten securing screws and recheck gap.

NOTE:

Check that CMP sensor (signal generator) tooth is free from any metal particles.

- 4) Install distributor cap and rotor.



75F00-6F1-9-2

CMP Sensor (Pickup Coil) Resistance

- 1) Disconnect distributor lead wire coupler.
- 2) Measure resistance of pickup coil by using ohmmeter.

Pickup coil resistance: 661.5 – 808.5 Ω
(at 20°C/68°F)

- 3) If resistance is out of specification, replace CMP sensor (signal generator) as follows.
- 4) Remove distributor cap and rotor.
- 5) Remove CMP sensor (signal generator) securing screws.
- 6) Replace CMP sensor (signal generator).
- 7) Adjust signal rotor air gap to specifications as previously outlined.
- 8) Install rotor, distributor cap seal and cap.

IGNITION TIMING

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.

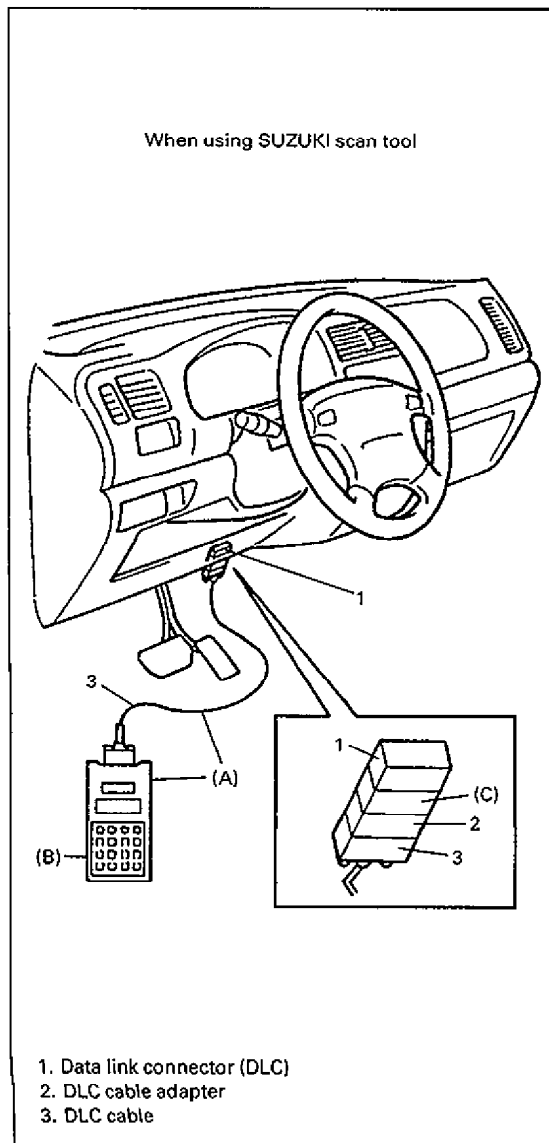
INSPECTION AND ADJUSTMENT

- 1) When using SUZUKI scan tool, connect SUZUKI scan tool to DLC with ignition switch OFF.

Special Tool (when using SUZUKI scan tool)

- (A): 09931-76011 Tech 1 (scan tool)
(B): Mass storage cartridge (with ECM 2.0 or later)
(C): 09931-96020 16/12 pin DLC adapter

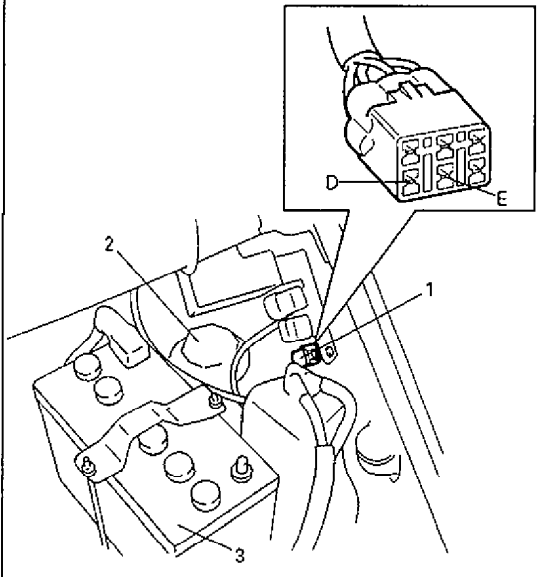
- 2) Start engine and warm it up to normal operating temperature.
- 3) Make sure that all of electrical loads except ignition are switched off.
- 4) Check to be sure that idle speed is within specification.
(Refer to SECTION 6E1)



75F00-6F1-9-5

When not using SUZUKI scan tool

1. Monitor coupler
2. Left front strut
3. Battery
- D: Ground terminal
- E: Test switch terminal



75F00-6F1-10-2

- 5) Set timing light to No. 1 high-tension cord.
- 6) Fix ignition timing to initial one as follows:

When using SUZUKI scan tool:

- a) Select "MISC" mode on SUZUKI scan tool and fix ignition timing to initial one.

When not using SUZUKI scan tool:

- a) Disconnect scan tool from DLC if connected and connect D and E terminals of monitor coupler by using service wire so that ignition timing is fixed on initial one.

- 7) Using timing light, check that timing is within specification.

Initial ignition timing (Test switch terminal grounded):

5 ± 1° BTDC (at idle speed)

Ignition order 1-3-4-2

Special Tool

(D): 09900-27301 or 09930-76420

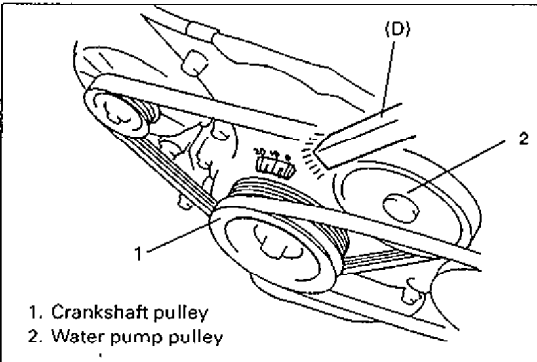
- 8) If ignition timing is out of specification, remove air cleaner assembly then loosen flange bolts, adjust timing by turning distributor assembly while engine is running, and then tighten bolts.

Tightening Torque

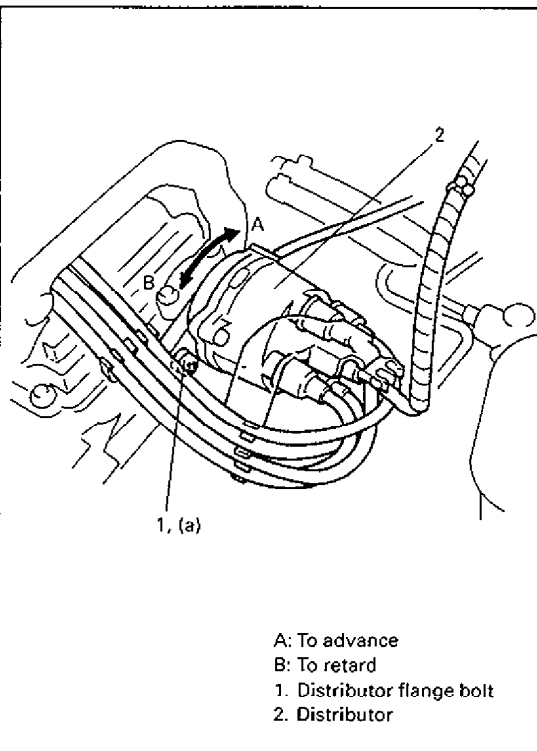
(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

- 9) After tightening distributor flange bolts, recheck that ignition timing is within specification.
- 10) After checking and /or adjusting initial ignition timing, release ignition timing fixation by SUZUKI scan tool or disconnect service wire from monitor coupler.
- 11) With engine idling (test switch terminal ungrounded, vehicle stopped), check that ignition timing is about 10° BTDC (Constant variation within a few degrees from 10° indicates no abnormality but proves operation of electronic timing control system). Also, check that increasing engine speed advances ignition timing.

If above check results are not satisfactory, check CTP switch, test switch terminal circuit and ECM.



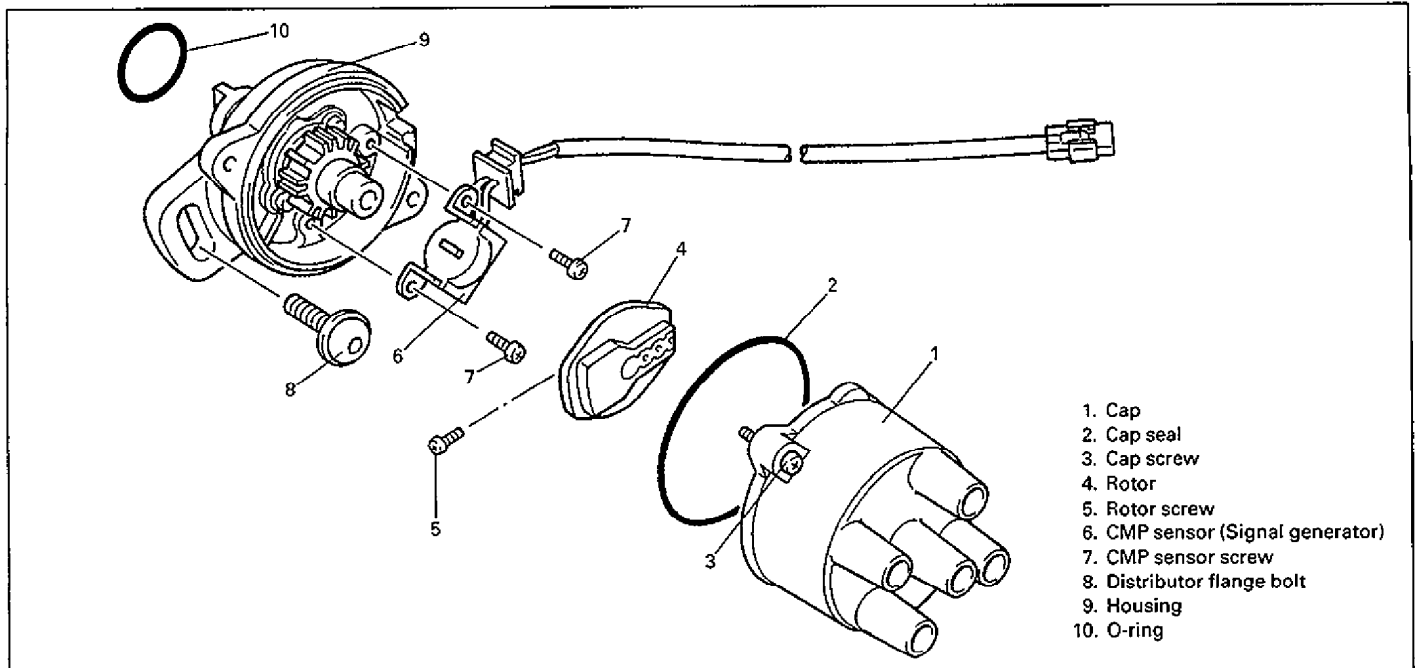
75F00-6F1-10-3



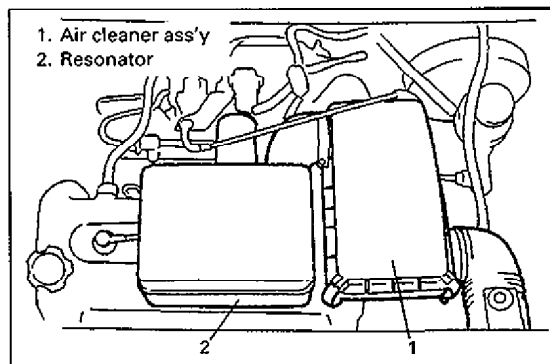
- A: To advance
B: To retard
1. Distributor flange bolt
2. Distributor

75F00-6F1-10-5

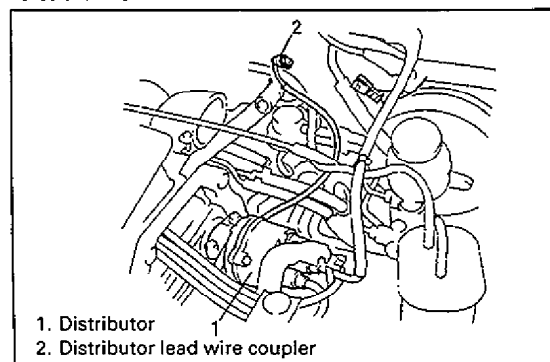
DISTRIBUTOR UNIT



75F00-6F1-11-2



75F00-6F1-11-3



75F00-6F1-11-4

DISMOUNTING

1) Remove air cleaner assembly.

2) Disconnect distributor lead wire coupler.

3) Disconnect high tension cords from distributor cap.

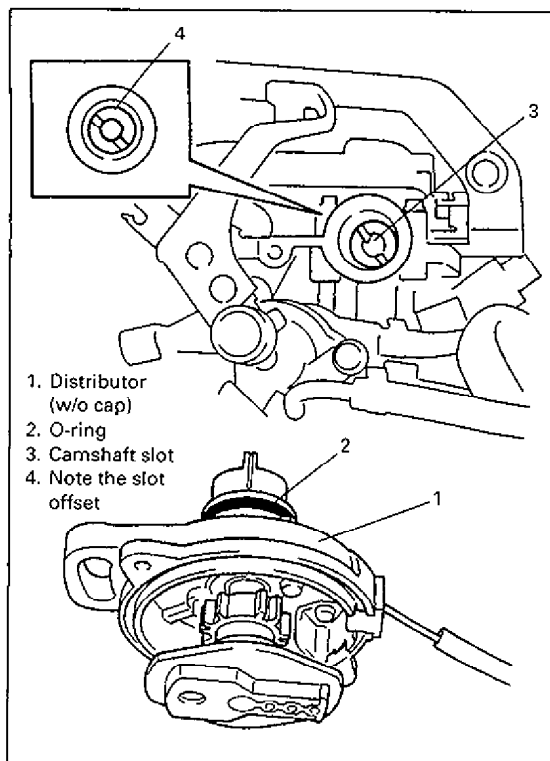
NOTE:

Always grip the cap of high tension cord when disconnecting it.

4) Remove distributor cap screws and cap.

5) Remove distributor flange bolts.

6) Pull out distributor housing assembly.



75F00-6F1-12-2

REMOUNTING

NOTE:

- Before installing distributor, check to make sure that its O-ring is in good condition.
- If new O-ring is to be installed, apply oil.

- 1) Install distributor without cap to camshaft.
Fit the dogs of distributor coupling into the slots of camshaft, when installing. The dogs of distributor coupling are offset. Therefore, if the dogs can not be fitted into the slots, turn distributor shaft by 180° and try again.

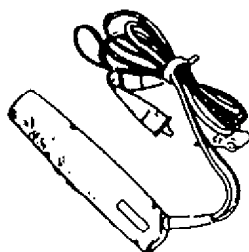
- 2) Lightly install flange bolts and prepare for ignition timing adjustment.
- 3) Check to make sure that rotor is in good condition.
- 4) Inspect distributor cap and clean or replace as required.
- 5) Make sure that distributor cap seal is placed properly and install cap, and then fasten it with screws.
- 6) Connect distributor lead coupler.
- 7) Check and adjust ignition timing as previously outlined.

75F00-6F1-12-3

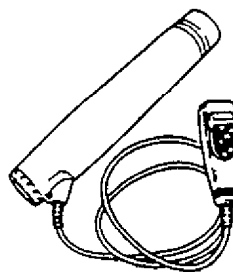
SPECIAL TOOLS



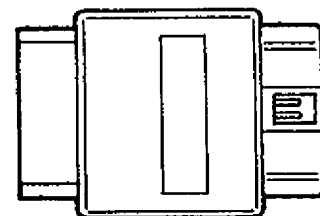
09900-25002
Pocket tester



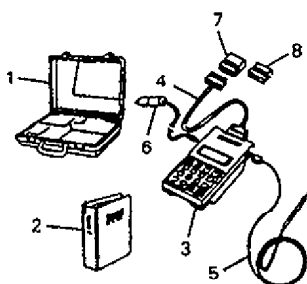
09900-27301
Timing light (DC 12V)



09930-76420
Timing light (Dry cell type)

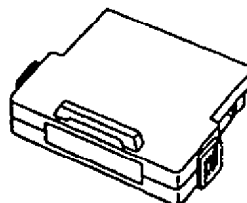


09931-96020
16/12 pin DLC adapter



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
(with ECM 2.0 or later)

SECTION 6G

CRANKING SYSTEM

(0.85 kW Conventional Type)

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

6G

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GENERAL DESCRIPTION

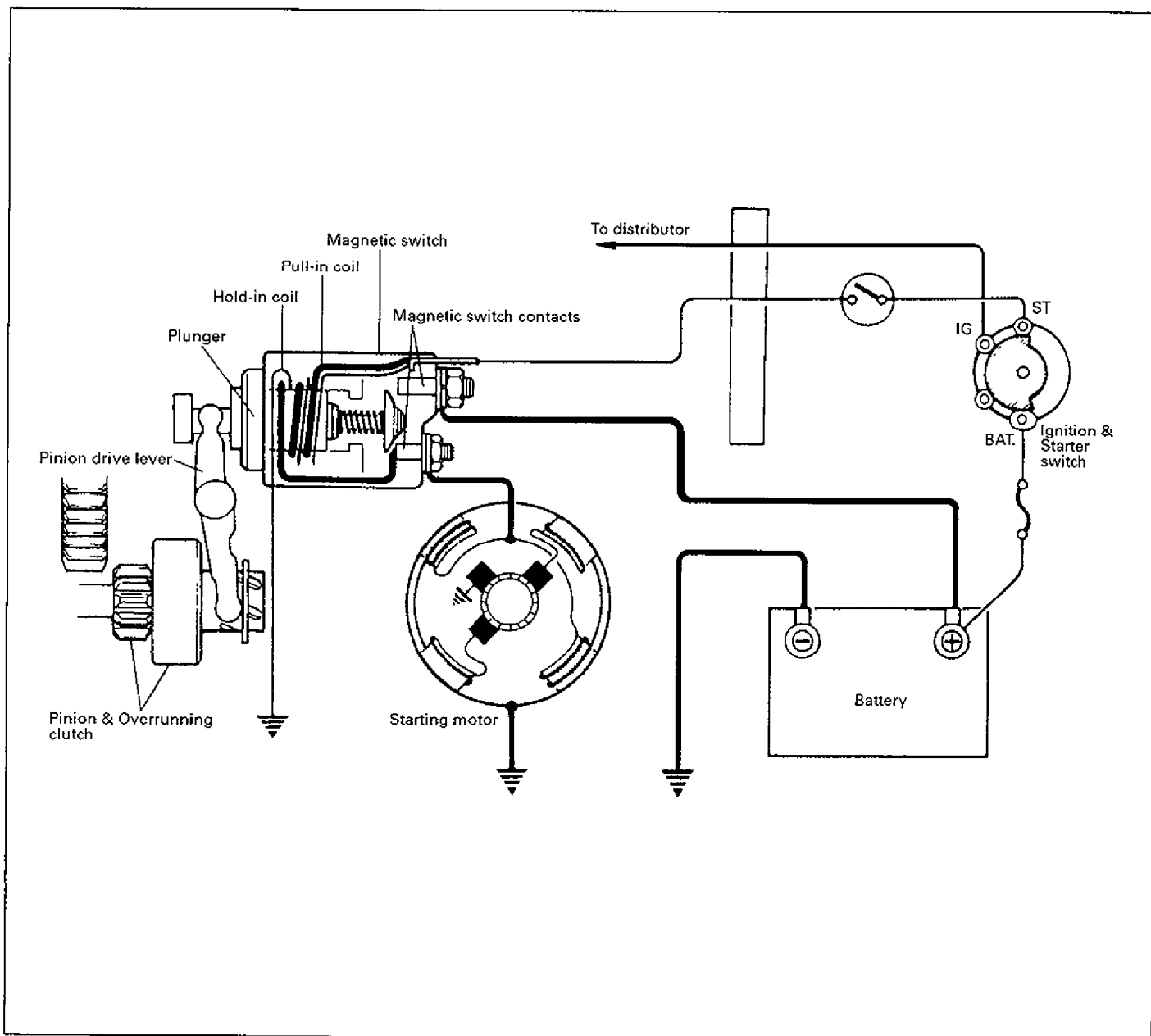
CRANKING CIRCUIT

The cranking circuit consists of the battery, starting motor, ignition switch, and related electrical wiring. These components are connected electrically as shown in figure below. Only the starting motor will be covered in this section.

STARTING MOTOR CIRCUIT

In the circuit shown in figure below, the magnetic switch coils are magnetized when the ignition switch is closed. The resulting plunger and pinion drive lever movement causes the pinion to engage the engine fly-wheel gear and the magnetic switch main contacts to close, and cranking takes place.

When the engine starts, the pinion overrunning clutch protects the armature from excessive speed until the switch is opened, at which time the return spring causes the pinion to disengage.



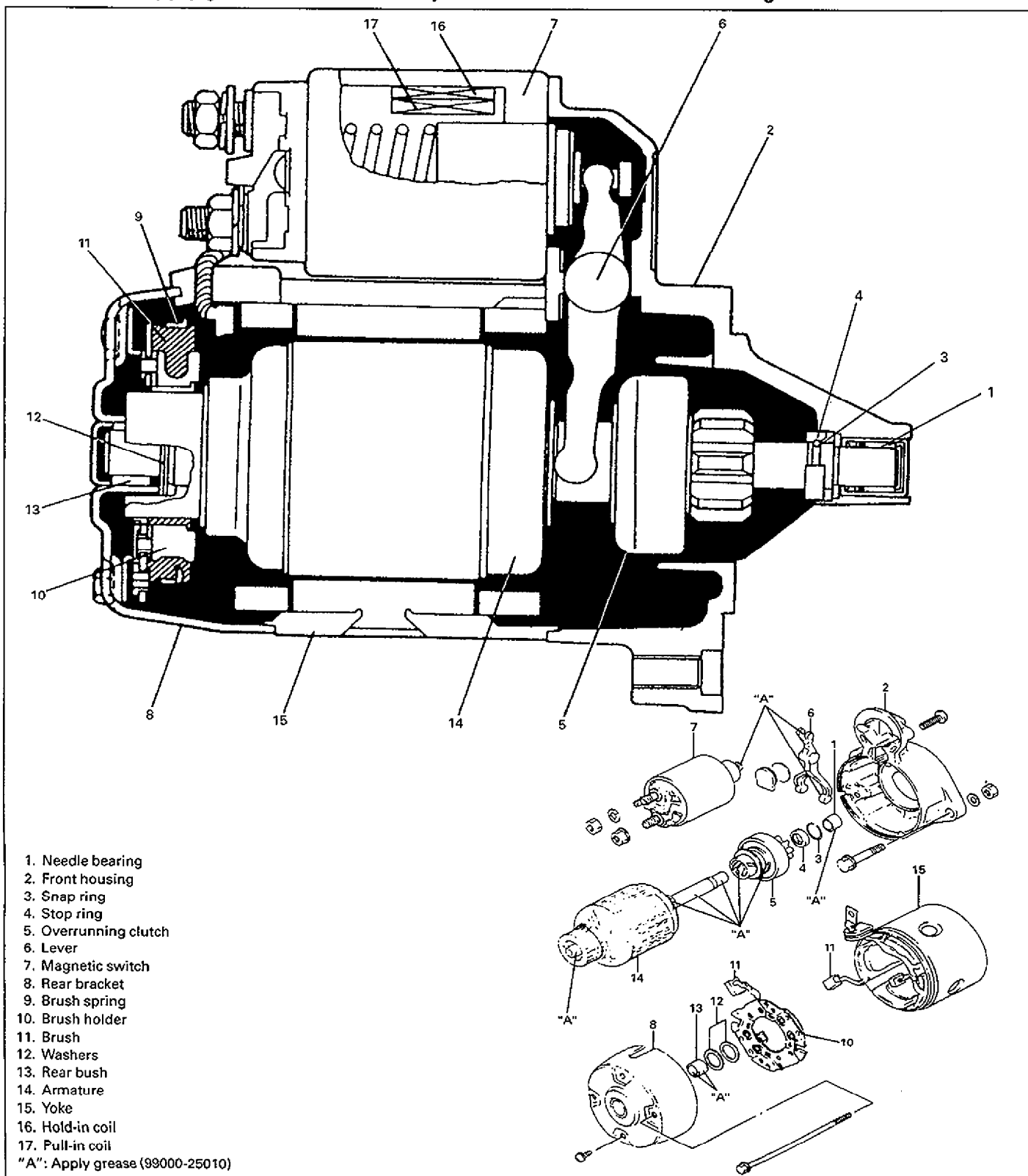
STARTING MOTOR

The starting motor consists of yoke assembly, armature assembly, overrunning clutch assembly, magnetic switch assembly, drive end frame (housing), rear end frame (commutator end housing), brush holder and drive lever.

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

NOTE:

Make sure to apply grease before assembly where so indicated "A" in the figure below.



DIAGNOSIS

Possible symptoms due to starting system trouble would be as follows.

- Starting motor does not run (or runs slowly)
- Starting motor runs but fails to crank engine
- Abnormal noise is heard

Proper diagnosis must be made to determine exactly where the cause of each trouble lies in battery, wiring harness, (including ignition and starter switch), starting motor or engine.

Do not remove motor just because starting motor does not run. Check following items and narrow down scope of possible causes.

- Condition of trouble
- Tightness of battery terminals (including ground cable connection on engine side) and starting motor terminals
- Discharge of battery
- Mounting of starting motor

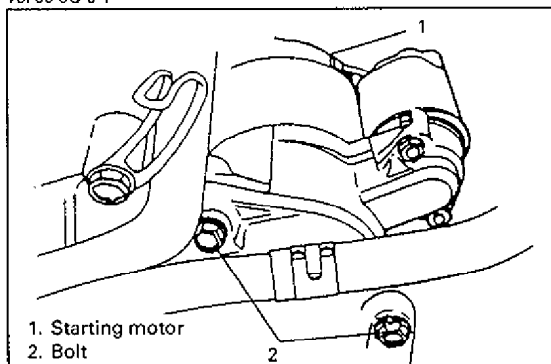
Condition	Possible Cause	Correction
Motor not running	No operating sound of magnetic switch • Shift lever switch is not P or N, or not adjusted (A/T) • Battery run down • Battery voltage too low due to battery deterioration • Poor contact in battery terminal connection • Loose grounding cable connection • Fuse set loose or blown off • Poor contacting action of ignition switch • Lead wire coupler loose in place • Open-circuit between ignition switch and magnetic switch • Open-circuit in pull-in coil • Brushes are seating poorly or worn down • Poor sliding of plunger	Shift in P or N, or adjust switch. Recharge battery. Replace battery. Retighten or replace. Retighten. Tighten or replace. Replace. Retighten. Repair. Replace magnetic switch. Repair or replace. Replace.
Motor not running	Operating sound of magnetic switch heard • Battery run down • Battery voltage too low due to battery deterioration • Loose battery cable connections • Burnt main contact point, or poor contacting action of magnetic switch • Brushes are seating poorly or worn down • Weakened brush spring • Burnt commutator • Field coil grounding • Layer short-circuit of armature • Crankshaft rotation obstructed	Recharge battery. Replace battery. Retighten. Replace magnetic switch. Repair or replace. Replace. Replace armature. Repair or replace yoke. Replace. Repair.

Condition	Possible Cause	Correction
Starting motor running but too slow (small torque)	If battery and wiring are satisfactory, inspect starting motor • Insufficient contact of magnetic switch main contacts • Layer short-circuit of armature • Disconnected, burnt or worn commutator • Field coil open • Worn brushes • Weakened brush springs • Burnt or abnormally worn end bushes	Replace magnetic switch. Replace. Repair commutator or replace armature. Replace yoke. Replace. Replace spring Replace.
Starting motor running, but not cranking engine	• Worn pinion tip • Poor sliding of overrunning clutch • Overrunning clutch slipping • Worn teeth of ring gear	Replace overrunning clutch. Replace. Replace. Replace flywheel.
Noise	• Abnormally worn bush • Worn pinion or worn teeth of ring gear • Poor sliding of pinion (failure in return movement) • Lack of oil in each part	Replace. Replace overrunning clutch or flywheel. Repair or replace. Lubricate.
Starting motor does not stop running	• Fused contact points of magnetic switch • Short-circuit between turns of magnetic switch coil (layer short-circuit) • Failure of returning action in ignition switch	Replace. Replace magnetic switch. Replace.

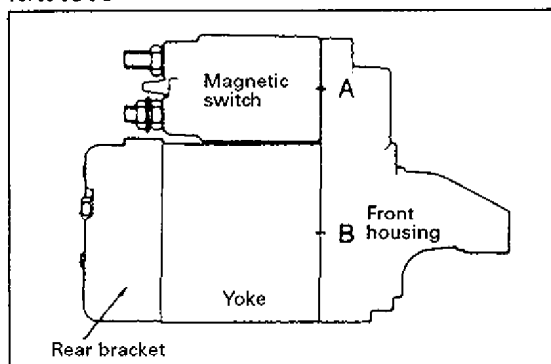
ON-VEHICLE SERVICE

For overhauling of starting motor, it is recommended that component parts should be cleaned thoroughly. However, yoke assembly, armature coil, overrunning clutch assembly, magnetic switch assembly, rubber or plastic parts are **NOT ALLOWED** to be washed in degreasing tank or with grease dissolving solvent. Those parts should be cleaned by blowing air and wiping with cloth.

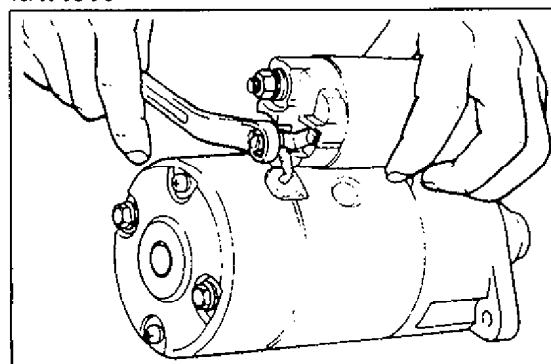
75F00-6G-6-1



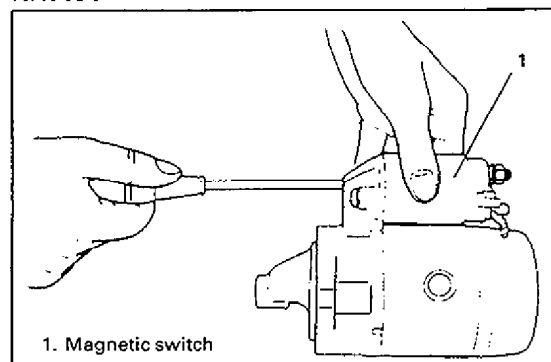
75F00-6G-6-2



75F00-6G-6-3



75F00-6G-6-4



75F00-6G-6-5

REMOVAL

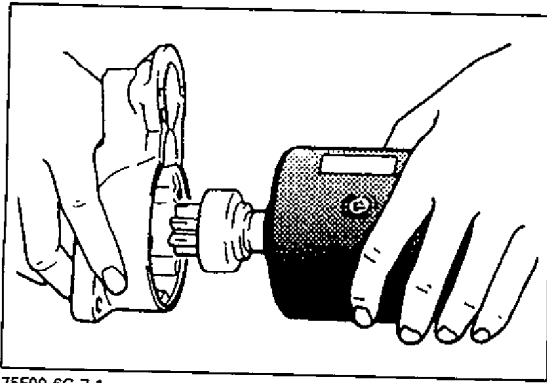
- 1) Disconnect negative (-) battery lead at battery.
- 2) Disconnect battery cable and magnetic switch lead wire from starting motor terminals.
- 3) Remove 2 mounting bolts.
- 4) Remove starting motor.

DISASSEMBLY

NOTE:

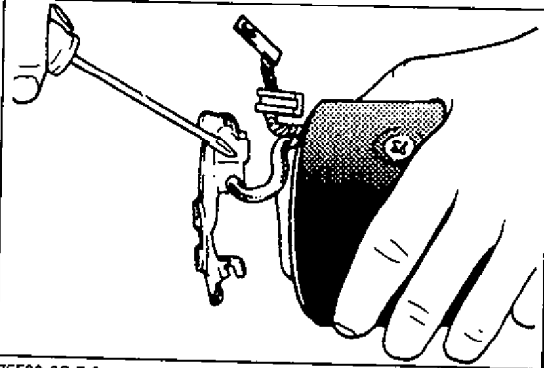
Before disassembling starting motor, be sure to put match marks at two locations (A and B) as shown in left figure so that any possible mistakes can be avoided.

- 1) Remove nut securing the end of field coil lead to terminal on the head of magnetic switch.
- 2) Take off magnetic switch from starting motor body by removing two mounting screws.



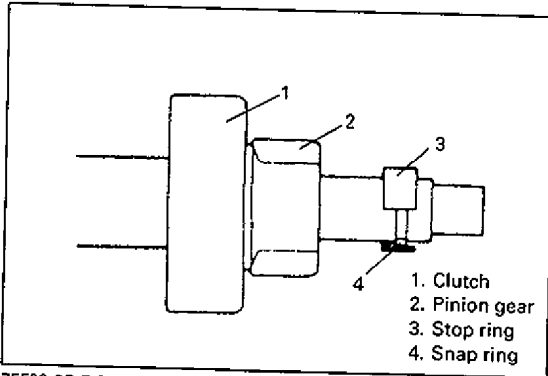
75F00-6G-7-1

- 3) Loosen 2 bolts and 2 screws to remove rear bracket.
- 4) Separate front housing and armature from yoke.



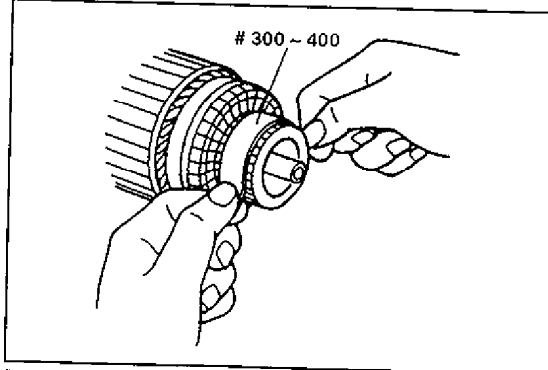
75F00-6G-7-2

- 5) Draw brushes out of holder.



75F00-6G-7-3

- 6) Draw stop ring toward clutch side and remove snap ring and slide off clutch, then draw off overrunning clutch.

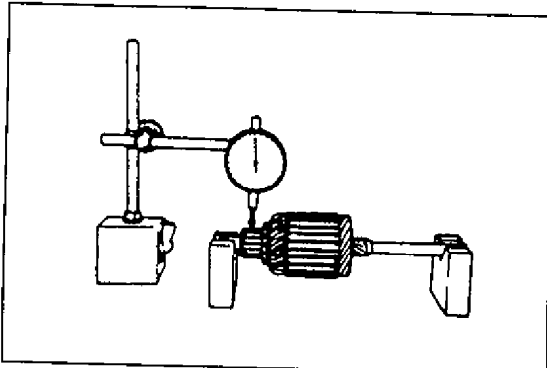


75F00-6G-7-4

INSPECTION

ARMATURE

Inspect commutator for dirt or burn. Correct with sandpaper or lathe, if necessary.



75F00-6G-7-5

Check commutator for uneven wear with armature supported on V-blocks. If deflection of dial gauge pointer exceeds limit, repair or replace.

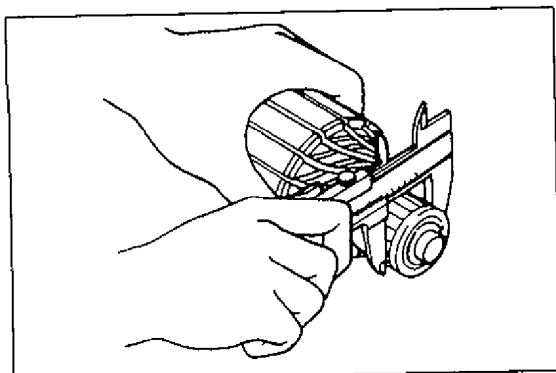
NOTE:

Below specification presupposes that armature is free from bend. Bent shaft must be replaced.

Commutator out of round

Standard: 0.05 mm (0.0019 in.) or less

Limit : 0.4 mm (0.015 in.)



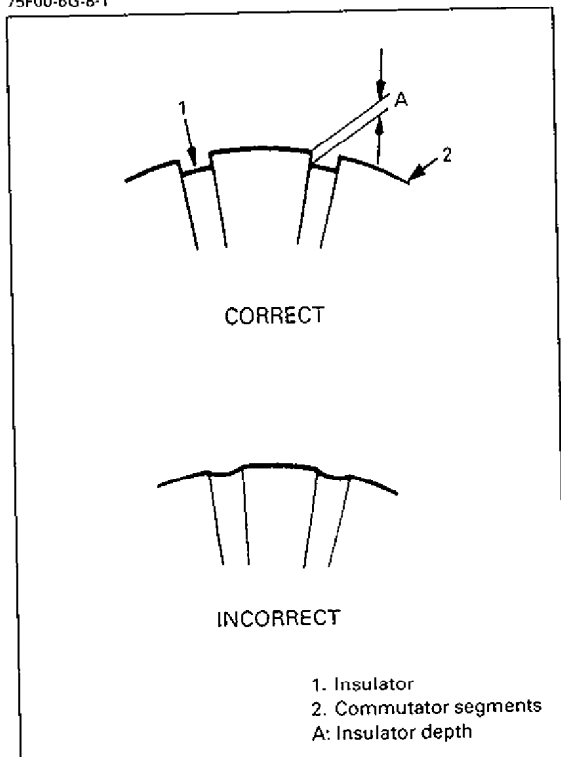
75F00-6G-8-1

Inspect commutator for wear. If below limit, replace armature.

Commutator outside diameter

Standard: 32 mm (1.26 in.)

Limit : 31.4 mm (1.24 in.)



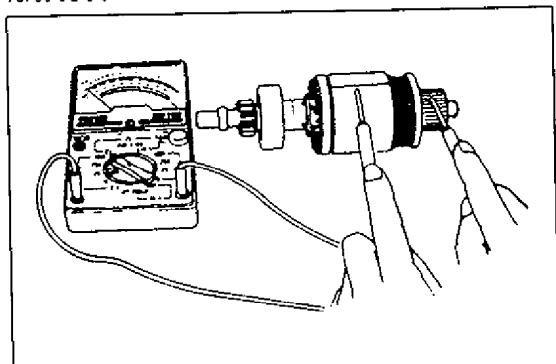
75F00-6G-8-3

Inspect commutator for insulator depth. Correct or replace if below limit.

Commutator insulator depth A

Standard: 0.4 – 0.6 mm (0.015 – 0.023 in.)

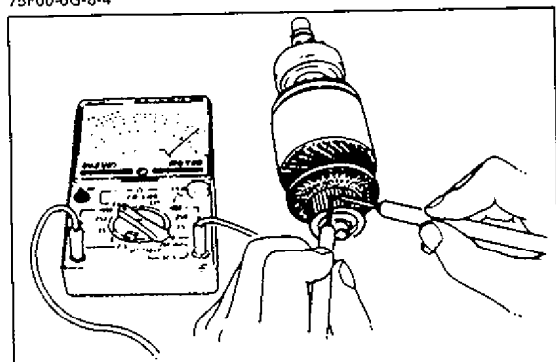
Limit : 0.2 mm (0.0078 in.)



75F00-6G-8-4

Ground Test

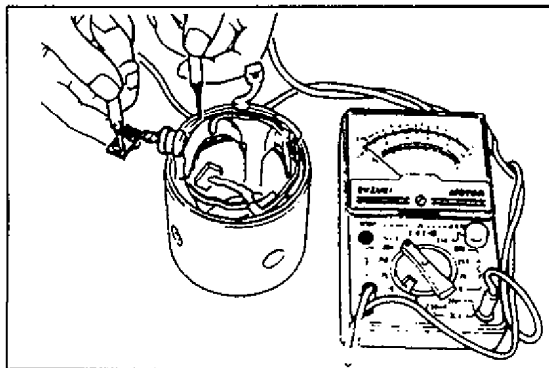
Check commutator and armature core. If there is continuity, armature is grounded and must be replaced.



75F00-6G-8-5

Open circuit Test

Check for continuity between segments. If there is no continuity at any test point, there is an open circuit and armature must be replaced.

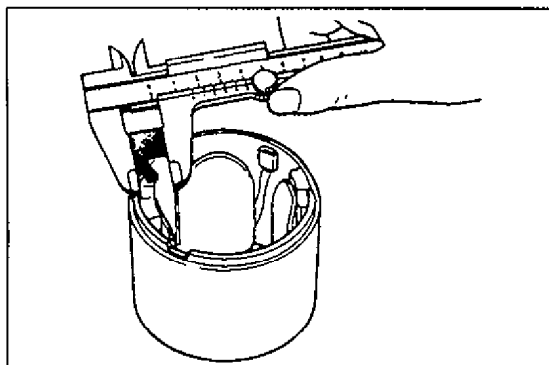


75F00-6G-9-1

FIELD COIL

Ground Test

Check for continuity between brush and bare surface. If there is continuity, field windings are grounded. The yoke must be replaced.



75F00-6G-9-2

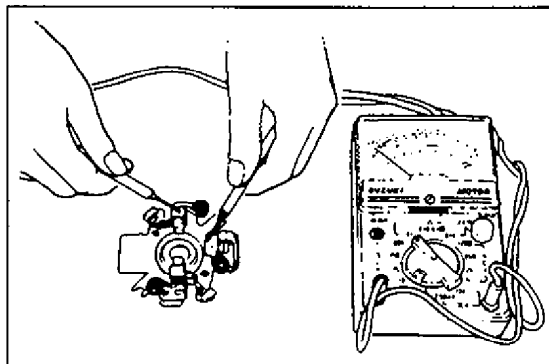
BRUSH

Check brushes for wear. If below limit, replace brush.

Brush length

Standard: 17 mm (0.67 in.)

Limit : 11.5 mm (0.45 in.)



75F00-6G-9-3

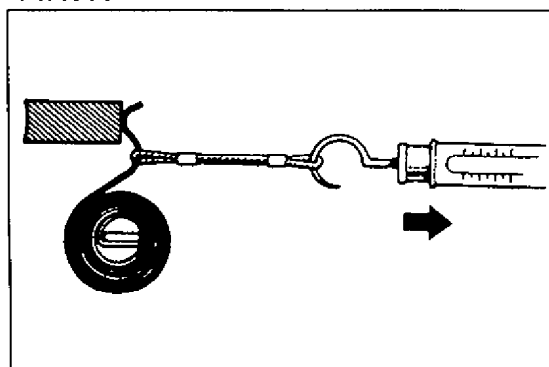
BRUSH HOLDER AND SPRING

Check movement of brush in brush holder. If brush movement within brush holder is sluggish, check brush holder for distortion and sliding faces for contamination.

Clean or correct as necessary.

Check for continuity across insulated brush holder (positive side) and grounded brush holder (negative side).

If continuity exists, brush holder is grounded due to defective insulation and should be replaced.

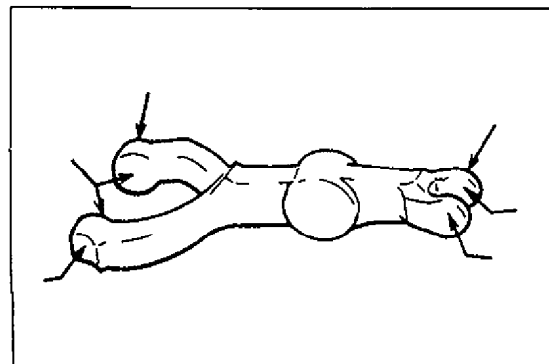


75F00-6G-9-4

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

Brush spring tension

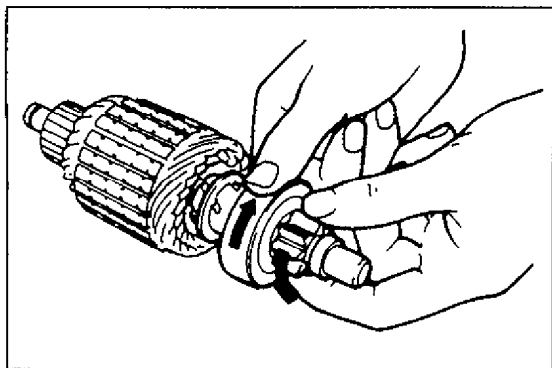
Standard: 1.6 – 2.2 kg (3.53 – 4.85 lb.)



75F00-6G-9-5

DRIVE LEVER

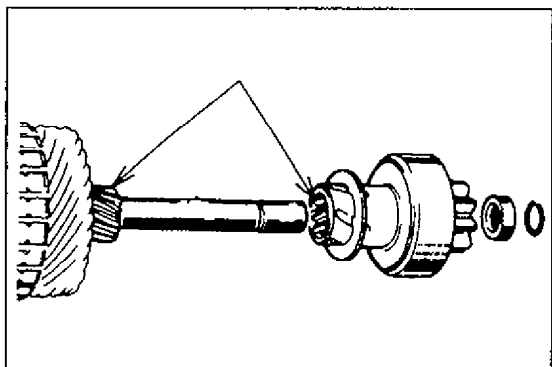
Inspect drive lever for wear. Replace if necessary.



75F00-6G-10-1

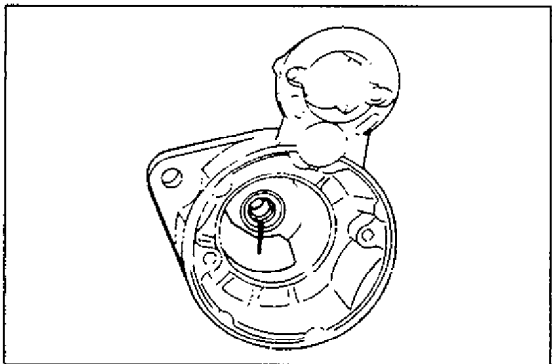
PINION AND OVER-RUNNING CLUTCH

Inspect pinion for wear, damage or other abnormal conditions. Check that clutch locks up when turned in direction of drive and rotates smoothly in reverse direction. Replace if necessary.



75F00-6G-10-2

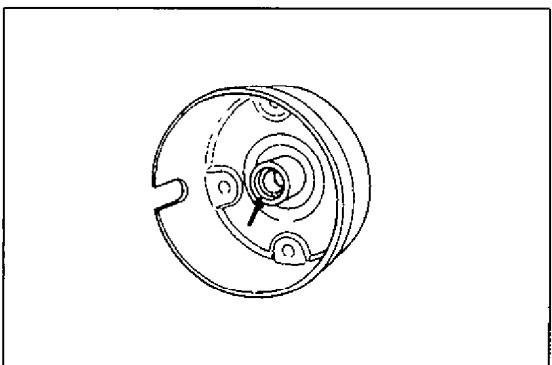
Inspect spline teeth for wear or damage. Replace if necessary. Inspect pinion for smooth movement.



75F00-6G-10-3

FRONT HOUSING BEARING

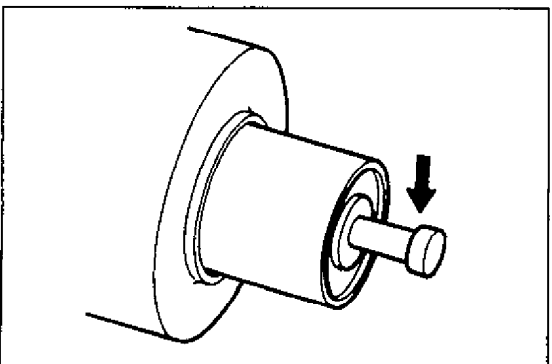
Inspect bearing for wear or damage. Replace if necessary.



75F00-6G-10-4

ARMATURE SHAFT BUSH

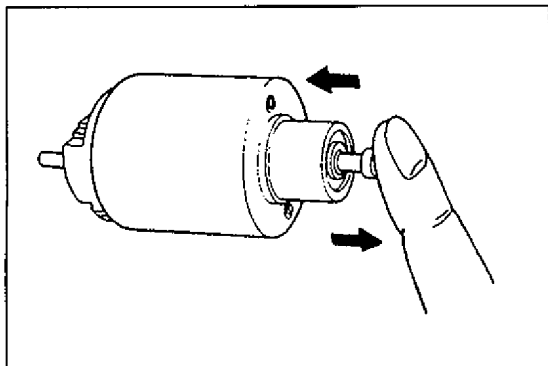
Inspect bush for wear or damage. Replace if necessary.



75F00-6G-10-5

PLUNGER

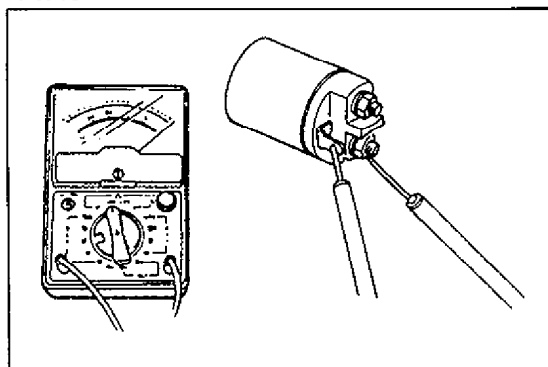
Inspect plunger for wear. Replace if necessary.



75F00-6G-11-1

MAGNETIC SWITCH

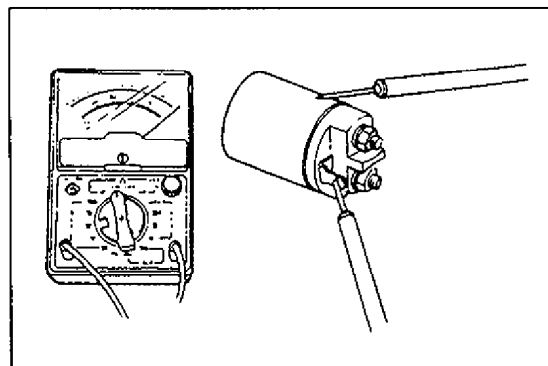
Push in plunger and release it. The plunger should return quickly to its original position. Replace if necessary.



75F00-6G-11-2

Pull-in Coil Open Circuit Test

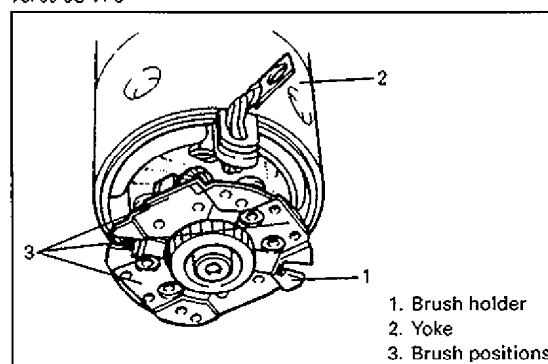
Check for continuity across magnetic switch "S" terminal and "M" terminal. If no continuity exists, the coil is open and should be replaced.



75F00-6G-11-3

Hold-in Coil Open Circuit Test

Check for continuity across magnetic switch "S" terminal and coil case. If no continuity exists, the coil is open and should be replaced.

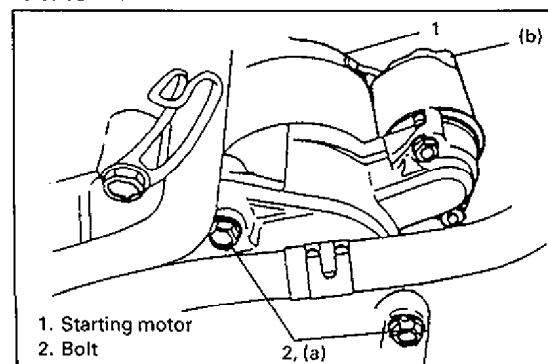


75F00-6G-11-4

ASSEMBLY

Reverse disassembly procedure, using care on following points.

- When installing pinion drive lever, refer to figure in page 6G2-3 for its installation direction.
- When installing 2 mashers, install a thinner one to the rear bracket side.
- When installing brush holder, be careful of brush position.



75F00-6G-11-5

INSTALLATION

Reverse the removal procedure.

Tightening Torque

- (a): 23 N·m (2.3 kg·m, 17.0 lb·ft)
 (b): 10 N·m (1.0 kg·m, 7.5 lb·ft)

PERFORMANCE TEST

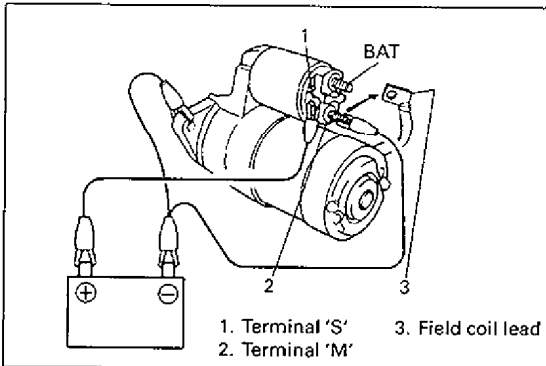
CAUTION:

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

WARNING:

When performing the following test, be sure to connect the battery and the starting motor with a lead wire of the same size as the cable that was originally used there.

75F00-6G-12-1



PULL-IN TEST

Connect battery to magnetic switch as shown.

Check that plunger and pinion (over-running clutch) move outward.

If plunger and pinion (over-running clutch) don't move, replace magnetic switch.

NOTE:

Before testing, disconnect field coil lead from terminal M.

HOLD-IN TEST

While connected as above with plunger out, disconnect negative lead from terminal 'M'.

Check that plunger and pinion remain out.

If plunger and pinion return inward, replace magnetic switch.

PLUNGER AND PINION RETURN TEST

Disconnect negative lead from switch body.

Check that plunger and pinion return inward.

If plunger and pinion don't return, replace magnetic switch.

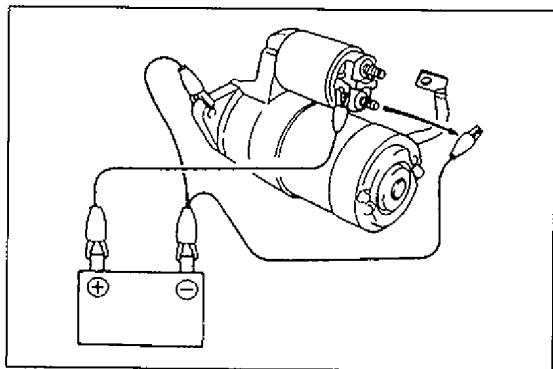
NO-LOAD PERFORMANCE TEST

a) Connect battery and ammeter to starter as shown.

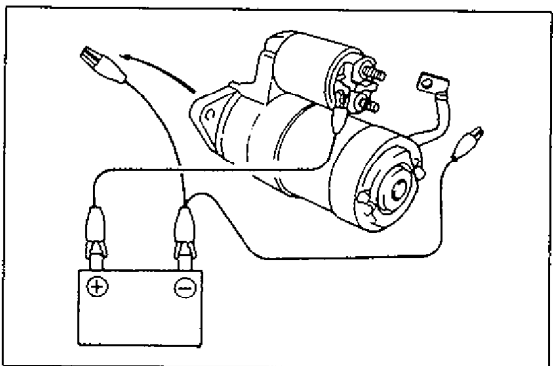
b) Check that starter rotates smoothly and steadily with pinion moving out. Check that ammeter indicates specified current.

No load current: Within 53A at 11.5V

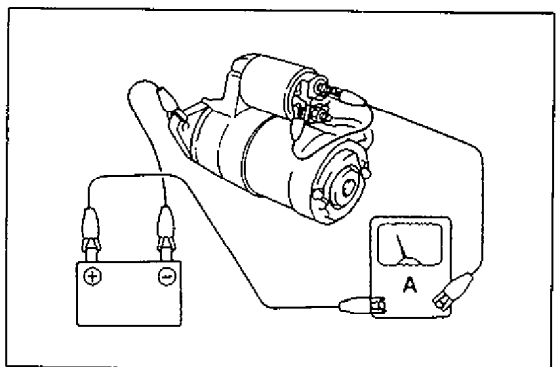
75F00-6G-12-2



75F00-6G-12-3



75F00-6G-12-4



75F00-6G-12-5

SPECIFICATIONS

Voltage		12 volts	
Output		0.85 kW	
Rating		30 seconds	
Direction of rotation		Clockwise as viewed from pinion side	
Brush length		17.0 mm (0.67 in.)	
Number of pinion teeth		8	
Performance		Condition	Guarantee
Around at 20°C (68°F)	No load characteristic	11.5V	53A maximum 6,000 rpm minimum
	Load characteristic	9.0V 150A	2.8 N·m (0.28 kg-m, 2.0 lb-ft) minimum 2,100 rpm minimum
	Locked rotor current	5.0V	370 A maximum 7 N·m (0.7 kg-m, 5.0 lb-ft) minimum
	Magnetic switch operating voltage		8 volts maximum

75F00-6G-13-2

SECTION 6H

CHARGING SYSTEM

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

6H

CONTENTS

BATTERY

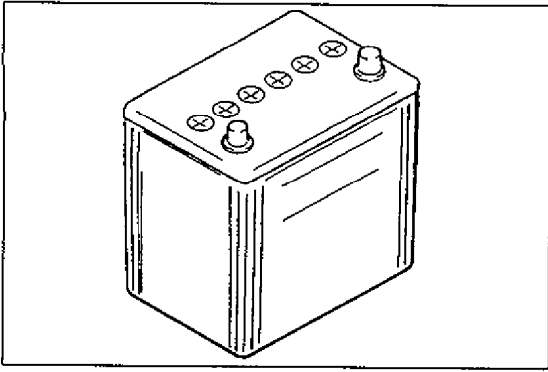
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TIGHTENING TORQUE SPECIFICATIONS	6H-21
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75F00-6H-2-1

BATTERY

GENERAL DESCRIPTION

The battery has three major functions in the electrical system.

- It is a source of electrical energy for cranking the engine.
- It acts as a voltage stabilizer for the electrical system.
- It can, for a limited time, provide energy when the electrical load exceeds the output of the generator.

The battery mounted in each vehicle is one the following two types, depending on specification.

38B20L TYPE

Rated capacity	28 AH/5HR, 12 Volts
Electrolyte	2.4 L (5.07/4.22 US/Imp pt)
Electrolyte S.G.	1.28 when fully charged at 20 °C (68 °F)

75F00-6H-2-2

CARRIER AND HOLD-DOWN

The battery carrier should be in good condition so that it will support the battery securely and keep it level.

Before installing the battery, the battery carrier and hold-down clamp should be clean and free from corrosion and make certain there are no parts in carrier.

To prevent the battery from shaking in its carrier, the hold-down bolts should be tight enough but not over-tightened.

75F00-6H-2-4

ELECTROLYTE FREEZING

The freezing point of electrolyte depends on its specific gravity. Since freezing may ruin a battery, it should be protected against freezing by keeping it in a fully charged condition. If a battery is frozen accidentally, it should not be charged until it is warmed.

75F00-6H-2-5

SULFATION

If the battery is allowed to stand for a long period in discharged condition, the lead sulfate becomes converted into a hard, crystalline substance, which will not easily turn back to the active material again during the subsequent recharging. "Sulfation" means the result as well as the process of that reaction. Such a battery can be revived by very slow charging and may be restored to usable condition but its capacity is lower than before.

75F00-6H-3-1

CARE OF BATTERY

WARNING:

- **Never expose battery to open flame or electric spark because of battery generate gas which is flammable and explosive.**
- **Do not allow battery fluid to contact eyes, skin, fabrics, or painted surfaces as fluid is a corrosive acid. Flush any contacted area with water immediately and thoroughly.**
- **Batteries should always be kept out of reach of children.**

- 1) The battery is a very reliable component, but needs periodical attentions.

Keep the battery carrier clean; prevent rust formation on the terminal posts; keep the electrolyte up to the upper level uniformly in all cells.

When keeping battery on vehicle over a long period of time, follow instructions given below.

- Weekly, start the engine and run it until it reaches normal operating temperature with engine speed of 2000 to 3000 rpm. Make sure all electric switches are off before storing the vehicle.
- Recharge the battery twice a month to prevent it from discharging excessively. This is especially important when ambient temperature is low.

The battery discharges even when it is not used, while vehicles are being stored. Battery electrolyte can freeze and battery case can crack at cold ambient condition if battery is not properly charged.

- 2) Keep the battery cable connections clean.

The cable connections, particularly at the positive (+) terminal post, tend to become corroded. The product of corrosion, or rust, on the mating faces of conductors resists the flow of current.

Clean the terminals and fittings periodically to ensure good metal-to-metal contact, and grease the connections after each cleaning to protect them against rusting.

- 3) Be always in the know as to the state of charge of the battery.

The simplest way to tell the state of charge is to carry out a hydrometer test. The hydrometer is an instrument for measuring the specific gravity (S.G.) of the battery electrolyte. The S.G. of the electrolyte is indicative of the state of charge.

75F00-6H-4-1

DIAGNOSIS

VISUAL INSPECTION

Check for obvious damage, such as cracked or broken case or cover, that could permit loss of electrolyte. If obvious damage is noted, replace battery. Determine cause of damage and correct as needed.

75F00-6H-4-2

HYDROMETER TEST

The direct method of checking the battery for state of charge is to carry out a high rate discharge test, which involves a special precise voltmeter and an expensive instrument used in the service shops, but not recommendable to the user of the vehicle.

At 20 °C of battery temperature (electrolyte temperature):

- The battery is in FULLY CHARGED STATE if the electrolyte S.G. is 1.280.
- The battery is in HALF CHARGED STATE if the S.G. is 1.220.
- The battery is in NEARLY DISCHARGED STATE if the S.G. is 1.150 and is in danger of freezing.

As the S.G. varies with the temperature, if battery temperature is not at 20°C (68°F), you have to correct your S.G. reading (taken with your hydrometer) to the value at 20°C (68°F) and apply the corrected S.G. value to the three-point guide stated value.

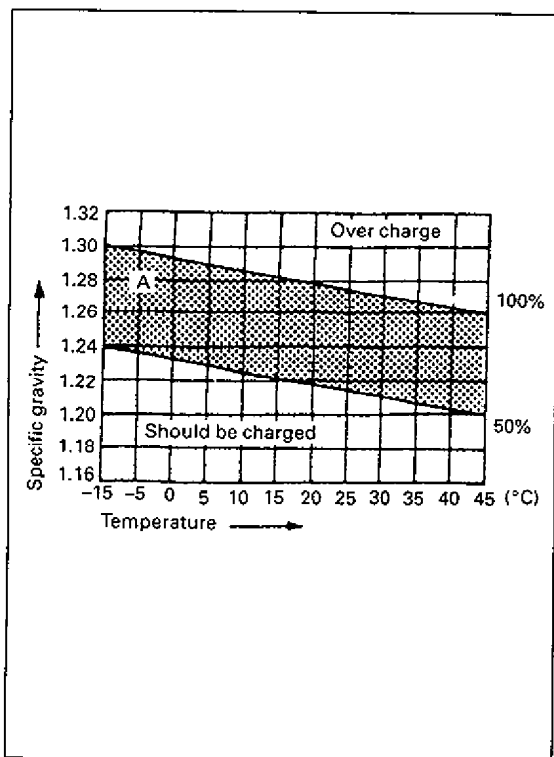
For the manner of correction, refer to the graph showing the relation between S.G. value and temperature at the left.

HOW TO USE THE TEMPERATURE-CORRECTED STAGE-OF-CHARGE GRAPH

Suppose your S.G. reading is 1.28 and the battery temperature is -5 °C (23°F). Locate the intersection of the -5 °C line and the 1.28 S.G. line.

The intersection is within the "A" zone (shaded area in the graph) and that means CHARGED STATE.

To know how much the battery is charged, draw a line parallel to the zone demarcation line and extend it to the right till it meets with the percentage scale. In the present example, the line meets at about 85% point on the percentage scale. Therefore, the battery is charged up to the 85% level.



75F00-6H-4-5

ON-VEHICLE SERVICE

JUMP STARTING IN CASE OF EMERGENCY WITH AUXILIARY (BOOSTER) BATTERY

CAUTION:

If vehicle is manual transmission model and has a catalytic converter, do not push or tow it to start. Damage to its emission system and / or to other parts may result.

Both booster and discharged battery should be treated carefully when using jumper cables. Follow procedure outlined below, being careful not to cause sparks.

WARNING:

- Departure from these conditions or procedure described below could result in:
 - 1) Serious personal injury (particularly to eyes) or property damage from such causes as battery explosion, battery acid, or electrical burns.
 - 2) Damage to electronic components of either vehicle.
- Remove rings, watches, and other jewelry. Wear approved eye protection.
- Be careful so that metal tools or jumper cables do not contact positive battery terminal (or metal in contact with it) and any other metal on vehicle, because a short circuit could occur.

- 1) Set parking brake and place automatic transmission in PARK (NEUTRAL on manual transmission). Turn off ignition, turn off lights and all other electrical loads.
- 2) Check electrolyte level. If it is below low level line, add distilled water.
- 3) Attach end of one jumper cable to positive terminal of booster battery and the other end of the same cable to positive terminal of discharged battery. (Use 12-volt battery only to jump start engine).
- 4) Attach one end of the remaining negative cable to negative terminal of booster battery, and the other end to a solid engine ground (such as exhaust manifold) at least 45 cm (18 in.) away from battery of vehicle being started.

WARNING:

Do not connect negative cable directly to negative terminal of dead battery.

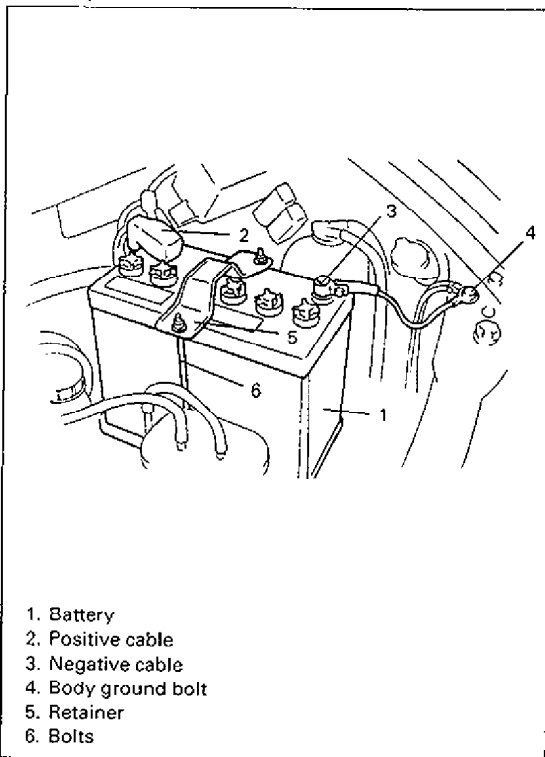
- 5) Start engine of vehicle with booster battery and turn off electrical accessories. Then Start engine of the vehicle with discharged battery.
- 6) Disconnect jumper cables in the exact reverse order.

WITH CHARGING EQUIPMENT

CAUTION:

When jump starting engine with charging equipment, be sure equipment used is 12-volt and negative ground. Do not use 24-volt charging equipment. Using such equipment can cause serious damage to electrical system or electronic parts.

75F00-6H-6-1



75F00-6H-6-3

REMOVAL

- 1) Disconnect negative cable.
- 2) Disconnect positive cable.
- 3) Remove retainer.
- 4) Remove battery.

HANDLING

When handling battery, following safety precautions should be followed:

- Hydrogen gas is produced by battery. A flame or spark near battery may cause the gas to ignite.
- Battery fluid is highly acidic. Avoid spilling on clothing or other fabric. Any spilled electrolyte should be flushed with large quantity of water and cleaned immediately.

INSTALLATION

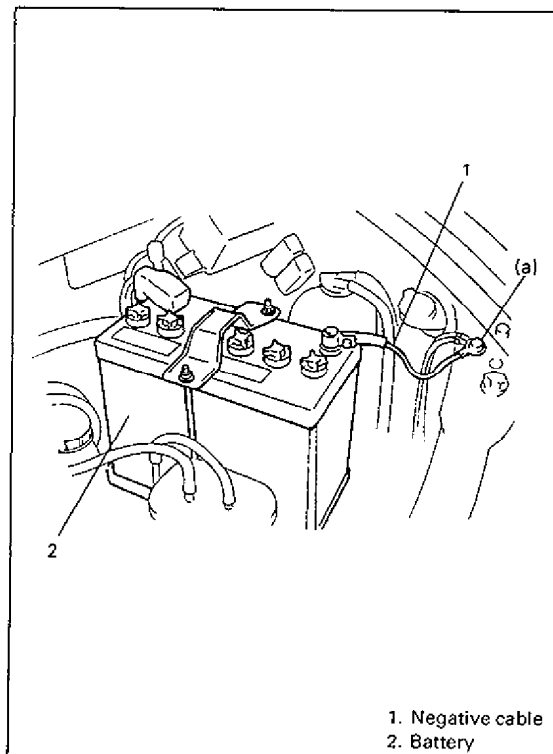
- 1) Reverse removal procedure.
- 2) Torque battery cables to specification.

NOTE:

- Check to be sure that ground cable has enough clearance to hood panel by terminal.
- Body and battery cable should not interfere with each other.
- After tightening positive terminal, be sure to put cap onto it securely.

Tightening Torque

(a): 8.0 N·m (0.8 kg-m, 6.0 lb-ft)



75F00-6H-6-5

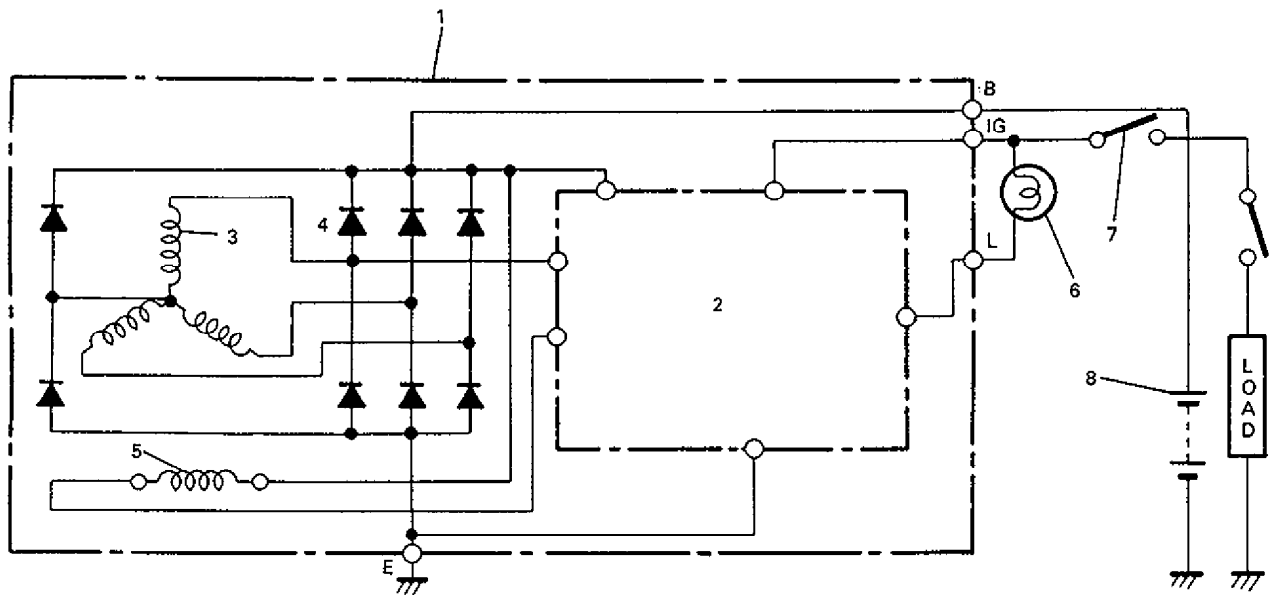
GENERATOR

GENERAL DESCRIPTION

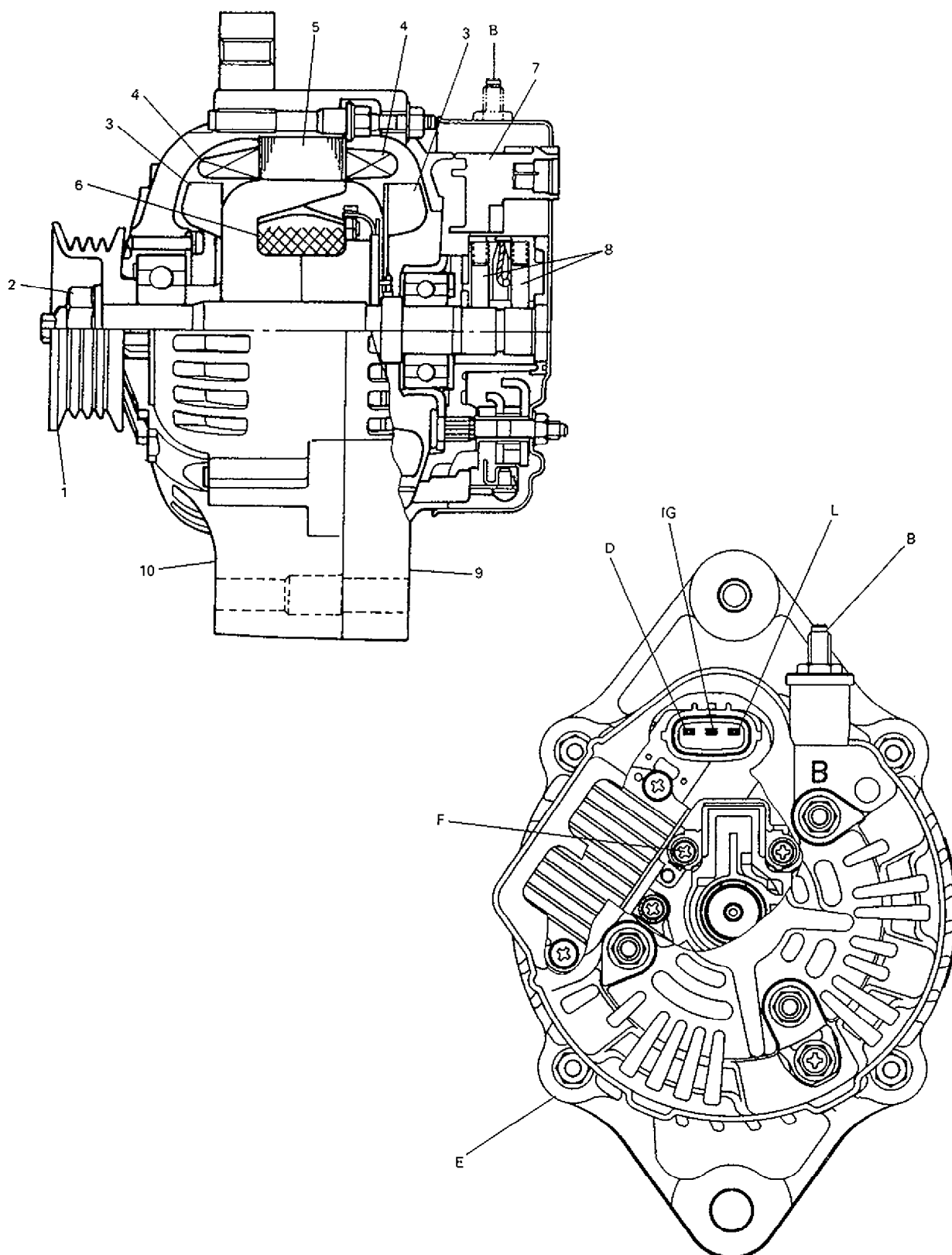
The generator is a small and high performance type with an IC regulator incorporated. The internal components are connected electrically as shown below figure.

The generator features are as follows:

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



1. Generator with regulator ass'y
2. I.C. regulator
3. Stator coil
4. Diode
5. Field coil (rotor coil)
6. Charge indicator light
7. Main switch
8. Battery



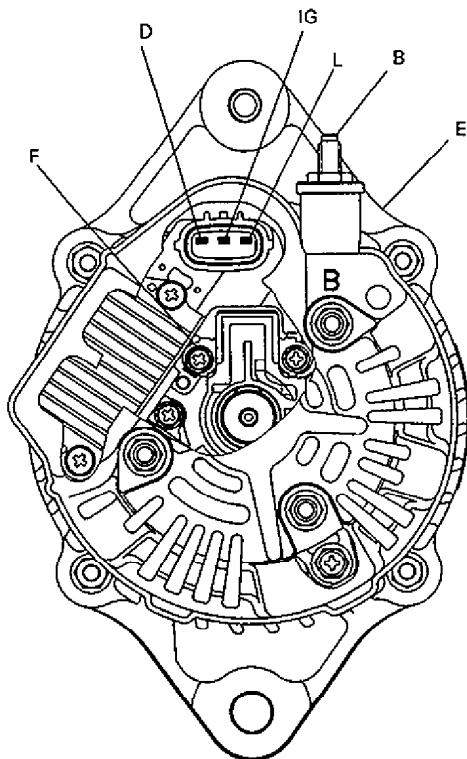
1. Pulley
2. Pulley nut
3. Rotor fan
4. Stator coil
5. Stator core
6. Field coil
7. Regulator
8. Brush
9. Rear end frame
10. Drive end frame

- B : Generator output (Battery terminal)
 D : Dummy terminal
 E : Ground
 F : Field coil terminal
 IG: Ignition terminal
 L : Lamp terminal

DIAGNOSIS

CAUTION:

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



B : Generator output (Battery terminal)
 D : Dummy terminal
 E : Ground
 F : Field coil terminal
 IG : Ignition terminal
 L : Lamp terminal

75F00-6H-9-3

Trouble in charging system will show up as one or more of following conditions:

- 1) Faulty indicator lamp operation.
- 2) An undercharged battery as evidenced by slow cranking or indicator dark.
- 3) An overcharged battery as evidenced by excessive spewing of electrolyte from vents.

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

FAULTY INDICATOR LAMP OPERATION

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

UNDERCHARGED BATTERY

This condition, as evidenced by slow cranking can be caused by one or more of the following conditions even though indicator lamp may be operating normal.

Following procedure also applies to cars with voltmeter and ammeter.

- 1) Make sure that undercharged condition has not been caused by accessories left on for extended period of time.
- 2) Check drive belt for proper tension.
- 3) If battery defect is suspected, refer to Battery section.
- 4) Inspect wiring for defects. Check all connections for tightness and cleanliness, battery cable connections at battery, starter and ignition ground cable.
- 5) Connect voltmeter and ammeter as shown in left figure.

Voltmeter

Set between generator B terminal and ground.

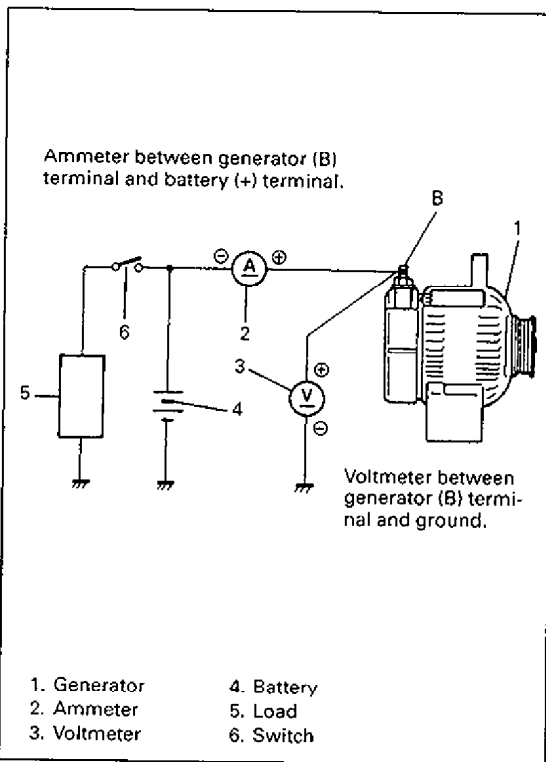
Ammeter

Set between generator B terminal and battery (+) terminal.

NOTE:

Use fully charged battery.

- 6) Measure current and voltage.



75F00-6H-10-3

NO-LOAD CHECK

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

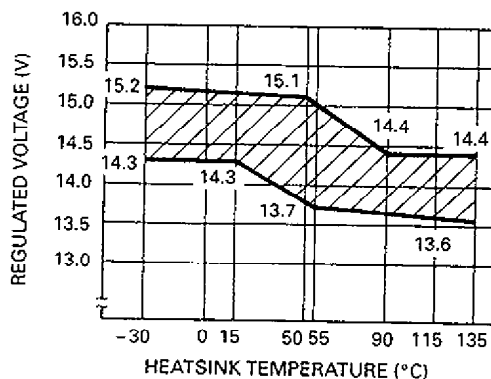
NOTE:

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

Standard current	10 A maximum
Standard voltage	14.4 – 15.0 v at 20 °C (68 °F)

NOTE:

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



75F00-6H-10-5

HIGHER VOLTAGE

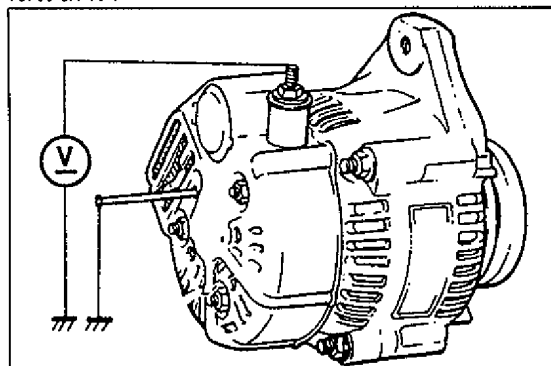
If voltage is higher than standard value, check ground of brush.

If brush ground is correct, replace IC regulator.

LOWER VOLTAGE

If voltage is lower than standard value, proceed to following check.

75F00-6H-11-1



75F00-6H-11-2

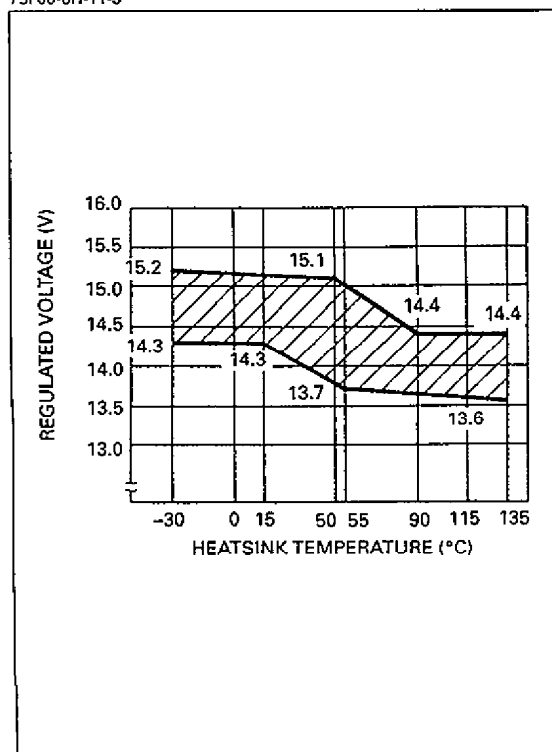
2) Ground F terminal and start engine, then measure voltage at B terminal as shown in left figure.

- Voltage is higher than standard value
It is considered that generator itself is good but IC regulator has been damaged, replace IC regulator.
- Voltage is lower than standard value
Generator itself has problem, check the generator.

LOAD CHECK

- 1) Run engine at 2,000 rpm and turn on head light and heater motor.
- 2) Measure current and if it is less than 20 A repair or replace generator.

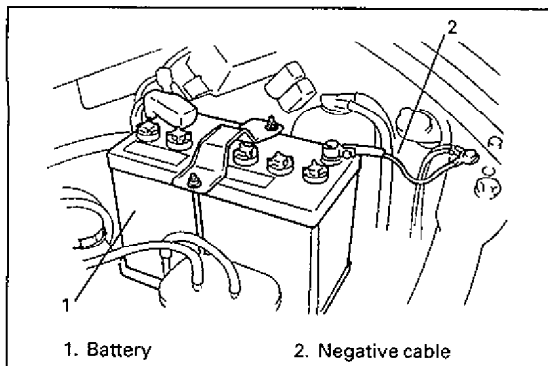
75F00-6H-11-3



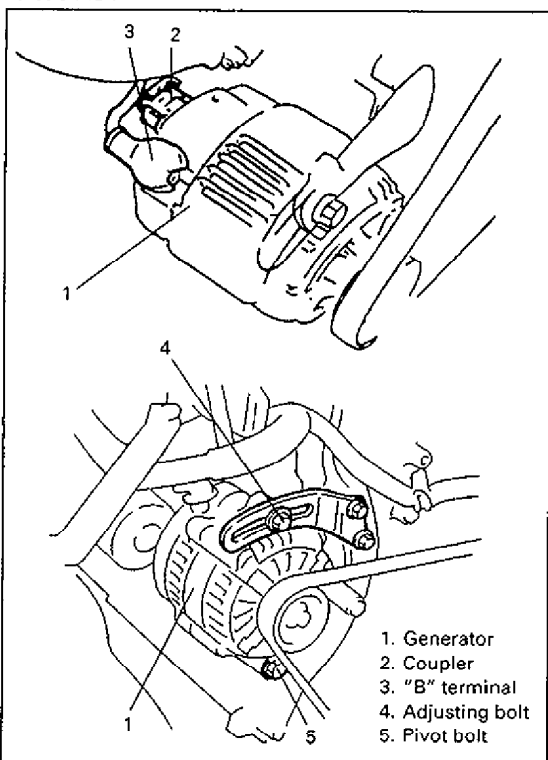
75F00-6H-11-5

OVERCHARGED BATTERY

- 1) To determine battery condition, refer to Battery section.
- 2) If obvious overcharge condition exists as evidenced by excessive spewing of electrolyte, proceed to disassembly section of generator service and check field windings for grounds and shorts. If problem exists, replace rotor.
- 3) With engine running at 2,000 rpm, measure voltage.
- 4) If measured voltage is out of standard value, check brush ground or IC regulator.



75F00-6H-12-1



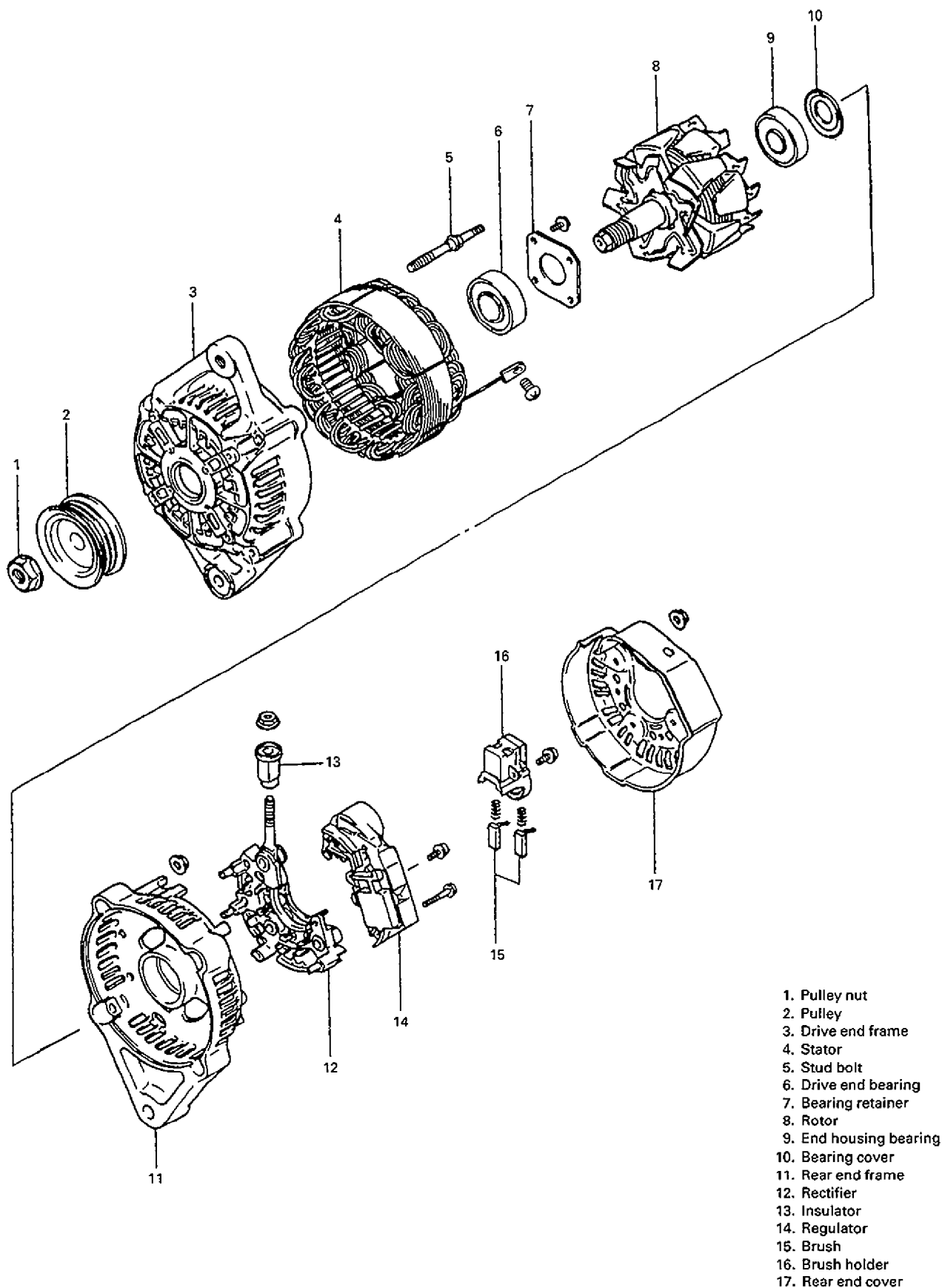
75F00-6H-12-3

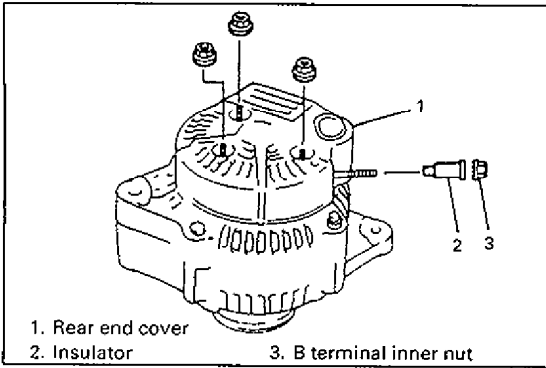
ON-VEHICLE SERVICE

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Hoist vehicle
- 3) Remove right side front wheel.
- 4) Remove right side drive shaft. (For details, refer to steps 2) – 8) of DRIVE SHAFT REMOVAL of Section 4A.)
- 5) Disconnect "B" terminal wire and coupler from generator.
- 6) Remove adjusting bolt and loosen generator pivot bolt.
- 7) Remove generator with bracket.

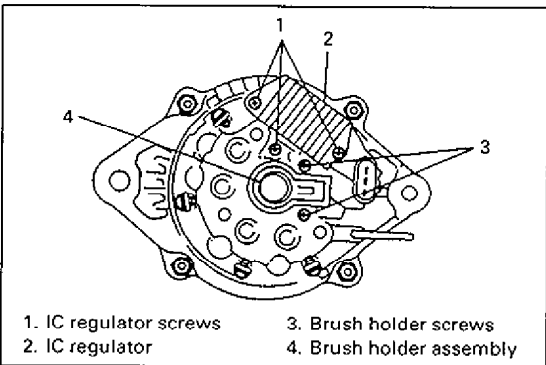
DISASSEMBLY





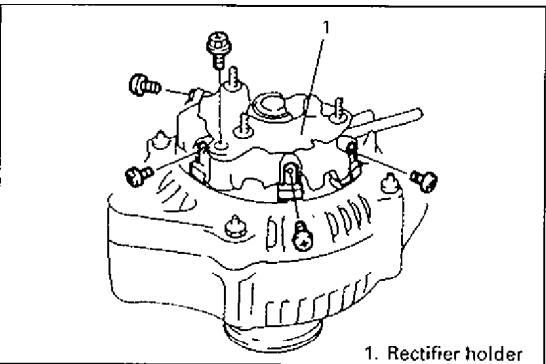
75F00-6H-14-1

- 1) Remove B terminal inner nut and insulator.
- 2) Remove rear end cover.



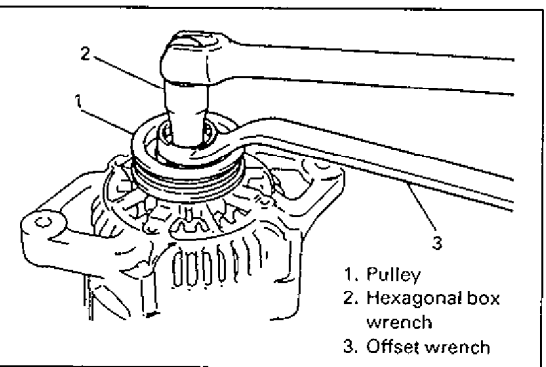
75F00-6H-14-2

- 3) Remove 2 screws and pull out brush holder assembly.
- 4) Remove 3 screws and IC regulator.
- 5) Remove brush holder cover from brush holder.



75F00-6H-14-3

- 6) Remove rectifier holder.

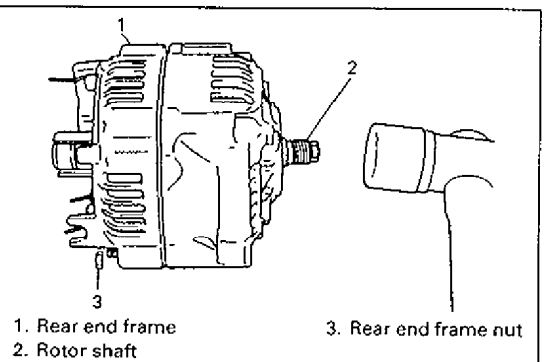


75F00-6H-14-4

- 7) Hold shaft by using hexagonal box wrench and remove pulley nut, and then pull out pulley.

CAUTION:

- To hold shaft, use hexagonal box. Duodecimal box may cause slipping and consequential shaft or tool damage.
- Do not attempt to hold pulley by using vise or pipe wrench so as not to distort it.

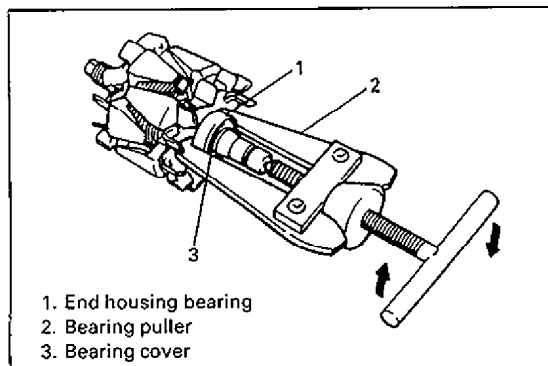


75F00-6H-14-5

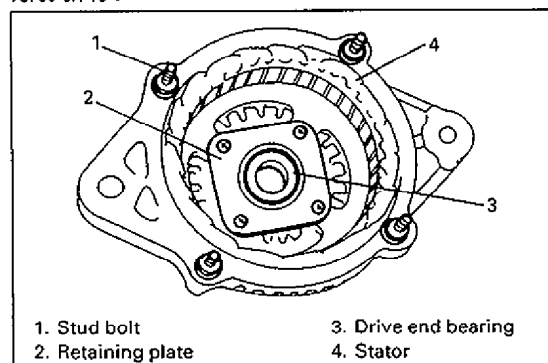
- 8) Remove 4 rear end frame nuts.
- 9) Drive out rear end frame with rotor tapping shaft lightly by using plastic hammer.
- 10) Separate rear end frame from rotor evenly by using plastic hammer.

CAUTION:

Do not hit shaft at slip ring side, when separating rotor and rear end frame.



75F00-6H-15-1



75F00-6H-15-2

- 11) If required, use bearing puller to remove end housing bearing and bearing cover.

CAUTION:

Care must be exercised so as not to distort cooling fan blade while applying puller.

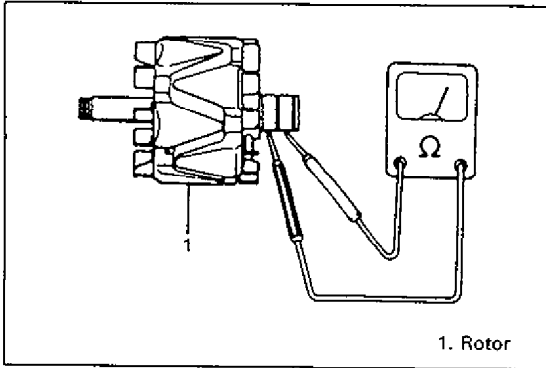
- 12) If required, remove 4 screws, retainer plate and then drive out drive end bearing.

- 13) If required, remove stud bolts and then pull out stator.

NOTE:

Heating drive end frame may facilitate removal of stator.

75F00-6H-15-3



75F00-6H-16-1

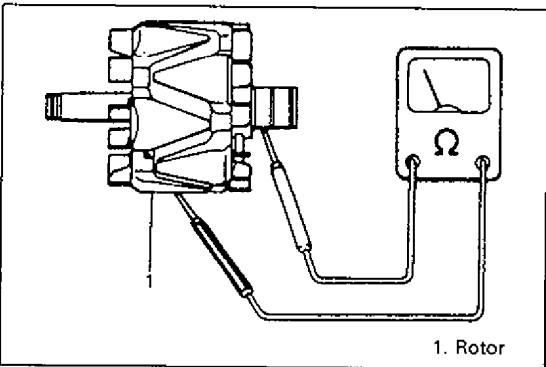
INSPECTION

ROTOR

Open Circuit

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

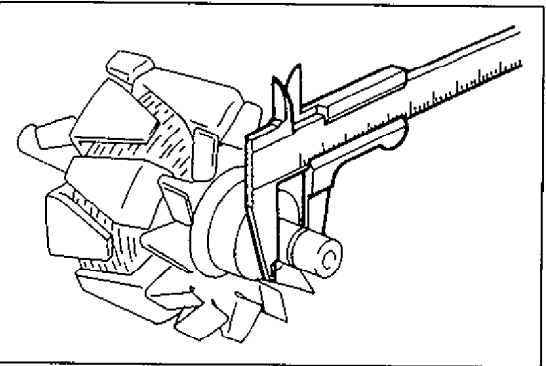
Standard resistance: About 2.9 Ω



75F00-6H-16-2

Ground

Using ohmmeter, check that there is no continuity between slip ring and rotor. If there is continuity, replace rotor.



75F00-6H-16-3

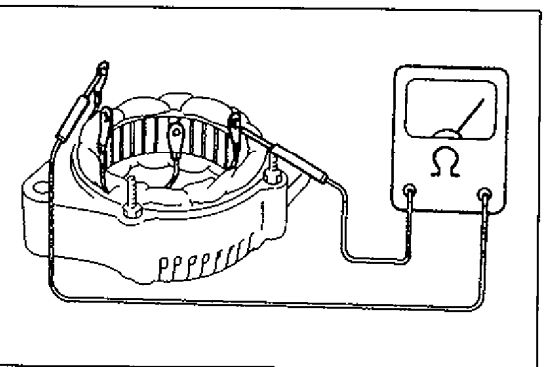
Slip Rings

- Check slip rings for roughness or scoring. If rough or scored, replace rotor.
- Using a vernier caliper, measure the slip ring diameter.

Standard diameter: 14.4 mm (0.567 in.)

Minimum diameter: 14.0 mm (0.551 in.)

If the diameter is less than minimum, replace the rotor.

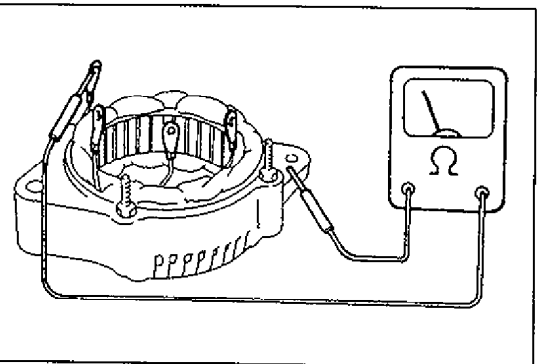


75F00-6H-16-4

STATOR

Open Circuit

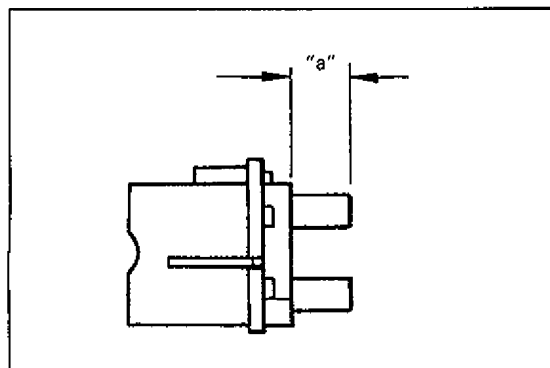
Using ohmmeter, check all leads for continuity. If there is no continuity, replace stator.



75F00-6H-16-5

Ground

Using ohmmeter, check that there is no continuity between coil leads and stator core. If there is continuity, replace stator.



75F00-6H-17-1

BRUSH

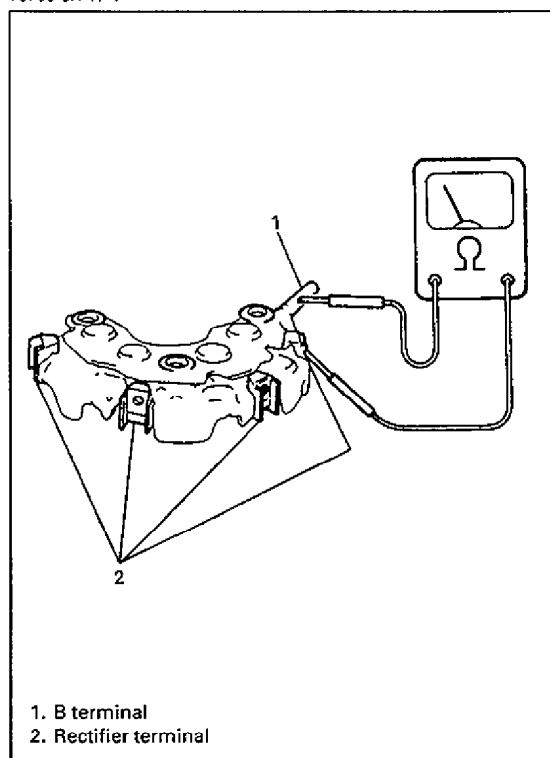
Exposed Brush Length

Check each brush for wear by measuring its length as shown. If brush is found worn down to service limit, replace brush. Refer to "Replace Brush" in this section.

Exposed brush length "a"

Standard : 10.5 mm (0.413 in.)

Limit : 4.5 mm (0.331 in.)



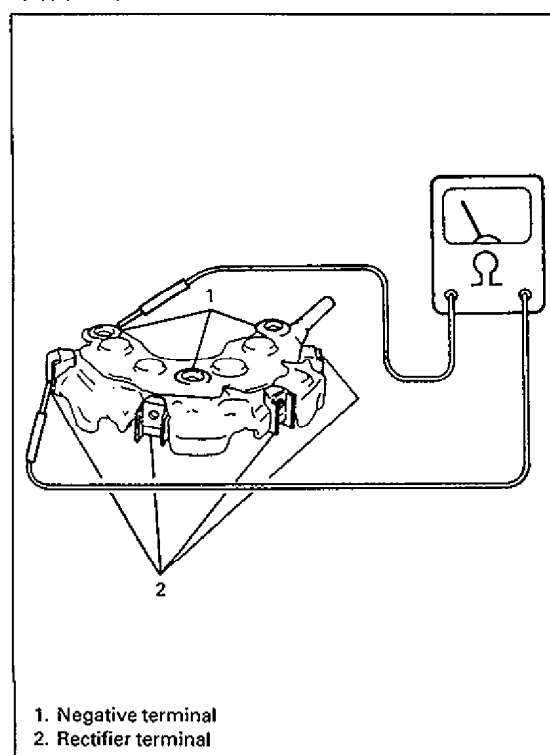
75F00-6H-17-3

RECTIFIER

Positive Rectifier

- 1) Using an ohmmeter, connect one tester probe to the B terminal and the other to each rectifier terminal.
- 2) Reverse the polarity of the tester probes and repeat step 1).
- 3) Check that one shows continuity and the other shows no continuity.

If there is continuity, replace the rectifier holder.

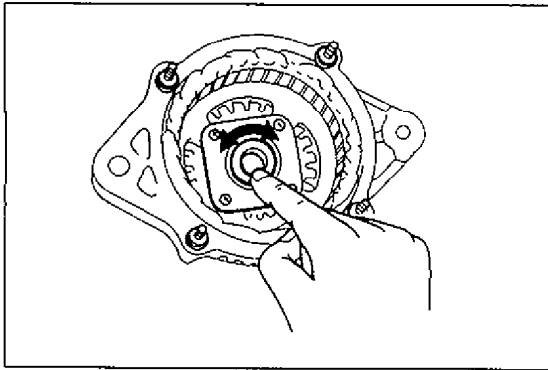


75F00-6H-17-5

Negative Rectifier

- 1) Using an ohmmeter, connect one tester probe to each negative terminal and the other to each rectifier terminal.
- 2) Reverse the polarity of the tester probes and repeat step 1).
- 3) Check that one shows continuity and the other shows no continuity.

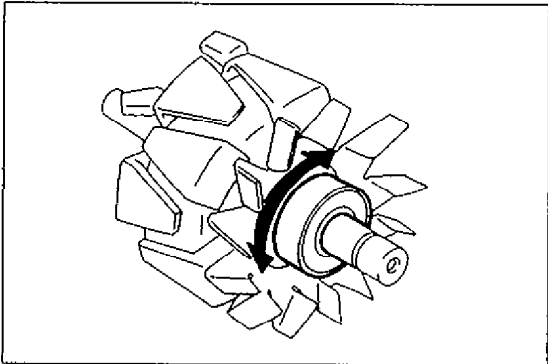
If there is continuity, replace the rectifier holder.



75F00-6H-18-1

BEARING**Drive End Bearing**

Check that the bearing is not rough or worn.

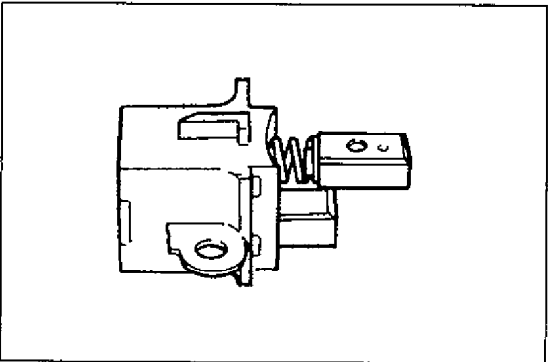


75F00-6H-18-2

End Housing Bearing

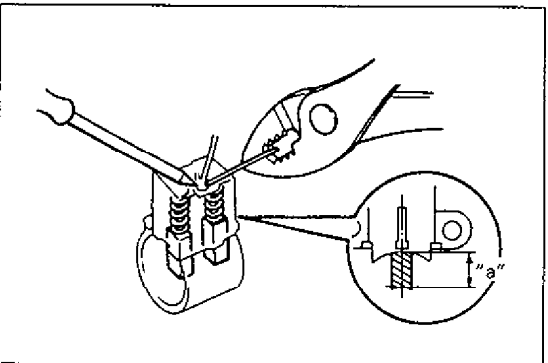
Check that the bearing is not rough or worn.

When removal is necessary, refer to 6H-15.

**REPLACE BRUSH**

- 1) Unsolder and remove the brush and spring.
- 2) Run the wire of a new brush through the hole in the brush holder, and insert the spring and brush into the brush holder.

75F00-6H-18-3

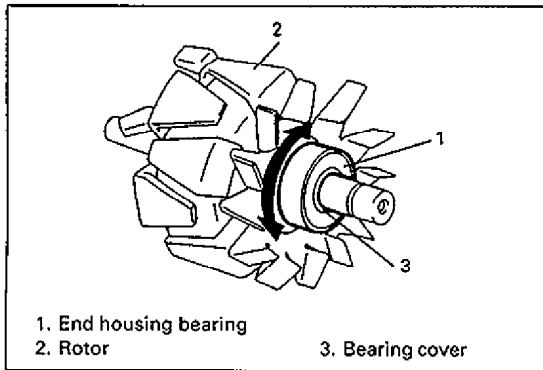


- 3) Solder the brush wire to the brush holder at specified exposed length.

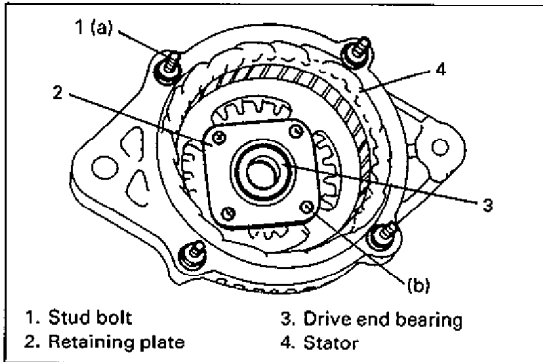
Exposed length "a": 10.5 mm (0.413 in.)

- 4) Check that the brush moves smoothly in the brush holder.
- 5) Cut off the excess wire.
- 6) Apply insulation paint to the soldered area.

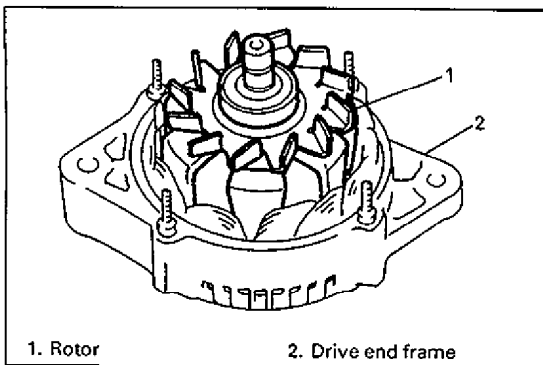
75F00-6H-18-4



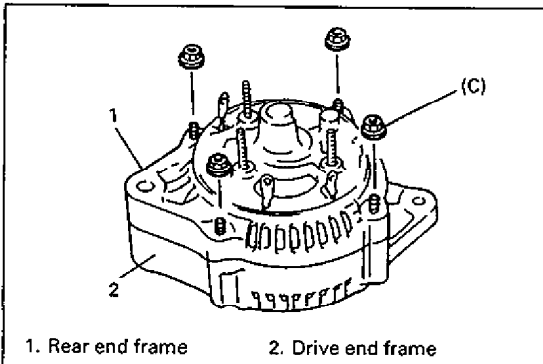
75F00-6H-19-1



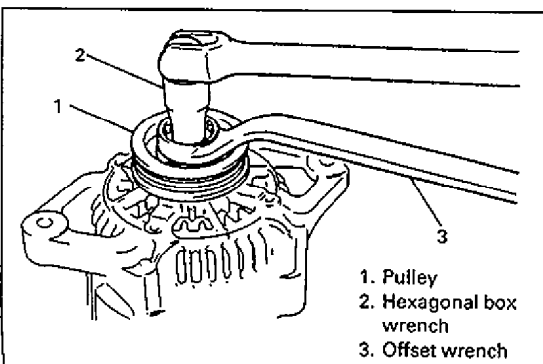
75F00-6H-19-2



75F00-6H-19-3



75F00-6H-19-4



75F00-6H-19-5

ASSEMBLY

- 1) If end housing bearing is removed, install it.
- 2) Check end housing bearing turns smoothly.

- 3) If stator is removed, install stator and tighten stud bolts.
- 4) If drive end bearing is removed, install it.
- 5) Check drive end bearing turns smoothly.

Tightening Torque

(a): 8.8 N·m (0.88 kg-m, 6.5 lb-ft)

(b): 2.6 N·m (0.26 kg-m, 2.0 lb-ft)

- 6) Place drive end frame on pulley, and then install rotor to drive end frame.

- 7) Install rear end frame to drive end frame.
- 8) Tighten 4 nuts to specified torque.

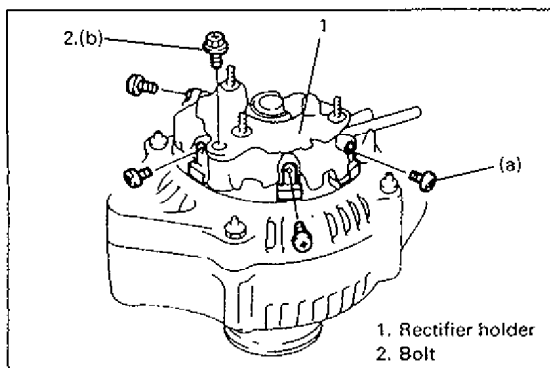
Tightening Torque

(C): 4.5 N·m (0.45 kg-m, 3.5 lb-ft)

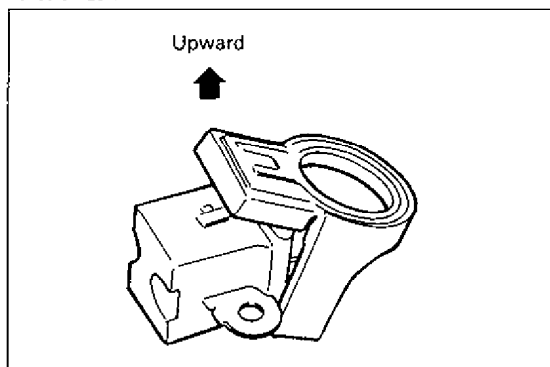
- 9) Install pulley and tighten pulley nut with holding shaft by using hexagonal box wrench to specified torque.

Tightening Torque

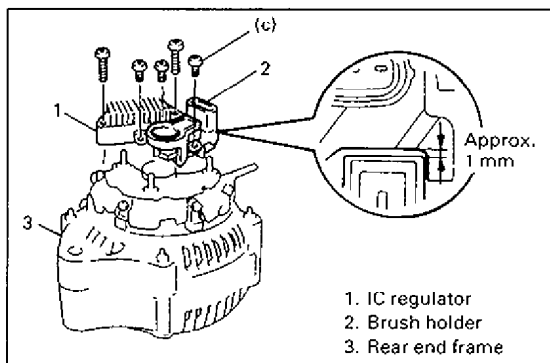
113 N·m (11.3 kg-m, 81.5 lb-ft)



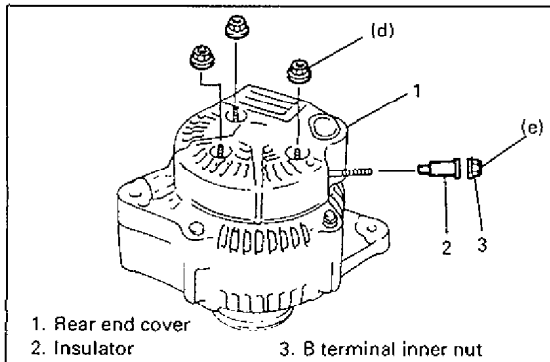
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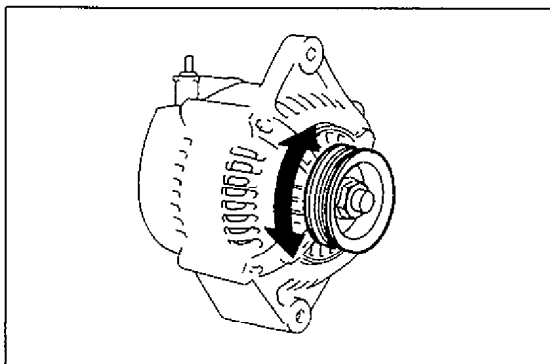
75F00-6H-20-2



75F00-6H-20-3



75F00-6H-20-4



75F00-6H-20-5

- 10) Install rectifier holder.

CAUTION:

When installing rectifier, check to confirm that stator leads have enough clearance with cooling fan blades.

Tightening Torque

(a): 2.0 N·m (0.2 kg-m, 1.5 lb-ft)

(b): 4.0 N·m (0.4 kg-m, 3.0 lb-ft)

- 11) Install brush holder cover to brush holder.

- 12) Place the IC regulator together with the brush holder horizontally on the rear end frame.

- 13) Install the 5 screws until there is a clearance of approx. 1 mm (0.04 in.) between the brush holder and connector.

Tightening Torque

(c): 2.0 N·m (0.2 kg-m, 1.5 lb-ft)

- 14) Install rear end cover.

Tightening Torque

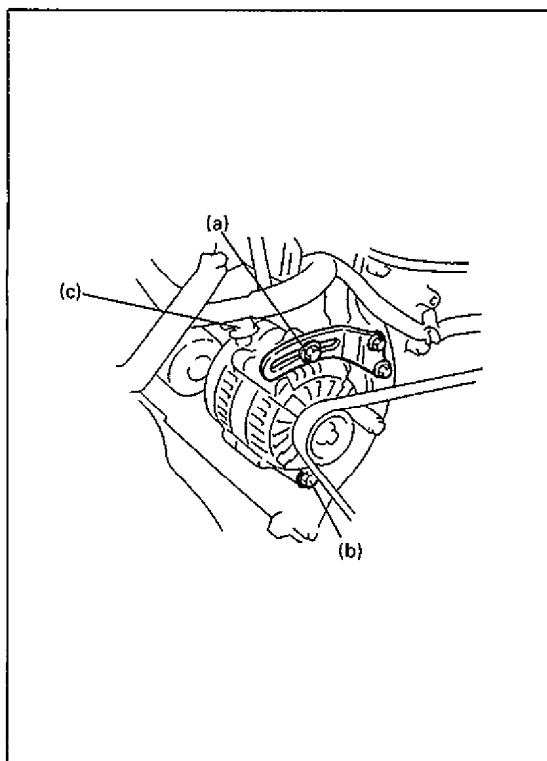
(d): 4.5 N·m (0.45 kg-m, 3.5 lb-ft)

- 15) Install insulator and tighten B terminal inner nut to specified torque.

Tightening Torque

(e): 4.2 N·m (0.42 kg-m, 3.0 lb-ft)

- 16) Make sure that rotor turns smoothly.



75F00-6H-21-1

INSTALLATION

Reverse above procedure giving specified tension to drive belt.

NOTE:

For belt tension, refer to SECTION 6B.

For right side drive shaft installation, refer to SECTION 4A.

Tightening Torque

(a): 23 N·m (2.3 kg-m, 16.5 lb-ft)

(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)

(c): 8 N·m (0.8 kg-m, 6.0 lb-ft)

SPECIFICATIONS

Rated voltage	12 V	Permissible ambient temperature	– 30 to 90 °C (– 22 to 194 °F)
Nominal output	60 A (at 13.5 V)		
Permissible max. speed	18,000 rpm	Polarity	Negative ground
No-load speed	1,150 rpm	Rotation	Clockwise viewed from pulley side
Setting voltage	13.6 to 14.4 V		

75F00-6H-21-3

TIGHTENING TORQUE SPECIFICATIONS

Fastening	Tightening torque		
	N·m	kg-m	lb-ft
1. Body ground bolt	8	0.8	6.0
2. Generator drive belt adjusting bolt	23	2.3	16.5
3. Generator pivot bolt	50	5.0	36.5
4. Generator bracket bolt	23	2.3	16.5
5. "B" terminal inner nut	4.2	0.42	3.0
6. "B" terminal outer nut	8	0.8	6.0
7. Pulley nut	113	11.3	81.5
8. Rear end frame nuts	4.5	0.45	3.5
9. Rear end cover nuts			
10. Negative rectifier fin bolt	4.0	0.4	3.0

75F00-6H-21-5

SECTION 6K

EXHAUST SYSTEM

NOTE:

Whether being equipped with three-way catalytic converter or not depends on regulations of each country.

CONTENTS

GENERAL DESCRIPTION	6K-2
MAINTENANCE	6K-3
ON-VEHICLE SERVICE	6K-4

6K

CAUTION:

THE ENGINE OF THIS VEHICLE REQUIRES THE USE OF UNLEADED FUEL ONLY. USE OF LEADED AND/OR LOW LEAD FUEL CAN RESULT IN DAMAGE AND REDUCE THE EFFECTIVENESS OF THE CATALYTIC CONVERTER

GENERAL DESCRIPTION

The exhaust system consists of a exhaust manifold, exhaust pipes, a muffler and seals, gasket and etc., and the three-way catalytic converter case has the three-way catalytic converter (TWC).

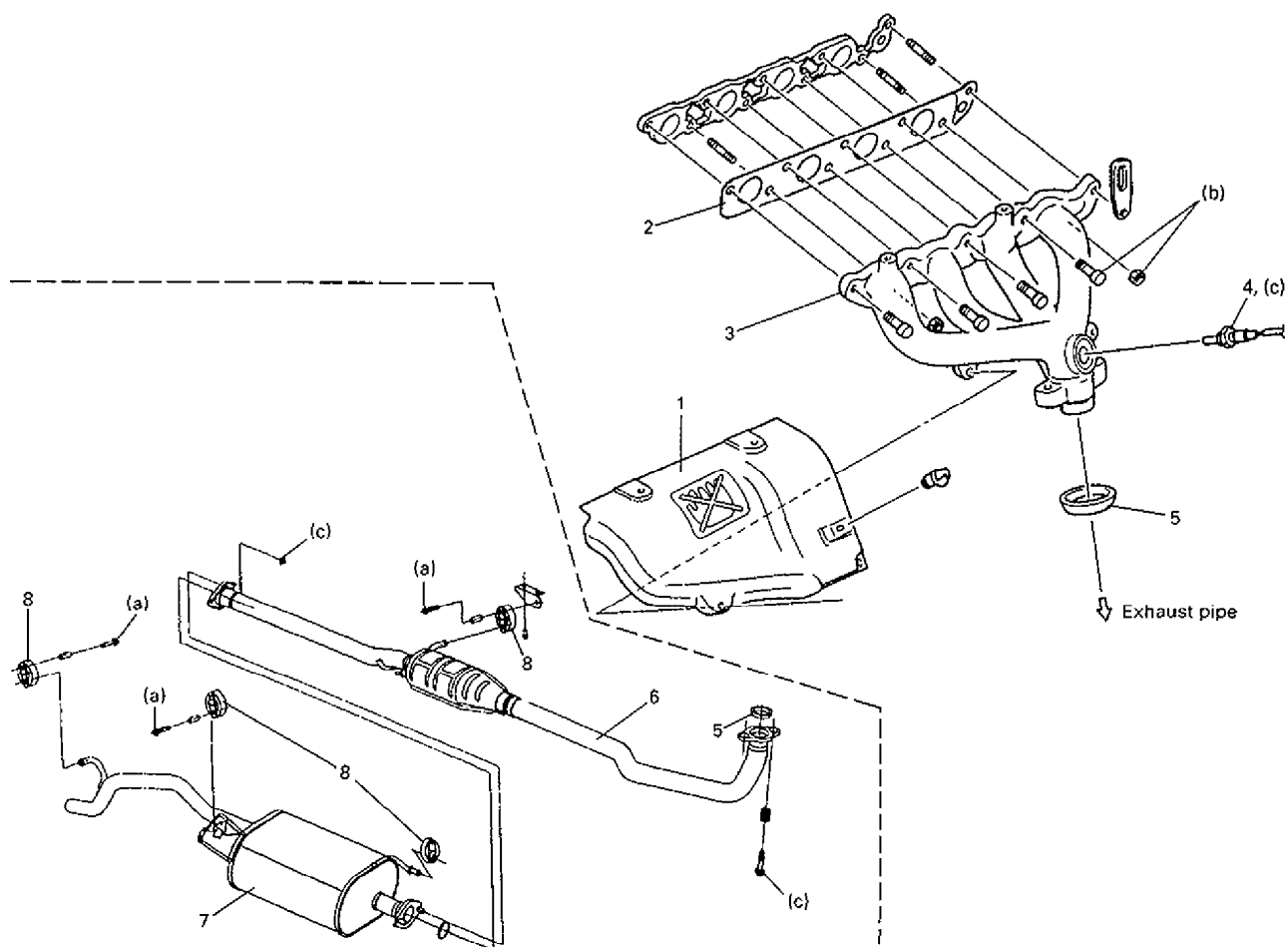
The three-way catalytic converter is an emission control device added to the exhaust system to lower the levels of Hydrocarbon (HC), Carbon Monoxide (CO), and Oxides of Nitrogen (NOx) pollutants in the exhaust gas.

THREE WAY CATALYTIC CONVERTER (if equipped)

The three way catalytic converter is provided in the exhaust system (exhaust pipe). The function of the catalyst is to reduce the emission of CO, HC and NOx in the exhaust gas by oxidizing or converting them into CO₂, H₂O and N₂ respectively.

EXHAUST SYSTEM

THE CATALYTIC CONVERTER REQUIRES USE OF UNLEADED FUEL ONLY.



1. Exhaust manifold cover
2. Gasket
3. Exhaust manifold
4. Oxygen sensor
5. Seal ring
6. Exhaust pipe
7. Muffler
8. Muffler mounting

Tightening torque

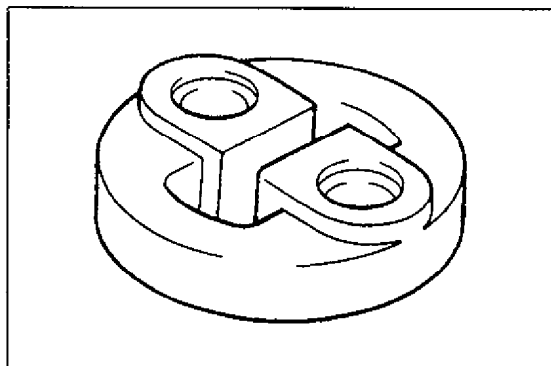
- (a) : 23 N·m (2.3 kg·m, 17.0 lb·ft)
 (b) : 23 N·m (2.3 kg·m, 17.0 lb·ft)
 (c) : 50 N·m (5.0 kg·m, 36.5 lb·ft)

MAINTENANCE

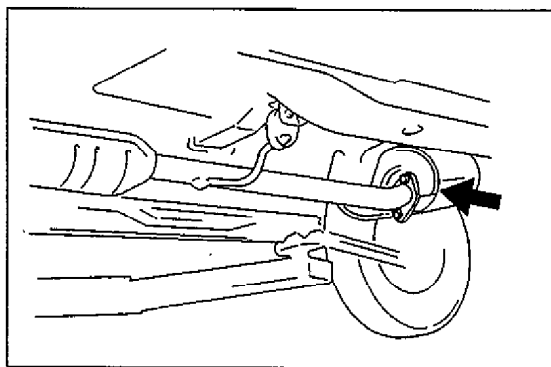
WARNING:

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

75F00-6K-3-1



75F00-6K-3-2



75F00-6K-3-3

At every interval of periodic maintenance service, and when vehicle is raised for other service, check exhaust system as follows:

- Check rubber mountings for damage, deterioration, and out of position.
- Check exhaust system for leakage, loose connection, dent and damage.
If bolts or nuts are loosened, tighten them to specified torque. Refer to page 6K-2 for torque data.
- Check nearby body areas for damaged, missing, or mispositioned part, open seam, hole, loose connection or any other defect which could permit exhaust fumes to seep into vehicle.
- Make sure that exhaust system components have enough clearance from underbody to avoid overheating and possible damage to passenger compartment carpet.
- Any defect should be fixed at once.

75F00-6K-3-4

ON-VEHICLE SERVICE

EXHAUST MANIFOLD

Refer to Section 6A4 for removal and installation procedures of exhaust manifold.

- Check gasket and seal for deterioration or damage.
Replace them as necessary.

75F00-6K-4-1

EXHAUST PIPE

For replacement of exhaust pipe, be sure to hoist vehicle and observe WARNING under "Maintenance" and following.

CAUTION:

As exhaust pipe and pre-catalytic converter have three way catalytic converter in it, it should not be exposed to any impulse.

Be careful not to drop it or hit it against something.

- Tighten bolts and nuts to specified torque when reassembling.
Refer to page 6K-2 for location of bolts and nuts.
- After installation, start engine and check each joint of exhaust system for leakage.

75F00-6K-4-3

SECTION 7A

MANUAL TRANSMISSION

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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).

7A

CONTENTS

GENERAL DESCRIPTION	7A- 2	Input shaft assembly	7A-16
DIAGNOSIS	7A- 6	Countershaft assembly	7A-19
ON-VEHICLE SERVICE	7A- 7	Gear shifter	7A-23
Oil Change	7A- 7	Differential assembly	7A-25
Differential Side Oil Seal	7A- 8	Assembly	7A-27
Gear Shift Control Lever and Rod	7A-10	Right case	7A-27
Vehicle Speed Sensor		Left case	7A-28
(VSS, Speedometer Driven Gear)	7A-12	Differential to left case	7A-29
Transmission Assembly	7A-12	Fifth gears	7A-31
UNIT REPAIR	7A-13	Gear shift & select shaft	
Disassembly	7A-13	assembly	7A-33
Fifth gears	7A-13	TIGHTENING TORQUE	
Gear shifter, main shaft and		SPECIFICATIONS	7A-35
countershaft	7A-14	REQUIRED SERVICE MATERIALS	7A-36
Right case	7A-15	SPECIAL TOOLS	7A-36

GENERAL DESCRIPTION

The transmission provides five forward speeds and one reverse speed by means of three synchronizers and three shafts—input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

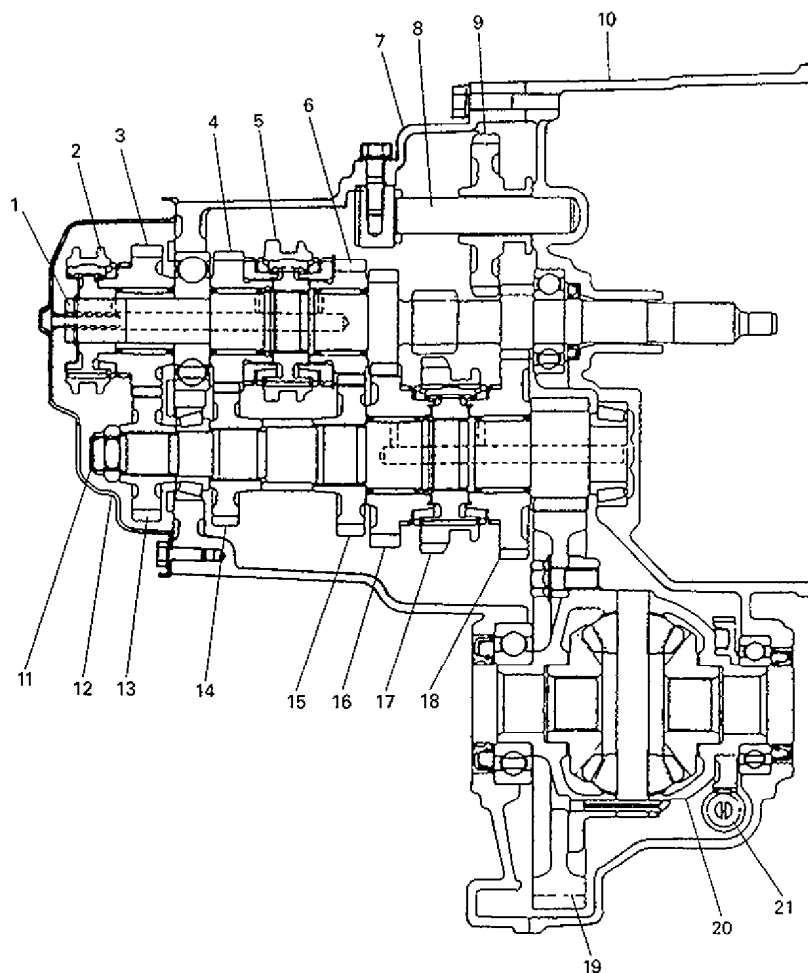
The low speed synchronizer is mounted on counter shaft and engaged with counter shaft first gear or second gear, while the high speed synchronizer is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

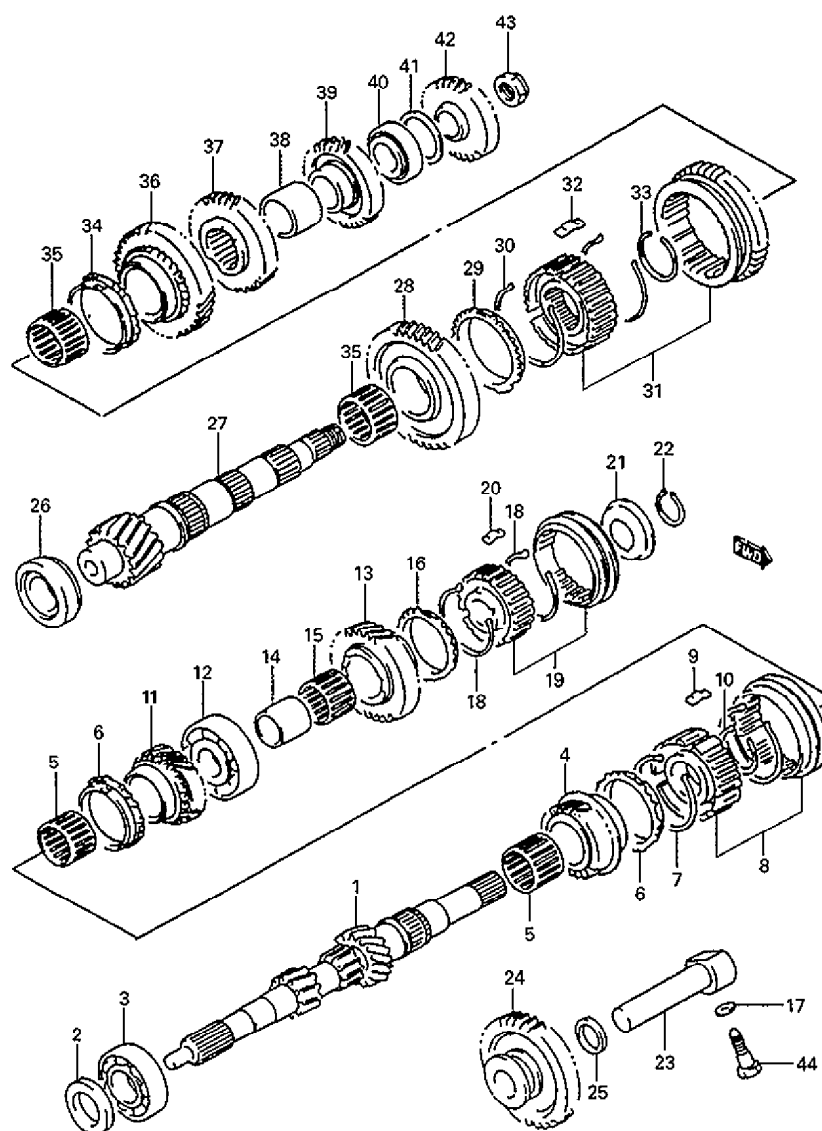
The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transmission case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

Further, care must be taken to adjust preload of counter shaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.



1. Input shaft
2. 5th speed sleeve & hub
3. Input shaft 5th gear
4. Input shaft 4th gear
5. High speed sleeve & hub
6. Input shaft 3rd gear
7. Left case
8. Reverse gear shaft
9. Reverse idler gear
10. Right case
11. Countershaft
12. Left cover
13. Countershaft 5th gear
14. Countershaft 4th gear
15. Countershaft 3rd gear
16. Countershaft 2nd gear
17. Low speed sleeve & hub
18. Countershaft 1st gear
19. Final gear
20. Differential case
21. Speedometer driven gear



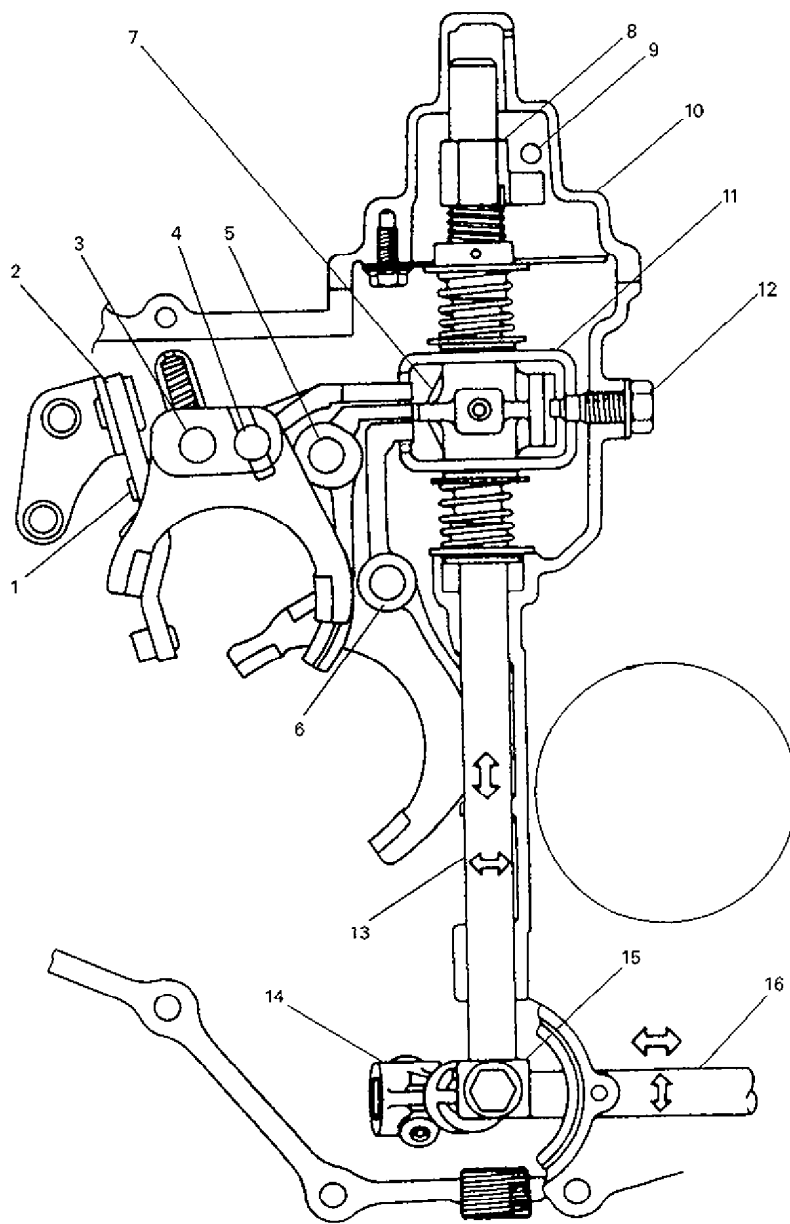
1. Input shaft
2. Oil seal
3. Input shaft R bearing
4. Input shaft 3rd gear
5. 3rd & 4th gear bearing
6. High speed synchronizer ring
7. High speed synchronizer spring
8. High speed sleeve & hub
9. High speed synchronizer key
10. Circlip
11. Input shaft 4th gear
12. Input shaft L bearing
13. Input shaft 5th gear
14. 5th gear spacer
15. 5th gear bearing

16. 5th speed synchronizer ring
17. Washer
18. 5th synchronizer spring
19. 5th speed sleeve & hub
20. 5th synchronizer key
21. 5th synchronizer hub plate
22. Circlip
23. Reverse gear shaft
24. Reverse idler gear
25. Reverse shaft washer
26. Countershaft R bearing
27. Countershaft
28. Countershaft 1st gear
29. 1st gear synchronizer ring
30. Low speed synchronizer spring

31. Low speed sleeve & hub
32. Low speed synchronizer key
33. Circlip
34. 2nd gear synchronizer ring
35. 1st & 2nd gear bearing
36. Countershaft 2nd gear
37. Countershaft 3rd gear
38. 3rd & 4th gear spacer
39. Countershaft 4th gear
40. Countershaft L bearing
41. Bearing set shim
42. Countershaft 5th gear
43. Countershaft nut
44. Reverse shaft bolt

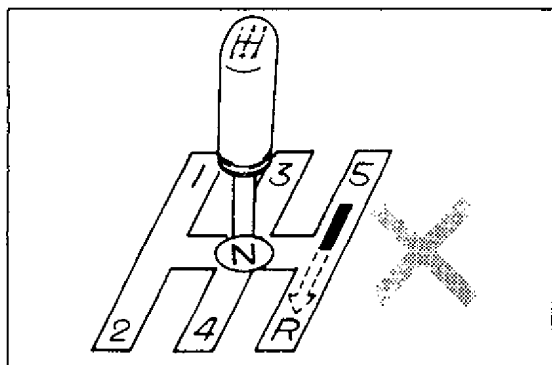
GEAR SHIFT MECHANISM

Movement of gear shift control lever is transmitted to gear shift shaft through gear shift control shaft, and gear shift & select shaft through gear shift arm and gear shift yoke, and then gear shift & select lever to each gear shift yoke, shaft and fork or arm. Gear shift interlock plate is provided to prevent the gear from engaging double.



1. Reverse gear shift arm
2. Reverse gear shift lever
3. 5th & REV gear shift guide shaft
4. 5th & REV gear shift shaft
5. High speed gear shift shaft
6. Low speed gear shift shaft
7. Gear shift & select lever
8. 5th & REV gear shift cam
9. 5th to REV interlock guide bolt
10. Gear shift guide case
11. Gear shift interlock plate
12. Gear shift interlock bolt
13. Gear shift & select shaft
14. Gear shift arm
15. Gear shift yoke
16. Gear shift shaft

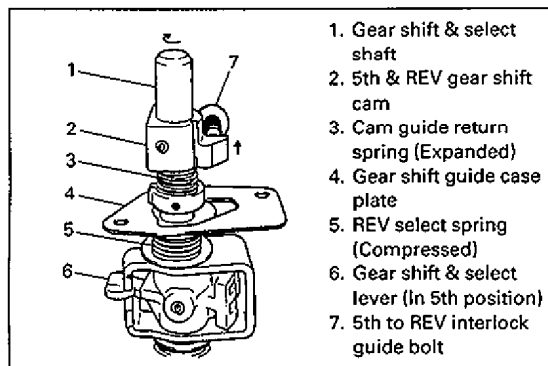
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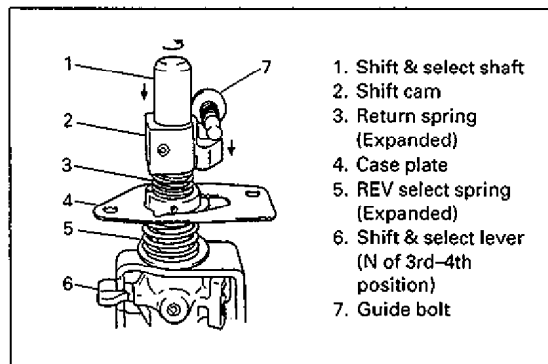
75F00-7A-4-5

5TH & REVERSE GEAR SHIFT CAM

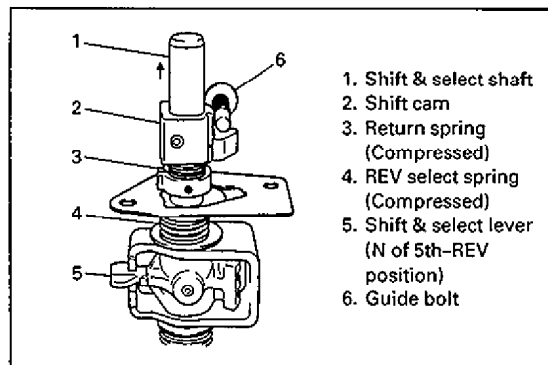
5th & reverse gear shift cam, cam guide return spring and 5th to reverse interlock guide bolt are provided to prevent the gear from being directly shifted from 5th to reverse.



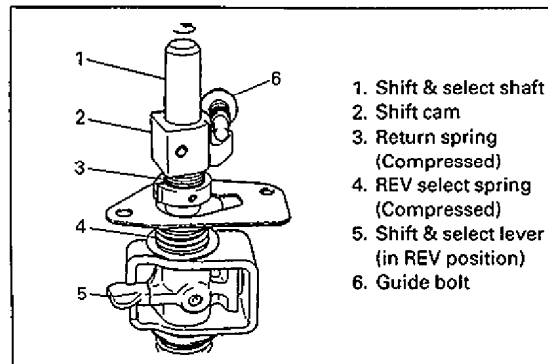
75F00-7A-5-1



75F00-7A-5-2



75F00-7A-5-3



75F00-7A-5-4

1) When gear is shifted to 5th speed, 5th & reverse gear shift cam turns clockwise with gear shift & select shaft and it is pushed up by cam guide return spring to the position where interlock guide bolt prevents the cam from being shifted to reverse straight.

2) Shifting from 5th to neutral is available and further shift to reverse is interrupted.

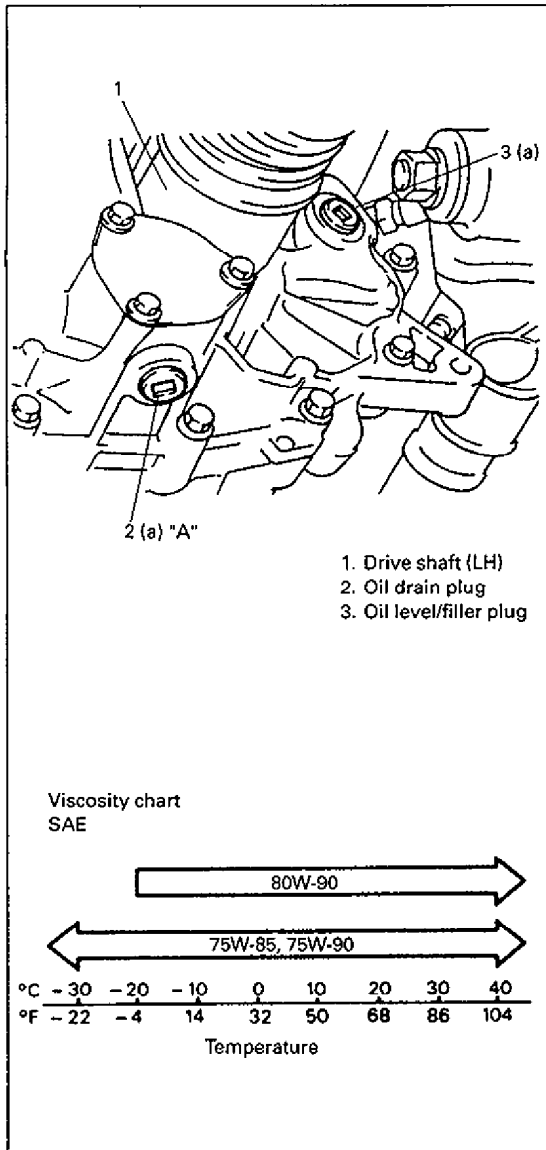
However, when shift & select shaft is moved to neutral of 3rd-4th position, shift limit cam mechanism is canceled as shown in figure.

3) Selected position in neutral of 5th-REV is shown in figure. While shift & select shaft moves up to allow shift & select lever to shift in 5th or reverse position, shift cam stays because of interference of guide bolt.

4) Now the mechanism is ready to be shifted to reverse without interference of shift cam.

DIAGNOSIS

Condition	Possible Cause	Correction
Gears slipping out of mesh	• Worn shift fork shaft • Worn shift fork or synchronizer sleeve • Weak or damaged locating springs • Worn bearings on input shaft or counter-shaft • Worn chamfered tooth on sleeve and gear	Replace. Replace. Replace. Replace. Replace sleeve and gear.
Hard shifting	• Inadequate lubricant • Improper clutch pedal free travel • Distorted or broken clutch disc • Damaged clutch pressure plate • Worn synchronizer ring • Worn chamfered tooth on sleeve or gear • Worn gear shift control shaft joint bush • Distorted shift shaft	Replenish. Adjust. Replace. Replace clutch cover. Replace. Replace sleeve or gear. Replace. Replace.
Noise	• Inadequate or insufficient lubricant • Damaged or worn bearing(s) • Damaged or worn gear(s) • Damaged or worn synchronizer parts	Replenish. Replace. Replace. Replace.



75F00-7A-7-3

ON-VEHICLE SERVICE

OIL CHANGE

- 1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
- 2) With vehicle lifted up, check oil level and leakage. If leakage exists, correct it.
- 3) Drain old oil and fill new specified oil by specified amount (up to level hole).
- 4) Torque drain and level/filler plugs as specified below. Apply sealant to thread of drain plug before installation.

"A": Sealant 99000-31110

Tightening Torque

(a): 21 N·m (2.1 kg-m, 15.5 lb-ft)

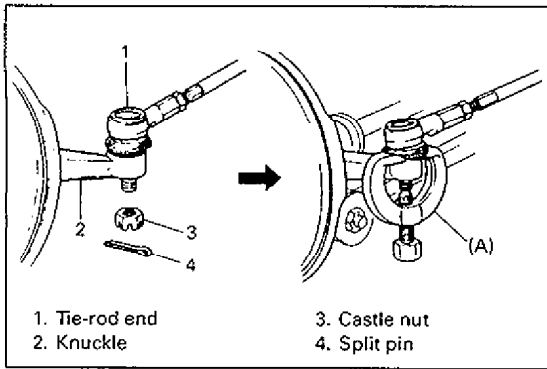
NOTE:

- It is recommended to use API GL-4 75W-90 gear oil.
- Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

Oil specification: API GL-4

For SAE classification, refer to viscosity chart at the left.

Oil capacity: 2.1 liters (4.5/3.7 US/Imp. pt)



75F00-7A-8-1

DIFFERENTIAL SIDE OIL SEAL REPLACEMENT

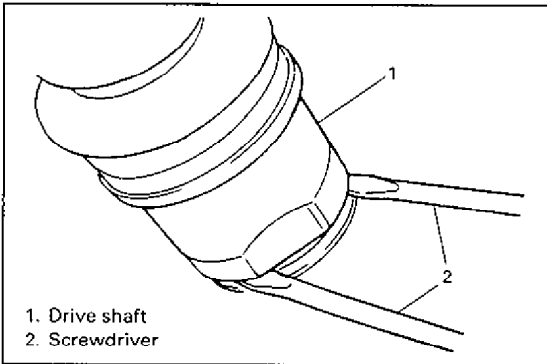
- 1) Lift up vehicle and drain transmission oil.
- 2) Remove wheel, and then remove tie-rod end split pin and castle nut.
- 3) Disconnect tie-rod end from knuckle by using special tool.

Special Tool

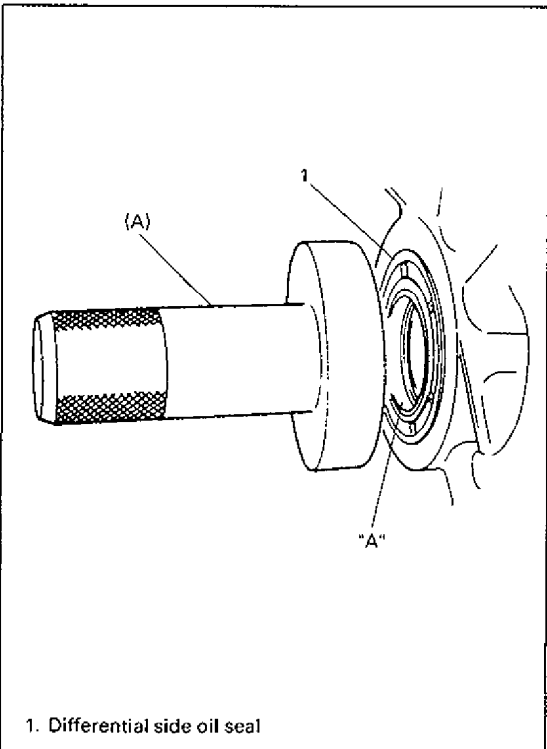
(A): 09913-65210

- 4) Remove two stabilizer mount brackets from vehicle body.
- 5) Remove ball stud bolt and then separate suspension arm from knuckle.

75F00-7A-8-2



75F00-7A-8-3



- 6) By using large size screwdrivers, pull out drive shaft joint so as to release snap ring fitting of joint spline at differential side.

Pushing knuckle portion outward, detach drive shaft at differential side.

- 7) Remove oil seal and install a new one until it becomes flush with case surface by using special tool and hammer.

NOTE:

When installing oil seal, face its spring side inward.

Special Tool

(A): 09913-75810 (for RH)

09913-75520 (for LH)

- 8) Apply grease to oil seal lip and at the same time check drive shaft where oil seal contacts and make sure of its smoothness.

"A": Grease 99000-25010

75F00-7A-8-5

- 9) Insert drive shaft joint to differential gear.

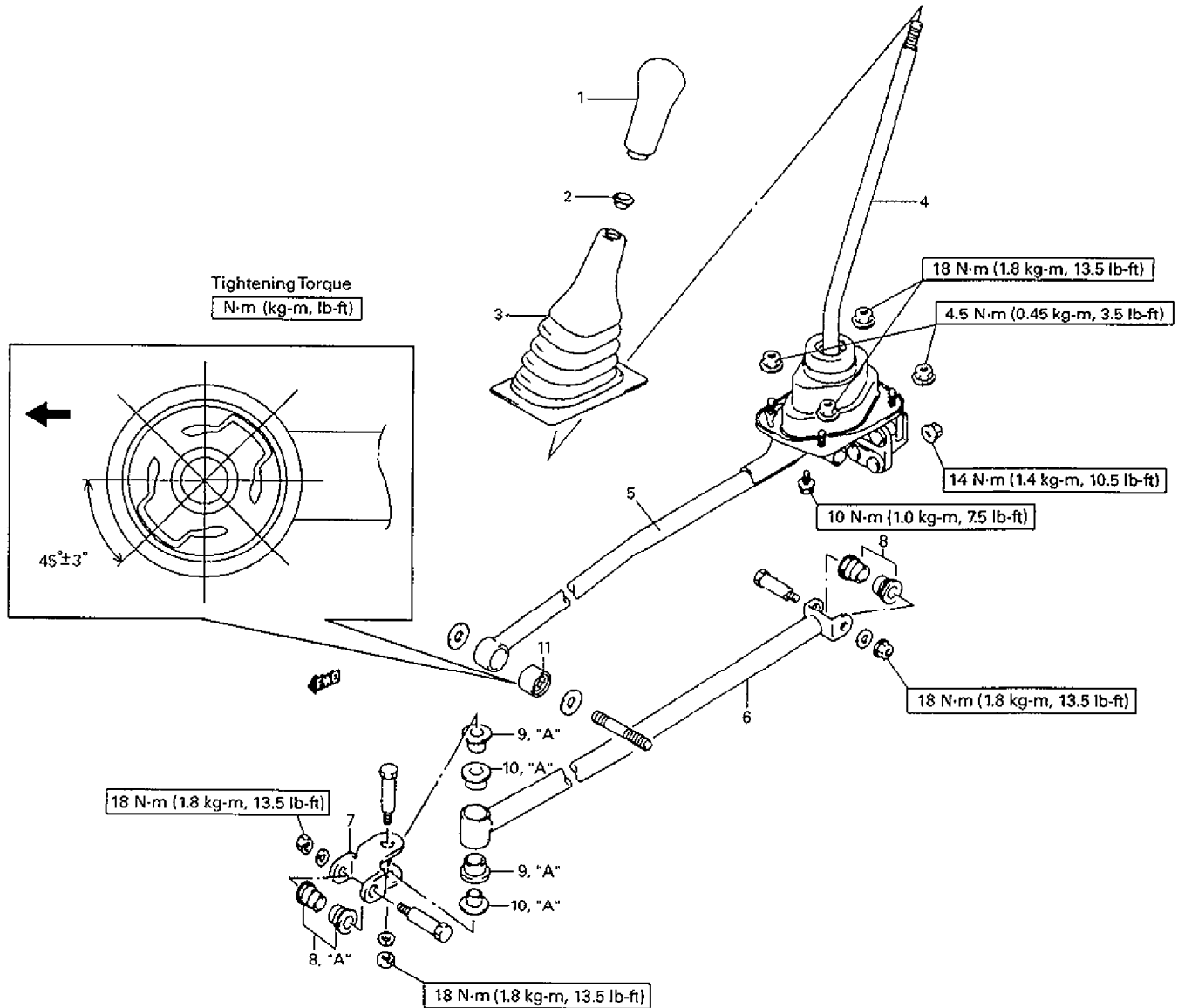
CAUTION:

- Be careful not to scratch oil seal lip with drive shaft joint while inserting.
- Make sure to insert drive shaft joint fully and seat its snap ring as it was.
- Do not hit joint boot with hammer or the like. Nothing but hands is allowed to use when inserting joint.

- 10) Connect ball stud with knuckle and fasten with bolt to specification, refer to Section 4A.
- 11) Connect tie-rod end with knuckle and fasten castle nut to specified torque, refer to Section 4A.
Install split pin and bend it.
- 12) Install stabilizer mount brackets, fasten bolts to specified torque referring to Section 4A.
- 13) Fill transmission oil as specified and make sure that oil has been sealed with oil seal.

GEAR SHIFT CONTROL LEVER AND ROD

1. Gear shift control lever knob
 2. Lever boot holder
 3. Gear shift lever boot
 4. Gear shift lever set
 5. Extension rod set
 6. Gear shift control shaft
 7. Gear shift control joint
 8. Shift control joint bush
 9. Bush
 10. Bush
 11. Extension bush
- "A": Apply grease



REMOVAL

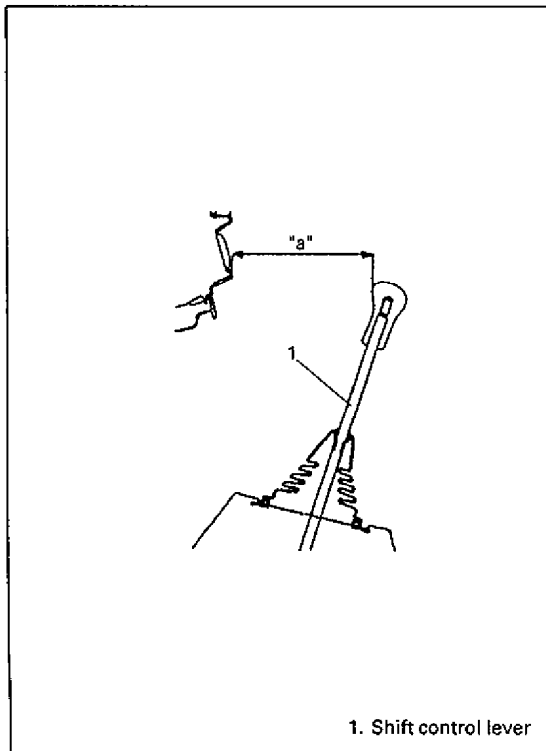
- 1) Disconnect gear shift control shaft from gear shift lever by removing control shaft bolt and nut.
- 2) Loosen extension rod nut at transmission end and then move extension rod.
- 3) Remove console box.
- 4) Remove 4 control lever housing nuts and gear shift lever set with extension rod set from body.

75F00-7A-11-1

INSTALLATION

- 1) Apply grease to turning or sliding portions.
- 2) If knob has been removed from lever, apply thread lock cement and then install knob to control lever. Make sure that knob is aligned with lever.

75F00-7A-11-2



75F00-7A-11-4

- 3) Install control lever assembly and related parts as they were. For positioning control lever, loosely install extension rod bolts and 4 control lever housing nuts first, adjust position and then tighten those nuts and bolts. (Refer to page 7A-10.)

NOTE:

- Do not apply grease to extension rod bush of transmission end.
- Apply grease to gear shift control shaft bushes.
- Make sure that boots are installed correctly.

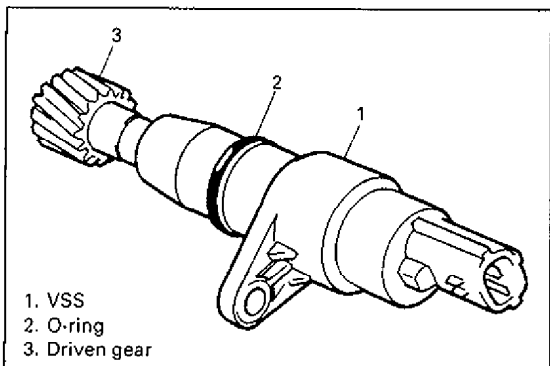
Distance "a": 189 – 219 mm (7.4 – 8.6 in.)

NOTE:

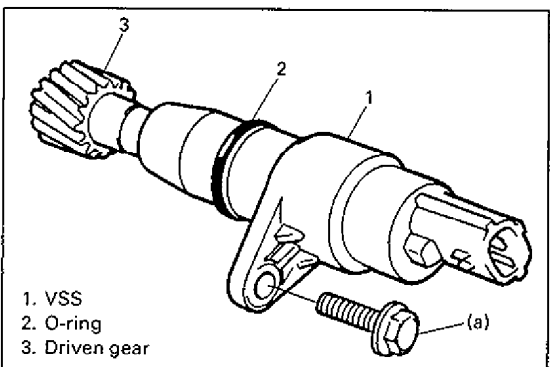
Check control lever for smooth movement after assembly.



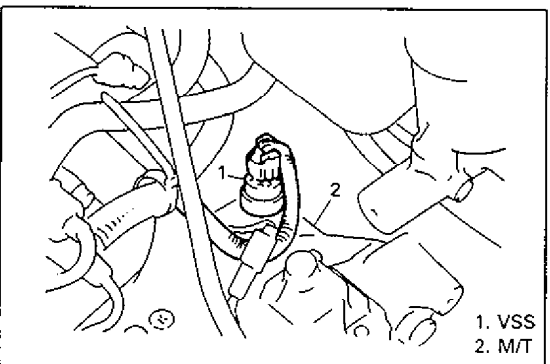
75F00-7A-12-1



75F00-7A-12-2



75F00-7A-12-3



75F00-7A-12-4

VEHICLE SPEED SENSOR (VSS, SPEEDOMETER DRIVEN GEAR)

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect VSS coupler.

- 3) Remove VSS.

INSTALLATION

- 1) Check O-ring and VSS surface for their flawlessness, apply oil to O-ring and driven gear and then install VSS to transmission.

Tightening Torque

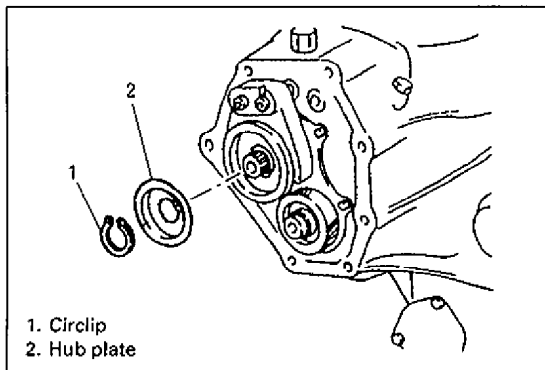
(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 2) Connect VSS coupler.
- 3) Connect negative cable at battery.

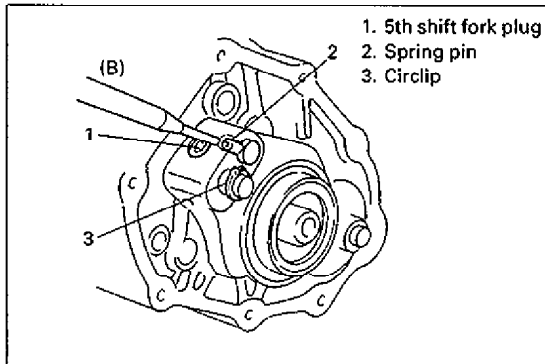
TRANSMISSION ASSEMBLY

REMOVAL AND INSTALLATION

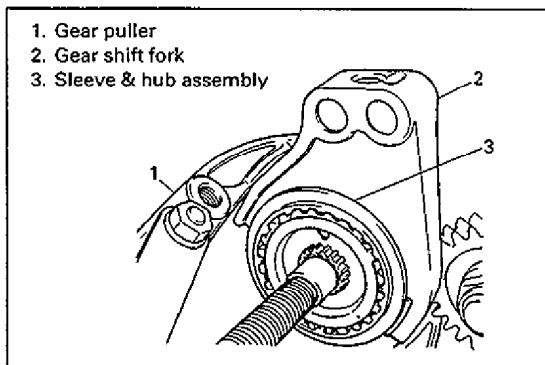
Remove or install transmission assembly with engine referring to Section 6A4 "Engine Mechanical", and separate or combine transmission and engine.



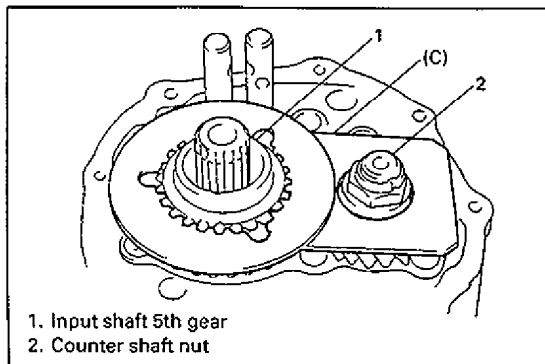
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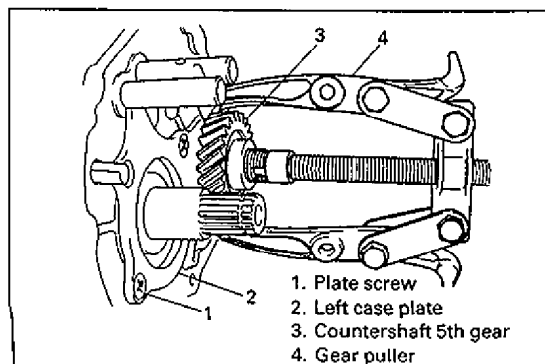
75F00-7A-13-2



75F00-7A-13-3



75F00-7A-13-4



75F00-7A-13-5

UNIT REPAIR DISASSEMBLY

FIFTH GEARS

- 1) Remove 8 bolts and take off transmission side cover.
- 2) Using special tool, remove circlip and then hub plate.

CAUTION:

Care should be taken not to distort side cover when it is removed from left case.

- 3) Remove shift fork plug and guide ball.

NOTE:

Use of magnet would facilitate removal of guide ball.

- 4) Drive out spring pin by using special tool and hammer and remove circlip.

Special Tool

(B): 09922-85811

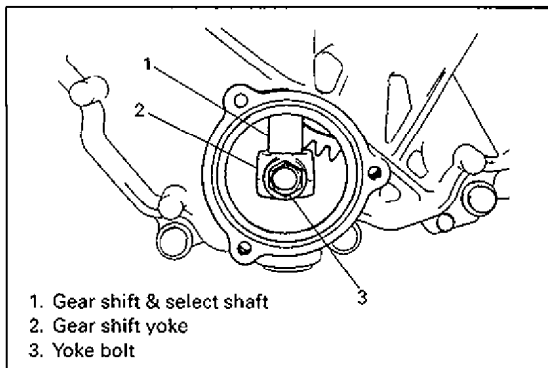
- 5) Remove gear shift fork, sleeve & hub assembly, synchronizer ring and 5th gear all together. Gear puller is required for this work.

- 6) Unfasten caulking of countershaft nut, install main shaft 5th gear and special tool to stop rotation of shafts, and then remove countershaft nut.

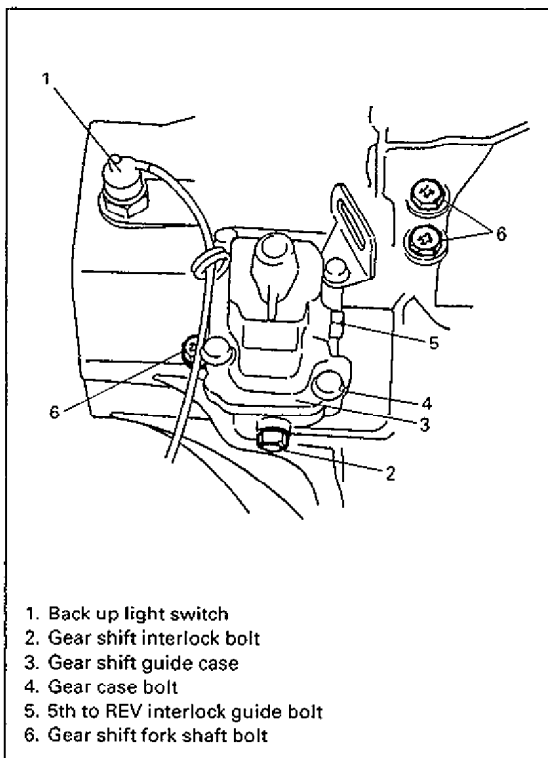
Special Tool

(C): 09927-76010

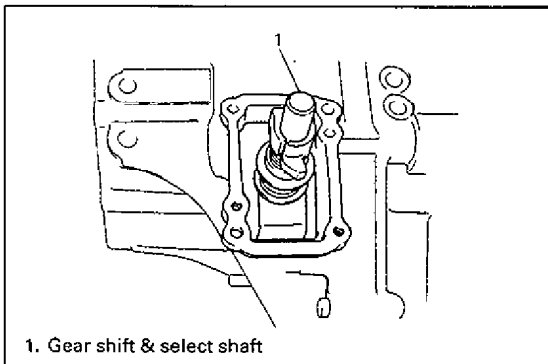
- 7) Remove special tool, main shaft 5th gear, needle bearing and then counter shaft 5th gear. Gear puller would be necessary if spline fitting of counter shaft 5th gear is tight.
- 8) Remove 5 screws and take off left case plate, and then bearing set shim.



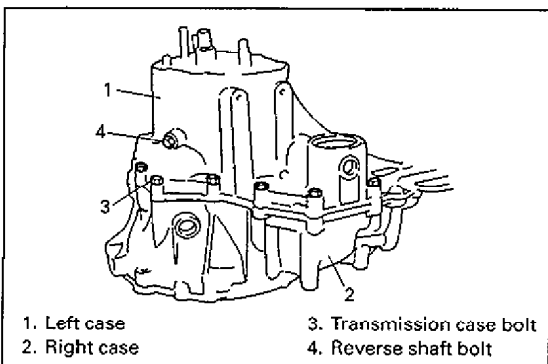
75F00-7A-14-1



75F00-7A-14-3



75F00-7A-14-4



75F00-7A-14-5

GEAR SHIFTER, MAIN SHAFT AND COUNTERSHAFT

- 1) Remove 3 bolts from left case cap and then take off cap.
- 2) Remove gear shift yoke bolt.

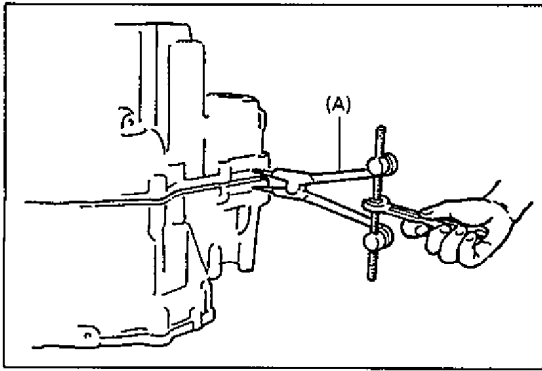
- 3) Remove 3 gear shift fork shaft bolts with washers, then take out locating springs and steel balls.
- 4) Remove 4 bolts from gear shift guide case, and then remove wiring harness clamp bracket and guide case.
- 5) Remove gear shift interlock bolt with washer.
- 6) Remove back up light switch.

NOTE:

Removal of 5th to REV interlock bolt is not necessary for removing gear shift & select shaft assembly.

- 7) Pull out gear shift & select shaft assembly.

- 8) Remove reverse shaft bolt with washer.
- 9) Remove 11 case bolts from outside and another 3 from clutch housing side.

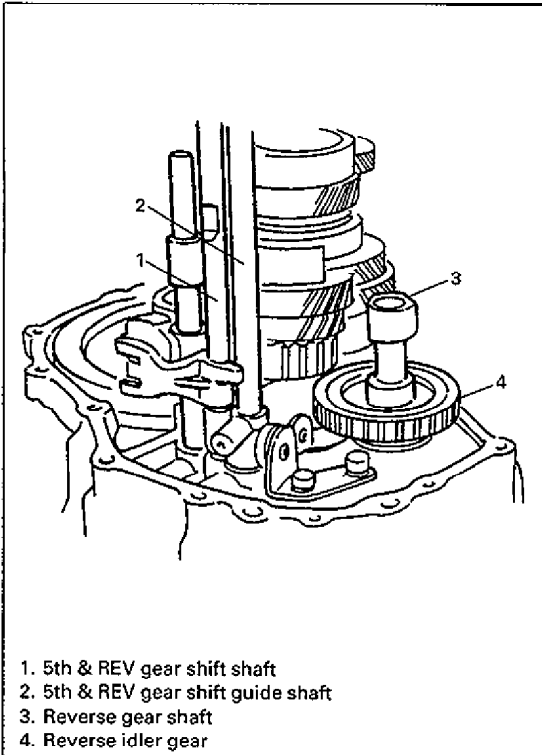


75F00-7A-15-1

- 10) Tapping left case flanges with plastic hammer, remove left case by using special tool.

Special Tool

(A): 09912-34510

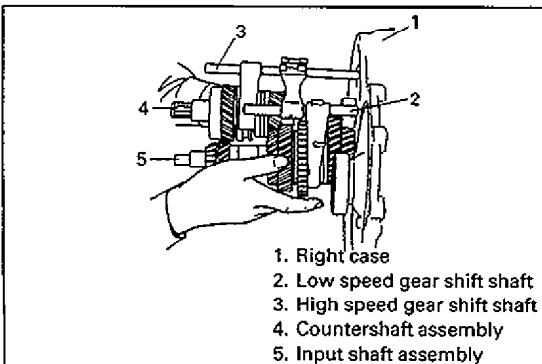


75F00-7A-15-3

- 11) Remove gear shift yoke, and reverse gear shift lever.
 12) Pull out reverse gear shaft with washer, then take off reverse idler gear.
 13) Pull out 5th & REV gear shift guide shaft together with 5th & REV gear shift shaft.

NOTE:

When removing 5th & REV gear shift shaft and guide shaft, push up high speed gear shift shaft and shift it to 4th to facilitate removal of 5th & REV shifter.



75F00-7A-15-4

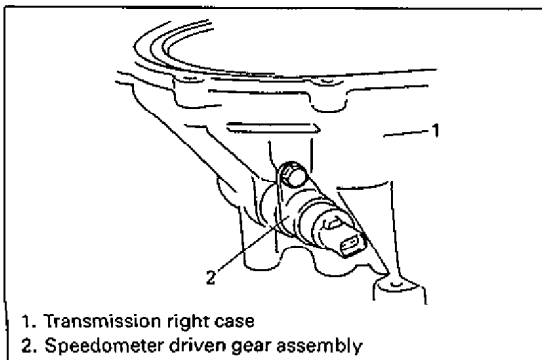
- 14) Tapping input shaft end with plastic hammer, push it out as assembly from case a little, then take out input shaft assembly, counter shaft assembly, high speed gear shift shaft and low speed gear shift shaft all at once.
 15) Remove countershaft L bearing cup from left case.
 16) Remove differential side L oil seal also from left case.

RIGHT CASE

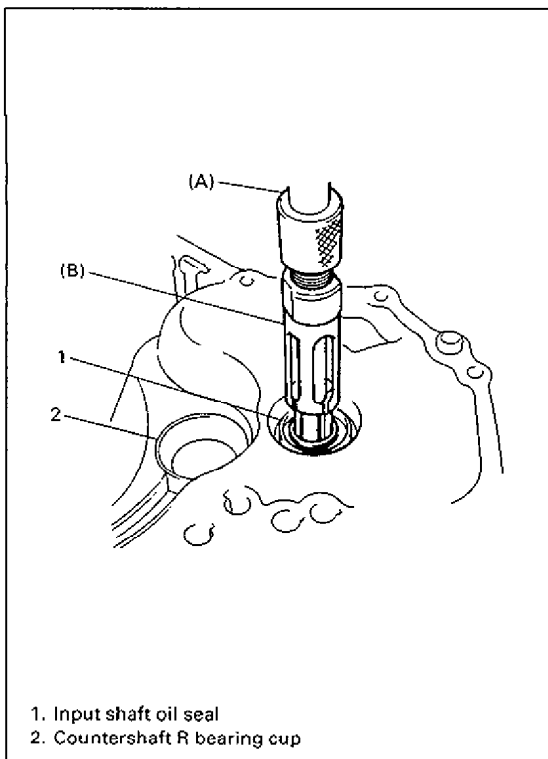
- 1) Remove differential gear assembly from right case.
 2) Remove bolt and then pull out speedometer driven gear.

CAUTION:

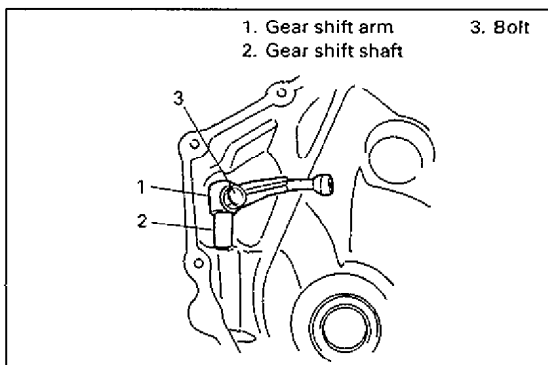
Be careful not to damage speedometer driven gear case when removing it.



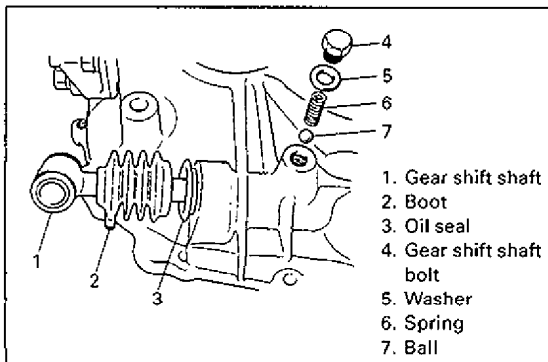
75F00-7A-15-5



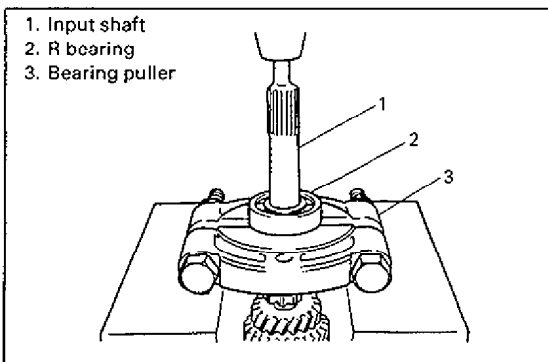
75F00-7A-16-2



75F00-7A-16-3



75F00-7A-16-4



75F00-7A-16-5

- 3) Remove input shaft oil seal by using special tools (combination of bearing remover and sliding shaft).

Special Tool

(A): 09930-30102

(B): 09923-74510

- 4) Also pull out countershaft R bearing cup by using special tools.

Special Tool

(A): 09930-30102

(B): 09941-64511

NOTE:

If input shaft R bearing has been left in right case, pull it out by using bearing remover 09923-74510 with sliding shaft 09930-30102.

- 5) Remove bolt and then pull out gear shift arm.

- 6) Remove gear shift shaft bolt with washer, then take out spring and steel ball.

- 7) Remove gear shift shaft, boot and oil seal.

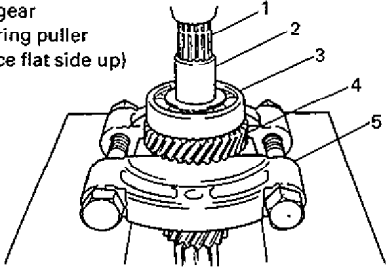
- 8) Remove differential side R oil seal from right case.

INPUT SHAFT ASSEMBLY

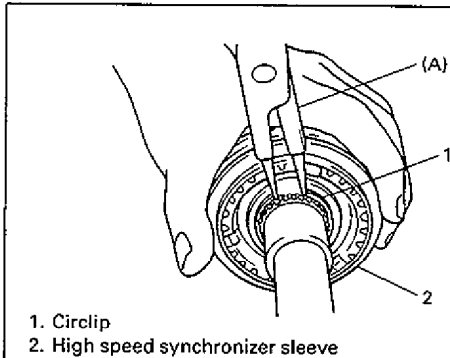
DISASSEMBLY

- 1) Remove input shaft R bearing by using bearing puller and press.

1. Input shaft
2. 5th gear spacer
3. L bearing
4. 4th gear
5. Bearing puller
(Place flat side up)

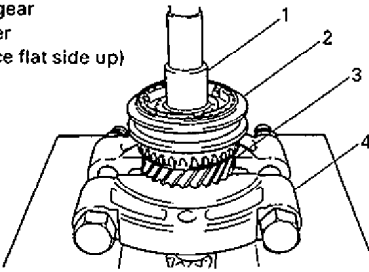


75F00-7A-17-1

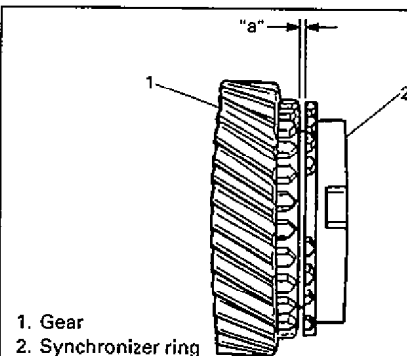


75F00-7A-17-2

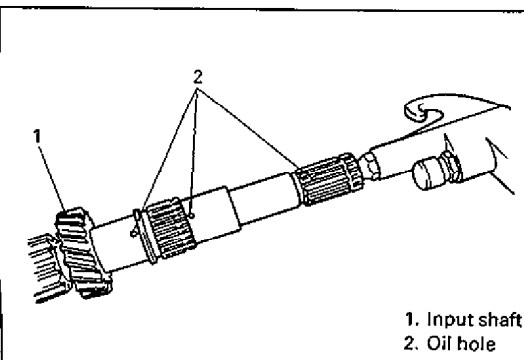
1. Input shaft
2. High speed synchronizer sleeve & hub assembly
3. 3rd gear
4. Puller
(Place flat side up)



75F00-7A-17-3



75F00-7A-17-4



75F00-7A-17-5

- 2) Drive out 5th gear spacer, L bearing and 4th gear all at once by using puller and press.

CAUTION:

- To avoid gear tooth from being damaged, support it at flat side of bearing puller.
- Stop press work in the middle way and take out 5th gear spacer to prevent it from being compressed and then continue to remove bearing with gear.

- 3) Take out 4th gear needle bearing and high speed synchronizer ring.
- 4) Using special tool, remove circlip.

NOTE:

For smooth removal of circlip, it is recommended to correct tool tips to be flat.

Special Tool

(A): 09900-06107

- 5) Drive out high speed synchronizer sleeve & hub assembly together with 3rd gear by using puller and press.

CAUTION:

Make sure to use flat side of puller to avoid causing damage to 3rd gear tooth.

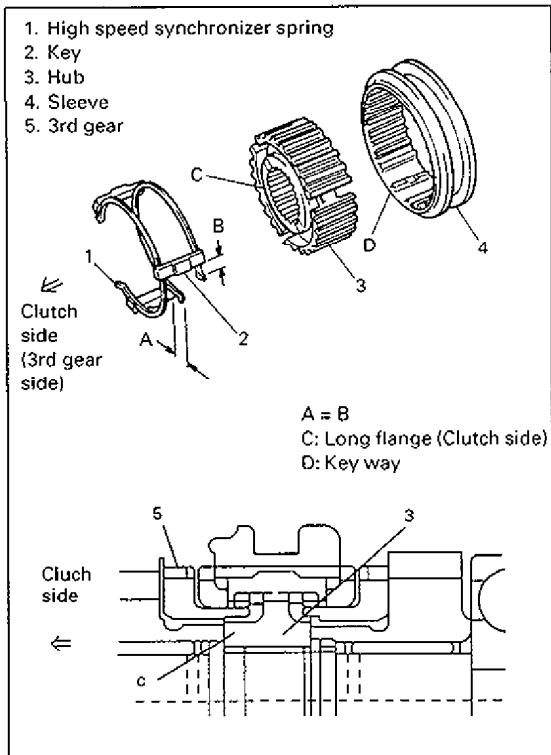
- 6) Take out 3rd gear needle bearing from shaft.
- 7) Disassemble synchronizer sleeve & hub assembly.

INSPECTION AND REASSEMBLY

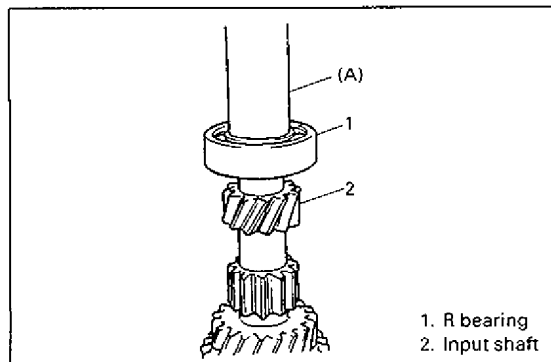
- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) If synchronizer parts need to be repaired, check clearance "a" between ring and gear, each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance "a": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)

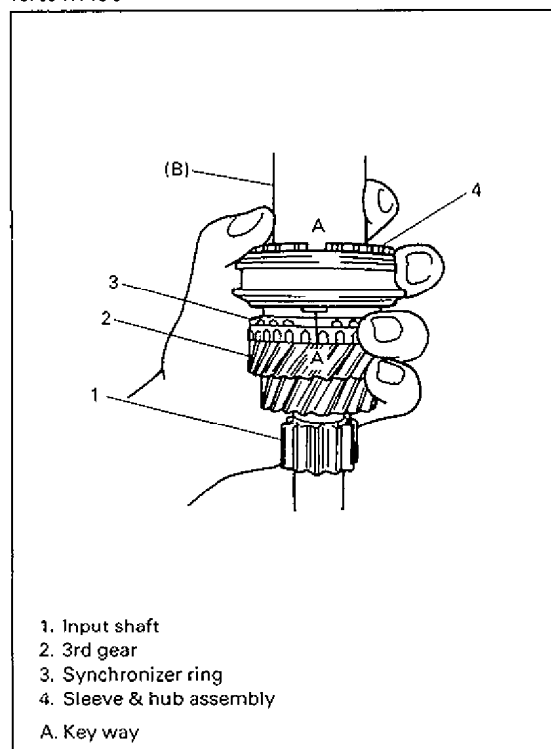
- 3) To ensure lubrication, air blow oil holes and make sure that they are free from any obstruction.



75F00-7A-18-2



75F00-7A-18-3



75F00-7A-18-5

- 4) Fit high speed synchronizer sleeve to hub, insert 3 keys in it and then set springs as illustrated left.

NOTE:

- No specific direction is assigned to high speed synchronizer sleeve or each key but it is assigned as assembly.
- Size of high speed synchronizer sleeve, hub, keys and springs is between those of low speed and 5th speed ones.

- 5) Drive in R bearing by using special tool and hammer.

Special Tool

(A): 09925-98221

- 6) Install 3rd gear needle bearing, apply oil to it, then install 3rd gear and synchronizer ring.

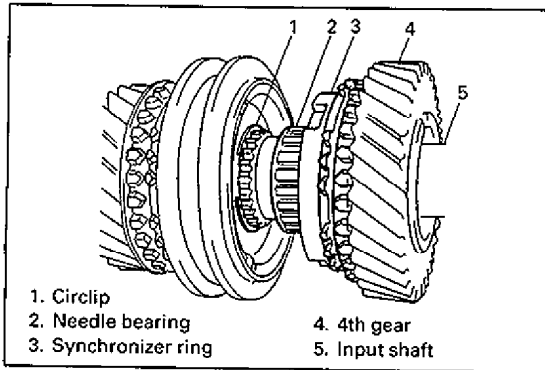
- 7) Drive in high speed sleeve & hub assembly by using special tool and hammer.

NOTE:

- While press-fitting sleeve & hub, make sure that synchronizer ring key slots are aligned with keys in sleeve & hub assembly.
- Check free rotation of 3rd gear after press-fitting sleeve & hub assembly.
- Needle bearings and synchronizer rings for 3rd and 4th are identical respectively.

Special Tool

(B): 09913-84510

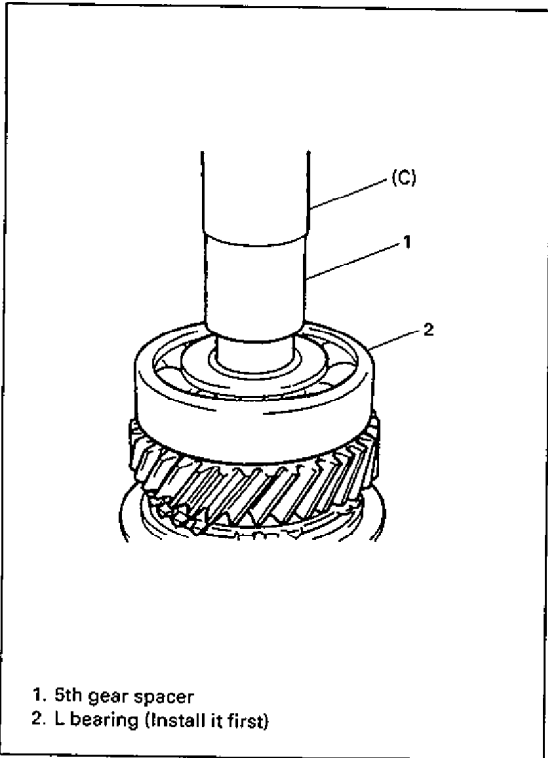


75F00-7A-19-1

- 8) Install circlip, needle bearing, apply oil to bearing, then install synchronizer ring and 4th gear.

CAUTION:

Confirm that circlip is installed in groove securely.



75F00-7A-19-3

- 9) Press-fit L bearing by using special tool and hammer.

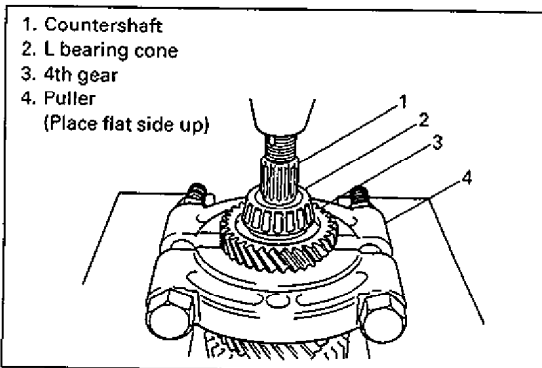
Special Tool

(C): 09925-98221

- 10) Using the same special tool, drive in 5th gear spacer.

CAUTION:

To prevent 5th gear spacer from being distorted because of excessive compression, do not press-fit it with L bearing at once.



75F00-7A-19-4

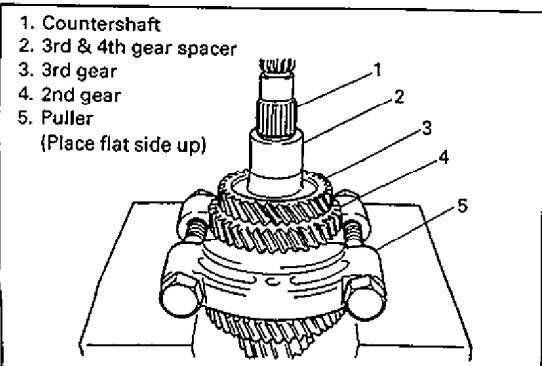
COUNTERSHAFT ASSEMBLY

DISASSEMBLY

- 1) Drive out L bearing cone with 4th gear by using puller and press.

CAUTION:

- Use puller and press that will bear at least 5 ton (11,000 lb) safely.
- To avoid tooth damage, support 4th gear at flat side of puller.

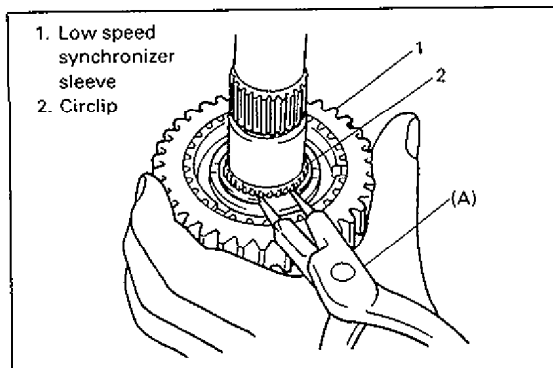


75F00-7A-19-5

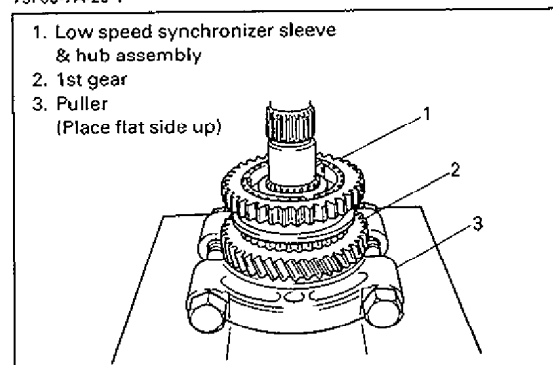
- 2) Apply puller to 2nd gear and drive out 3rd gear together with 2nd gear by using press. Needle bearing would come out with 2nd gear.

CAUTION:

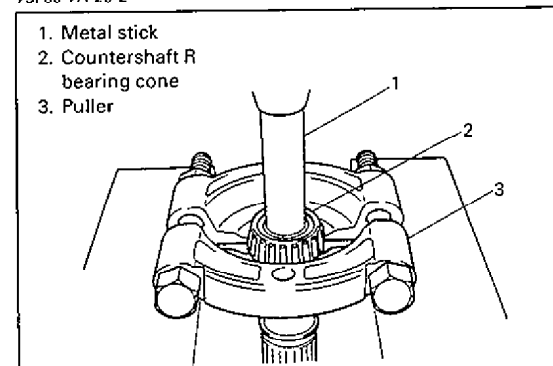
If compression exceeds 5 ton (11,000 lb), release compression once, reset puller support and then continue press work again.



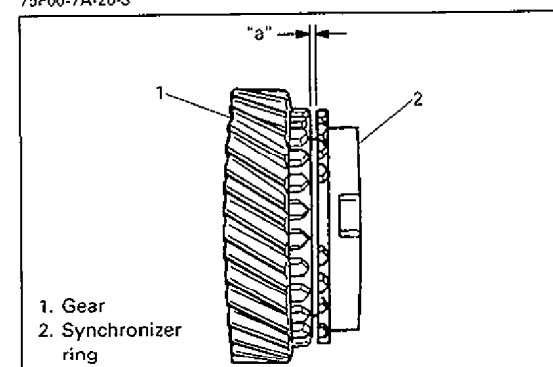
75F00-7A-20-1



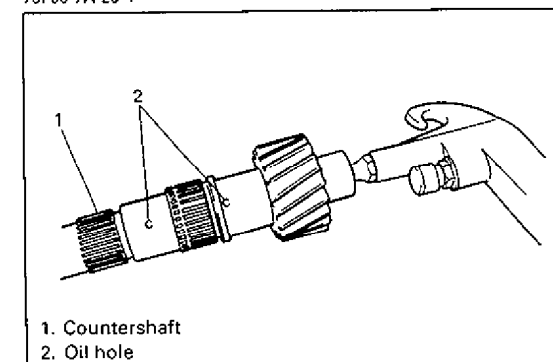
75F00-7A-20-2



75F00-7A-20-3



75F00-7A-20-4



75F00-7A-20-5

- 3) Take out 2nd synchronizer ring.
- 4) Using special tool, remove circlip.

NOTE:

Correct tool tips to be flat to facilitate removal of circlip.

Special Tool

(A): 09900-06107

- 5) Apply puller to 1st gear and drive out low speed synchronizer sleeve & hub assembly with gear by using press.
- 6) Disassemble synchronizer sleeve & hub assembly.
- 7) Take out needle bearing from shaft.

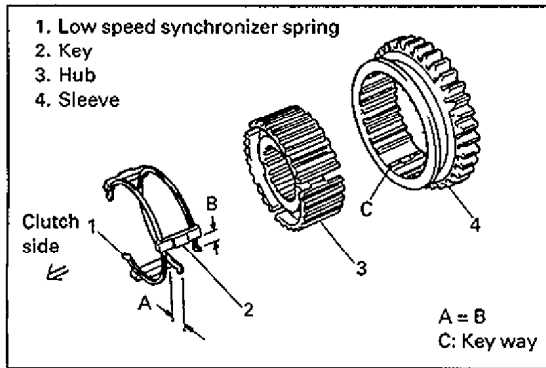
- 8) Remove R bearing cone by using puller, metal stick and press.

INSPECTION AND REASSEMBLY

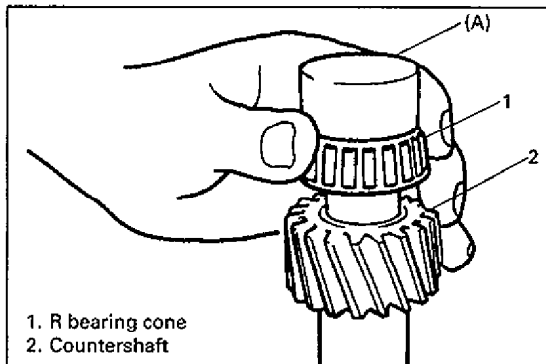
- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) If synchronizer parts need to be repaired, check clearance "a" between ring and gear, each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

Clearance "a": Standard 1.0 – 1.4 mm (0.039 – 0.055 in.)
Service limit 0.5 mm (0.019 in.)

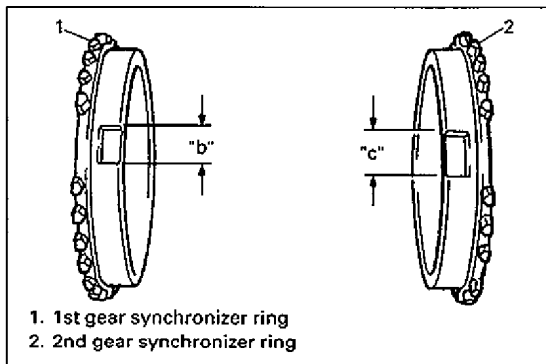
- 3) To ensure lubrication, air blow oil holes and make sure that they are free from any obstruction.



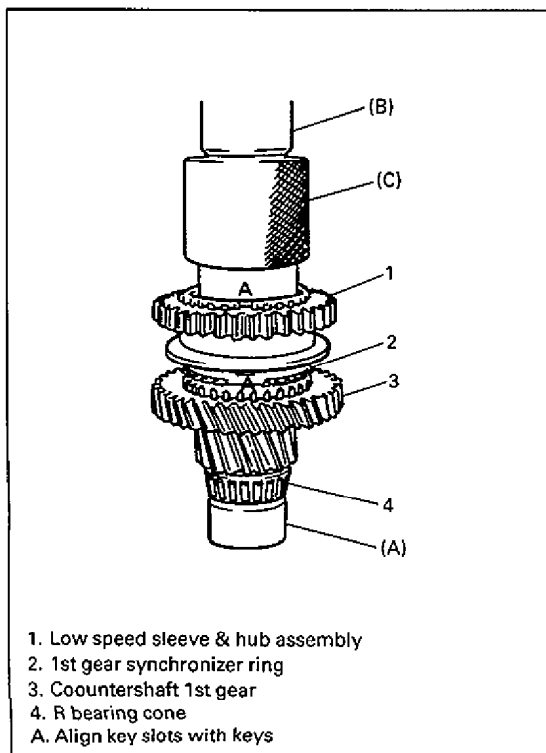
75F00-7A-21-1



75F00-7A-23-2



75F00-7A-21-3



75F00-7A-21-5

- 4) Fit low speed synchronizer sleeve to hub, insert 3 keys in it and then set springs as illustrated left.

NOTE:

- No specific direction is assigned to low speed synchronizer hub or each key but it is assigned as assembly.
- Size of low speed synchronizer keys and springs are the largest compared with those of high speed and 5th speed ones.

- 5) Install R bearing cone by using special tool and hammer.

Special Tool

(A): 09923-78210

- 6) Install needle bearing, apply oil to it, then install 1st gear and 1st gear synchronizer ring.

NOTE:

- Key slot width of 1st synchronizer ring is smaller than that of 2nd synchronizer ring.

Distinguish the difference properly.

Width "b": 8.2 mm (0.32 in.)

"c": 8.8 mm (0.35 in.)

- Needle bearings for 1st and 2nd gear are identical.

- 7) Drive in low speed sleeve & hub assembly by using special tool and hammer.

NOTE:

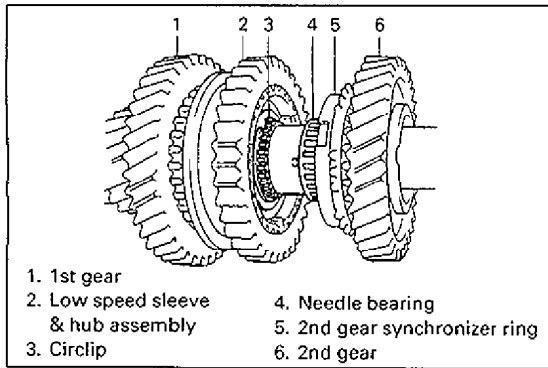
- Support shaft with special tool as illustrated left so that retainer of bearing cone will be free from compression.
- Make sure that synchronizer ring key slots are aligned with keys while press-fitting sleeve & hub assembly.
- Check free rotation of 1st gear after press-fitting sleeve & hub assembly.

Special Tool

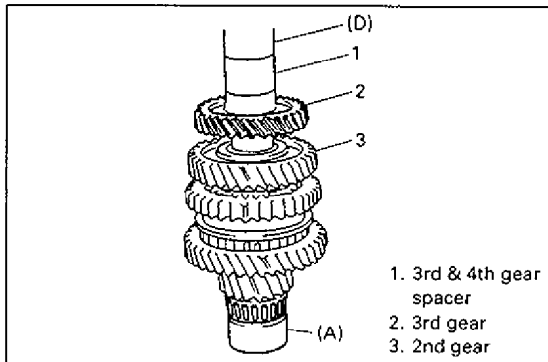
(A): 09923-78210

(B): 09913-85210

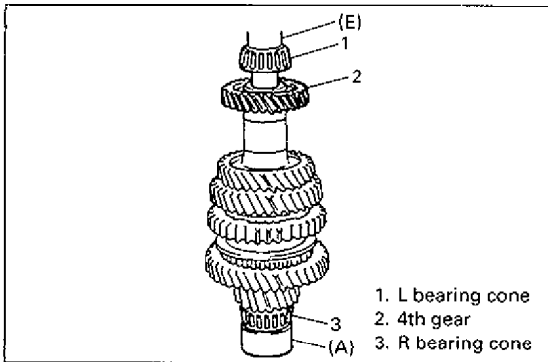
(C): 09940-53111



75F00-7A-22-1



75F00-7A-22-2



75F00-7A-22-3

- 8) Install circlip, needle bearing, apply oil to bearing, then install 2nd gear synchronizer ring and 2nd gear.

CAUTION:

Confirm that circlip is installed in groove securely.

- 9) Press-fit 3rd gear and spacer by using special tool and press.

NOTE:

It is recommended to press-fit spacer and 3rd gear first, and then 4th gear later separately, so that countershaft will not be compressed excessively.

Special Tool

(A): 09923-78210

(D): 09925-98221

- 10) Press-fit 4th gear by using the same procedure as the above.

- 11) Install L bearing cone by using special tool and hammer.

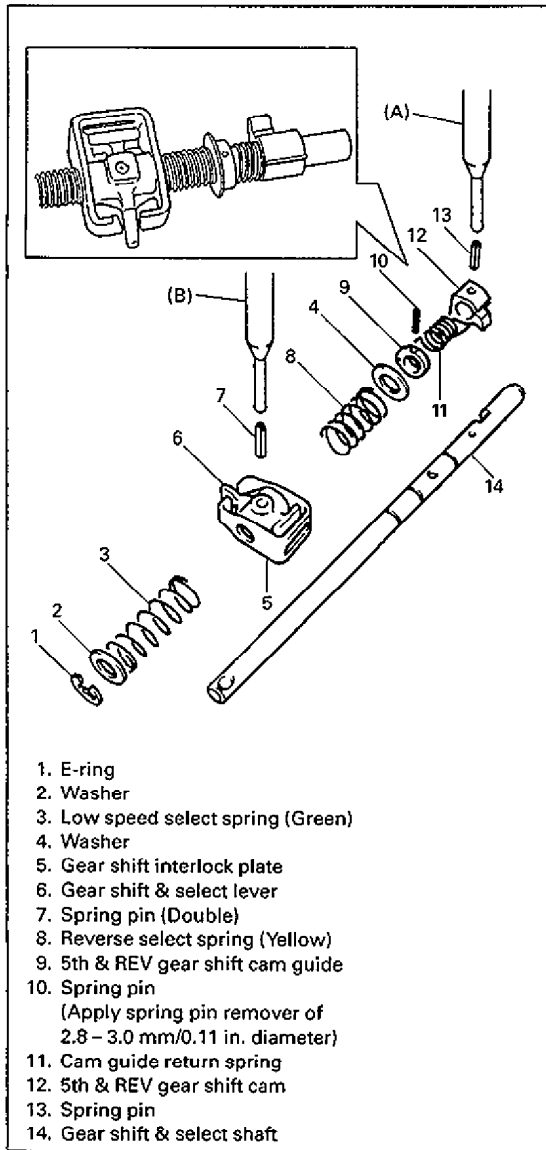
NOTE:

For protection of bearing cone, always support shaft with special tool as illustrated.

Special Tool

(A): 09923-78210

(E): 09925-98221



75F00-7A-23-3

GEAR SHIFTER

GEAR SHIFT & SELECT SHAFT ASSEMBLY

- 1) To disassembly component parts, use special tools and 2.8 – 3.0 mm (0.11 in.) pin remover in addition.

Special Tool

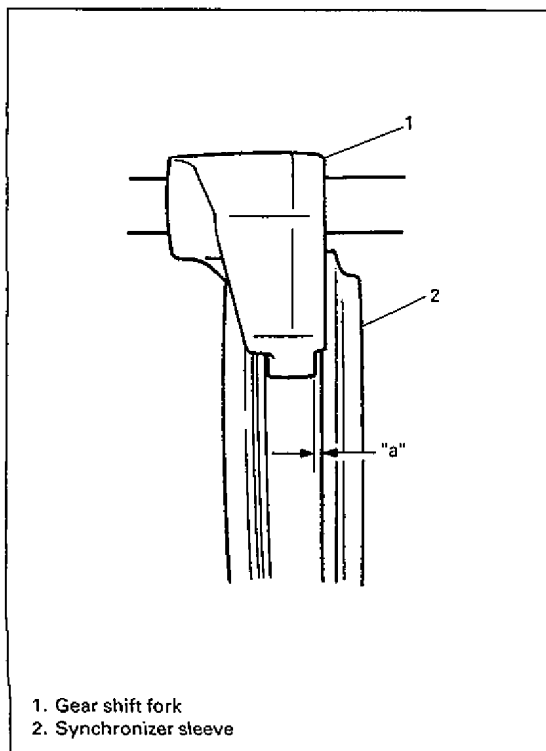
(A): 09922-85811 (4.5 mm)

(B): 09925-78210 (6.0 mm)

- 2) Clean all parts thoroughly, inspect them and replace with new ones as required.
- 3) Assemble component parts by reversing removal procedure.

NOTE:

- When driving in spring pins, prevent shaft from being bent by supporting it with wood block.
- Assemble 5th & REV gear shift cam by winding cam guide return spring, and then drive in spring pin.
- Locate low speed select spring (Green – Lower position) and reverse select spring (Yellow – Upper position) correctly.



75F00-7A-23-5

HIGH SPEED AND LOW SPEED GEAR SHIFT SHAFTS

Inspection

- 1) Using feeler gauge, check clearance between fork and sleeve and replace those parts if it exceeds limit of 1.0 mm (0.039 in.).

NOTE:

For correct judgement of parts replacement, carefully inspect contact position of fork and sleeve.

Clearance "a": Service limit 1.0 mm (0.039 in.)

- 2) Insert each gear shift shaft into case and check that it moves smoothly. If it doesn't, correct by using oilstone, reamer or the like.

5TH & REV GEAR SHIFTER

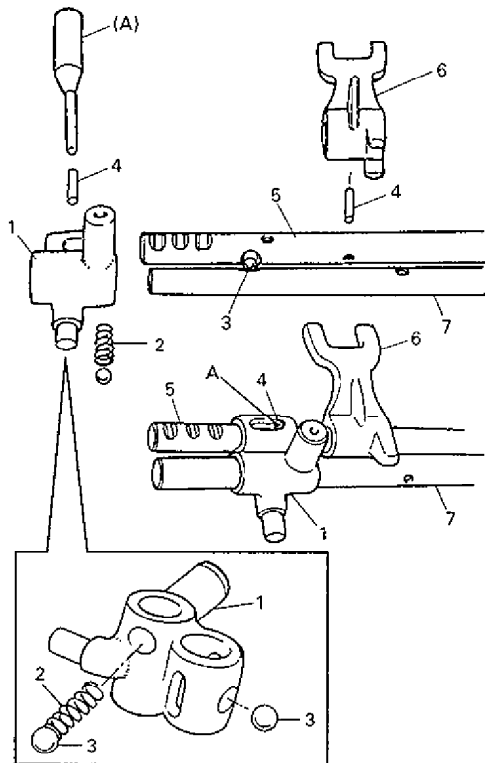
- 1) Disassemble component parts by using special tool and hammer.

Special Tool**(A): 09922-85811 (4.5 mm)**

- 2) Replace or correct parts as required and assemble shafts making sure that component parts are in proper order as shown left.

NOTE:

- Distinguish reverse gear shift arm spring from low speed locating spring (Purple & Green).
- Install 2 steel balls in reverse gear shift arm without fail.
- Drive in spring pin for reverse shift arm facing slit A toward front.



1. Reverse gear shift arm
 2. Reverse gear shift arm spring
 3. Steel ball
 4. Spring pin
 5. 5th & REV gear shift shaft
 6. 5th & REV gear shift yoke
 7. 5th & REV gear shift guide shaft
- A: Face pin slit toward front

DIFFERENTIAL ASSEMBLY

DISASSEMBLY

- 1) Using special tool, remove R bearing.

Special Tool

(A): 09913-65810

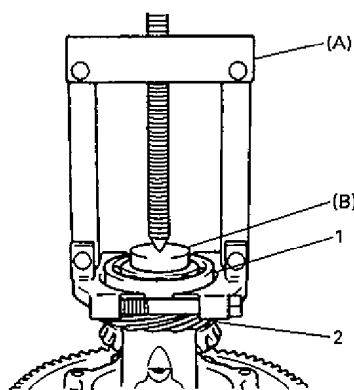
(B): 09925-88210

- 2) Take out speedometer drive gear.

NOTE:

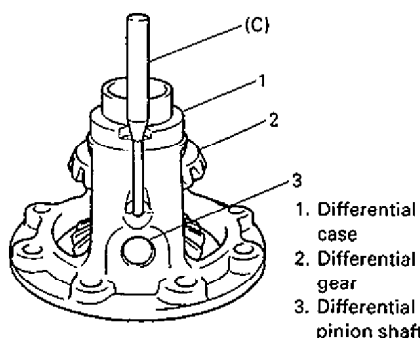
In case that half-moon type puller is used with press for bearing removal, remove final gear in advance.

- 3) Remove L bearing by using puller while supporting its center shaft as described above.
- 4) Support differential case with soft jawed vise and remove 8 final gear bolts then take out final gear.



1. R bearing
2. Speedometer drive gear

75F00-7A-25-2



1. Differential case
2. Differential gear
3. Differential pinion shaft

75F00-7A-25-3

- 5) Using special tool and hammer, drive out differential side pinion shaft pin and then disassemble component parts.

Special Tool

(C): 09922-85811 (4.5 mm)

ADJUSTMENT AND REASSEMBLY

Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly. Make sure that all parts are clean.

- 1) Assemble differential gear and measure thrust play of differential gear as follows.

Special Tool

(A): 09900-20606

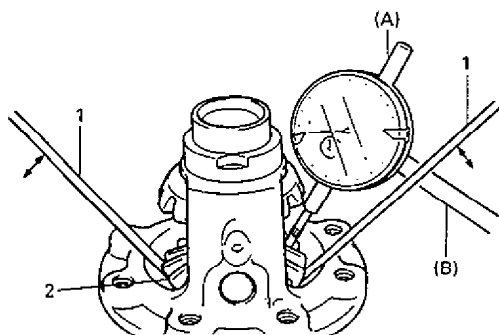
(B): 09900-20701

Diff. gear thrust play: 0.03 – 0.40 mm (0.0012 – 0.015 in.)

LEFT SIDE

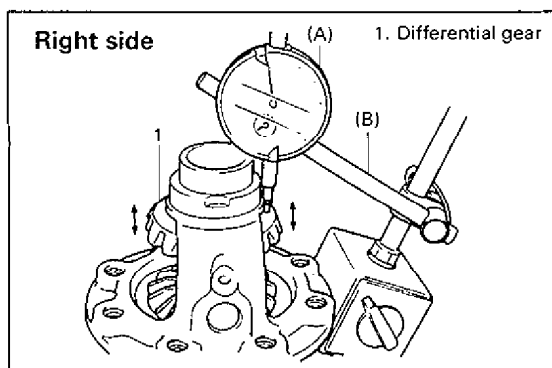
- Hold differential assembly with soft jawed vise and apply measuring tip of dial gauge to top surface of gear.
- Using 2 screwdrivers, move gear up and down and read movement of dial gauge pointer.

Left side



1. Screwdriver
2. Differential gear

75F00-7A-25-5



75F00-7A-26-1

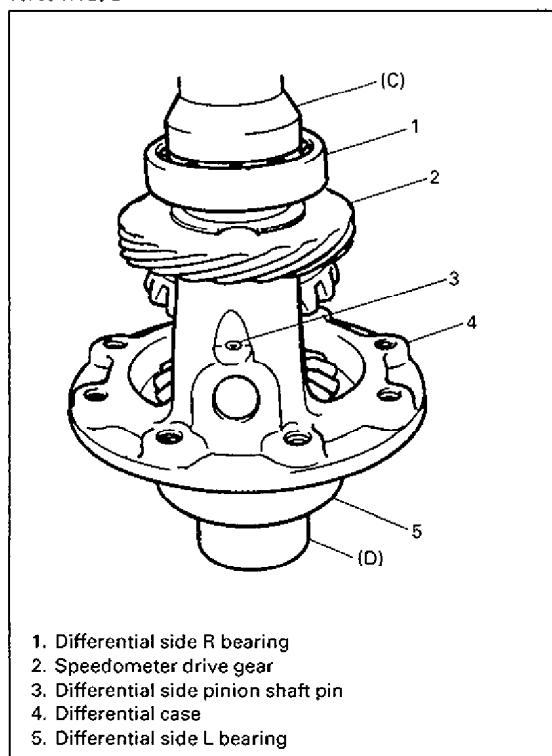
RIGHT SIDE

- Using similar procedure to the above, set dial gauge tip to gear shoulder.
- Move gear up and down by hand and read dial gauge.

- 2) If thrust play is out of specification, select suitable thrust washer from among following available size, install it and check again that specified gear play is obtained.

Available thrust washer thickness	0.9, 1.0 and 1.1 mm (0.035, 0.039 and 0.043 in.)
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75F00-7A-26-2



75F00-7A-26-4

- 3) Drive in spring pin from right side till it is flush with differential case surface.
- 4) Press-fit L bearing by using special tool and copper hammer.

Special Tool**(C): 09951-76010****(D): 09951-16060**

- 5) Install speedometer drive gear, support differential assembly as illustrated so as to L bearing is floating, and then press-fit R bearing like L bearing in Step 4).

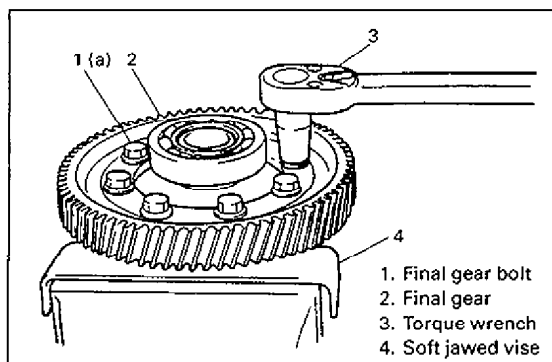
- 6) Hold differential assembly with soft jawed vise, install final gear and then tighten it with 8 bolts to specified torque.

CAUTION:

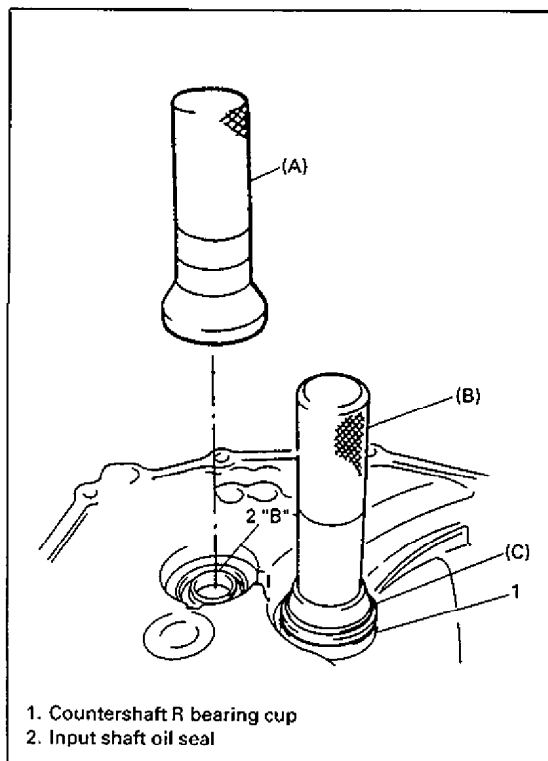
Use of any other bolts than specified ones is prohibited.

Tightening Torque

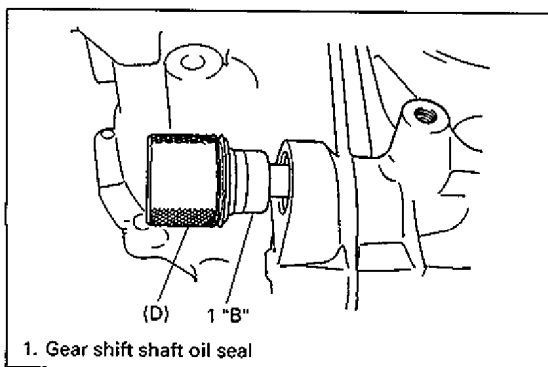
(a): 90 N·m (9.0 kg-m, 65.0 lb-ft)



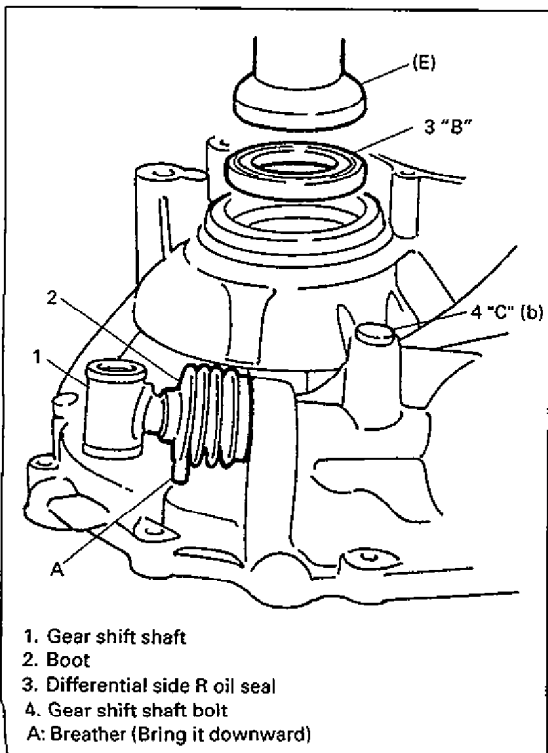
75F00-7A-26-5



75F00-7A-27-2



75F00-7A-27-3



75F00-7A-27-5

ASSEMBLY

RIGHT CASE

- 1) Install input shaft oil seal facing its spring side upward.
Use special tool and hammer for installation and apply grease to oil seal lip.

"B": SUZUKI SUPER GREASE A, 99000-25010

Special Tool

(A): 09951-76010

- 2) Install countershaft R bearing cup by using special tools and hammer.

Special Tool

(B): 09924-74510

(C): 09925-68210

- 3) Apply grease to gear shift shaft oil seal at its lip and install it up to bottom of the bore by using special tool and hammer.

"B": SUZUKI SUPER GREASE A, 99000-25010

Special Tool

(D): 09925-58210

- 4) Install gear shift shaft, boot, steel ball, spring and tighten bolt with washer applied with sealant.

"C": SUZUKI BOND NO. 1215, 99000-31110

Tightening Torque

(b): 13 N·m (1.3 kg-m, 9.5 lb-ft)

NOTE:

Bring breather of gear shift shaft boot downward.

- 5) Install differential side R oil seal until it becomes flush with case surface by using special tool with hammer, and then apply grease to its lip.

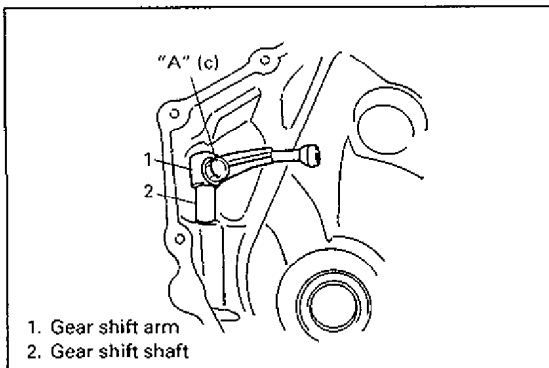
NOTE:

Face diff. side oil seal spring side inward.

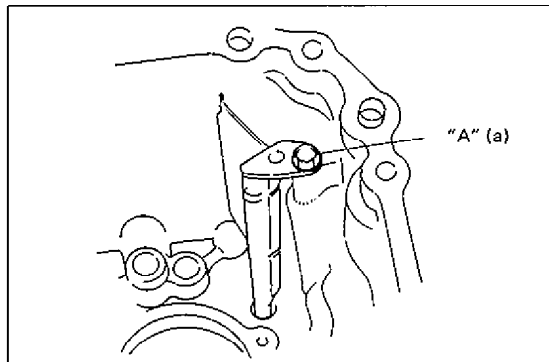
"B": SUZUKI SUPER GREASE A, 99000-25010

Special Tool

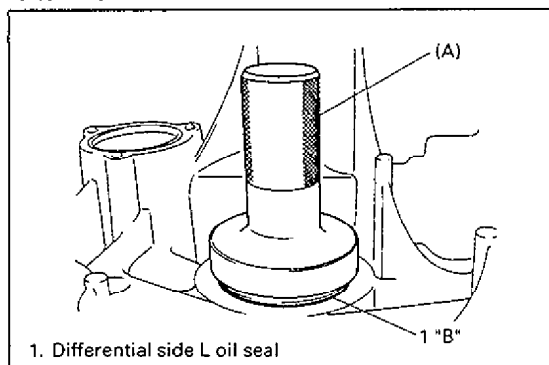
(E): 09913-75810



75F00-7A-28-1



75F00-7A-28-2



75F00-7A-28-3

- 6) Insert gear shift arm in gear shift shaft, then fasten them with bolt applied with thread lock cement.

"A": Thread lock 1322, 99000-32110

Tightening Torque

(c): 34 N·m (3.4 kg-m, 24.5 lb-ft)

LEFT CASE

- 1) If input oil gutter has been removed, install it with bolt applied with thread lock cement.

"A": Thread lock 1322, 99000-32110

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 2) Install differential side L oil seal until it becomes flush with case surface by using special tool with hammer, and then apply grease to its lip.

NOTE:

Face oil seal spring side inward.

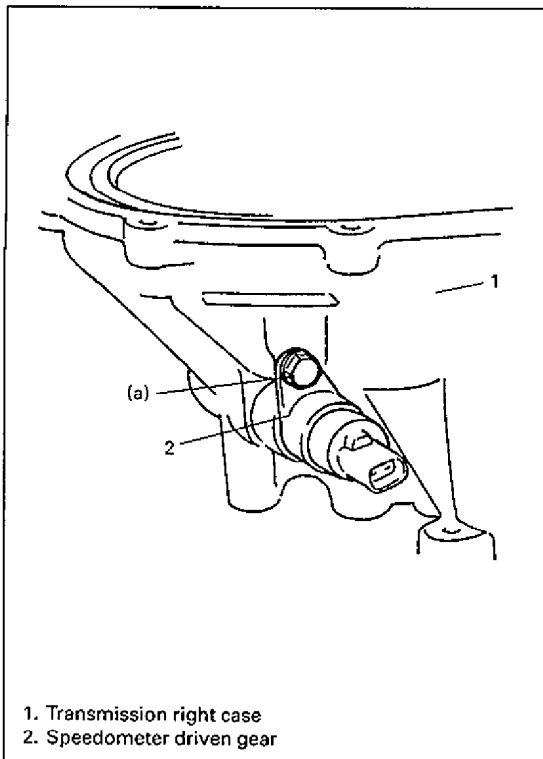
"B": SUZUKI SUPER GREASE A, 99000-25010

Special Tool

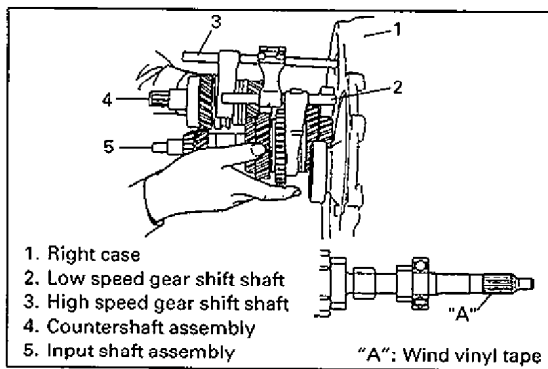
(A): 09913-75520

- 3) Install countershaft L bearing cup into case bore by tapping it with plastic hammer lightly.

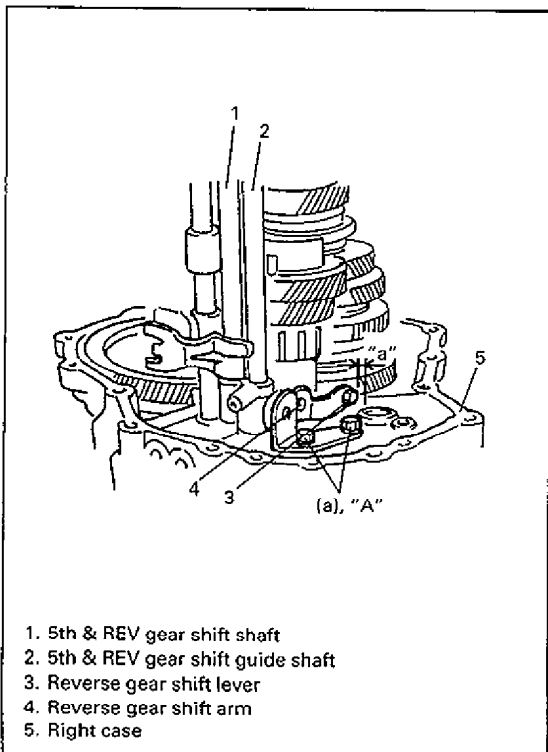
75F00-7A-28-4



75F00-7A-29-2



75F00-7A-29-3



75F00-7A-29-5

DIFFERENTIAL TO LEFT CASE

- 1) Install differential assembly into right case.
- 2) Insert speedometer driven gear case assembly applied with oil to its O ring and gear, then tighten it with bolt.

CAUTION:

- While inserting case assembly into transmission, turn final gear by hand slightly so that gear can mesh easily.
- Never push or hit slit portion of case when inserting it. Such attempt may cause case to break.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 3) Join input shaft, countershaft, low speed gear shift shaft and high speed gear shift shaft assemblies all together, then install them into right case.

NOTE:

- Input shaft R bearing on shaft can be installed into right case by tapping shaft with plastic hammer.
- Check to make sure that counter shaft is engaged with final gear while installing.

CAUTION:

To protect the oil seal from damage, wind vinyl tape to the spline section of the input shaft when installing it.

- 4) Place reverse gear shift lever, fasten it with 2 bolts after applying thread lock cement.

"A": Thread lock cement 1322, 99000-32110

Tightening Torque

(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

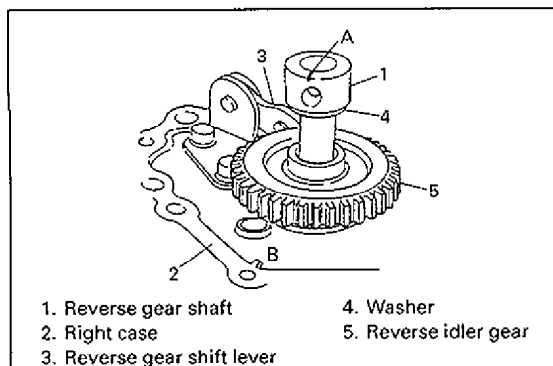
NOTE:

- When installing reverse gear shift lever, set distance "a" between lever end and shaft bore to be 5 mm (0.2 in.).

Distance "a": 5 mm (0.2 in.)

- Distance "a" can be measured by installing reverse gear shaft provisionally.
- When "a" is 5 mm (0.2 in.), clearance between reverse idler gear groove and shift lever end will be 1 mm (0.04 in.).

- 5) Install 5th & REV gear shift shaft with 5th & REV gear shift guide shaft into right case. Reverse gear shift arm has to be joined with reverse gear shift lever at the same time.

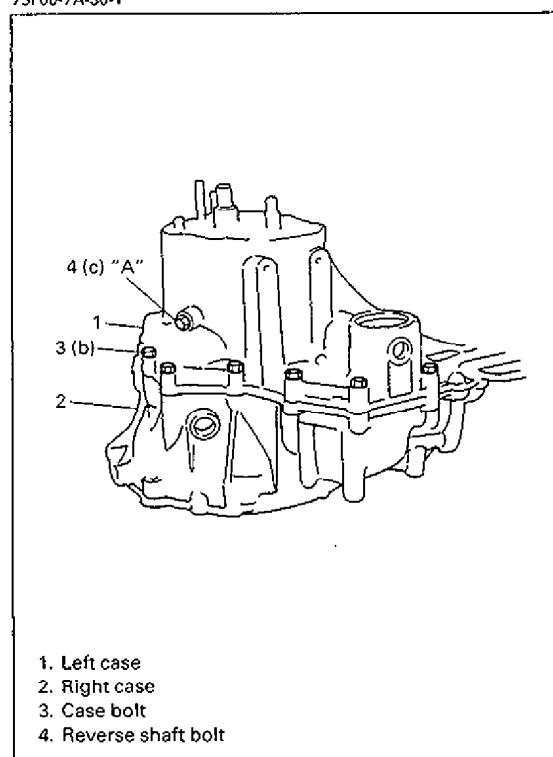


75F00-7A-30-1

- 5) Make reverse idler gear with reverse gear shift lever, insert reverse gear shaft into case through idler gear and then align A in shaft with B in case.

NOTE:

- Make sure that washer has been installed in shaft at above the gear.
- Check to confirm that reverse gear shift lever end has clearance 1 mm (0.04 in.) to idler gear groove.



75F00-7A-30-2

- 6) Clean mating surfaces of both right and left cases, coat mating surface of left case with sealant evenly then mate it with right case.

Sealant: SUZUKI BOND No. 1215, 99000-31110

- 7) Tighten case bolts from outside to specified torque.

Tightening Torque

(b): 19 N·m (1.9 kg-m, 14.0 lb-ft)

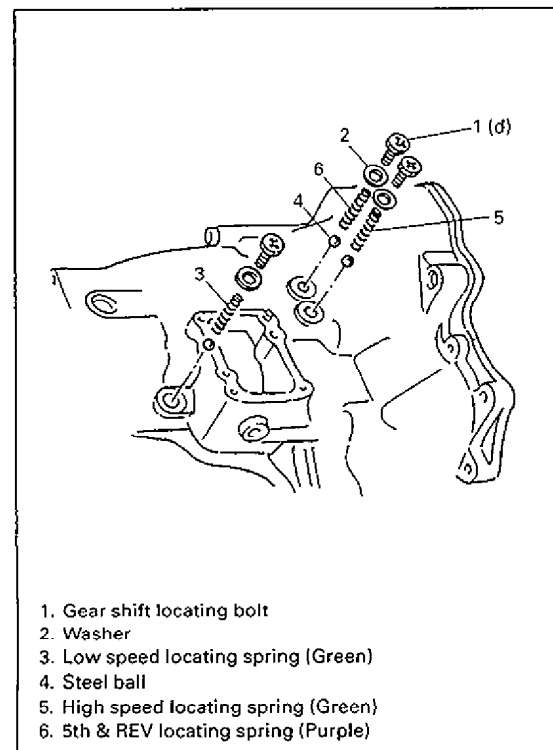
- 8) Install reverse shaft bolt applied with thread lock cement with aluminum washer and tighten it.

"A": Thread lock 1322, 99000-32110

Tightening Torque

(c): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 9) Install another 3 case bolts from clutch housing side and tighten them to specification.
If vinyl tape has not been removed, remove it.



75F00-7A-30-3

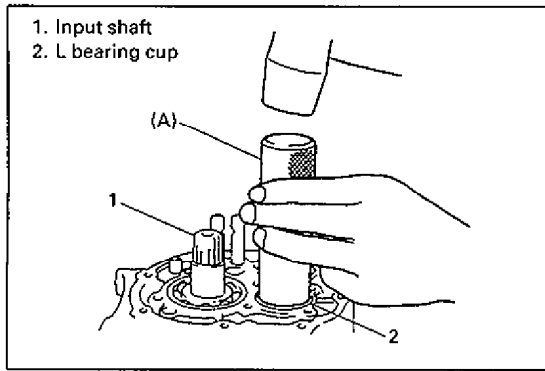
- 10) Check locating spring for deterioration and replace with new one as necessary.

Locating spring free length	Standard	Service Limit
5th & REV (Pink painted)	33.6 mm (1.323 in.)	32.5 mm (1.280 in.)
High speed, Low speed (Green painted)	38.8 mm (1.528 in.)	37.7 mm (1.484 in.)

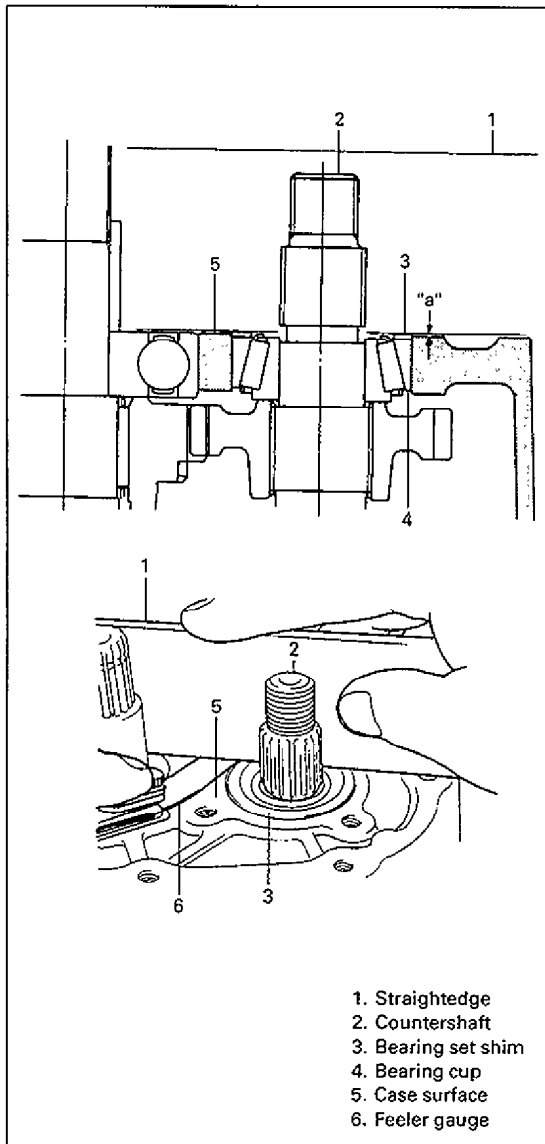
- 11) Install steel ball and locating spring for respective gear shift shaft and tighten with bolt.

Tightening Torque

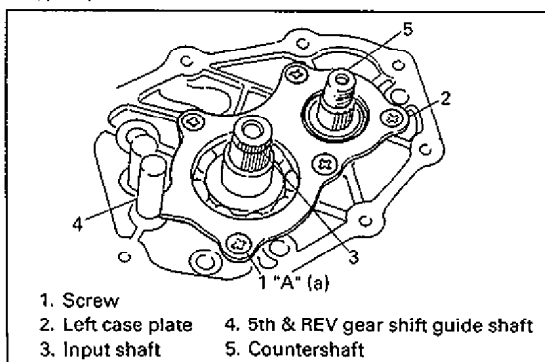
(d): 13 N·m (1.3 kg-m, 9.5 lb-ft)



75F00-7A-31-1



75F00-7A-31-4



75F00-7A-31-5

FIFTH GEARS

- 1) To seat countershaft L bearing cup to bearing cone, tap cup by using special tool and plastic hammer.

Special Tool

(A): 09913-84510

- 2) Put a shim on bearing cup provisionally, place straight edge over it and compress it by hand through straight edge, and then measure "a" (Clearance between case surface and straight edge) by using feeler gauge.

Clearance "a": 0.08 – 0.12 mm (0.0032 – 0.0047 in.)

(Shim protrusion)

- 3) By repeating above step, select a suitable shim which adjusts clearance "a" to specification and put it on bearing cup.

NOTE:

Insert 0.1 mm (0.004 in.) feeler to know whether or not a shim fulfills specification quickly.

Available shim thickness	0.40, 0.45, 0.50, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0, 1.05, 1.1 and 1.15 mm
	(0.015, 0.017, 0.019, 0.021, 0.023, 0.025, 0.027, 0.029, 0.031, 0.033, 0.035, 0.037, 0.039, 0.041, 0.043 and 0.045 in.)

- 4) Place left case plate inserting its end in groove of shift guide shaft and then tighten it with 5 screws applied with thread lock cement.

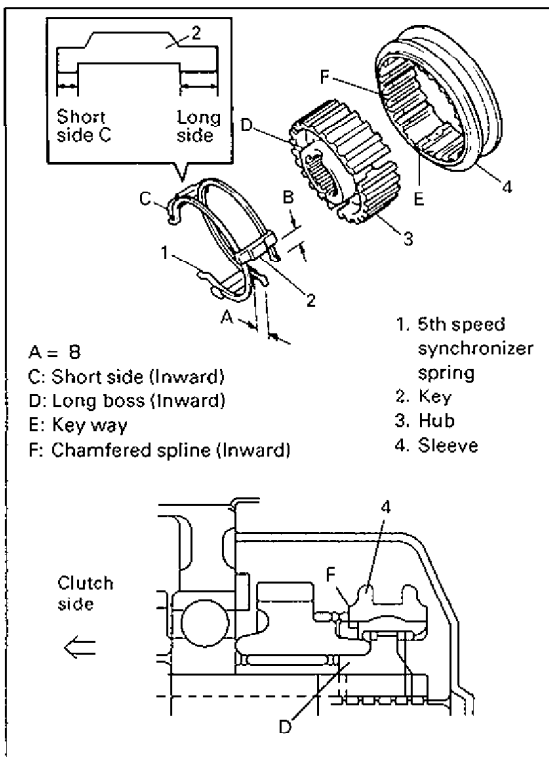
NOTE:

After tightening screws, make sure that counter shaft can be rotated by hand feeling some load.

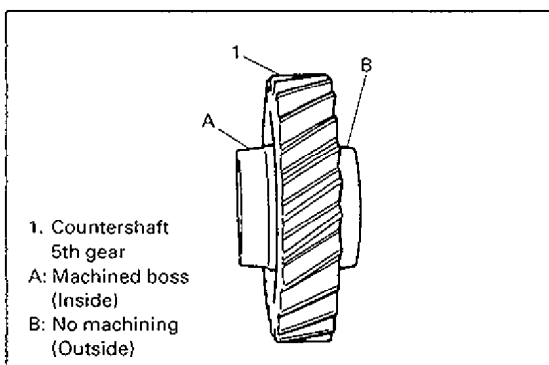
"A": Thread lock cement 99000-32110

Tightening Torque

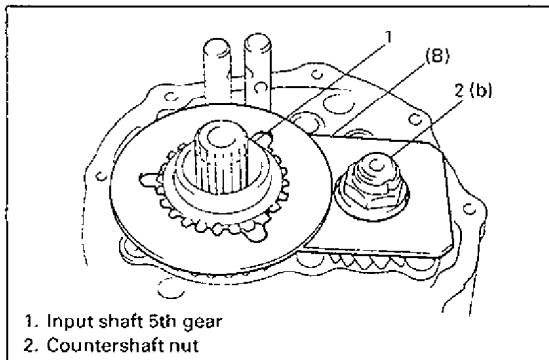
(a): 9 N·m (0.9 kg-m, 6.5 lb-ft)



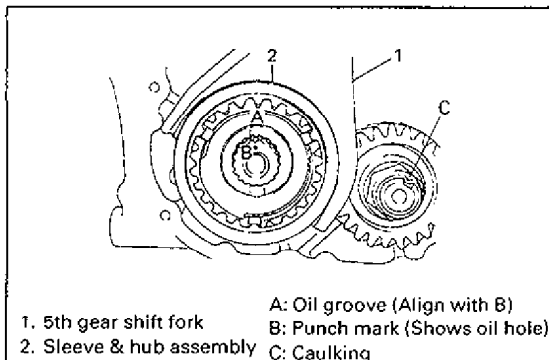
75F00-7A-32-2



75F00-7A-32-3



75F00-7A-32-4



75F00-7A-32-5

- 5) Assemble 5th speed synchronizer sleeve and hub with keys and springs.

NOTE:

Short side C in keys, long boss D in hub and chamfered spline F in sleeve should face inward (5th gear side).

- 6) Install 5th gear to counter shaft facing machined boss A inward.

- 7) Install needle bearing to input shaft, apply oil then install 5th gear and special tool to stop shaft rotation.

Special Tool

(B): 09927-76010

- 8) Install countershaft nut and tighten it to specification.

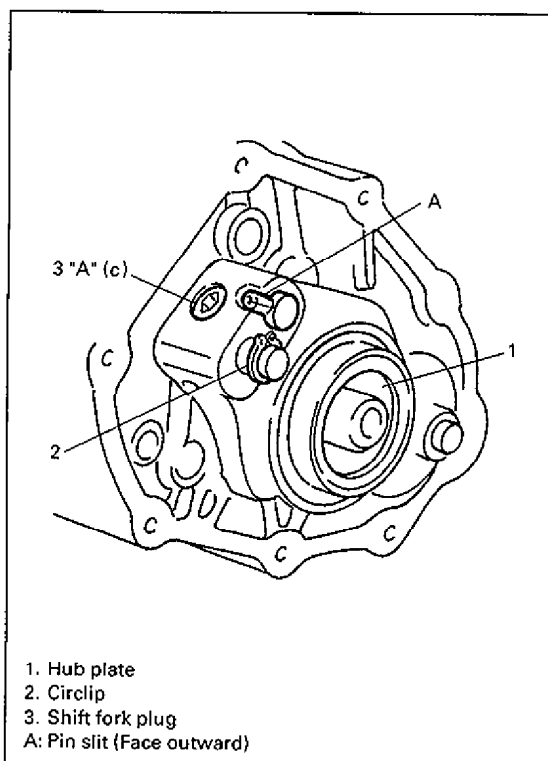
Tightening Torque

(b): 70 N·m (7.0 kg-m, 51.0 lb-ft)

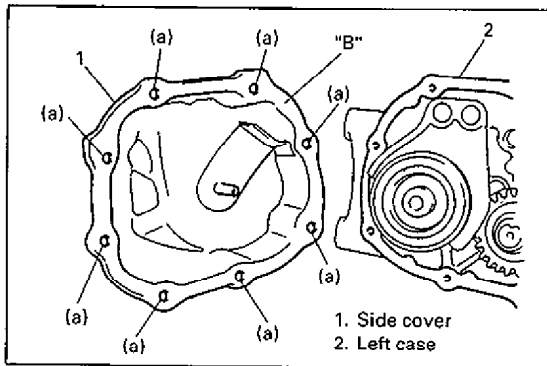
- 9) Remove special tool, then caulk nut at C with caulking tool and hammer.
- 10) Install synchronizer ring.
- 11) Fit 5th gear shift fork to sleeve & hub assembly and install them into input shaft, shift shaft and shift guide shaft at once aligning hub oil groove A with shaft mark B.

NOTE:

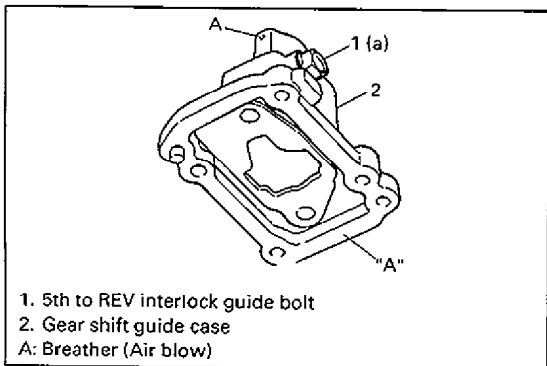
Long boss of hub faces inward (gear side).



75F00-7A-33-2



75F00-7A-33-3



75F00-7A-33-4

- 12) Drive in spring pin facing its slit A outward.
- 13) Install steel ball, tighten shift fork plug applied with thread lock cement.

"A": Thread lock 1322, 99000-32110

Tightening Torque

(c): 9 N·m (0.9 kg-m, 6.5 lb-ft)

- 14) Fit hub plate and fix it with circlip.
- 15) Install circlip to the end of 5th & REV gear shift guide shaft.

CAUTION:

- Coat shift fork plug with thread lock cement reasonably. If it is done to much, excess may interfere in ball movement and cause hard shift to 5th speed.
- Make sure circlip is installed in shaft groove securely.

- 16) Clean mating surface of both left case and side cover, coat mating surface with sealant evenly, mate it with left case and then tighten with 8 bolts.

"B": Sealant 99000-31110

Tightening Torque for left cover bolts:

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

GEAR SHIFT & SELECT SHAFT ASSEMBLY

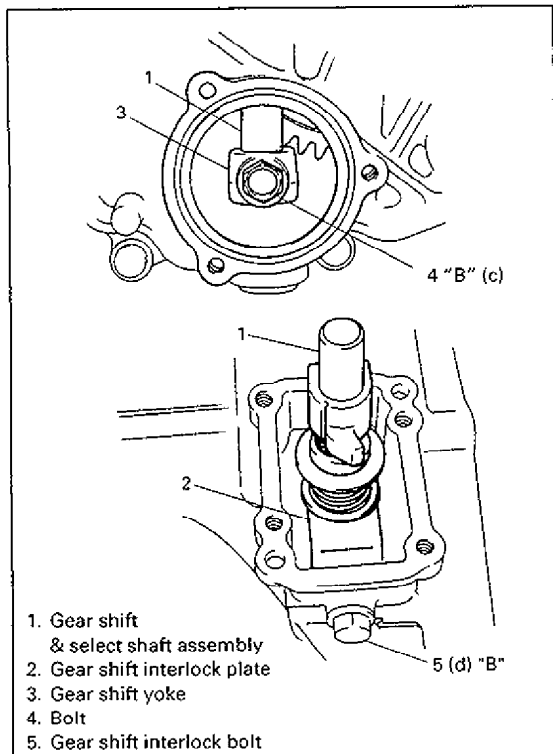
- 1) If gear shift guide case has been disassembled or replaced, tighten bolt as specified below. Also check breather hole for clog.

Tightening Torque

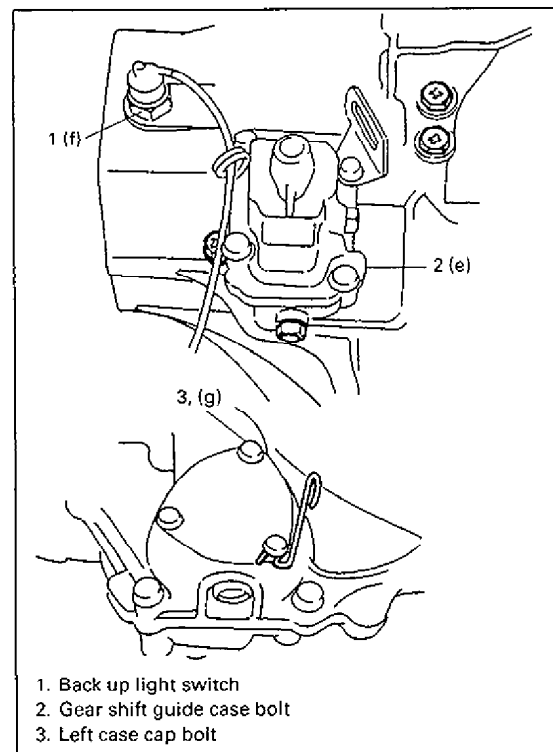
(a): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 2) Clean mating surface of guide case and coat it with sealant evenly.

"A": Sealant 99000-31110



75F00-7A-34-2



75F00-7A-34-4

- 3) Install gear shift yoke and joint it with gear shift arm.
- 4) Install gear shift & select shaft assembly into transmission and joint its bottom end with gear shift yoke.

NOTE:

When installing gear shift & select shaft assembly, position gear in neutral so that gear shift interlock plate will go in smoothly.

- 5) Tighten yoke and shaft with bolt applied with thread lock cement.

Tightening Torque

(c): 34 N·m (3.4 kg-m, 24.5 lb-ft)

- 6) Install gear shift interlock bolt applied with thread lock cement with washer and tighten it to specification.

"B": Thread lock 1322, 99000-32110

Tightening Torque

(d): 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 7) Clean mating surface of left case and put gear shift guide case applied with sealant on it.

Sealant: SUZUKI BOND No. 1215, 99000-31110

- 8) Place wiring harness clamp bracket and transmission hook, then fasten it together with gear shift guide case.

Tightening Torque

(e): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 9) Install back up light switch and clamp its lead.

Tightening Torque

(f): 20 N·m (2.0 kg-m, 14.5 lb-ft)

- 10) Clean left case cap and mating surface of left case, check condition of O-ring, place clutch cable clamp and then fasten cap with 3 bolts.

Tightening Torque

(g): 10 N·m (1.0 kg-m, 7.5 lb-ft)

- 11) Check input shaft for rotation in each gear position.
- 12) Also confirm function of back up light switch in reverse position by using ohmmeter.

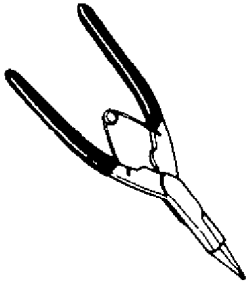
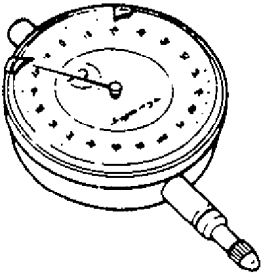
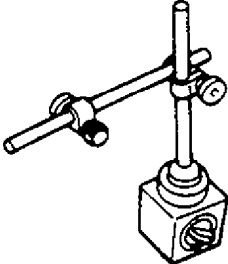
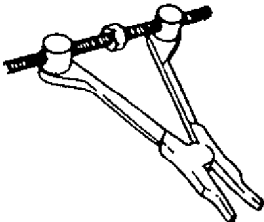
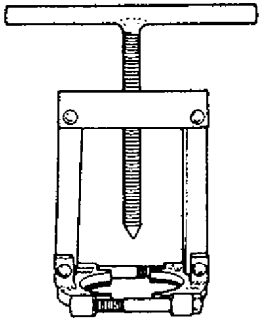
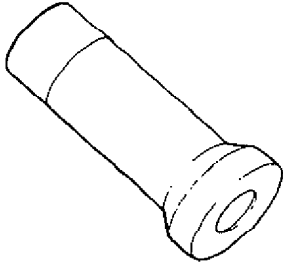
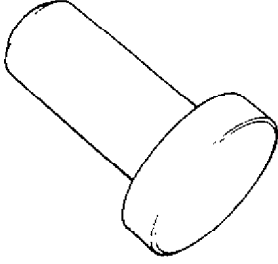
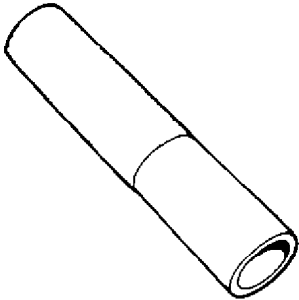
TIGHTENING TORQUE SPECIFICATIONS

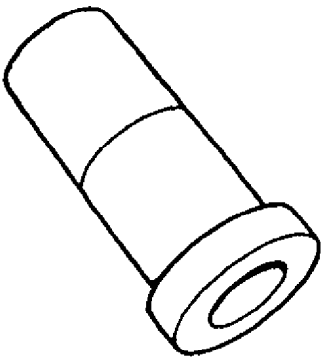
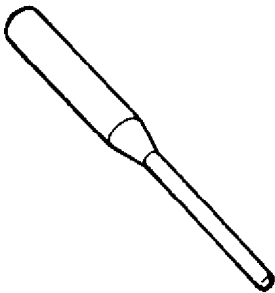
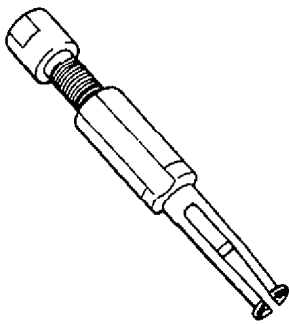
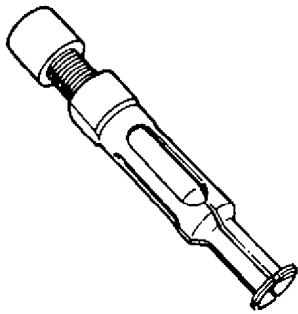
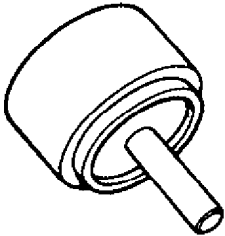
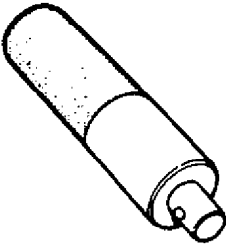
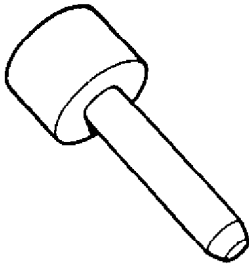
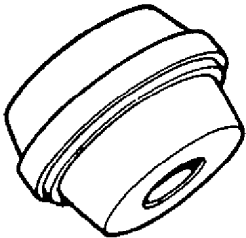
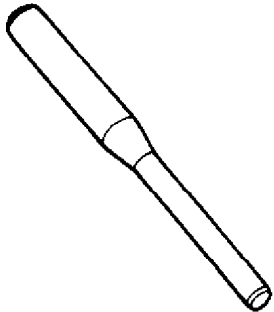
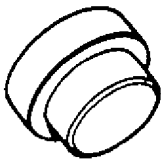
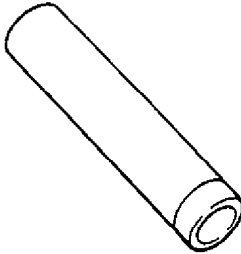
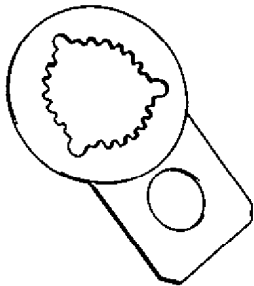
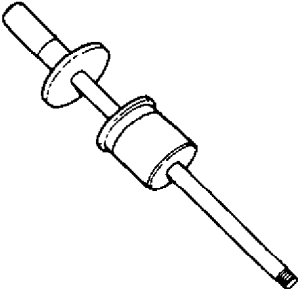
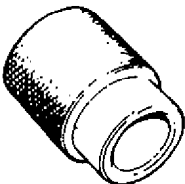
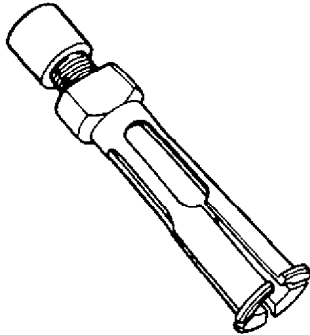
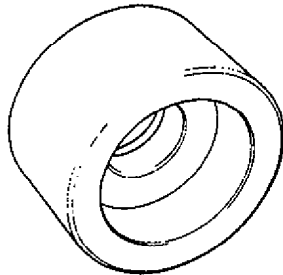
Fastening portion	Tightening torque		
	N·m	kg·m	lb·ft
Oil hole plug	21	2.1	15.5
Oil drain plug			
Ball stud bolt	55	5.5	40.0
Control lever housing nuts	4.5	0.45	3.5
Extension rod stud bolt	18	1.8	13.0
Extension rod nut	18	1.8	13.0
Gear shift control shaft bolts and nuts	18	1.8	13.0
Speedometer driven gear case bolt	10	1.0	7.5
Reverse gear shift lever bolts	23	2.3	17.0
Gear shift shaft bolt	13	1.3	9.5
Gear shift arm bolt	34	3.4	24.5
Oil gutter plate bolt	10	1.0	7.5
Final gear bolts	90	9.0	65.0
Transmission case bolts	19	1.9	14.0
Reverse shaft bolt	23	2.3	17.0
Gear shift locating shaft bolt	13	1.3	9.5
Left case plate screws	9	0.9	6.5
Counter shaft nut	70	7.0	51.0
5th shift fork plug	9	0.9	6.5
Side cover bolts (6 mm thread diameter (8 pcs.))	10	1.0	7.5
5th to REV interlock guide bolt	23	2.3	17.0
Gear shift yoke bolt	34	3.4	24.5
Gear shift interlock bolt	23	2.3	17.0
Gear shift guide case bolts	10	1.0	7.5
Left case cap bolts			
Back up light switch	20	2.0	14.5

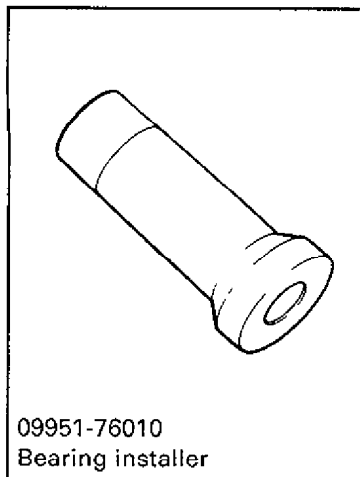
REQUIRED SERVICE MATERIALS

MATERIALS	RECOMMENDED SUZUKI PRODUCTS	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Oil seal lips • Gear shift control lever • Gear shift control shaft bushes
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	• Oil drain plug • Gear shift shaft bolt • Mating surface of transmission case • Mating surface of side cover • Mating surface of gear shift guide case
Thread lock cement	THREAD LOCK 1322 (99000-32110)	• Control lever knob • Reverse gear shift lever bolts • Oil gutter bolt • Left case plate screws • Gear shift yoke bolt • Shift fork plug • Gear shift interlock bolt • Reverse shaft bolt

SPECIAL TOOLS

 09900-06107 Snap ring pliers (Opening type)	 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09912-34510 Case separator
 09913-65810 Bearing puller	 09913-75810 Bearing installer	 09913-75520 Bearing installer	 09913-84510 Bearing installer

 09913-85210 Bearing installer	 09922-85811 Spring pin remover 4.5 mm	 09923-73210 Bearing remover	 09923-74510 Bearing remover
 09923-78210 Bearing installer	 09924-74510 Installer attachment	 09925-58210 Oil seal installer	 09925-68210 Bearing outer race installer
 09925-78210 Spring pin remover 6 mm	 09925-88210 Bearing puller attachment	 09925-98221 Bearing installer	 09927-76010 Gear holder
 09930-30102 Sliding shaft	 09940-53111 Bearing installer	 09941-64511 Bearing remover	 09951-16060 Bush remover



SECTION 7C

CLUTCH

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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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7C

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Clutch Cable	7C- 5	REQUIRED SERVICE MATERIALS	7C-12
UNIT REPAIR OVERHAUL	7C- 6	SPECIAL TOOLS	7C-13

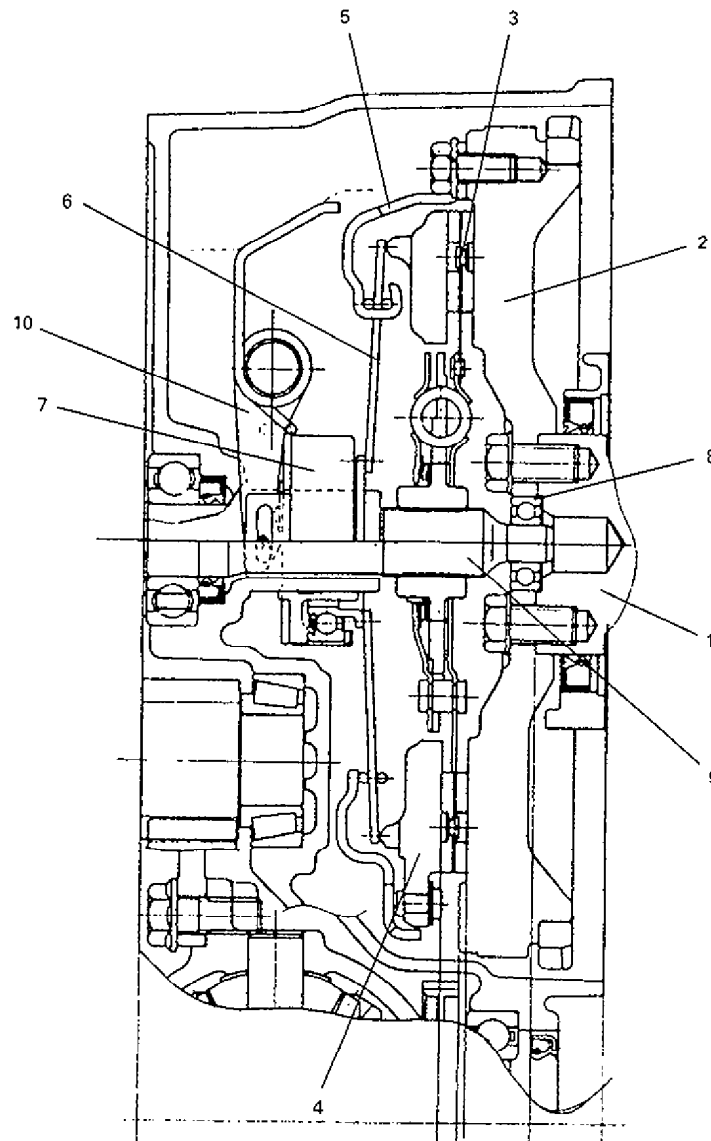
GENERAL DESCRIPTION

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 three 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.

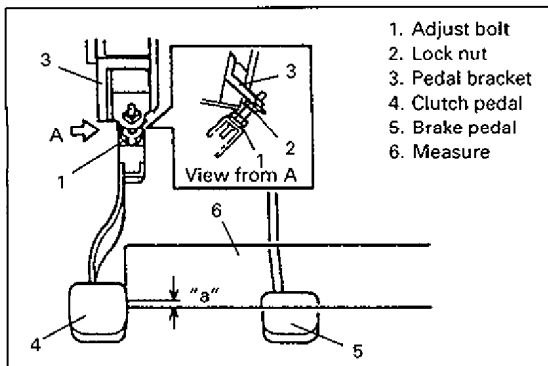
Depressing the clutch pedal causes the release bearing to advance and pushes on the tips of the tapered fingers of the diaphragm spring. When this happens, the diaphragm spring pulls the pressure plate away from the flywheel, thereby interrupting the flow of drive from flywheel through clutch disc to transmission input shaft.



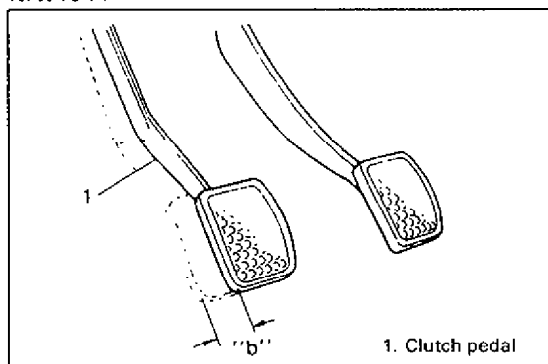
1. Crankshaft
2. Flywheel
3. Clutch disc
4. Pressure plate
5. Clutch cover
6. Diaphragm spring
7. Release bearing
8. Input shaft bearing
9. Input shaft
10. Release shaft

DIAGNOSIS

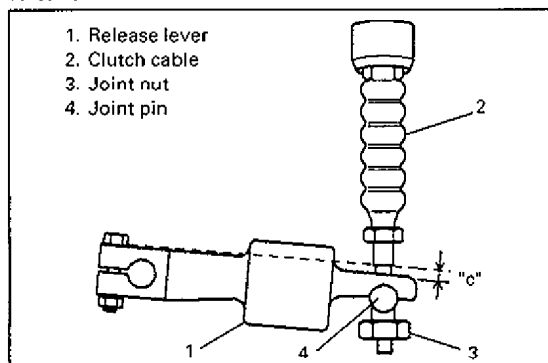
Condition	Possible Cause	Correction
Slipping	• Improper clutch pedal free travel. • Worn or oily clutch disc facing. • Warped disc, pressure plate or flywheel surface. • Weakened diaphragm spring. • Rusted clutch cable	Replace clutch arm or master cylinder. Replace disc. Replace disc, clutch cover or flywheel. Replace clutch cover. Replace cable
Dragging clutch	• Improper clutch pedal free travel. • Weakened diaphragm spring, or worn spring tip. • Rusted input shaft splines. • Damaged or worn splines of transmission input shaft. • Excessively wobbly clutch disc. • Clutch facings broken or dirty with oil.	Replace clutch arm or master cylinder. Replace clutch cover. Lubricate. Replace input shaft. Replace disc. Replace disc.
Clutch vibration	• Glazed (glass-like) clutch facings. • Clutch facings dirty with oil. • Release bearing slides unsmoothly on input shaft bearing retainer. • Wobbly clutch disc, or poor facing contact. • Weakened torsion springs in clutch disc. • Clutch disc rivets loose. • Distorted pressure plate or flywheel surface. • Weakened or loosened engine mounting bolt or nut.	Repair or replace disc. Replace disc. Lubricate or replace input shaft bearing retainer. Replace disc. Replace disc. Replace disc. Replace clutch cover or flywheel. Retighten or replace mounting.
Noisy clutch	• Worn or broken release bearing. • Input shaft front bearing worn down. • Excessive rattle of clutch disc hub. • Cracked clutch disc. • Pressure plate and diaphragm spring rattling.	Replace release bearing. Replace input shaft bearing. Replace disc. Replace disc. Replace clutch cover.
Grabbing clutch	• Clutch disc facings soaked with oil. • Clutch disc facings excessively worn. • Rivet heads showing out of facing. • Weakened torsion springs.	Replace disc. Replace disc. Replace disc. Replace disc.



75F00-7C-4-1



75F00-7C-4-2



75F00-7C-4-3

ON-VEHICLE SERVICE

MAINTENANCE SERVICE

CLUTCH PEDAL HEIGHT

Adjust clutch pedal height with adjust bolt located on pedal bracket so that clutch pedal height is same as brake pedal height.

Height difference "a": 0 mm (0 in.)

CLUTCH PEDAL FREE TRAVEL

1) Depress clutch pedal, stop the moment clutch resistance is felt, and measure distance (clutch pedal free travel). Free travel should be within following specification.

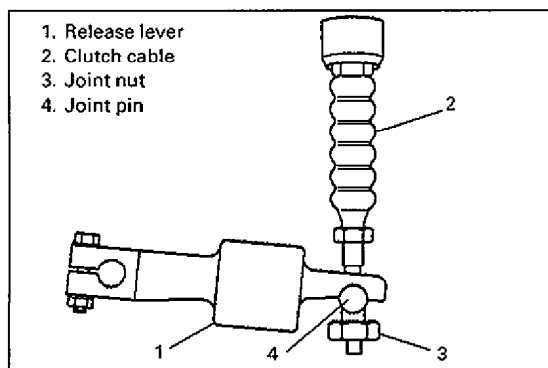
Pedal free travel "b": 15 – 20 mm (0.6 – 0.8 in.)

2) If free travel is out of specification, adjust it with cable joint nut.

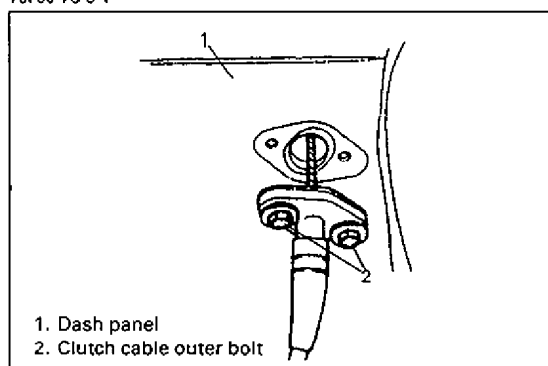
Release lever free travel "c": 0 – 2 mm (0 – 0.08 in.)

3) After checking clutch pedal free travel, also check clutch for proper function with engine running.

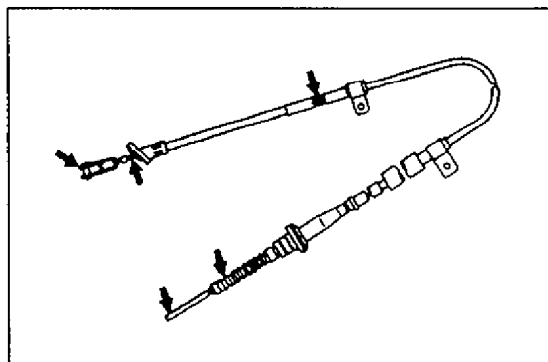
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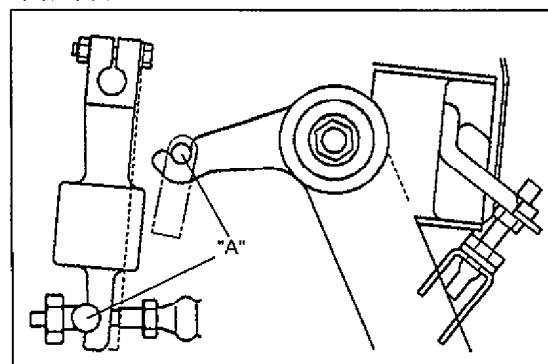
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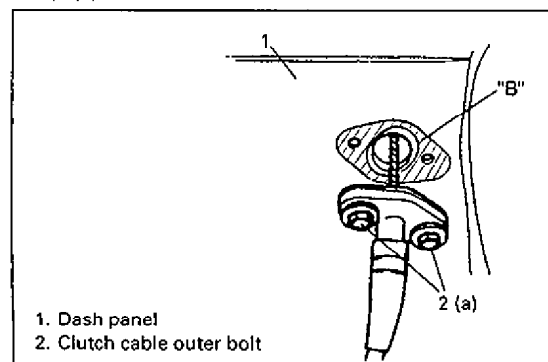
75F00-7C-5-2



75F00-7C-5-3



75F00-7C-5-4



75F00-7C-5-5

CLUTCH CABLE

REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove clutch cable joint nut.
- 3) Remove joint pin from clutch release arm.
- 4) Remove clutch cable outer bolts at dash panel in engine room.
- 5) Disconnect cable hook at clutch pedal shaft arm, then take off cable.

INSPECTION

Inspect clutch cable and replace it for any of following conditions.

- Excessive cable friction
- Frayed cable
- Bent or kinked cable
- Broken boots
- Worn end

INSTALLATION

- 1) Apply grease to cable end hook and also joint pin before installing cable.

"A": Grease 99000-25010

- 2) Hook cable end with pedal by using screwdriver or long nose pliers from cabin inside, then join inner cable wire joint pin in release arm.

- 3) Apply water tight sealant to mating surface of cable and fasten it with 2 bolts to dash panel.

"B": Sealant 99000-31090

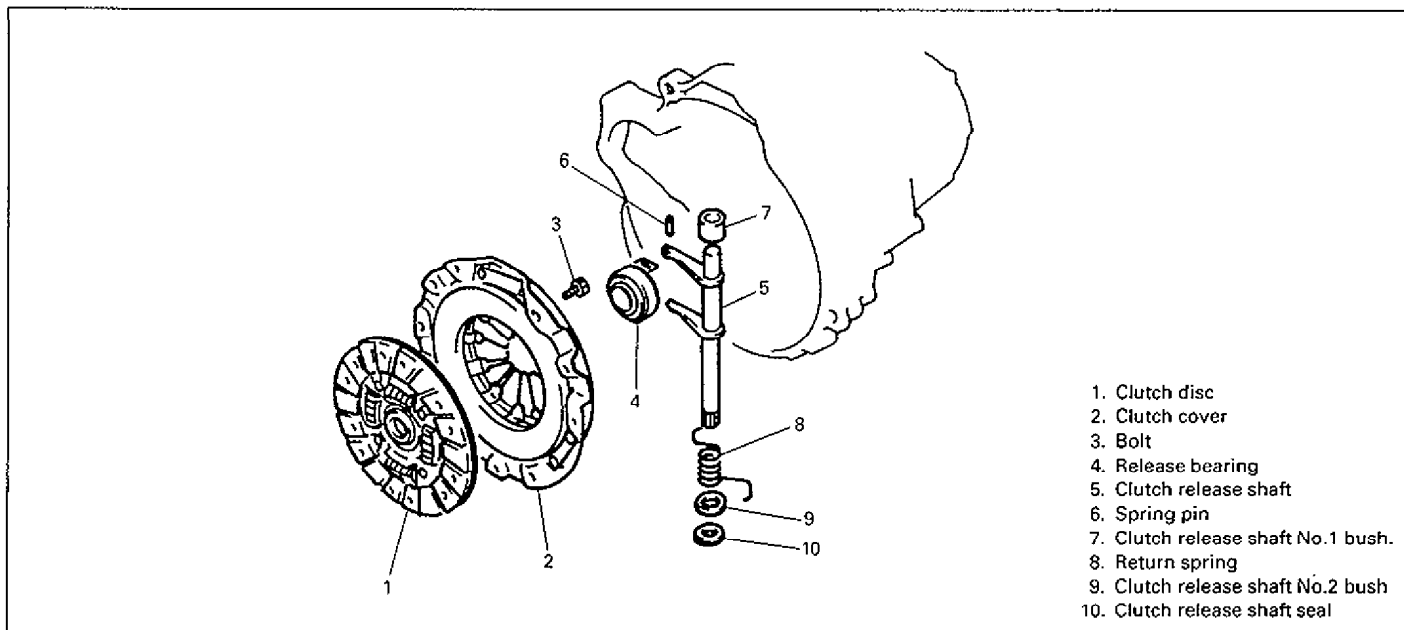
Tightening Torque

(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

- 4) Screw in joint nut and adjust free travel of pedal to specification by turning nut.
- 5) Check clutch for proper function with engine running.

UNIT REPAIR OVERHAUL

CLUTCH COVER, CLUTCH DISC AND FLYWHEEL

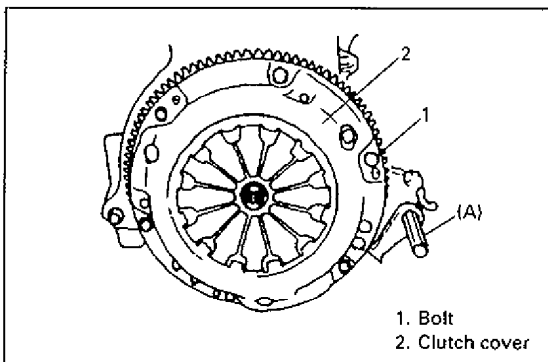


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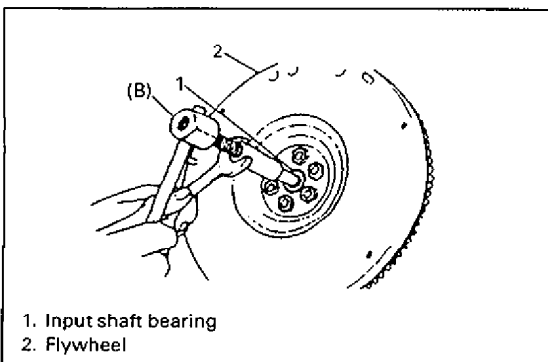
DISMOUNTING / REMOUNTING

Refer to SECTION 6A4.

75F00-7C-6-3



75F00-7C-6-4



75F00-7C-6-5

REMOVAL

- 1) Hold flywheel stationary with special tool (A) and remove clutch cover bolts, clutch cover and clutch disc.

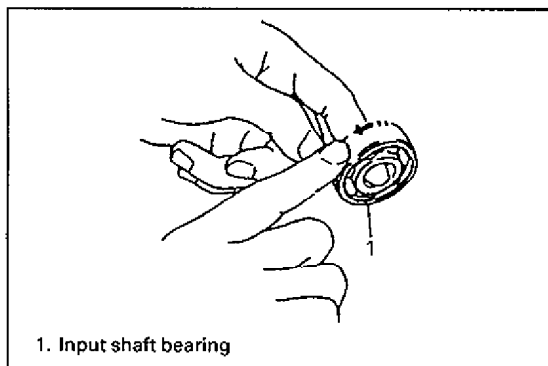
Special Tool

(A): 09924-17810

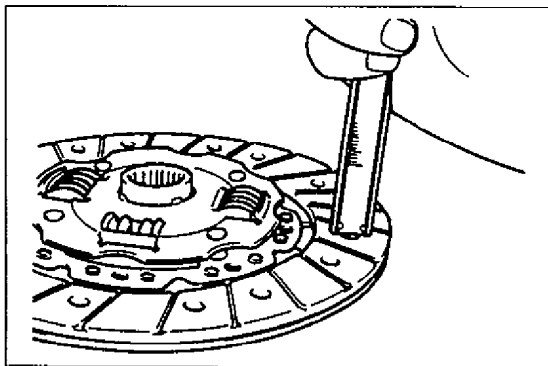
- 2) Pull out input shaft bearing by using special tool (B) and wrench.

Special Tool

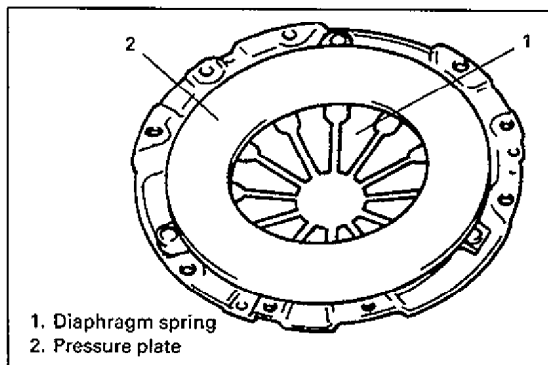
(B): 09917-58010



75F00-7C-7-1



75F00-7C-7-2



75F00-7C-7-3

INSPECTION

Input Shaft 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: 1.2 mm (0.06 in.)

Service limit: 0.5 mm (0.02 in.)

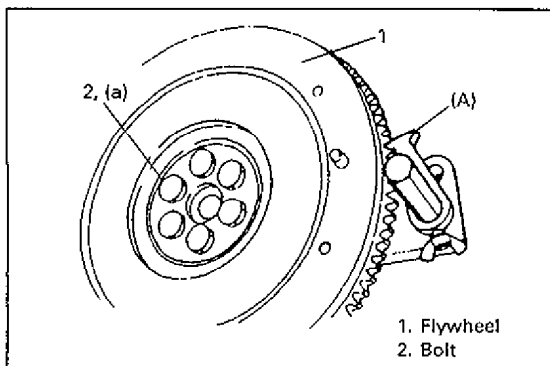
Clutch Cover

- 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.

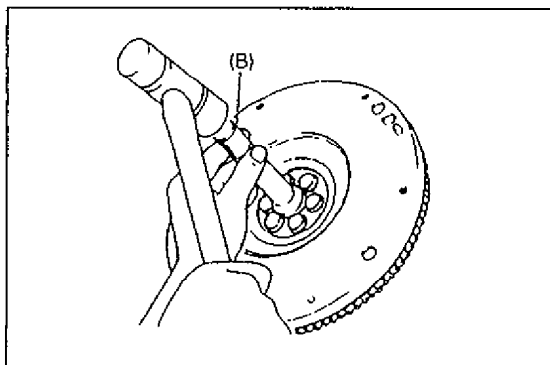
Flywheel

Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.

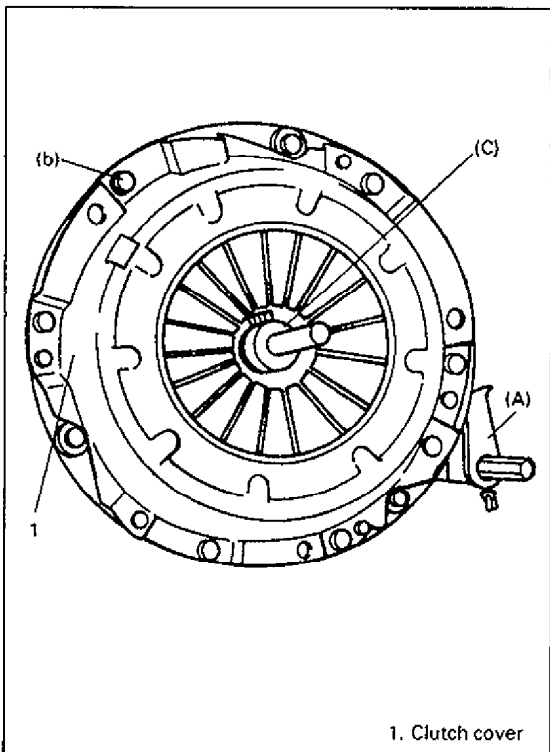
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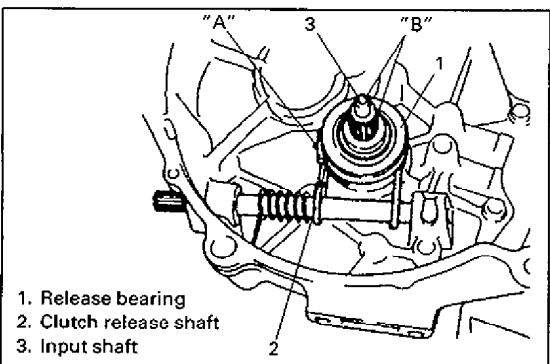
75F00-7C-8-1



75F00-7C-8-2



75F00-7C-8-4



75F00-7C-8-5

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): 42 N·m (4.2 kg-m, 30.5 lb-ft)

- 2) Using special tool, install input shaft bearing to flywheel.

Special Tool

(B): 09925-98210

- 3) Aligning clutch disc to flywheel center by using special tool, install clutch cover and bolts. Then tighten bolts to specification.

NOTE:

- While tightening clutch cover bolts, compress clutch disc with special tool (C) by hand so that disc centered.
- Tighten cover bolts little by little evenly in diagonal order.

Special Tool

(A): 09924-17810

(C): 09923-36330

Tightening Torque

(b): 23 N·m (2.3 kg-m, 16.5 lb-ft)

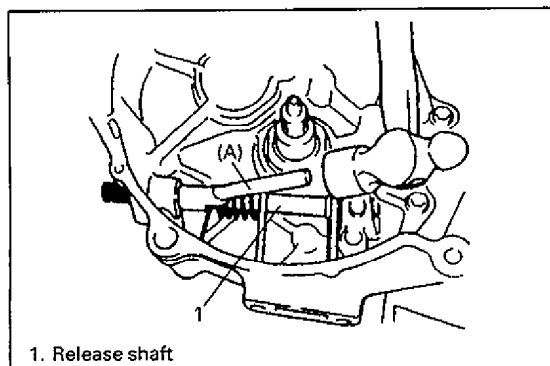
- 4) Slightly apply grease to input shaft, then join transmission assembly with engine. Refer to SECTION 7A for remounting procedure.

"A": Grease 99000-25010

"B": Grease 99000-25210

NOTE:

Turn crankshaft with wrench from front while inserting transmission input shaft to clutch disc until splines mesh.



75F00-7C-9-1

CLUTCH RELEASE SYSTEM

REMOVAL

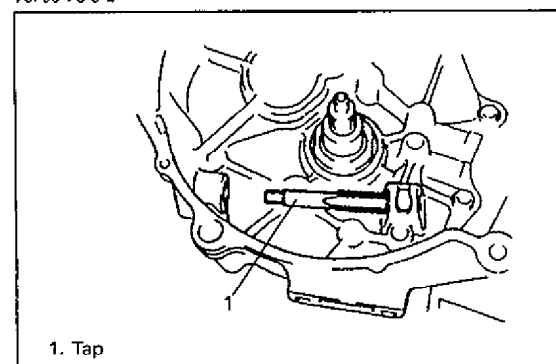
- 1) Remove release arm by loosening its bolt.
- 2) Take out release bearing by turning release shaft.
- 3) Unhook return spring by using pliers.
- 4) Drive out No.2 bush by using special tool and hammer.
Release shaft seal will also be pushed out.

Special Tool

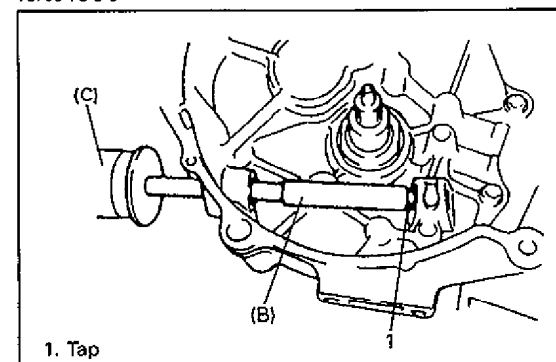
(A): 09922-46010

- 5) Remove release shaft and return spring.

75F00-7C-9-2



75F00-7C-9-3



75F00-7C-9-4

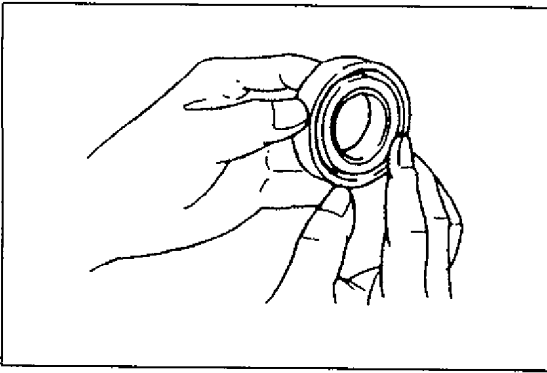
- 6) Install tap (M14 × 1.5) to clutch release shaft No.1 bush.

- 7) Pull No.1 bush out by using special tools.

Special Tool

(B): 09923-46030

(C): 09930-30102



75F00-7C-10-1

INSPECTION

Clutch release bearing

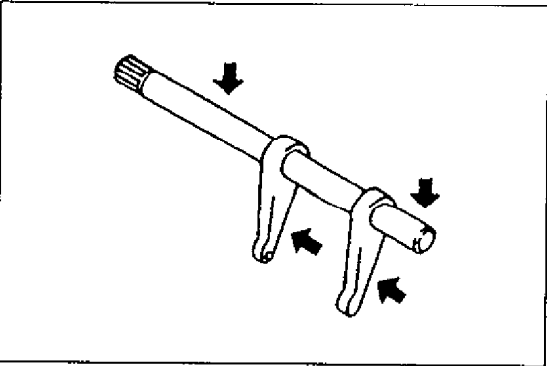
Check clutch release bearing for smooth rotation.
If abnormality is found, replace it.

CAUTION:

Do not wash release bearing. Washing may cause grease leakage and consequential bearing damage.

Clutch release shaft

Check clutch release shaft and its pin for deflection or damage.
If abnormality is found, replace it.



75F00-7C-10-2

INSTALLATION

- 1) Drive in a new No.1 bush by using special tools and then apply grease to bush inside.

Special Tool

(A): 09951-16040

(B): 09923-46030

"A": Grease 99000-25010

- 2) Install release shaft with return spring applied to it.

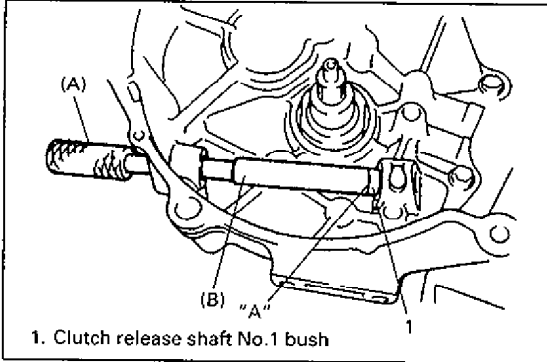
- 3) Apply grease to No.2 bush inside and press-fit it by using the same special tool as in removal.

Grease 99000-25010

Special Tool

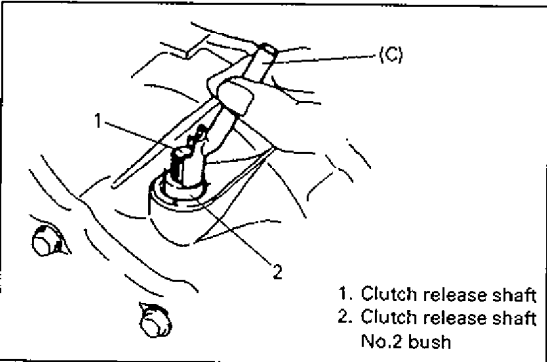
(C): 09922-46010

- 4) Coat grease (99000-25010) to shaft seal and then install it till is flush with case surface. Use special tool (09925-98221) for this installation and face seal lip downward (inside).



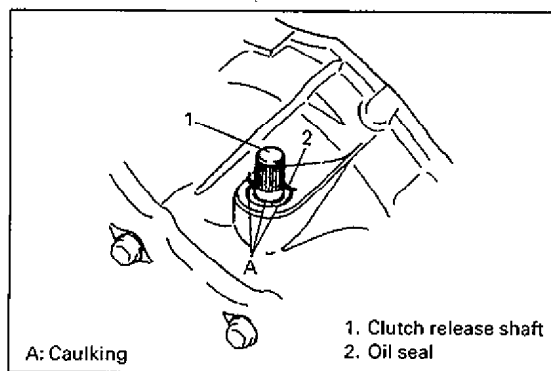
1. Clutch release shaft No.1 bush

75F00-7C-10-3

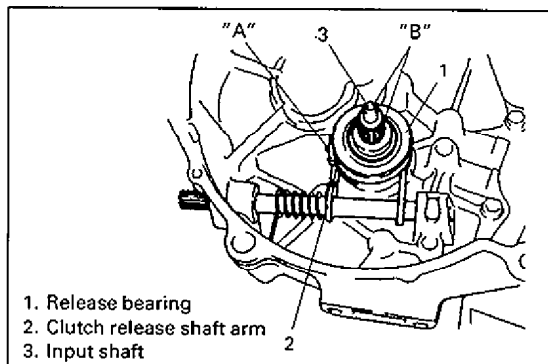


1. Clutch release shaft
2. Clutch release shaft
No.2 bush

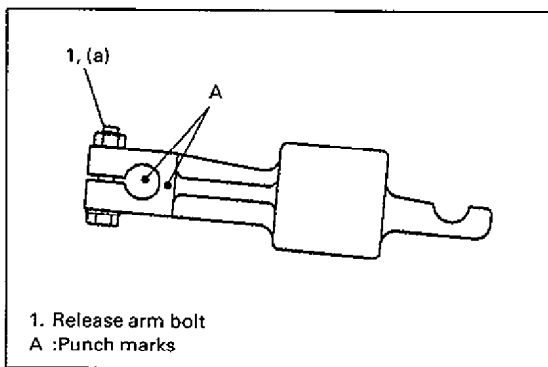
75F00-7C-10-4



75F00-7C-11-1



75F00-7C-11-2



75F00-7C-11-3

5) Caulk seal at A by using caulking tool and hammer.

6) Hook return spring.

7) Apply grease to release bearing inside and release shaft arm, then set bearing.

"A": Grease 99000-25010

8) Apply small amount of grease to input shaft spline and front end as well.

"B": Grease 99000-25210

9) Set release arm to release shaft aligning their punch marks, then tighten bolt.

Tightening Torque

(a): 13 N·m (1.3 kg-m, 9.5 lb-ft)

TIGHTENING TORQUE SPECIFICATIONS

Fastening portion	Tightening torque		
	N·m	kg-m	lb-ft
1. Clutch cable outer bolt	11	1.1	8.0
2. Clutch pedal stopper bolt lock nut	5.5	0.6	4.5
3. Flywheel bolts	42	4.2	30.5
4. Clutch cover bolts	23	2.3	16.5
5. Release arm bolt	13	1.3	9.5
6. Clutch hose union bolt	23	2.3	16.5

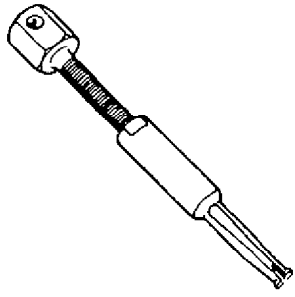
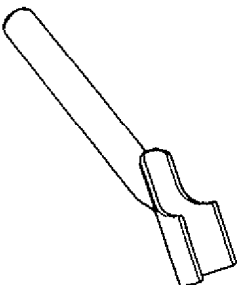
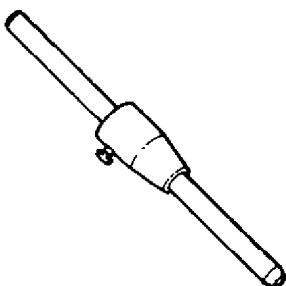
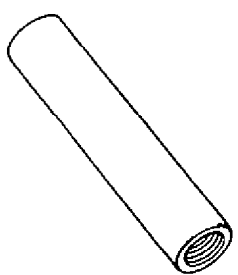
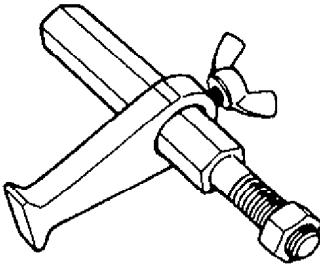
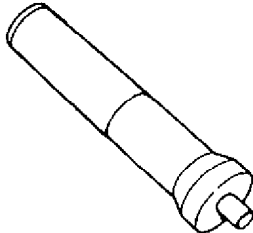
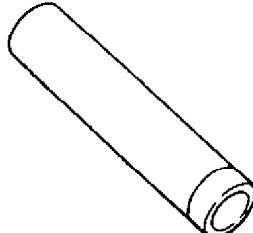
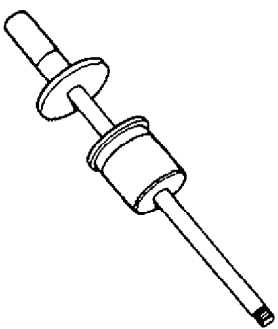
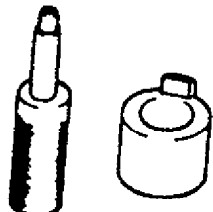
75F00-7C-12-2

REQUIRED SERVICE MATERIALS

MATERIAL	RECOMMENDED SUZUKI PRODUCT	USE
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Clutch master cylinder clevis pin. • Release shaft bushes and seal. • Release shaft arm. • Push rod tip of operating cylinder.
	SUZUKI SUPER GREASE I (99000-25210)	Input shaft spline front end.
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	Clutch cable fastening portion with dash panel.

75F00-7C-12-4

SPECIAL TOOLS

 09917-58010 Bearing remover	 09922-46010 Bush remover	 09923-36330 Clutch center guide	 09923-46030 Joint pipe
 09924-17810 Flywheel holder	 09925-98210 Input shaft bearing installer	 09925-98221 Bearing installer	 09930-30102 Sliding shaft
 09951-16040 Control arm bush installer /remover			

SECTION 8

ELECTRICAL SYSTEM

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

When the text says "If equipped", the subject vehicle may or may not be equipped with that system depending on models or statutory regulations.

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SYSTEM AND CIRCUIT	8-3
Main Fuse Box	8-3
Junction/Fuse Block (J/B)	8-4
Ignition (Main) Switch	8-6
Power Supply Diagram	8-7

GENERAL DESCRIPTION

The body electrical components of this vehicle are designed to operate on 12 volts power supplied by the battery. The electrical system utilizes negative grounded polarity.

WIRING

All body low voltage wires are insulated. The insulation is color coded for identification of individual body circuit.

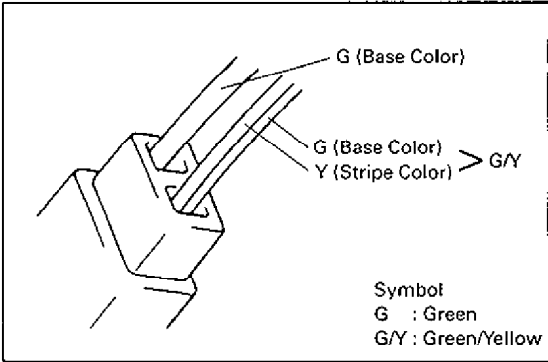
75F00-8-2-1

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

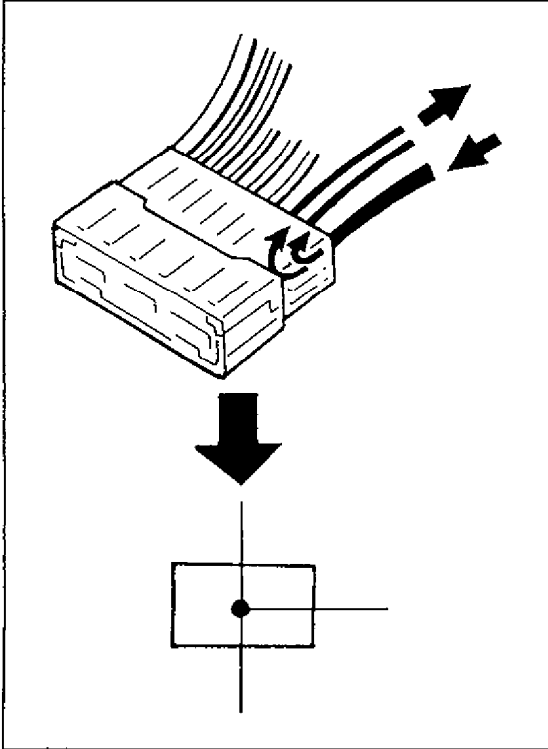
The initial alphabet(s) of the color name is used to represent each color as listed at the left.

75F00-8-2-2



There are two types of wire color: one-color type and 2-color type (with a stripe). In case of 2-color type, the first alphabet ("G" of the example in the figure at the left) represents the basic color (color of wire insulation) and the next alphabet ("Y" of the example) represents the color of stripe.

75F00-8-2-3



JOINT CONNECTOR (J/C)

- Wiring of this vehicle employs joint connectors (J/C) which divide one wire into several different wires or combine several different wires into one wire.
- The joint connector is illustrated left.

75F00-8-2-5

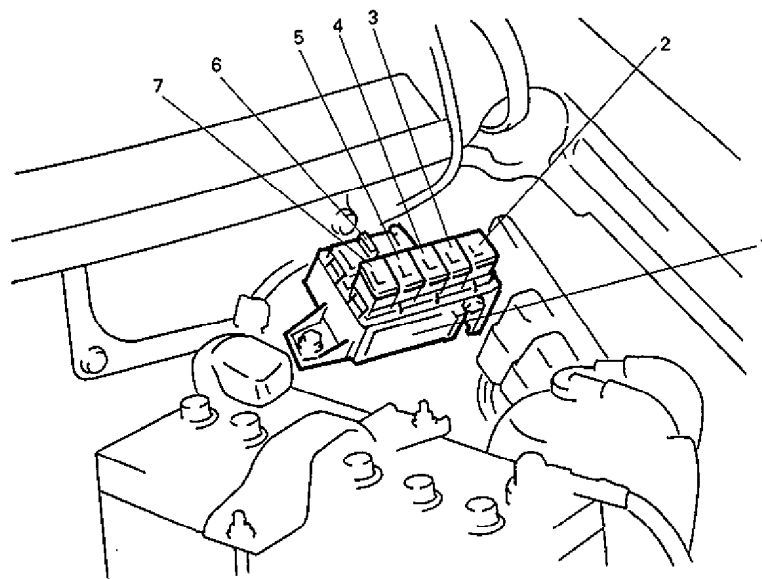
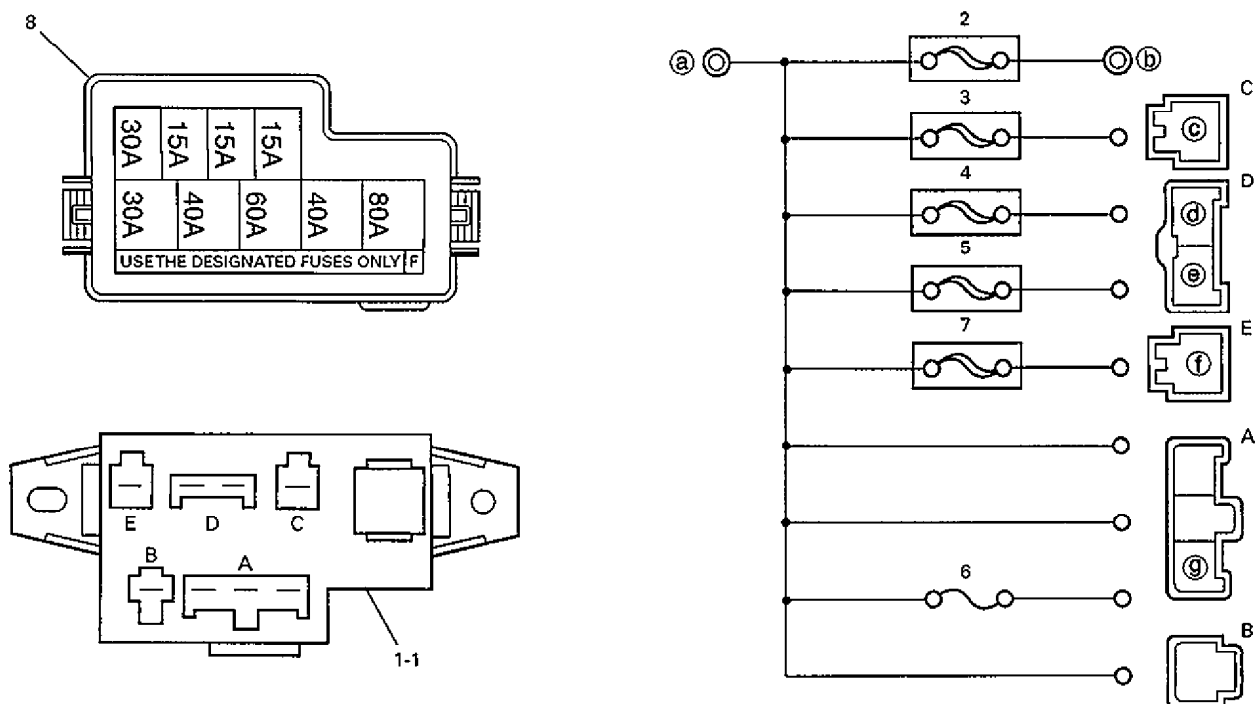
SYSTEM AND CIRCUIT

MAIN FUSE BOX

CAUTION:

- When replacing a fuse, be sure to use one having a correct rated amperage.
- Before replacing a fuse, turn OFF every switch of electric equipments including ignition switch.

LOCATION, DESIGNATION AND CIRCUIT



1. Main fuse box
- 1-1 Main fuse box (viewed from bottom)
2. Main fuse
3. ABS circuit fuse
4. IG circuit fuse
5. Headlight circuit fuse
6. Fuel injection circuit fuse
7. Radiator fan circuit fuse
8. Main fuse box cover

- Ⓐ To generator
- Ⓑ To battery
- Ⓒ To ABS motor relay
- Ⓓ To J/B
- Ⓔ To J/B
- Ⓕ To radiator fan relay
- Ⓖ To main relay

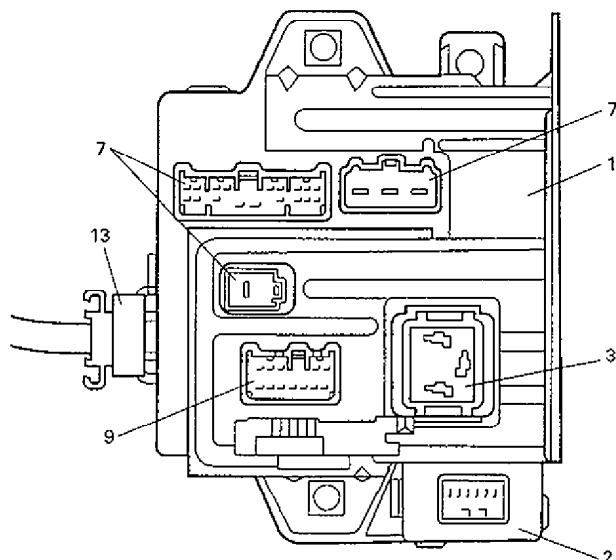
JUNCTION/FUSE BLOCK (J/B)

CAUTION:

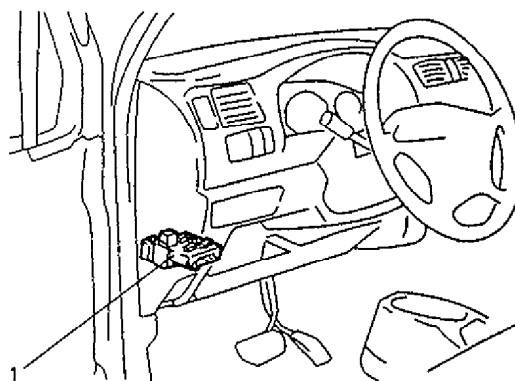
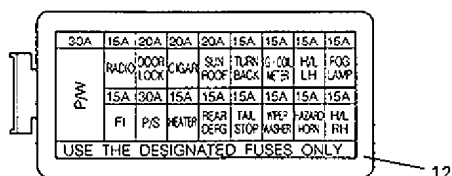
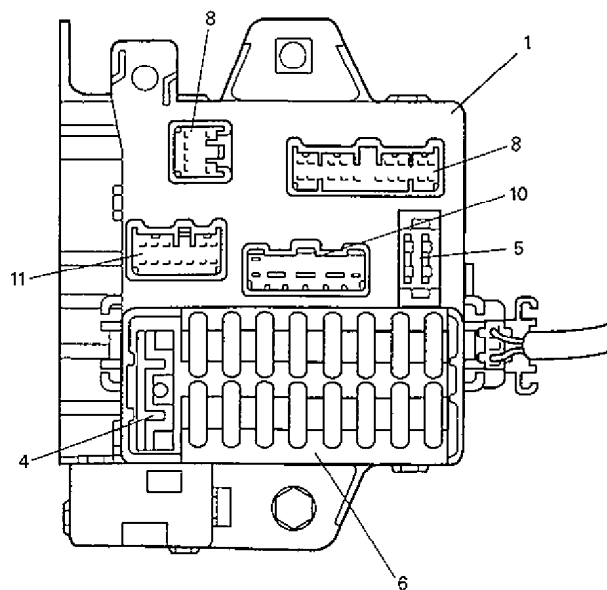
- When replacing a fuse, be sure to use one having a correct rated amperage.
- Before replacing a fuse, turn off every switch of electric equipments including ignition switch.

J/B DESIGNATION AND FUSE LOCATION

Upper side



Lower side



NOTE:
LH steering
vehicle shown

1. Junction/ fuse block
2. Warning controller/buzzer unit
3. To turn signal/hazard relay
4. Power window breaker
5. To front fog light relay
6. Fuse box
7. To main harness
8. To instrument harness
9. To floor harness
10. To ignition switch
11. To combination switch
12. Fuse box cover
13. Air bag system fuse

IGNITION (MAIN) SWITCH

Inspection

- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" in Section 10B or 10B1.
- 3) Disconnect main switch lead wire connectors from junction/fuse block and air bag harness.

60G00-8-6-1

Checking continuity between terminals

Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace main switch.

Wire color		W/G	BI	B/W	W	Y/B	B/Y	B	B	G	G
Key	Position										
OUT	LOCK	○									
	ACC	○—○									
	ON	○—○	○—○	○—○	○—○					○—○	○—○
	START	○—○		○—○	○—○		○—○	○—○			

ACC: Accessory

75F00-8-6-3

Removal

- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" in section 10B or 10B1.
- 3) Remove steering column referring to Section 3C1 of this manual. And then remove steering lock/main switch from steering column, referring to Section 3C1.

75F00-8-6-4

Installation

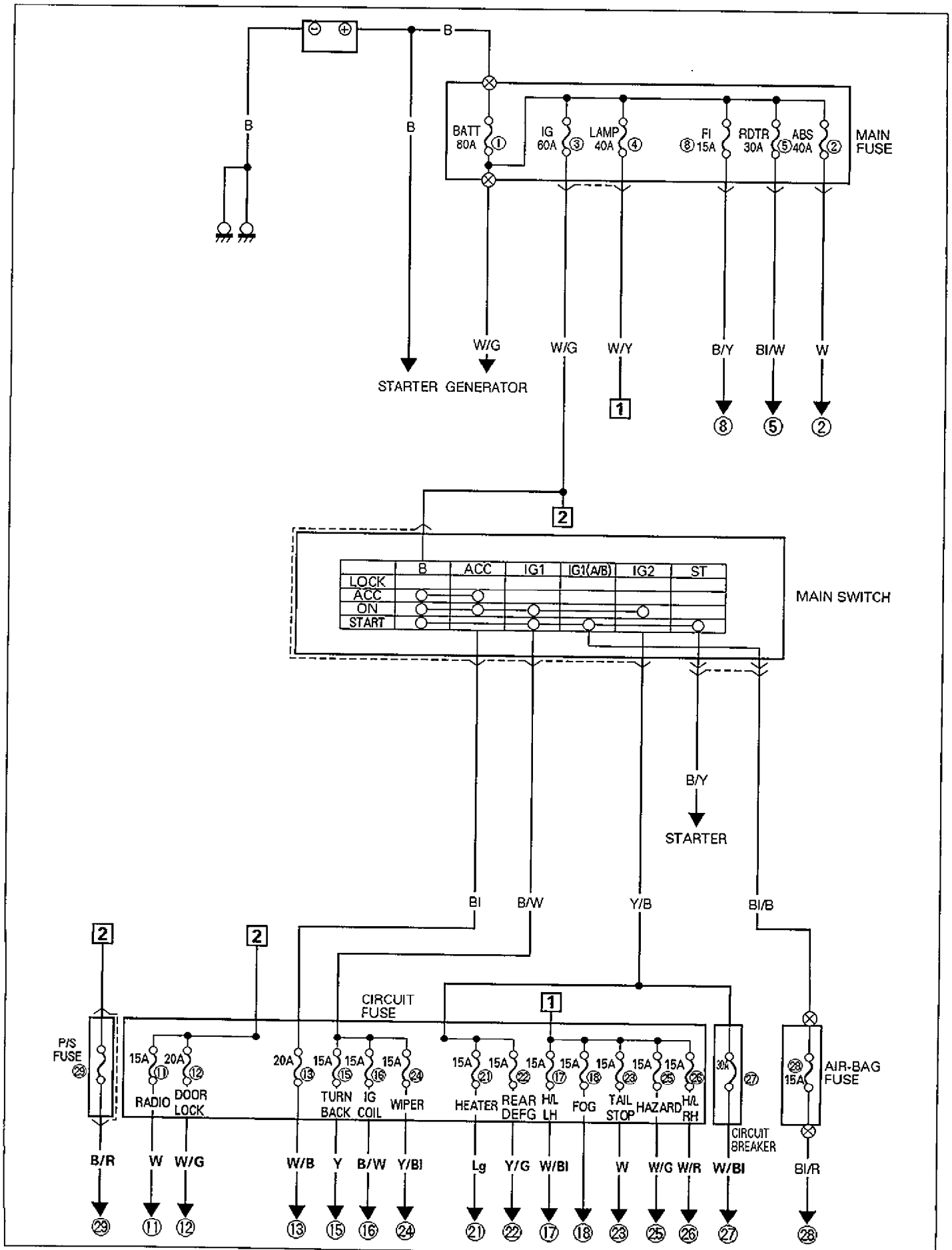
- 1) Install steering lock/main switch and steering column referring to Section 3C1 of this manual.
- 2) Enable air bag system. Refer to "Enabling Air Bag System" in Section 10B or 10B1.

NOTE:

When installing steering column, special care must be used for tightening sequence and each torque.

75F00-8-6-5

POWER SUPPLY DIAGRAM



SECTION 8B

BODY ELECTRICAL SYSTEM

WARNING:

For vehicles equipped with Air Bag System:

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.
- Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).

NOTE:

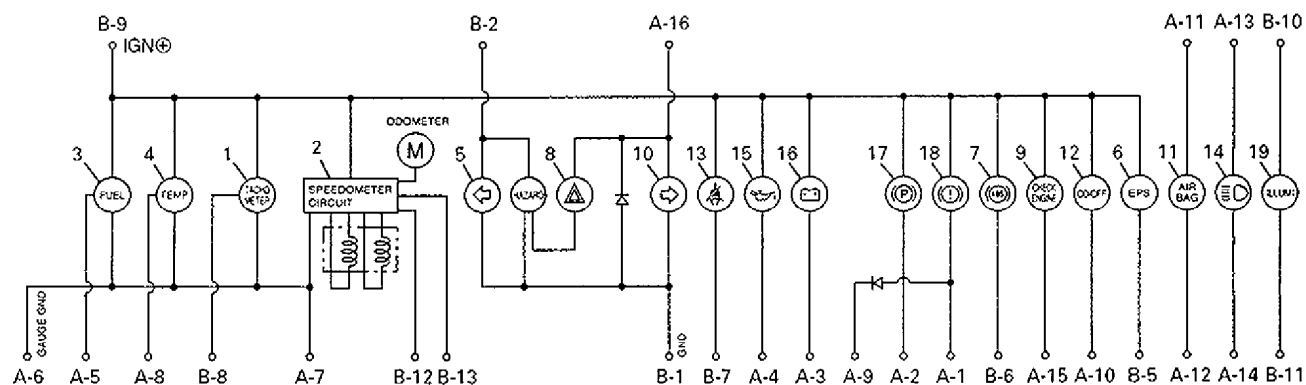
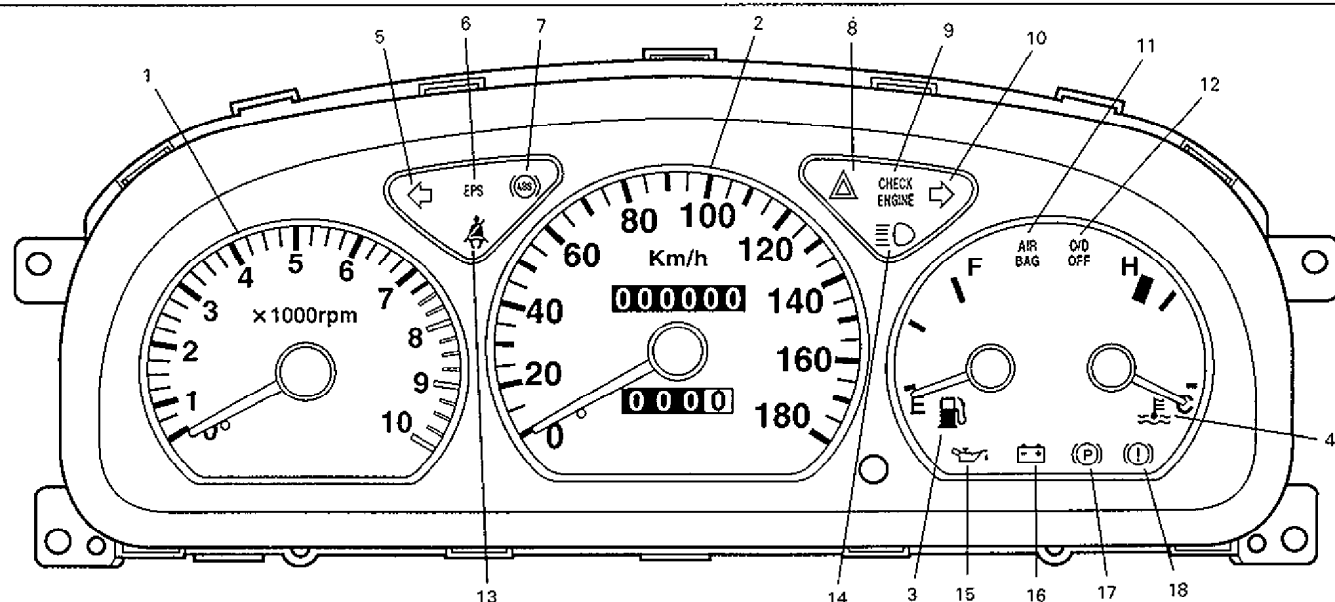
When the text says "If equipped", the subject vehicle may or may not be equipped with the system depending on models or statutory regulations.

CONTENTS

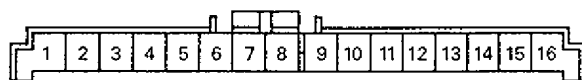
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INSTRUMENTS AND GAUGES

COMBINATION METER WIRING



Coupler A



Coupler B



1. Tachometer
2. Speedometer
3. Fuel level meter
4. Water temperature meter
5. Turn signal pilot light (LH)
6. EPS warning light
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. Illumination light

Coupler A

1. To brake fluid level switch R/B
2. To parking brake switch V/G
3. To generator W/R
4. To oil pressure switch Y/B
5. To fuel level gauge Y/R
6. To ground B/BI
7. To VSS Lg/B
8. To ECT sensor Y/W
9. To J/B Br/B
10. To TCM BI/Y
11. To J/B (fuse box) B/W
12. To SDM BI
13. To J/B (fuse box) W/BI
14. To J/B (combination SW) R
15. To ECM V/Y
16. To J/B (combination SW) G/R

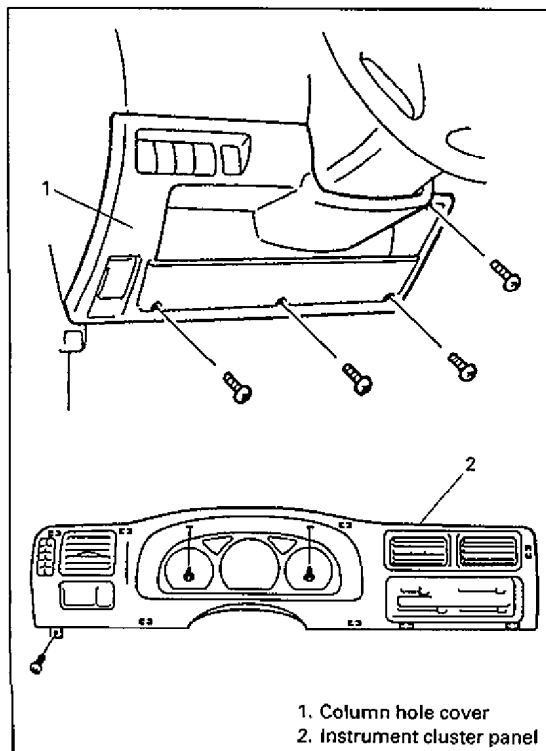
Coupler B

1. To J/B (to ground) B
2. To J/B (combination SW) G/Y
3. Blank RHD G/R
4. Blank
5. To EPS controller V/G
6. To ABS controller R/BI
7. To seat belt SW (if equipped) (Br/R)
8. To noise suppressor Br
9. To J/B (to IG COIL METER fuse) B/W
10. To J/B R/Y
11. To ground B
12. To VSS Lg/R
13. To EPS controller V

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Speedometer shows no operation.	IG fuse blown Speed sensor faulty Speedometer faulty Wiring or grounding faulty	Replace fuse to check for short. Check speed sensor. Replace speedometer. Repair.
Fuel level meter shows no operation.	IG fuse blown Fuel meter faulty Fuel level gauge unit (in fuel pump ass'y) faulty Wiring or grounding faulty	Replace fuse to check for short. Check meter. Check gauge unit. Repair.
Coolant (Water) temp. meter shows no operation.	IG fuse blown Coolant (Water) temp. meter faulty Coolant (Water) temp. sending unit faulty Wiring or grounding faulty	Replace fuse to check for short. Check meter. Check sending unit. Repair.
Oil pressure light shows no lighting.	Light fuse blown Bulb burnt out Oil pressure switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check switch. Repair.
Brake warning light (parking brake light) shows no lighting.	Light fuse blown Bulb burnt out Parking brake switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check parking brake switch. Repair.
Main switch key warning buzzer shows no sounding. (Applicable to vehicle equipped with buzzer.)	IG COIL METER fuse blown Buzzer faulty Wiring or grounding faulty	Replace fuse to check for short. Replace J/B. Repair.
Light warning buzzer shows no sounding. (Applicable to vehicle equipped with buzzer.)	IG COIL METER fuse blown Buzzer faulty Driver side door switch faulty	Replace fuse to check for short. Replace J/B. Replace door switch.

75F00-8B-3-3



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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 or 10B1.
- 3) Remove column hole cover.
- 4) Remove instrument cluster panel.
- 5) Disconnect couplers from combination meter.
- 6) Remove combination meter.

INSTALLATION

Reverse removal procedure for installation, noting the following.

- If equipped with air bag system, be sure to enable air bag system after installation. Refer to "Enabling Air Bag System" in SECTION 10B or 10B1.

SPEEDOMETER AND SENSOR

DESCRIPTION OF CIRCUIT

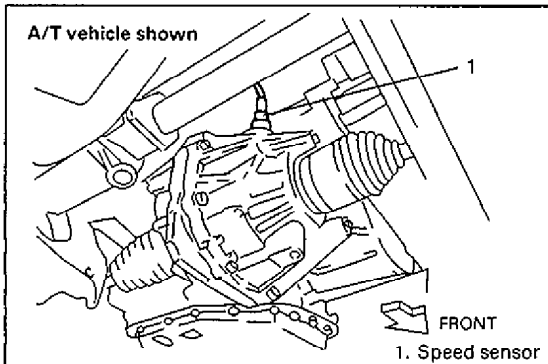
The speedometer circuit consists of the speedometer installed inside the combination meter and the speed sensor installed to the transmission case.

75F00-8B-4-1

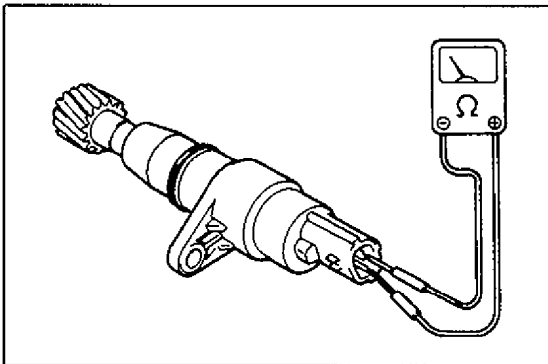
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

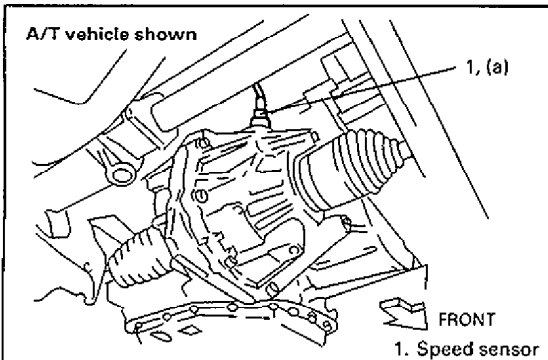
75F00-8B-4-2



75F00-8B-4-3



75F0000-8B-4-4



75F00-8B-4-5

SPEED SENSOR

REMOVAL

- 1) Hoist vehicle.
- 2) Disconnect coupler from speed sensor.
- 3) Remove speed sensor.

INSPECTION

- Resistance between terminals should be within following range.

Coil resistance (20 – 30°C): 295 – 455 Ω

- When speed sensor shaft is turned with fingers, resistance due to magnetic force (click) should be felt.

INSTALLATION

Reverse removal procedure for installation.

Tightening Torque

(a): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

FUEL LEVEL METER AND GAUGE UNIT

DESCRIPTION OF CIRCUIT

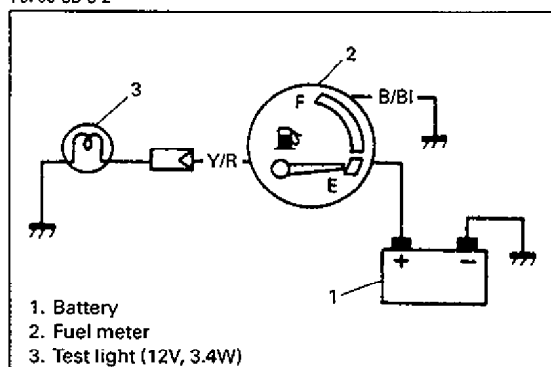
The fuel level meter circuit consists of the fuel level meter installed inside the combination meter and the fuel level gauge (included in fuel pump assembly) installed in the fuel tank.

Current flowing through the meter coil is changed to control the meter pointer. That is, when fuel is full, the fuel level gauge unit resistance is decreased with more current flowing into the meter coil, causing the meter pointer to point at the "F" position.

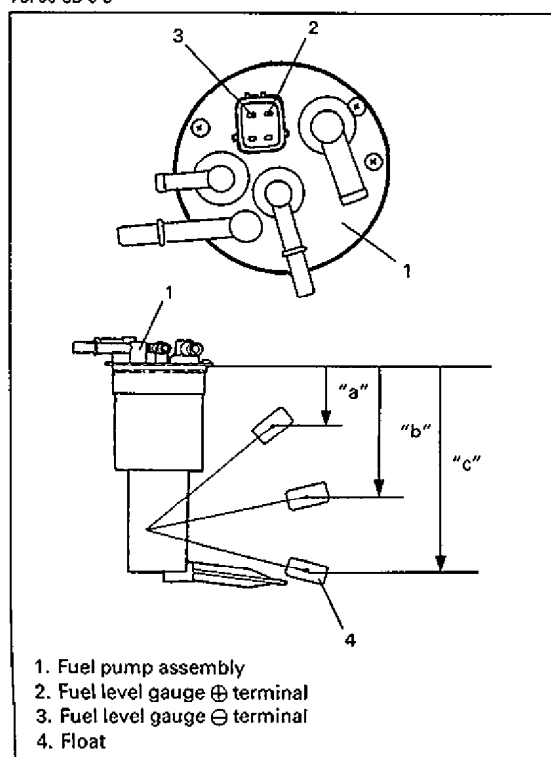
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

75F00-8B-5-2



75F00-8B-5-3



75F00-8B-5-5

FUEL LEVEL METER

INSPECTION

- 1) Remove rear seat and peel rear end of the carpet.
- 2) Disconnect Y/R lead wire going to gauge unit.
- 3) Use a bulb (12V 3.4W) in position to ground lead wire as illustrated.
- 4) Turn ignition switch ON.

Make sure that bulb is lighted with meter pointer fluctuating several seconds thereafter. If meter is faulty, replace.

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		Resistance (Ω)	
"a"	56mm (2.20in.)	F	2 - 4
"b"	119.2mm (4.70in.)	1/2	29.5 - 35.5
"c"	200.5mm (7.90in.)	E	119 - 121

If the measured value is out of specification, replace.

ENGINE COOLANT TEMPERATURE METER AND SENSOR UNIT

DESCRIPTION OF CIRCUIT

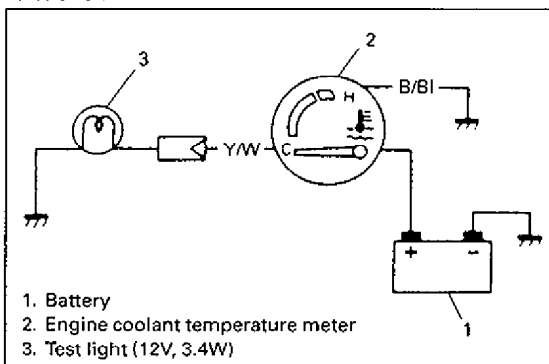
The coolant temperature gauge circuit consists of coolant temperature meter installed in the cluster and the coolant temperature sensor unit on the thermostat case.

The sensor unit shows different resistance values depending on the coolant temperature. This causes a current flowing through the temperature sensor coil to change, controlling the sensor pointer. That is, when the coolant temperature rises, the sensor unit resistance is decreased with more current flowing through the gauge coil, raising the gauge pointer upward from the "C" position.

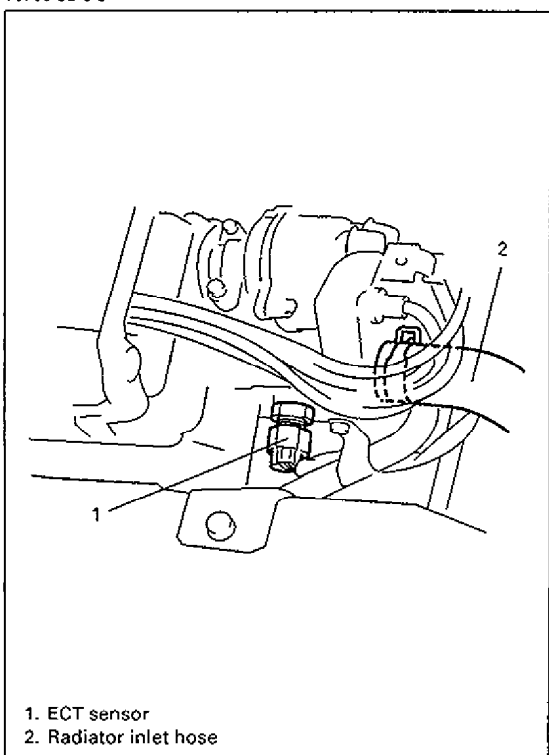
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

75F00-8B-6-2



75F00-8B-6-3



75F00-8B-6-5

ENGINE COOLANT TEMPERATURE METER INSPECTION

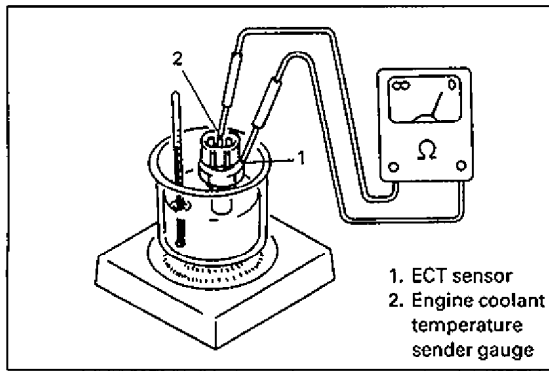
- 1) Disconnect Y/W lead wire going to sender gauge installed to thermostat case.
- 2) Use a bulb (12V 3.4W) in position to ground wire as illustrated.
- 3) Turn main switch ON. Confirm that bulb is lighted with meter pointer fluctuating several seconds thereafter. If meter is faulty, replace.

ENGINE COOLANT TEMPERATURE SENSOR REMOVAL

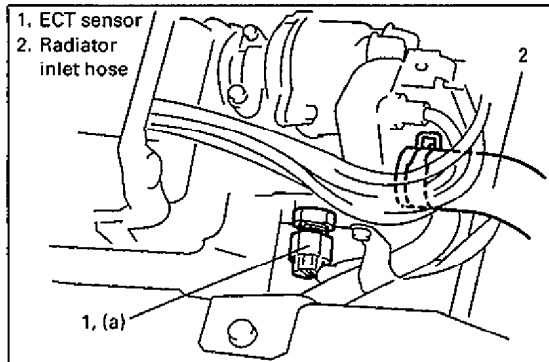
WARNING:

- Make sure that engine coolant temperature is cold before removing any part of cooling system.
- Also be sure to disconnect negative cable from battery terminal before removing any part.

- 1) Drain coolant.
- 2) Remove air cleaner ass'y.
- 3) Remove engine coolant temperature sensor.



75F00-8B-7-1



75F00-8B-7-2

INSPECTION

Warm up sender gauge. Thus make sure its resistance is decreased with increase of its temperature.

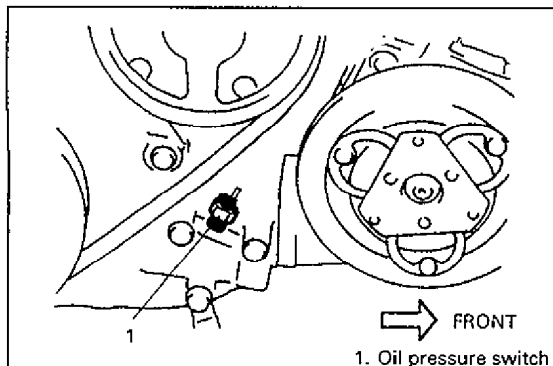
Temperature	Resistance
50°C (122°F)	136 – 216 Ω
120°C (248°F)	16.4 – 19.4 Ω

INSTALLATION

Reverse removal procedure for installation.

Tightening Torque

(a): 15 N·m (1.5 kg-m, 11.0 lb-ft)



75F00-8B-8-1

OIL PRESSURE LIGHT

DESCRIPTION OF CIRCUIT

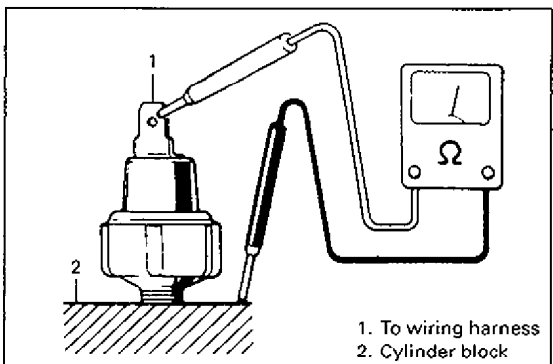
The oil pressure circuit consists of the oil pressure switch installed to the cylinder block and the light (warning light) inside the combination meter.

The oil pressure switch operates in such a way that it is switched OFF when oil pressure is produced by the started engine and then fed to switch.

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

75F00-8B-8-2



75F00-8B-8-3

OIL PRESSURE SWITCH

INSPECTION

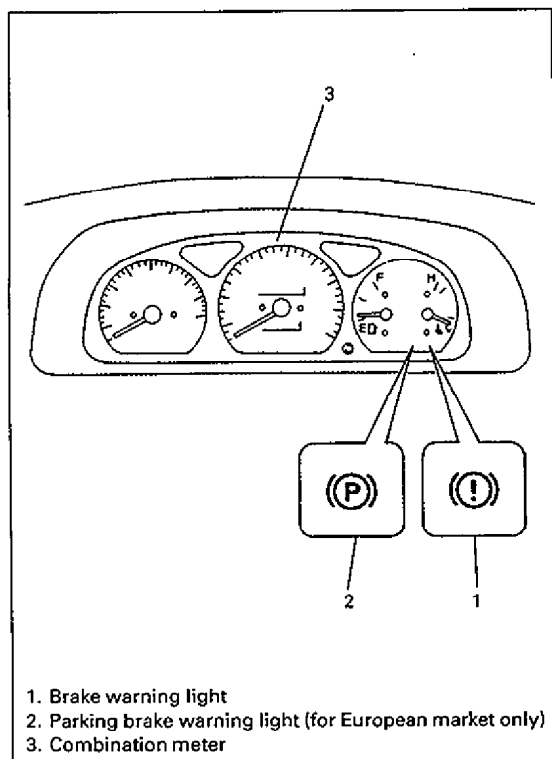
Use an ohmmeter to check switch continuity.

During Engine Running	No continuity ($\infty \Omega$)
At Engine Stop	Continuity (0Ω)

REMOVAL AND INSTALLATION

Refer to Section 6A4 OIL PRESSURE CHECK in this manual.

75F00-8B-8-4



75F00-8B-9-2

BRAKE WARNING LIGHT AND PARKING BRAKE WARNING LIGHT (If equipped) DESCRIPTION OF CIRCUIT

The brake warning light circuit consists of a brake fluid level switch installed in the master cylinder reservoir, and the light (brake warning light) in the gauge cluster. Also, this circuit is additionally provided with the parking brake switch which warns that the parking brake is applied.

OPERATION OF WARNING LIGHT

For European market:

Brake warning light comes on at IG switch ON when:

- Brake fluid level is inadequate.

Parking brake light comes on at IG switch ON when:

- Parking brake is applied.

For Other market:

Brake warning light comes on at IG switch ON when:

- Parking brake is applied.
- Brake fluid level is inadequate. (if parking brake is not applied)

NOTE:

For the purpose of brake warning light bulb check, the brake warning light comes ON briefly during engine starting (cranking) regardless of the brake fluid level and the parking brake operation (for all market).

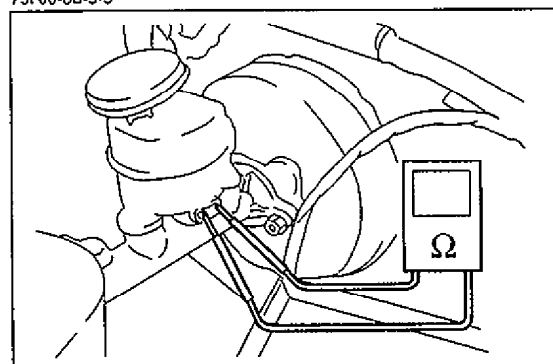
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
Brake warning light (parking brake warning light) shows no lighting.	Light fuse blown Bulb burnt out Parking brake switch faulty Wiring or grounding faulty	Replace fuse to check for short. Replace bulb. Check parking brake switch. Repair.

75F00-8B-9-3



75F00-8B-9-4

INSPECTION

• BRAKE FLUID LEVEL SWITCH

Use an ohmmeter to check switch for continuity.

If found defective, replace switch.

OFF position (float up)	No continuity
ON position (float down)	Continuity

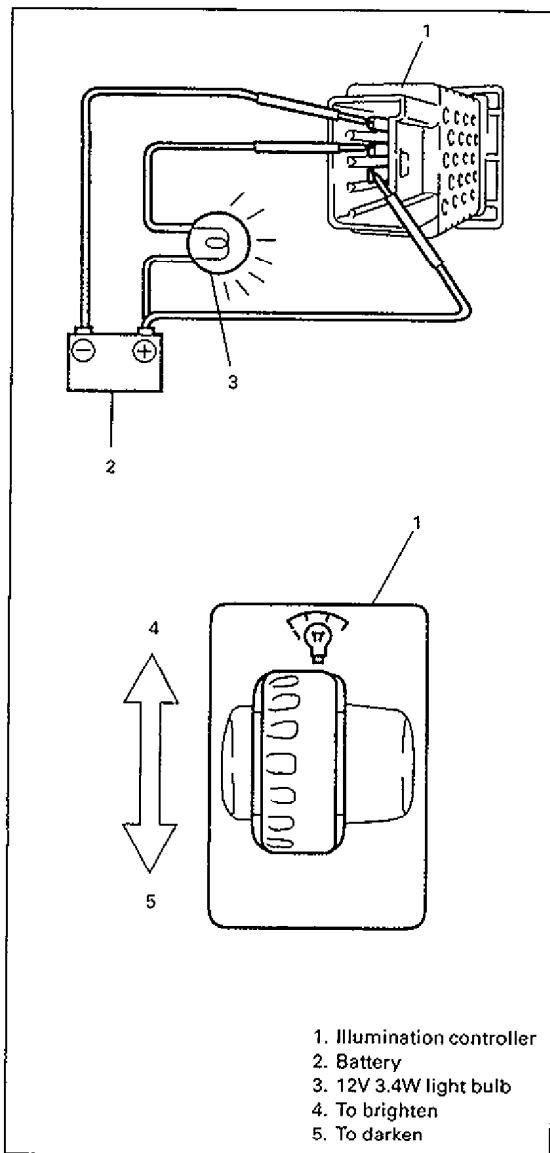
• PARKING BRAKE SWITCH

Use an ohmmeter to check switch for continuity.

If found defective, replace switch.

OFF position (release the parking brake)	No continuity
ON position (parking brake lever pulled up)	Continuity

75F00-8B-9-5



75F00-8B-10-3

ILLUMINATION CONTROLLER (If equipped)

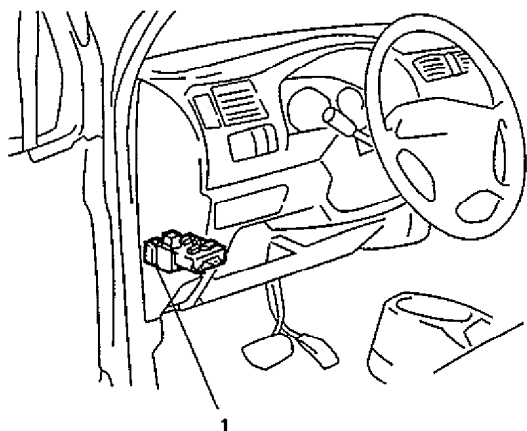
INSPECTION

Use a light bulb (if equipped) (12V 3.4W) and wire as illustrated.

Move illumination controller knob upward to brighten light bulb and downward to darken it.

If it does not brighten or darken light bulb, replace illumination controller.

LH steering vehicle shown



1. Warning controller/buzzer unit (in J/B)

75F00-8B-11-2

IGNITION SWITCH KEY REMAINDER WARNING BUZZER (If equipped)

DESCRIPTION OF CIRCUIT

The ignition switch key remainder warning buzzer circuit is a system to sound the buzzer if the driver leaves the vehicle with the ignition switch key inserted in place, (i.e. the ignition switch key is turned to ACC or OFF position) urging the driver to take it out.

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

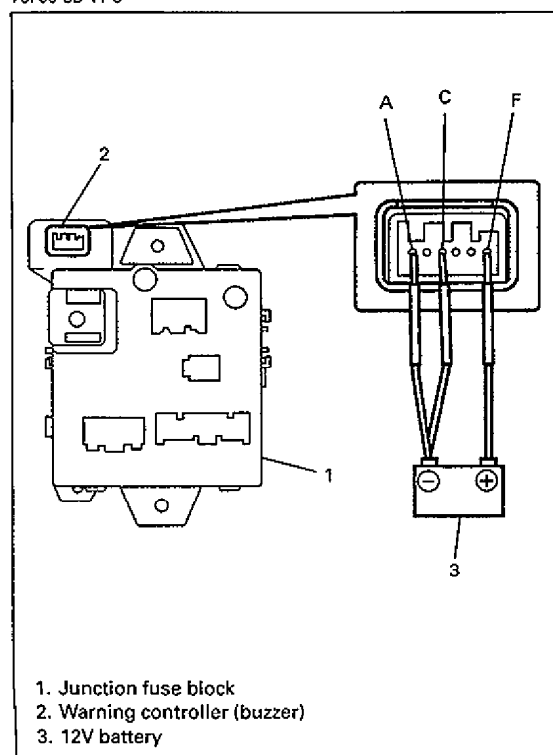
INSPECTION OF CIRCUIT

If ignition switch key remainder warning buzzer does not sound, use its wiring diagram in Wiring Diagram Manual as reference to check buzzer, wiring, etc.

TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
Ignition switch key remainder warning buzzer shows no sounding. Applicable to vehicle equipped with buzzer.	Buzzer fuse blown Buzzer faulty Wiring or grounding faulty	Replace fuse to check for short. Replace J/B. Repair.

75F00-8B-11-3



1. Junction fuse block
 2. Warning controller (buzzer)
 3. 12V battery

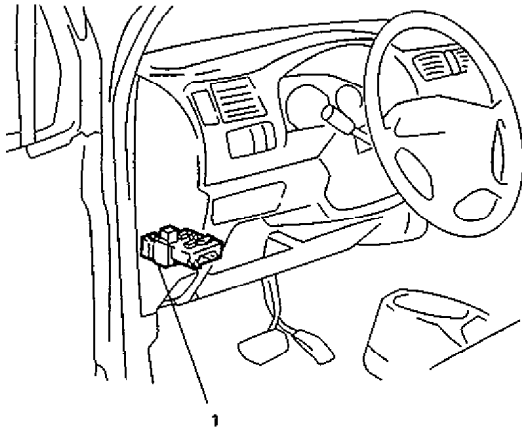
75F00-8B-11-5

INSPECTION OF WARNING CONTROLLER

Remove junction fuse block from vehicle, then connect 12V battery and warning controller (buzzer). Connect battery (+) terminal to terminal "F" of warning controller, and battery (-) terminal to terminal "A" and "C" of warning controller.

If warning controller emits a regular intermittent sound, the warning controller has no problem. If it does not, replace J/B.

LH steering vehicle shown



1. Warning controller/buzzer unit (in J/B)

75F00-8B-12-2

LIGHT REMAINDER WARNING BUZZER

DESCRIPTION OF CIRCUIT

The light warning buzzer is a system to warn and urge the driver to turn off the headlights, when the driver turns off the ignition and opens the driver side door but leaves the lights on, by sounding the buzzer.

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

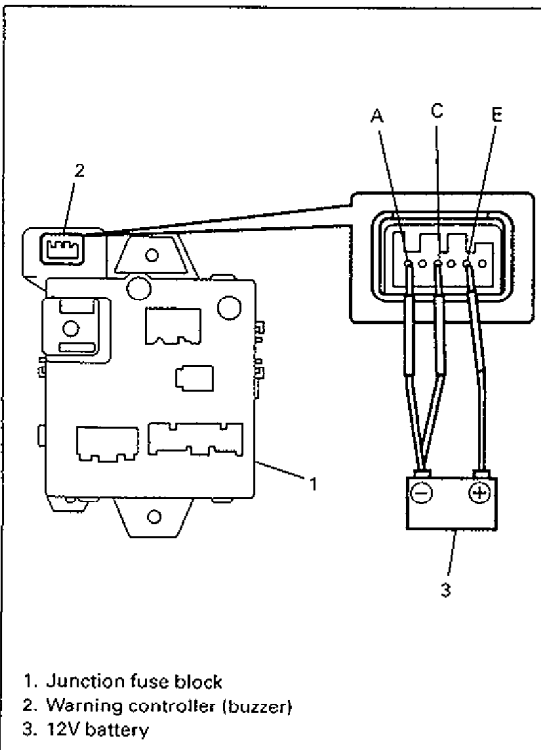
INSPECTION OF CIRCUIT

When the warning buzzer does not make sounding, use the circuit diagram in Wiring Diagram Manual as reference to check the buzzer, wiring, etc.

TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
Light warning buzzer shows no sounding. Applicable to vehicle equipped with buzzer.	Buzzer fuse blown Buzzer faulty Driver side door switch faulty	Replace fuse to check for short. Replace J/B. Replace door switch.

75F00-8B-12-3



INSPECTION OF WARNING CONTROLLER

Remove junction fuse block from vehicle, then connect 12V battery and warning controller (buzzer). Connect battery (+) terminal to terminal "E" of warning controller, and battery (-) terminal to terminal "A" and "C" of warning controller. If warning controller emits a continuous sound, the warning controller has no problem. If it does not, replace J/B.

75F00-8B-12-5

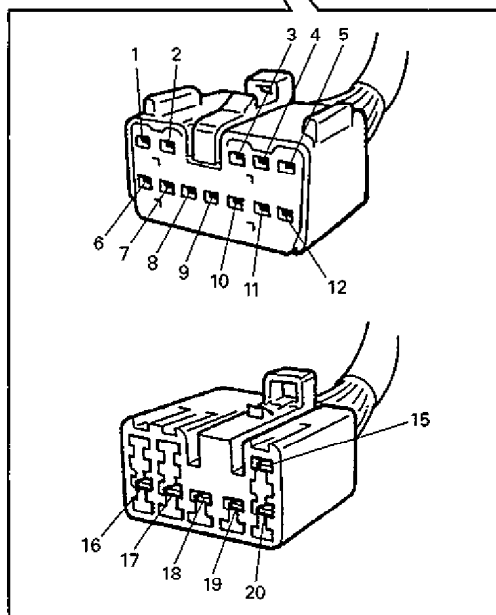
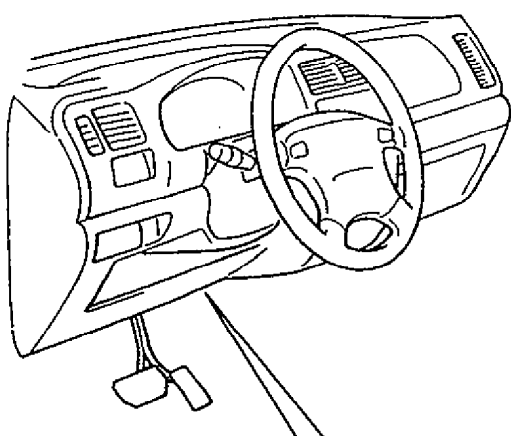
COMBINATION SWITCH

DESCRIPTION

Combination switch incorporates lighting, turn signal, hazard warning light, dimmer, passing light and wiper/washer switches.

75F00-8B-13-1

LH steering vehicle shown



1. Combination switch couplers

INSPECTION

- 1) Disconnect negative (-) cable at battery.
- 2) Disconnect combination switch lead wire couplers from junction/fuse block.
- 3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

Dimmer & Passing Light

Light SW	Switch Position	Terminal Wire Color	11	9	3	15	2	8
			B	R/W	R	Br/Y	W	R/Y
OFF	Passing		○		○			
	Low beam							
	High beam							
SMALL	Passing		○		○			
	Low beam							
	High beam							
HEAD	Passing		○		○			
	Low beam		○	○		○	○	○
	High beam		○		○	○		

Turn & Hazard

Hazard SW	Turn Signal SW	Terminal Wire Color	10	4	1	6	5	12
			G/R	G	G/Y	Y	Y/W	W/G
OFF	L		○	○				
	N					○	○	
	R			○	○			
ON			○	○	○		○	○

Wiper and Washer

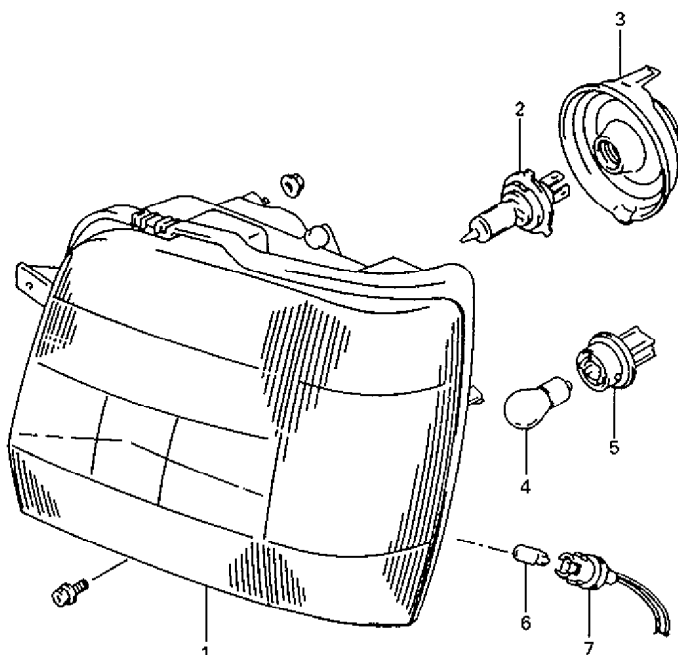
Wiper SW	Terminal Wire Color	7	18	17	19
		Y/BI	BI/R	BI	BI/W
OFF				○	○
INT				○	○
LO		○		○	
HI		○	○		

Washer SW	Terminal Wire Color	7	20
		Y/BI	BI/B
OFF			
ON		○	○

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LIGHTING SYSTEMS

HEADLIGHTS



1. Headlight assembly
2. Halogen bulb
3. Socket cover
4. Turn signal light bulb

5. Turn signal light bulb socket
6. Position light bulb
7. Position light bulb socket

75F00-8B-14-3

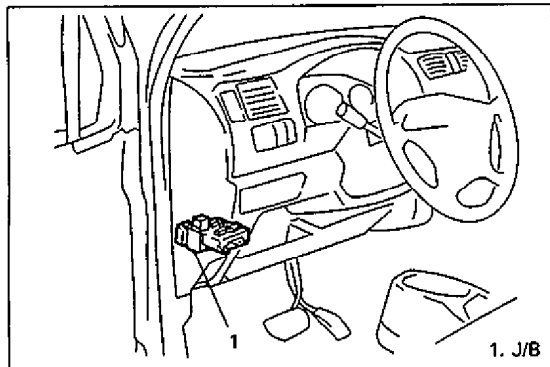
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Only one light does not light.	• Bulb burnt out • Fuse blown • Socket, wiring or grounding faulty	Replace bulb. Replace fuse. Repair as necessary.
Headlights do not light.	• Main fuse and/or fuses blown • Lighting and dimmer switches faulty • Defective light relay • Defective diode • Wiring or grounding faulty	Replace main fuse and/or fuses to check for short. Check switches. Replace light relay. Replace warning controller. Repair as necessary.
Only one beam ("Hi" or "Lo") does not light.	• Bulb burnt out • Lighting or dimmer switch faulty	Replace bulb. Check switch.

75F00-8B-14-5



75F00-8B-15-1

INSPECTION

Circuit Continuity

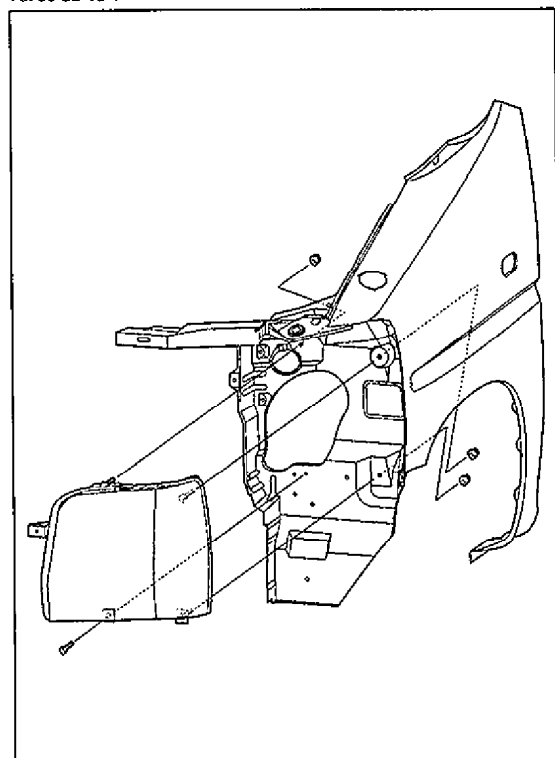
- 1) Headlight is grounded at J/B.
- 2) Check lighting and dimmer switch for each terminal-to-terminal continuity. Refer to "COMBINATION SWITCH" in this section.

REMOVAL

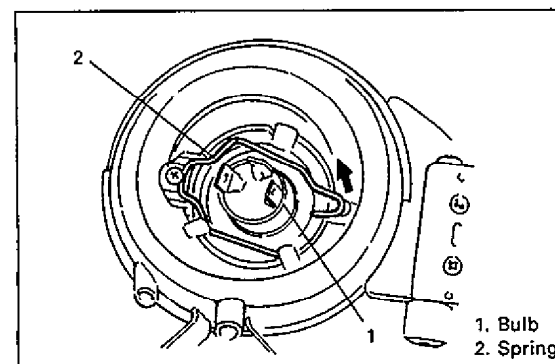
- 1) Disconnect negative (-) cable at battery.
- 2) Remove headlight mounting screws and nuts.
- 3) Disconnect coupler from headlight bulb.
 Disconnect headlight leveling actuator coupler (for vehicle with headlight leveling system).
 Disconnect position light coupler.
- 4) Remove headlight.

INSTALLATION

Reverse removal procedure of removal.



75F00-8B-15-3



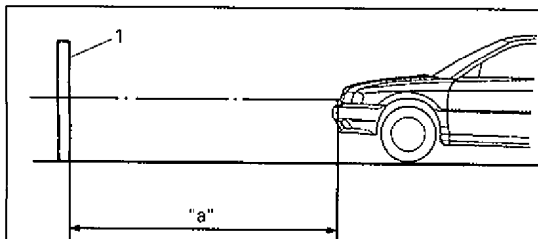
75F00-8B-15-4

BULB REPLACEMENT

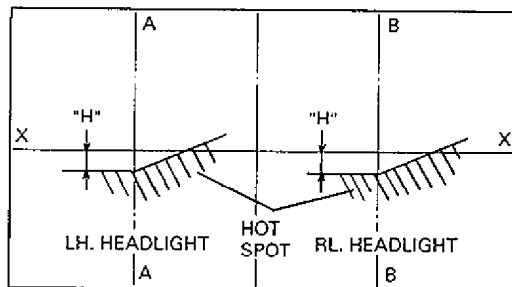
WARNING:

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

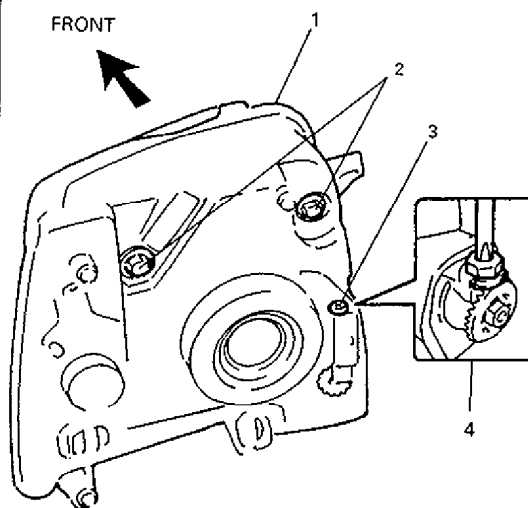


LH steering vehicle shown

X - X: Horizontal center line of headlights

A - A: Vertical center line of left headlight

B - B: Vertical center line of right headlight



1. Headlight ass'y (LH)

2. Aiming bolt (for right/left adjustment)

3. Aiming screw (for up/down adjustment)

4. Aiming screw (for up/down adjustment with leveling system)

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 with one driver aboard as below.

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.

HEADLIGHT BEAM LEVELING SYSTEM (If equipped)

GENERAL DESCRIPTION

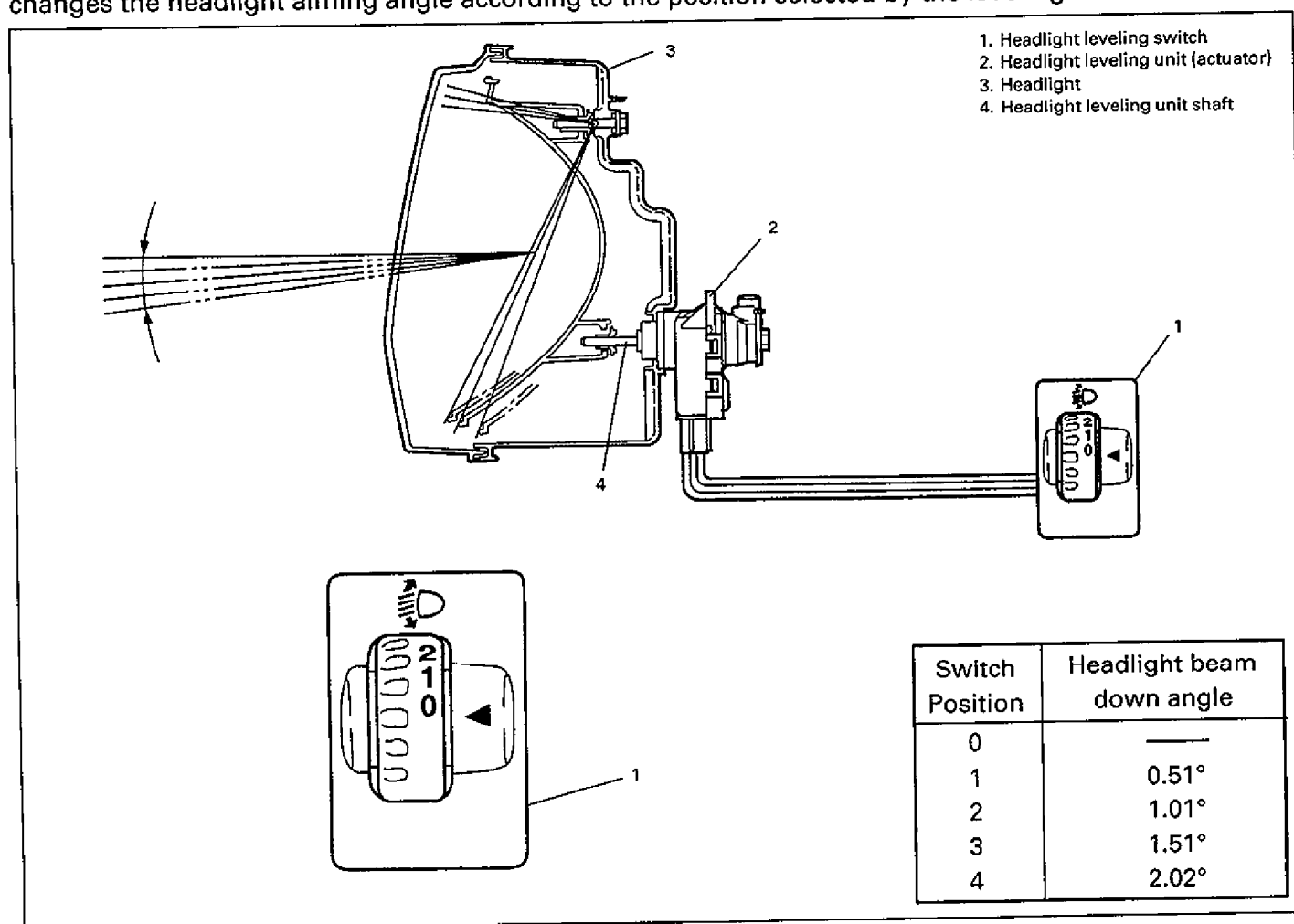
This system consists of the headlight leveling switch and headlight leveling actuator. It is used to lower both headlight aiming angles from the initial setting level by operating the leveling switch on the instrument.

NOTE:

When inspecting and adjusting the headlight beam, make sure to set the leveling switch to the "0" position with the ignition switch "ON", or down stroke from the initial setting level will be reduced.

Operation

The headlight leveling actuator is mounted behind headlight assembly and connected to the headlight reflector. When the headlight leveling switch knob is turned, the headlight leveling actuator operates and it changes the headlight aiming angle according to the position selected by the leveling switch knob.



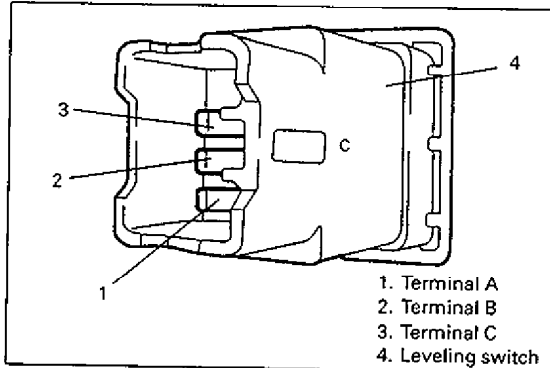
TROUBLE DIAGNOSIS

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 stuck - Vehicle body around headlight deformed - Headlight ass'y itself deformed	Repair as necessary. Replace actuator. Repair body. Replace headlight ass'y.

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

75F00-8B-18-1



INSPECTION

Leveling switch

Use a circuit tester to check the resistance between terminal A and C and terminal "A" and "B" at each leveling switch position. If the obtained resistance value is out of specification, replace switch.

Position	Resistance (Ω)	
	between terminal "A" and "B"	between terminal "A" and "C"
0	3724 – 4116	646 – 714
1	3078 – 3402	1292 – 1428
2	2432 – 2688	1938 – 2142
3	1786 – 1974	2584 – 2856
4	1140 – 1260	3230 – 3570

75F00-8B-18-3

Leveling actuator

All headlight system couplers connected including leveling actuator and switch, and at IG 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.

75F00-8B-18-4

TURN SIGNAL AND HAZARD WARNING LIGHTS

WIRING CIRCUIT

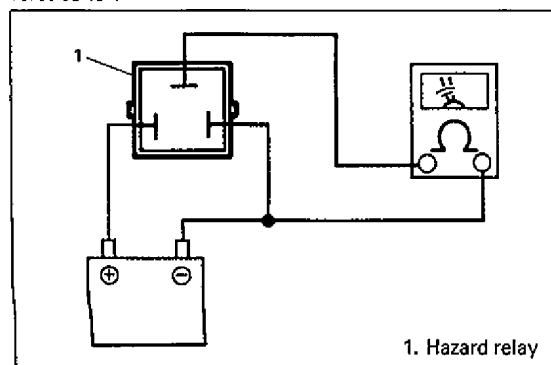
Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

75F00-8B-19-1

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Flash rate high or one side only flashes	- Faulty ground - Incorrect bulb - One of light bulbs burnt out or right or left side of front or rear side - Defective turn signal/hazard warning relay - 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 - Defective relay - Defective switch	Replace. Repair. Replace. Replace.
Flash rate low	- Supply voltage too low - Defective relay	Recharge battery. Repair.

75F00-8B-19-4



75F00-8B-19-5

HAZARD RELAY

The turn signal/hazard relay is located in the junction/fuse block.

INSPECTION

Connect battery and tester as shown left.

Unless a continued click sound is heard, replace relay.

CLEARANCE, TAIL AND LICENCE LIGHTS

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
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.

BACK-UP LIGHTS

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Back-up lights do not light.	• Fuse blown • Bulb burnt out • Back-up light switch or transmission range switch faulty • Wiring or grounding faulty	Replace fuse to check for short. Replace. Check switch. Repair as necessary.

BRAKE LIGHTS

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Stop lights do not light.	• Fuse blown • Bulb burnt out • Stop light switch faulty • Wiring or grounding faulty	Replace fuse to check for short. Replace. Adjust or replace switch. Repair as necessary.
Stop lights stay on.	Stop light switch faulty	Adjust or replace switch.

REAR FOG LIGHT (If equipped)

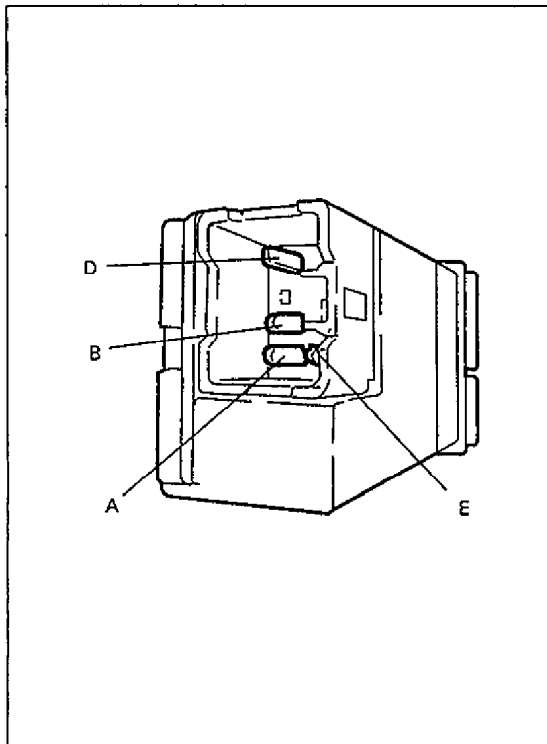
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Rear fog light does not come on.	• Main fuse and/or fuses blown • Lighting switch faulty • Wiring or grounding faulty	Replace main fuse and/or fuses to check for short. Check switch. Repair as necessary.

75F00-8B-21-2



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INSPECTION

Rear Fog Light Switch

TERMINAL		B	E	D	A
RR FOG SW	OFF SW				
FREE	FREE		○	○	○
	PUSH		○	○	○
PUSH	FREE	○	○	○	○
	PUSH		○	○	○

CIGARETTE LIGHTER

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Cigarette lighter does not work.	• Fuse blown • Main switch faulty • Cigarette lighter faulty • Wiring or grounding faulty	Replace fuse to check for short. Check switch. Repair or replace. Repair as necessary.

75F00-8B-21-5

REAR WINDOW DEFOGGER

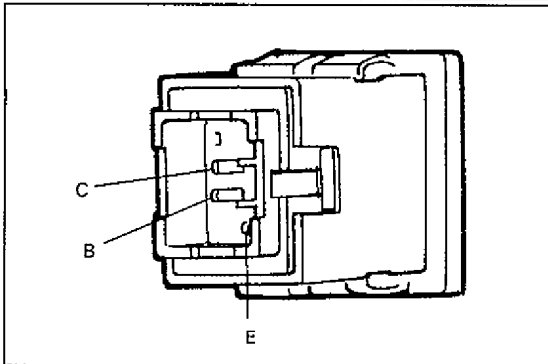
The rear window defogger system has horizontal ceramic silver compound elements and two vertical bus bar. The system is operated by the defogger switch in the instrument panel.

WIRING DIAGRAM

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Defogger won't work.	- Fuse blown - Defogger switch faulty - Defogger heat wire faulty - Wiring or grounding faulty	Replace fuse to check for short. Check switch. Check heat wire. Repair as necessary.



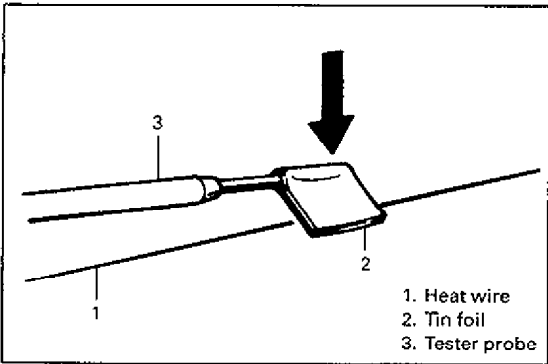
75F00-8B-22-2

INSPECTION

Defogger Switch

Use a circuit tester to check defogger switch for continuity. If switch has no continuity between terminals, replace.

Terminal	B	C	E
Defogger SW			
OFF		○	○
ON	○	○	○



75F00-8B-22-3

Defogger Wire

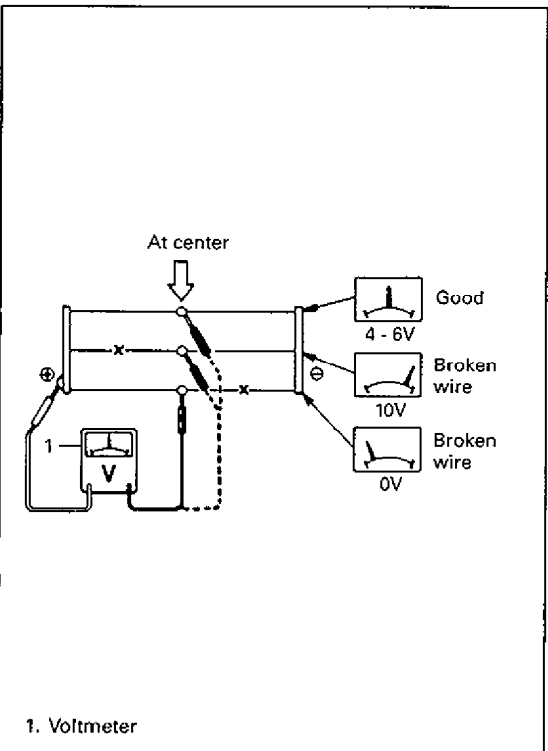
NOTE:

- When cleaning rear window glass, use a dry cloth to wipe it along wire direction.
- When cleaning glass, do not use detergent or abrasive-containing glass cleaner.
- When measuring wire voltage, use a tester with negative probe wrapped with a tin foil which should be held down on wire by finger pressure.

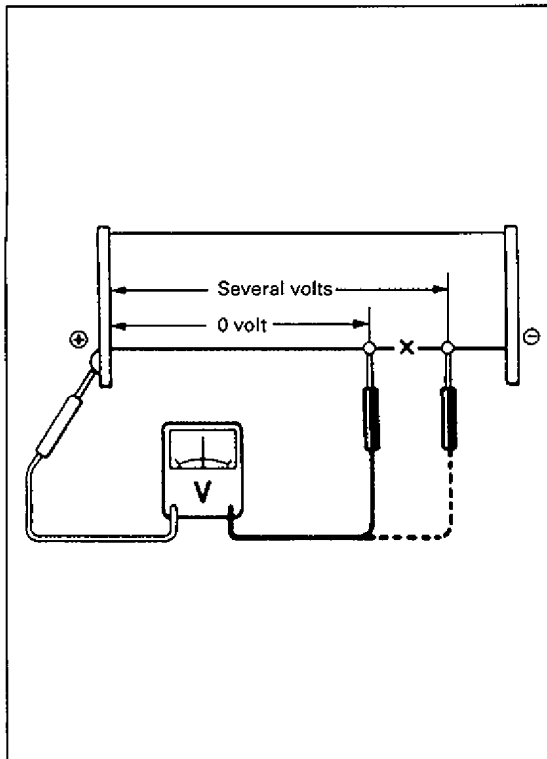
- Checking wire damage
 - Turn main switch ON.
 - Turn defogger switch ON.
 - Use a voltmeter to check voltage at the center of each heat wire, as shown.

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.



75F00-8B-22-5



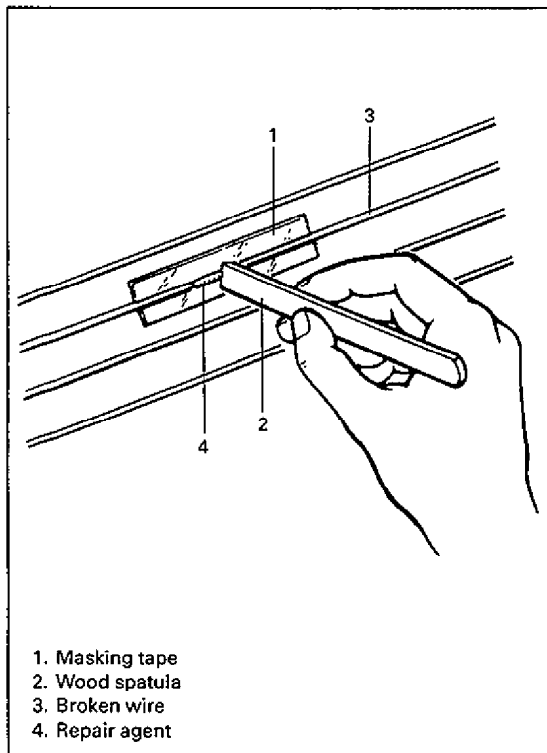
75F00-8B-23-2

2) Locating damage in wire

- Touch voltmeter positive (+) lead to heat wire positive terminal end.
- Touch voltmeter negative (-) lead with a foil strip to heat wire positive terminal end, then move it along wire to the negative terminal end.
- 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).



- Masking tape
- Wood spatula
- Broken wire
- Repair agent

75F00-8B-23-4

REPAIR

Defogger Circuit

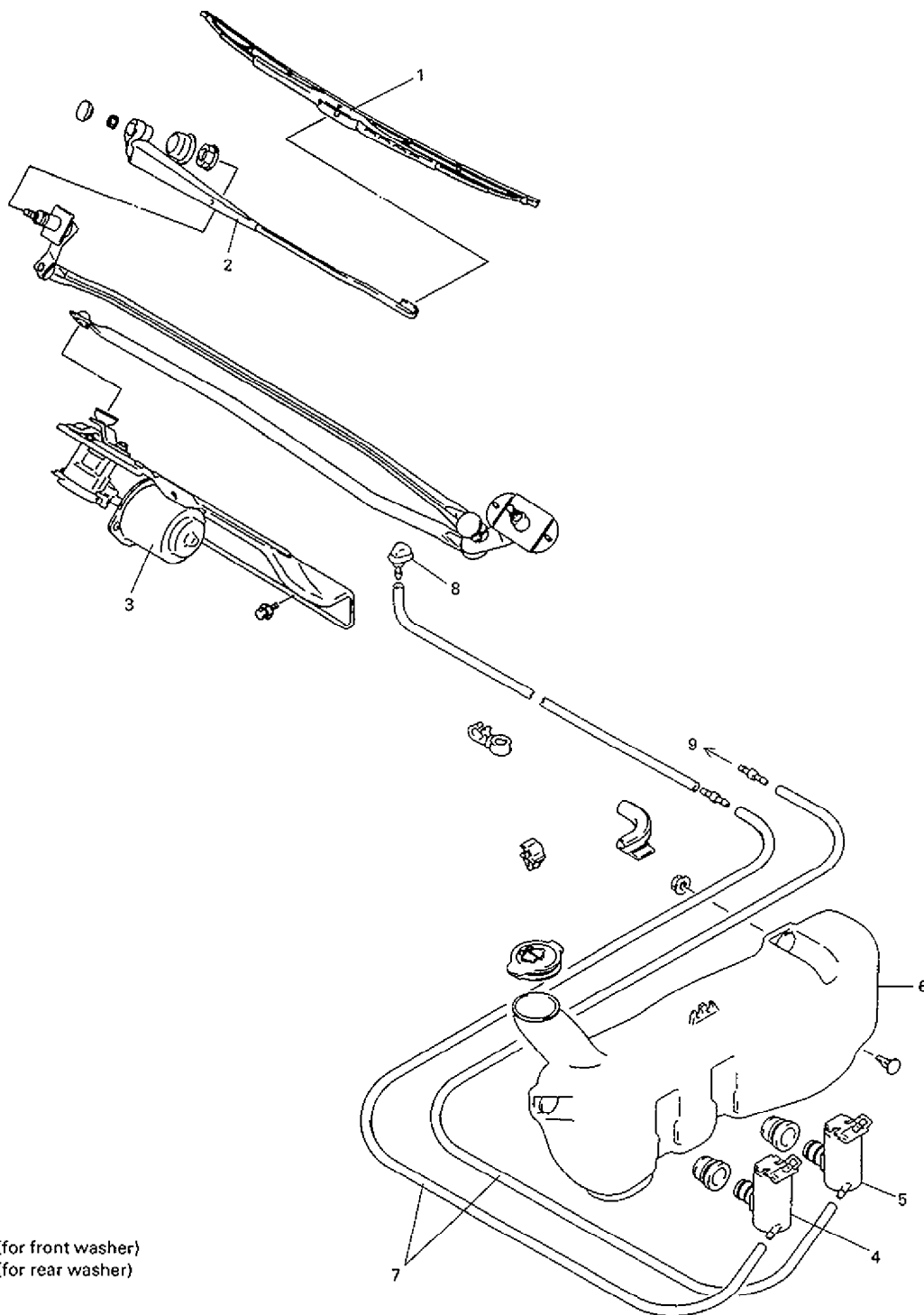
- Use white gasoline for cleaning.
- Apply masking tape at both upper and lower sides of heat wire to be repaired.
- Apply commercially-available repair agent with a fine-tip brush.
- Two to three minutes later, remove masking tapes previously applied.
- Leave repaired heat wire as it is for at least 24 hours before operating defogger again.

WINDSHIELD WIPERS

FRONT WIPER AND WASHER

The windshield wiper is 3-speed type and the windshield washer is equipped with a separate-type washer pump.

The washer tank is located inside of the front part of the left front fender. It has washer pumps for the front and rear respectively.



1. Wiper blade
2. Wiper arm
3. Wiper motor
4. Washer pump (for front washer)
5. Washer pump (for rear washer)
6. Washer tank
7. Washer hose
8. Washer nozzle (front)
9. To rear washer nozzle

DESCRIPTION OF CIRCUIT

WINDSHIELD WIPER CIRCUIT

The circuit is designed so that when the wiper switch is turned OFF the wiper blades automatically return to their specified level rest positions. In the figure, when the wiper switch is turned ON with the ignition switch ON, current is supplied continuously from the battery (via lead Y/BI – switch – lead BI or BI/R) to the motor, running the motor to move the blades.

The gear-and-linkage mechanism, which converts the rotary movement of the motor to the wiping movement of the blades, has a contact plate on the shaft of its output gear.

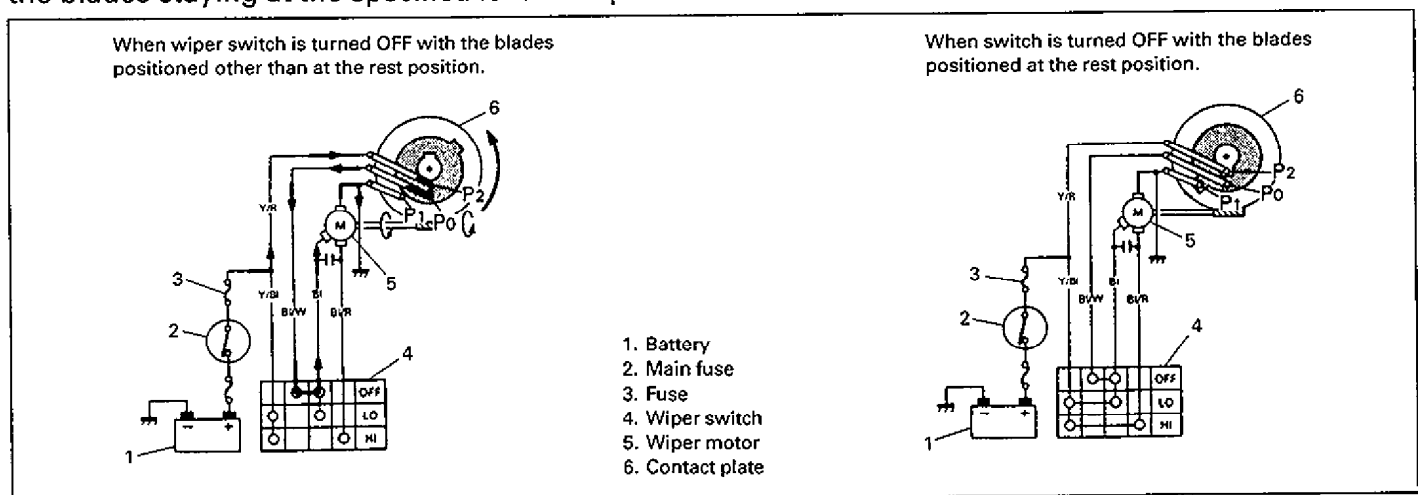
The plate serves to connect the contact P₀ to the contact P₁. Although the plate thus serves to make and break the circuits containing the contacts P₀, P₁ and P₂, the wiper motor makes its rotation completely independent of this plate rotation. When the wiper switch is turned OFF (the switch is set to the OFF position) with the blades positioned at the rest positions, current supply is cut, causing the motor to stop with the blades staying at the same positions.

Even when the wiper switch is turned OFF (the switch is set to the OFF position) with the blades positioned other than at the rest positions, current is still supplied, though intermittently, through a different path from the battery (via lead Y/BI – contact P₂ – contact P₀ – lead BI/W – switch (OFF position) – lead BI) to the motor.

Therefore, the motor can still rotate supplied with this intermittent current, causing the blades to return to the rest positions.

As soon as the blades have returned to their rest positions, the plate connects contact P₀ to contact P₁, causing current to be shunted around the motor.

When current is no longer supplied to the motor, a counter electromotive force is generated in the motor armature, causing a current to flow through the motor-and-shunt circuit so that the motor is stopped with the blades staying at the specified level rest positions.



INTERMITTENT WIPER RELAY CIRCUIT

When the wiper switch is set to the intermittent position with the ignition switch ON (the condenser is charged at this time), current from the battery flows through the Y/BI wire, generates magnetic force in the coil in the relay and causes the switch in the relay to turn ON. Then current is transmitted in the sequence of Y/BI, BI/W, wiper switch and BI, and causes the wiper motor to rotate (meanwhile, the condenser discharges). By the time the wiper motor makes one rotation and the contact plate in the motor comes to the automatic stop position P₁, the condenser in the relay has finished discharging (no magnetic force in the coil in the relay). Then the switch in the relay turns OFF and the wiper stops. They remain that way until the condenser is fully charged. As soon as the condenser begins discharging after being fully charged, magnetic force generated in the coil in the relay causes the switch to turn ON. As described above, intermittent operation of the wiper motor is controlled by charging and discharging of the condenser.

WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
Wiper malfunctions or does not return to original position.	• Wiper fuse blown • Wiper motor faulty • Wiper control switch faulty • Wiring or grounding faulty	Replace blown fuse to check for short. Check motor. Check switch. Repair.
Washer malfunctions.	• Washer hose or nozzle clogged • Washer motor faulty • Wiper control switch faulty • Wiring faulty	Repair. Check motor. Check switch. Repair.

75F00-8B-26-2

INSPECTION

A. Wiper/Washer Switch

Use a circuit tester to check switch for each terminal-to-terminal continuity referring to "COMBINATION SWITCH" in this section.

75F00-8B-26-3

B. Wiper Motor

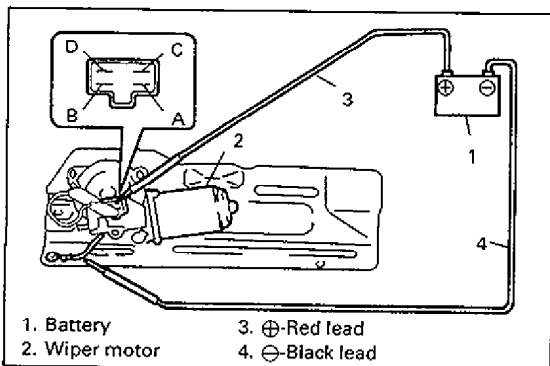
REMOVAL

- 1) Disconnect wiper motor coupler.
- 2) Remove wiper motor assembly mounting bolt, and remove wiper motor assembly from wiper link.

INSTALLATION

Reverse removal procedure for installation.

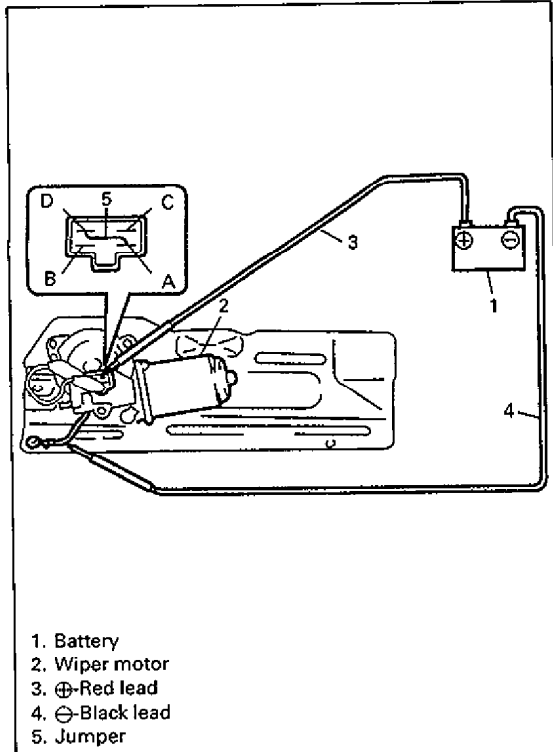
75F00-8B-26-4



75F00-8B-26-5

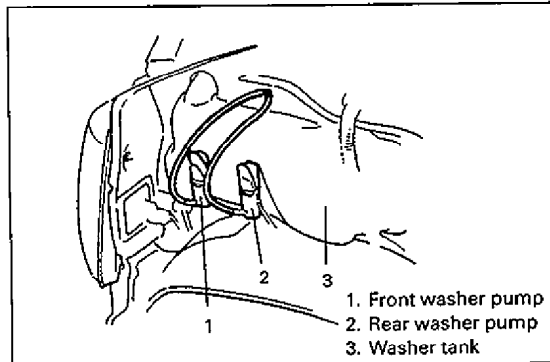
INSPECTION

- 1) As illustrated left, have a 12V battery and connect its (+) terminal to terminal "A", and its (-) terminal to bracket (wiper ground). If motor rotates at a low revolution speed of 45 to 55 rpm, it is proper. As for high speed check, connect battery (+) terminal to terminal "B", and its (-) terminal to bracket (wiper ground). If motor rotates at a high revolution speed of 67 to 83 rpm, it is proper.



75F00-8B-27-2

- 2) Testing automatic stop action
 - a) Connect 12V battery (+) terminal to terminal "A" of wiper motor and (-) terminal to bracket (wiper ground) 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.



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C. Washer Pump REMOVAL

- 1) Disconnect battery (-) cable.
- 2) Remove front fender lining (LH).
- 3) Remove washer tank fitting nuts and clip.
- 4) Disconnect pump lead wires and hoses.
- 5) Remove washer tank.
- 6) Remove pump from tank.

INSPECTION

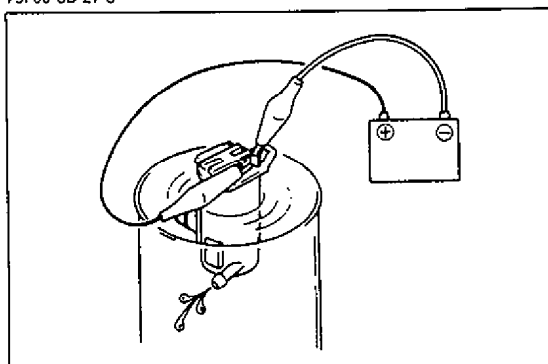
Connect battery (+) and (-) terminals to pump (+) and (-) terminals respectively to check pumping rate.

Check for both front and rear washer pump.

Pumping Rate:

Front more than 1.0 l/min (2.1 US pt./min, 1.76 Imp pt./min)

Rear more than 0.72 l/min (1.5 US pt./min, 1.26 Imp pt./min)



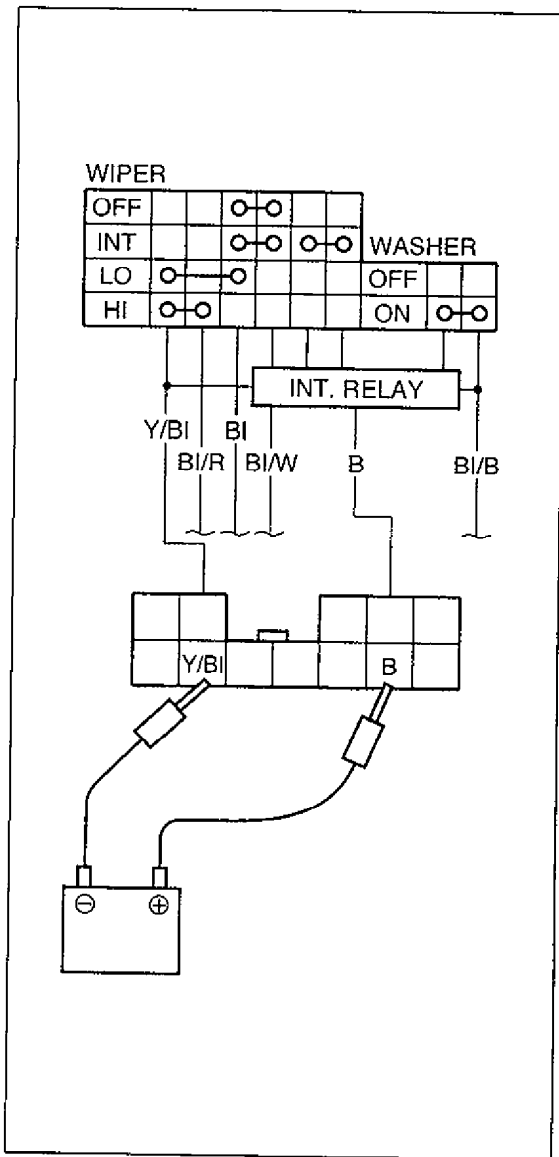
75F00-8B-27-4

INSTALLATION

Reverse removal procedure for installation.

D. Intermittent Wiper Relay

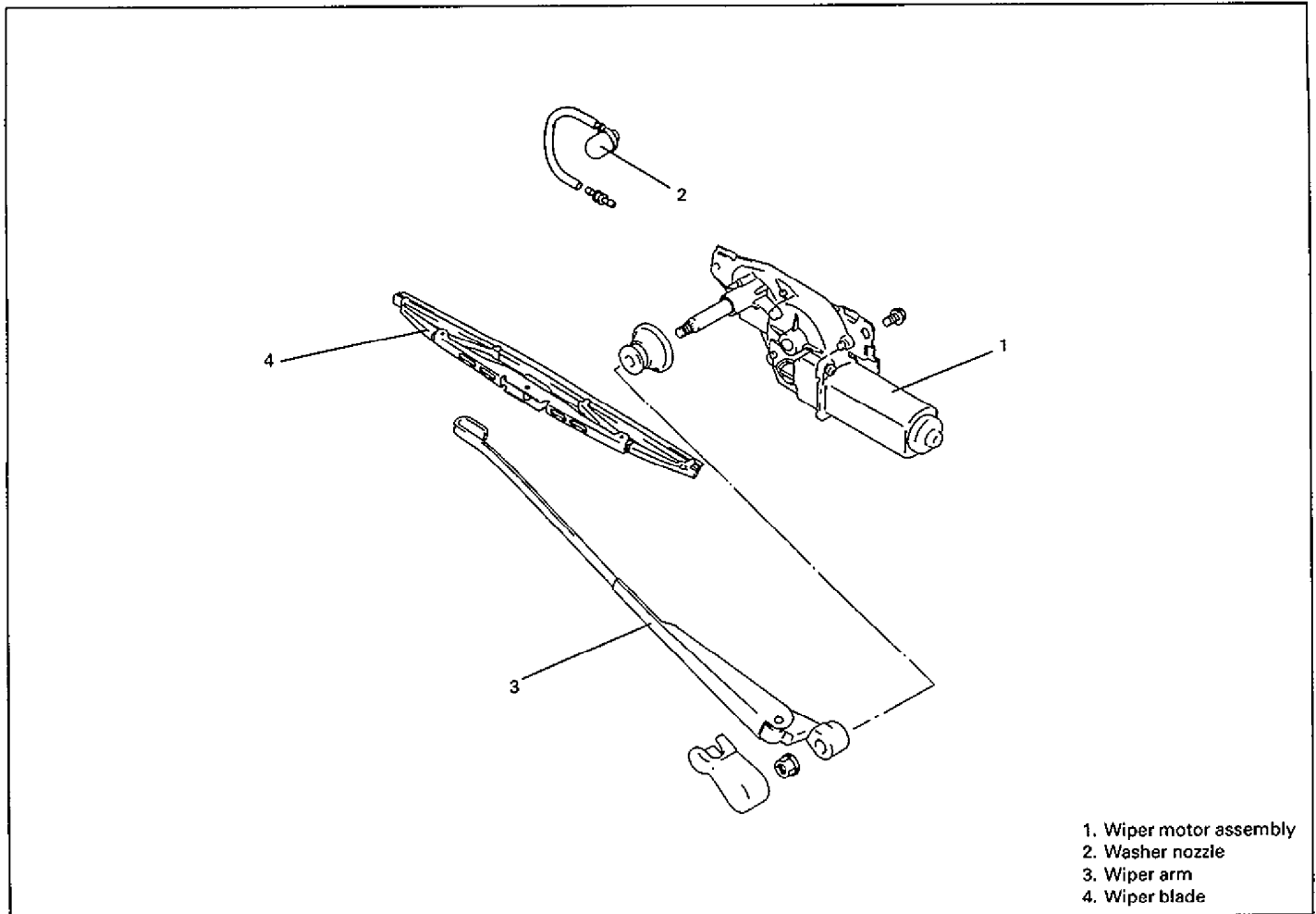
- 1) Disconnect combination switch coupler.
 - 2) Connect (+) cord and (-) cord of 12V battery to coupler terminals as shown.
 - 3) Turn wiper switch to "OFF" position.
- If an operating sound (click) is heard from relay, the relay has no problem.



75F00-8B-28-3

REAR WIPER AND WASHER

The rear window wiper is of the one-speed type, and its washer is equipped with a separate-type washer pump.



75F00-8B-29-3

WIRING CIRCUIT

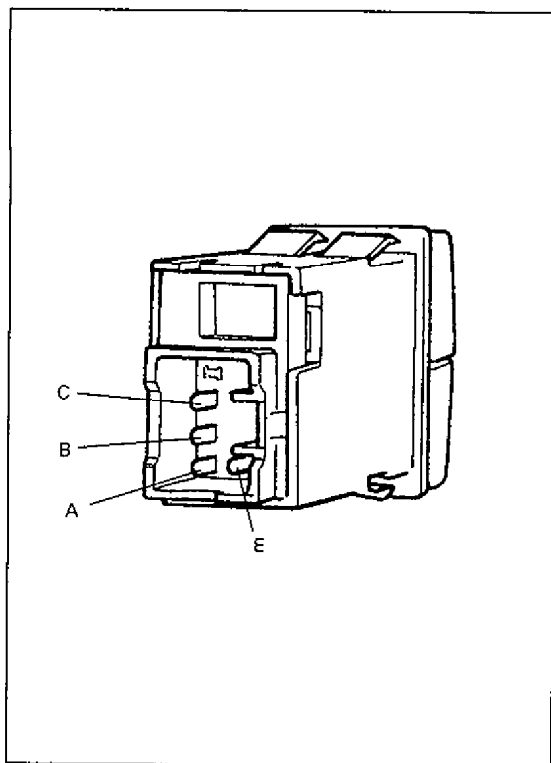
Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

75F00-8B-29-4

DESCRIPTION OF CIRCUIT AND TROUBLE DIAGNOSIS

Refer to "WINDSHIELD WIPER" in this section.

75F00-8B-29-5



75F00-8B-30-2

INSPECTION

A. Wiper And Washer Switches

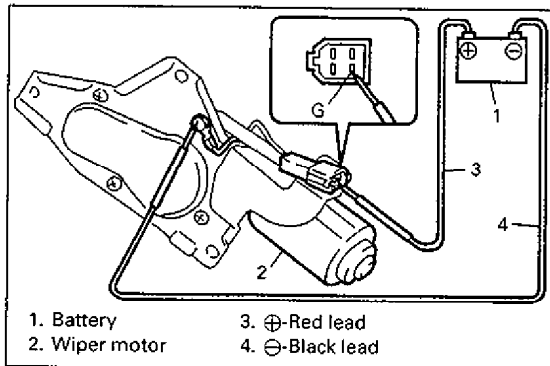
Use a circuit tester to check switches for continuity.

Wiper & Washer SW	Terminal	C	B	A	E
	Wiper SW				
OFF	OFF		○	○	
	ON	○	○		
Washer ON	OFF	○			○
	ON	○	○		○
ON	OFF	○	○		○
	ON	○	○		○

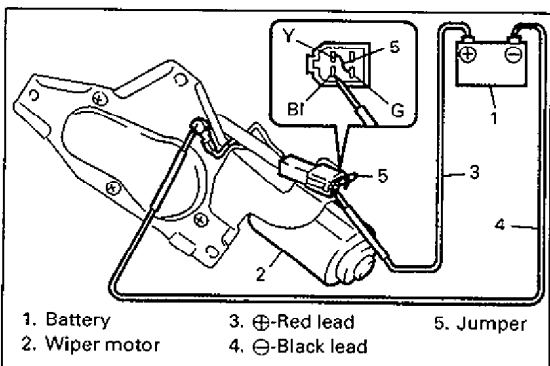
B. Washer Pump

Refer to FRONT WIPER AND WASHER INSPECTION in this section.

75F00-8B-30-3



75F00-8B-30-4



75F00-8B-30-6

C. Wiper Motor

1) TESTING WIPER MOTOR

As shown left, use a 12V battery to connect its (+) and (-) terminals to terminal "G" and Black lead wire respectively. Then motor should rotate at 33 to 43 rpm.

2) TESTING AUTOMATIC STOP ACTION

- First, connect battery (+) terminal to terminal "G" and battery (-) terminal to black lead wire and let the motor turn.
- Then disconnect terminal "G" from battery and let the motor stop.
- Next connect terminal "G" and terminal "Y" with a jumper wire and connect terminal "BI" to battery (+) terminal. Observe the wiper motor turns once again, then stops at a given position.
- Repeat these steps several times, and inspect if the motor stops at the given position every time.

POWER WINDOW CONTROL SYSTEM (If equipped)

The power window control system is so designed that it electrically controls up & down movement of side door window glass by means of the motor which is installed to the window regulator.

The system consists of the ignition switch, power window switches, window regulator motors and related wiring harness.

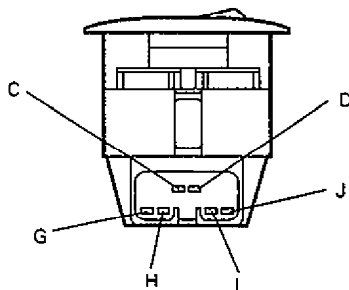
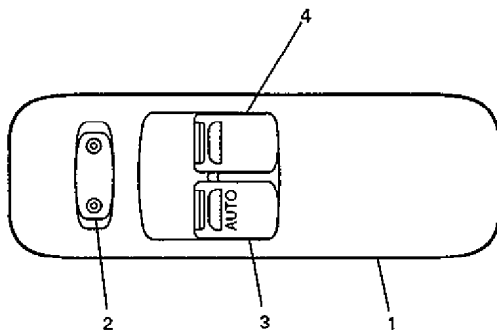
WIRING CIRCUIT

Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Trouble	Possible cause	Correction
None of power windows functions.	• Main circuit breaker worked • Main switch faulty • Wiring or grounding faulty	Reset breaker. Check switch. Correct wiring or grounding.
Only one power window does not function.	• Main circuit breaker worked • Main switch faulty • Wiring or grounding faulty • Actuator faulty • Window lock switch faulty	Reset breaker. Check switch. Correct wiring or grounding. Replace actuator. Replace switch.

Type 1 (LH steering vehicle shown)



1. Power window main switch
2. Power window lock switch
3. Driver side window switch
4. Passenger side window switch

INSPECTION

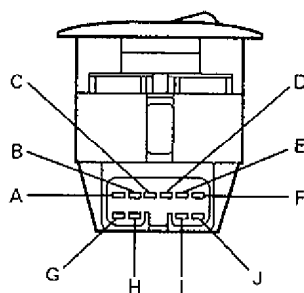
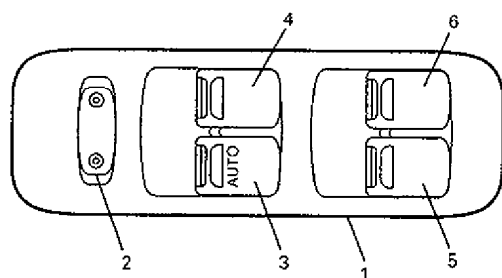
Power Window Main Switch

Inspect switch continuity between terminals.

Type 1

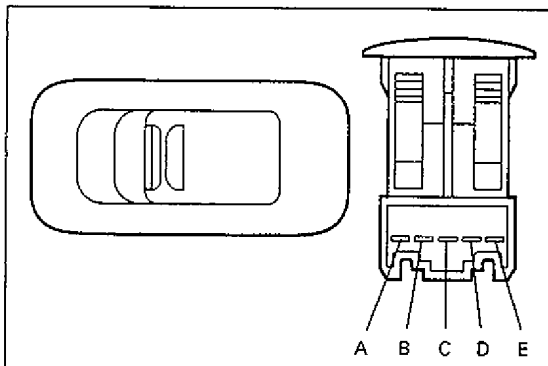
			Driver Side Window Switch				Passenger Side Window Switch			
For LH steering vehicle terminal			D	C	G	H	D	C	I	J
For RH steering vehicle terminal			D	C	I	J	D	C	G	H
Power Window Lock Switch	OFF	UP								
		OFF								
		DOWN								
	ON	UP								
		OFF								
		DOWN								

Type 2 (LH steering vehicle shown)

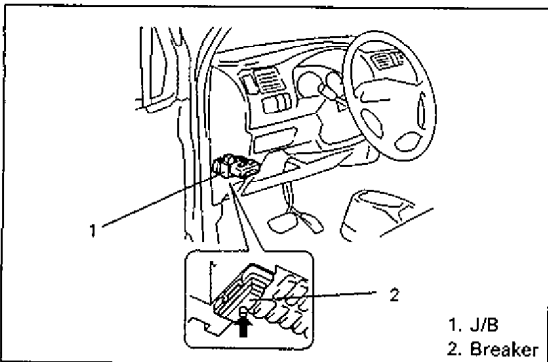


1. Power window main switch
2. Power window lock switch
3. Driver side window switch
4. Passenger side window switch
5. Rear LH window switch
6. Rear RH window switch

75F00-8B-32-3



75F00-8B-32-4



75F00-8B-32-5

Type 2

			Driver Side Window Switch	Passenger Side Window Switch	Rear RH Window Switch	Rear LH Window Switch
For LH steering vehicle terminal			D C G H	D C I J	D C E F	D C A B
For RH steering vehicle terminal			D C I J	D C G H	D C E F	D C A B
Power Window Lock Switch	OFF	UP	○	○	○	○
		OFF	○	○	○	○
		DOWN	○	○	○	○
	ON	UP	○	○	○	○
		OFF	○	○	○	○
		DOWN	○	○	○	○

Power Window Sub Switch

Inspect switch continuity between terminal.

Terminal Switch Position	C	D	A	E	B
UP	○	○	○	○	○
OFF		○	○	○	○
DOWN	○		○	○	○

Breaker

When breaker worked, press breaker button located in junction/fuse block.

POWER DOOR LOCK CONTROL SYSTEM (If equipped)

The power door lock control system consists of the power door lock controller, door knob switch, door lock actuator and related wiring harness.

WIRING CIRCUIT

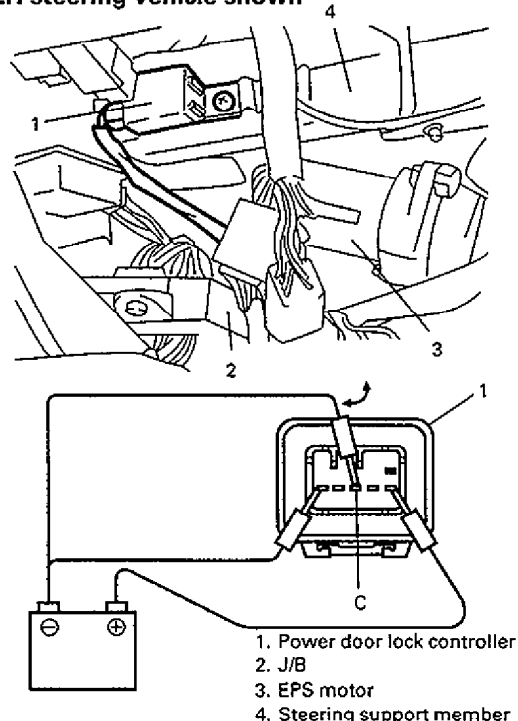
Refer to Wiring Diagram Manual mentioned in FOREWORD of this manual.

TROUBLE DIAGNOSIS

Condition	Possible cause	Correction
All power door locks do not operate.	• Main fuse and/or fuses blown • Wiring or grounding faulty • Knob switch faulty • Controller faulty	Replace main fuse and/or fuses to check for short. Repair as necessary. Replace. Replace.
Only one power door lock does not operate.	• Wiring or coupler faulty • Actuator (door lock motor) faulty	Repair as necessary. Replace.

75F00-8B-33-2

LH steering vehicle shown



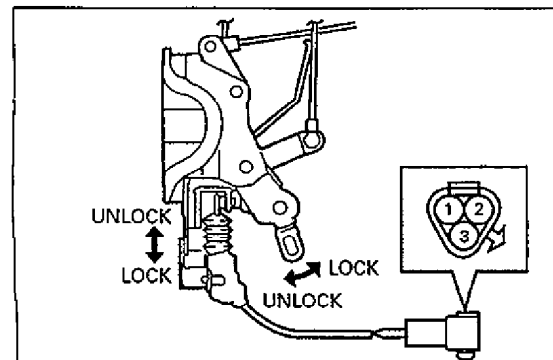
75F00-8B-33-4

INSPECTION

Power Door Lock Controller

Remove door lock controller from vehicle. Disconnect coupler from door lock controller. Connect door lock controller terminal to 12V battery as shown.

If operation sound (click) can be heard when terminal "C" is grounded and terminal "C" is released from battery (-) terminal, the controller is in good condition.

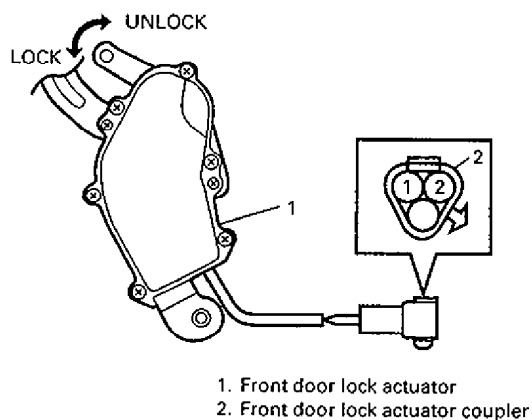
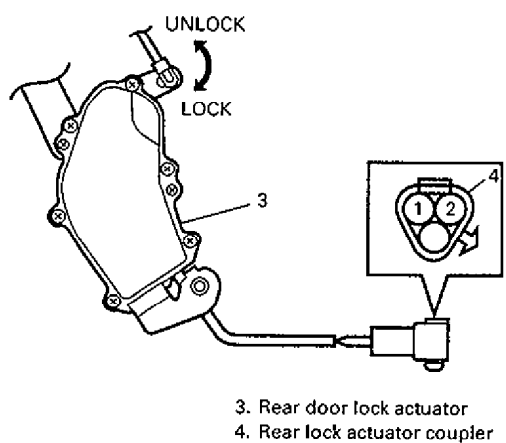
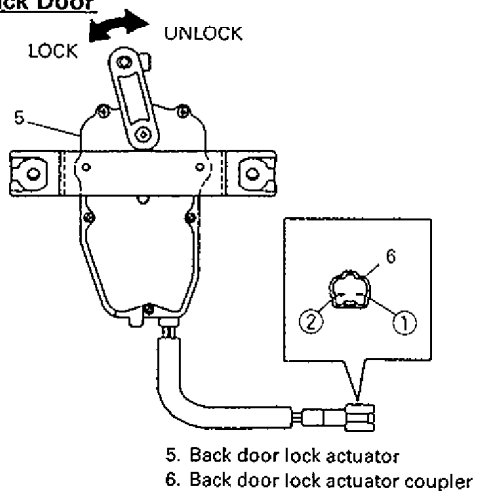


75F00-8B-33-5

Key Cylinder Switch

Inspect switch continuity between terminals.

Terminal	1	2	3
LOCK	○	○	
UNLOCK		○	○

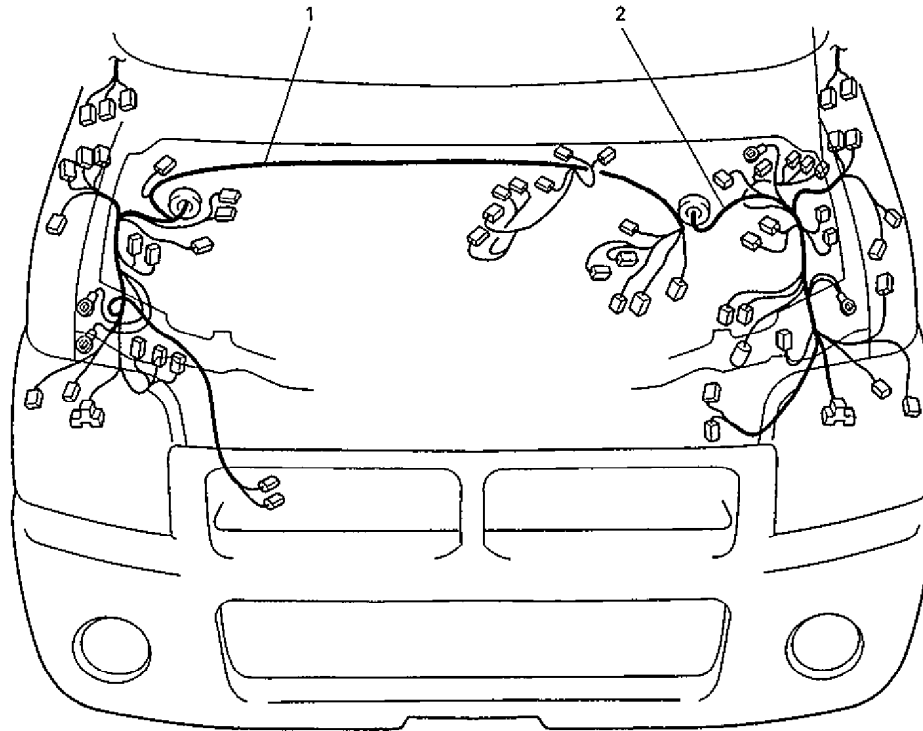
Front Door Passenger Side**Rear Door****Back Door****Power Door Lock Actuator**

- 1) Disconnect power door lock actuator coupler.
- 2) Connect (+) cord and (-) cord of 12V battery to coupler terminal "1" and "2".
- 3) Actuator is proved to be operating properly if (-) cord connection to terminal "1" results in "Lock" and its connection to terminal "2" results in "Unlock".

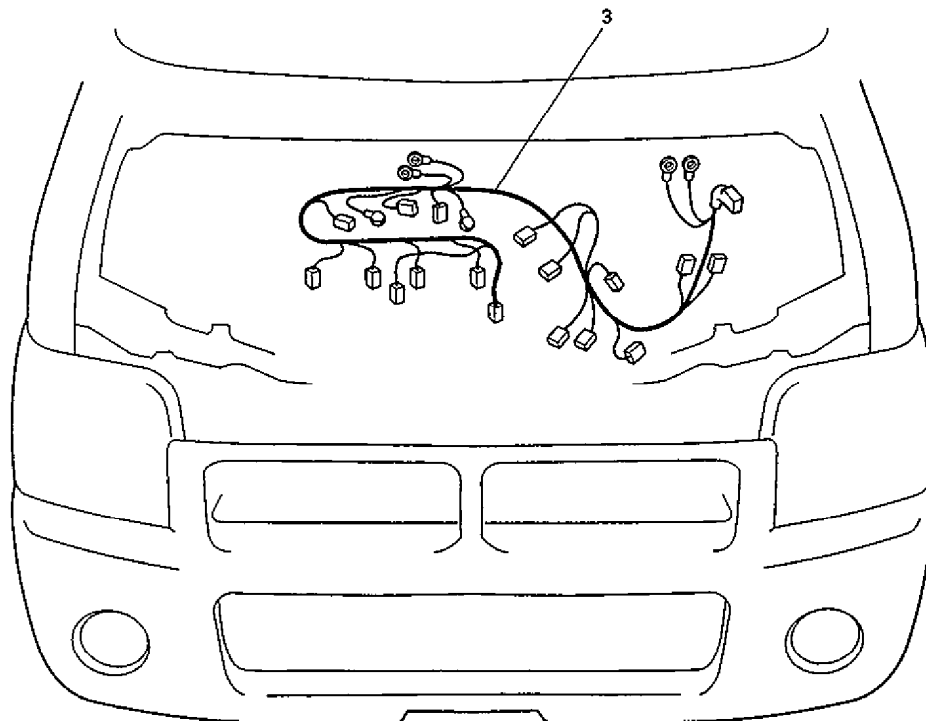
WIRING HARNESS ROUTING

NOTE: All figures show LH steering vehicle.

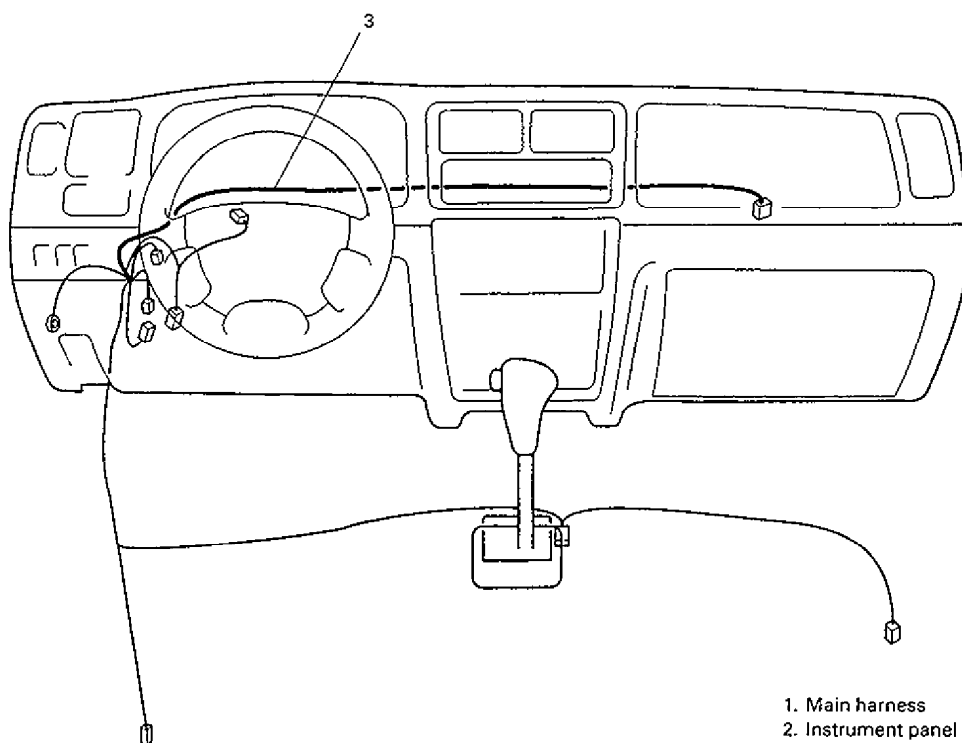
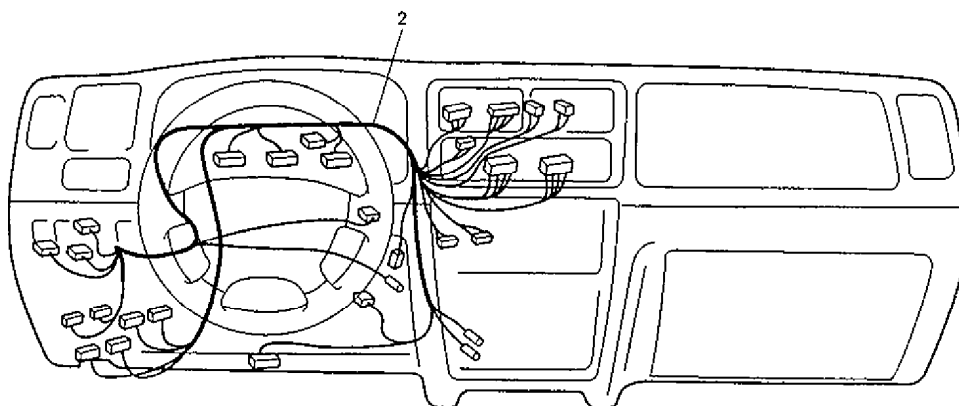
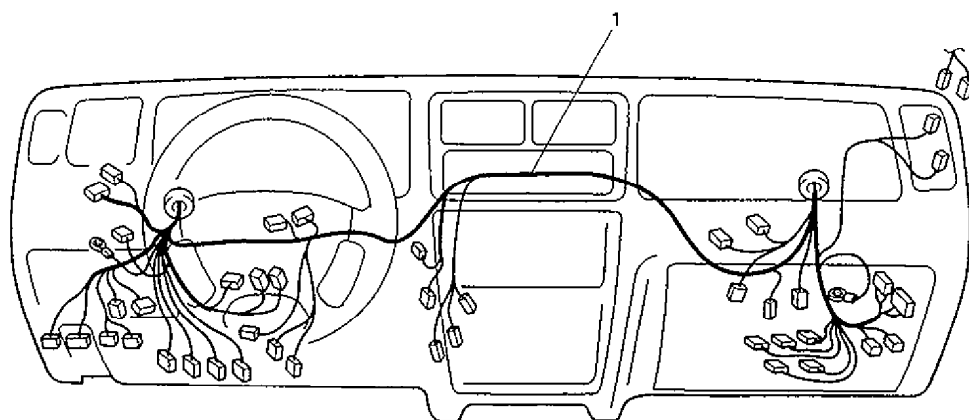
ENGINE ROOM



- 1. Main harness (RH)
- 2. Main harness (LH)
- 3. Engine harness

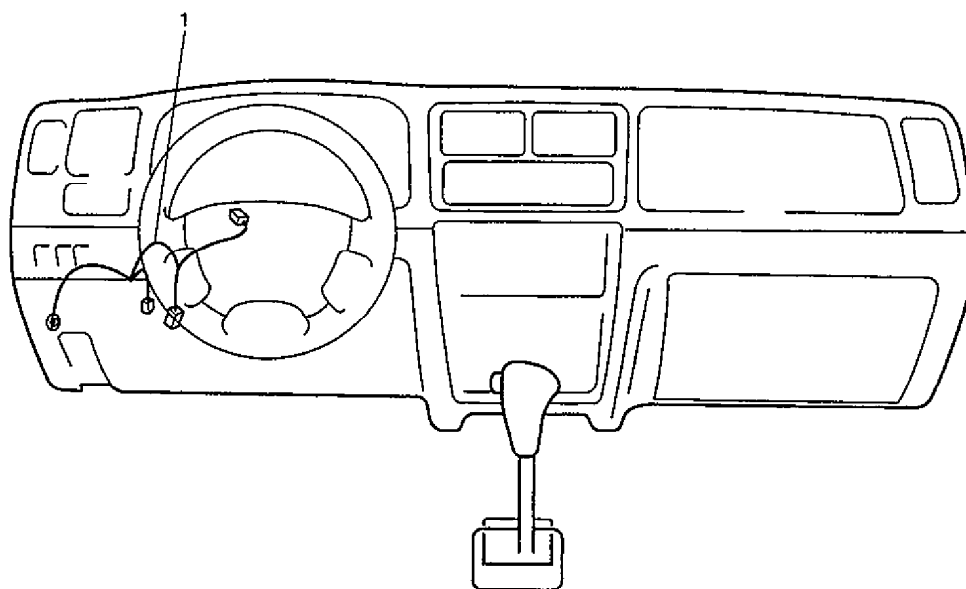


INSTRUMENT PANEL



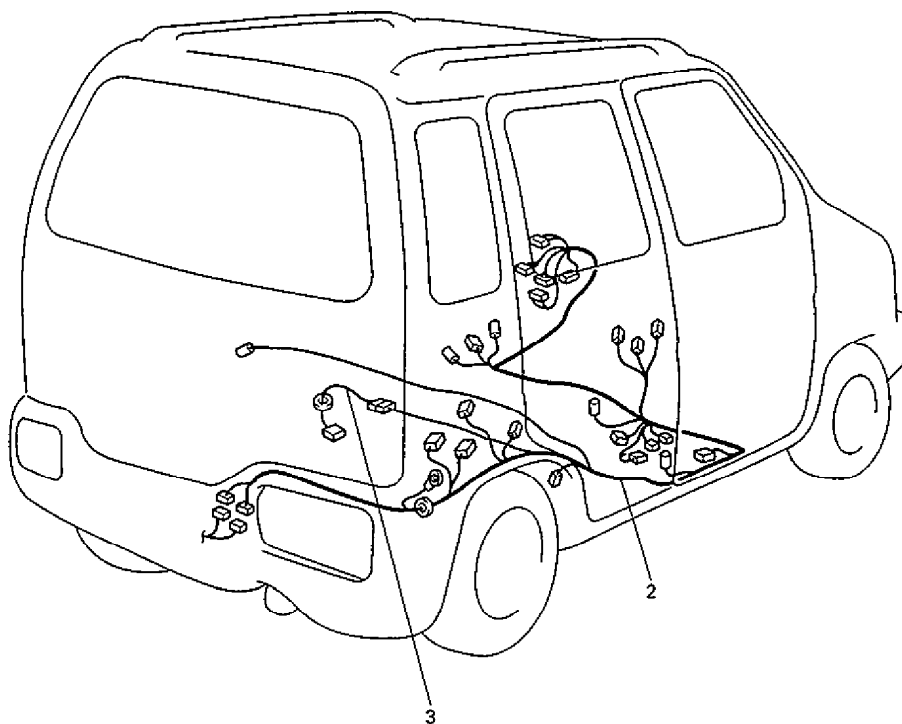
1. Main harness
2. Instrument panel harness
3. Air bag harness
(for vehicle with passenger side air bag)

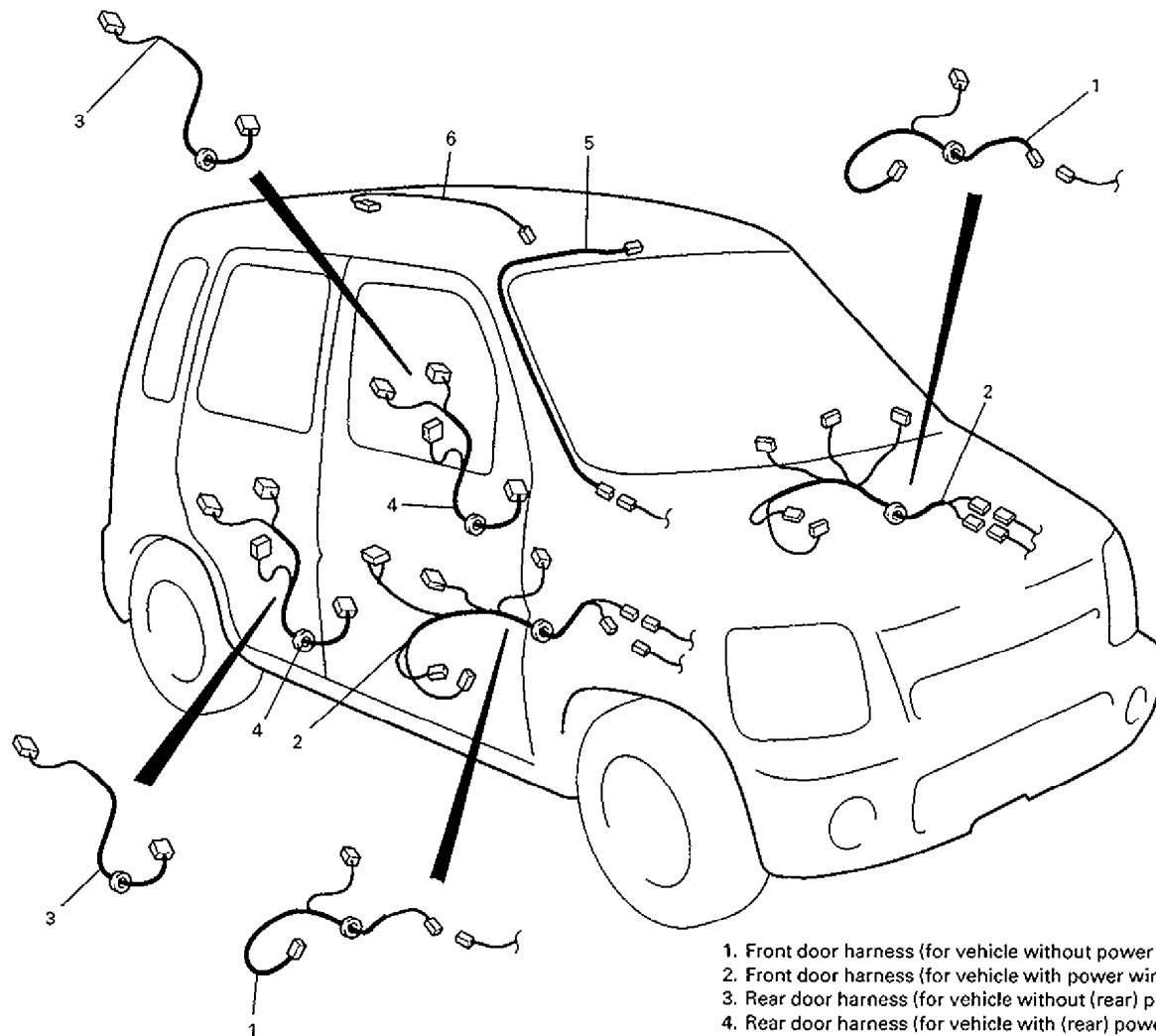
INSTRUMENT PANEL (continued)



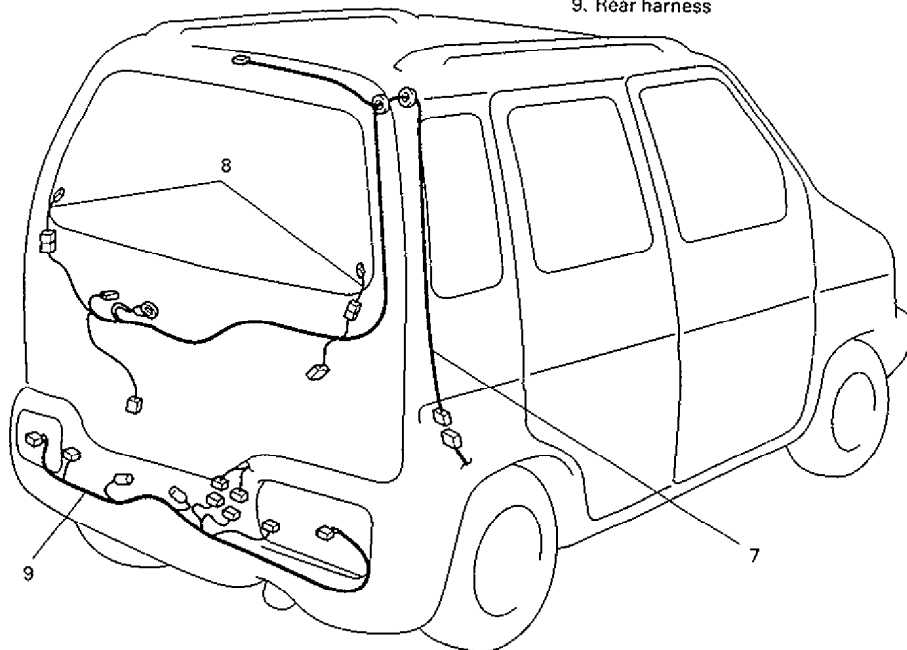
- 1. Air bag harness (for vehicle without passenger side air bag)
- 2. Floor harness
- 3. Fuel pump wire

FLOOR



DOOR AND ROOF

1. Front door harness (for vehicle without power window)
2. Front door harness (for vehicle with power window)
3. Rear door harness (for vehicle without (rear) power window)
4. Rear door harness (for vehicle with (rear) power window)
5. Room light wire
6. Rear room light wire
7. Back door harness
8. Rear defogger wire
9. Rear harness

BACK DOOR

SECTION 8C

IMMOBILIZER CONTROL SYSTEM (IF EQUIPPED)

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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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ICM	8C- 4	from ECM or DLC Circuit	
ECM	8C- 4	Opened/Shorted	8C-18
On-board Diagnostic System		DTC83 No ECM/ICM Code Transmitted	
(Self-diagnosis function)	8C- 4	from ICM or DLC Circuit	
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Opened/Shorted	8C-14	PROCEDURE AFTER ICM REPLACEMENT	8C-25
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(ECM Side)	8C-16		

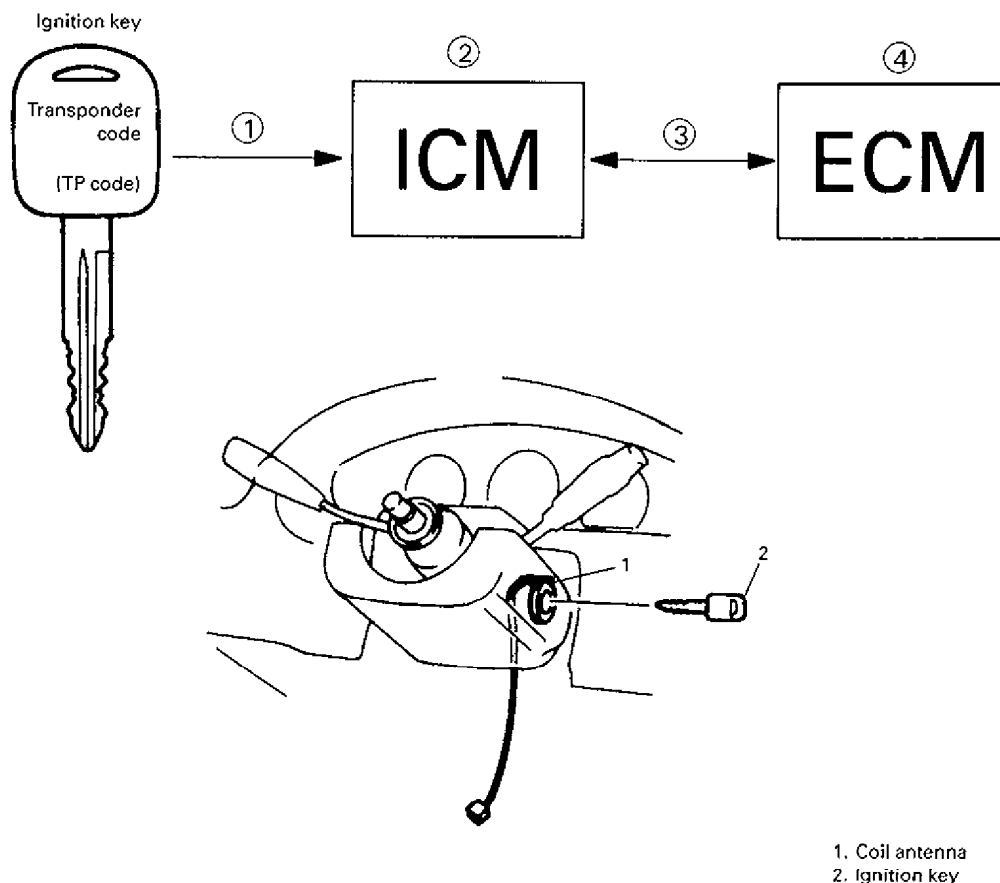
GENERAL DESCRIPTION

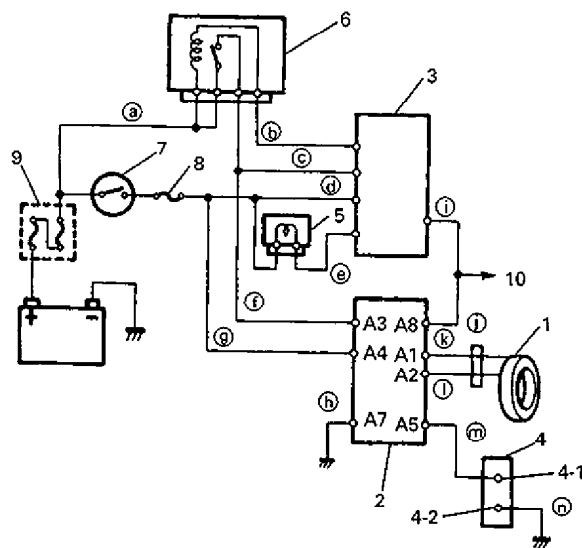
The immobilizer control system designed to prevent vehicle burglar consists of following components.

- Engine control module (ECM)
- Immobilizer control module (ICM)
- Ignition key (with built-in transponder)
- Coil antenna

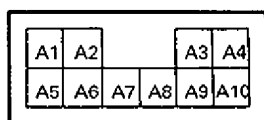
Operation of this system is as follows.

- ① Each ignition key has its own code (Transponder (TP) code) stored in memory. When the ignition switch is turned ON, ICM tries to read the TP code through the coil antenna installed to the steering lock assembly.
- ② ICM compares the TP code read in ① and that registered in ICM and checks if they match.
- ③ When it is confirmed that two TP codes match each other as described above, ICM and ECM check if ECM/ICM codes registered in them respectively match.
- ④ Only when it is confirmed that ECM/ICM codes match, the engine starts running. If TP codes in Step ② or ECM/ICM codes in Step ③ do not match, ECM will stop operation of the injector and the ignitor (i.e., ignition of spark plug).





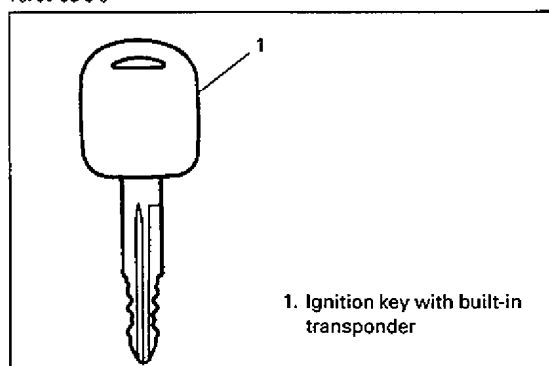
WIRE SYMBOL	WIRE COLOR
Ⓐ	B/Y
Ⓑ	B/BI
Ⓒ	B/R
Ⓓ	B/W
Ⓔ	V/Y
Ⓕ	B/R
Ⓖ	B/W
Ⓗ	B
Ⓘ	W/B
Ⓚ	W/B
Ⓛ	BI
Ⓜ	R
Ⓝ	SbI
Ⓟ	B



Terminal arrangement of ICM coupler
(Viewed from harness side)

1. Coil antenna
2. ICM
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

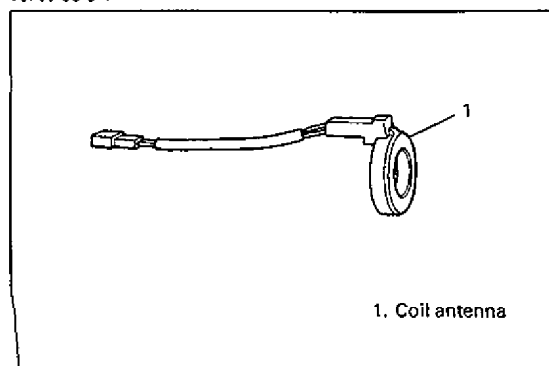
75F00-8C-3-3



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 ICM when the ignition switch is turned ON.

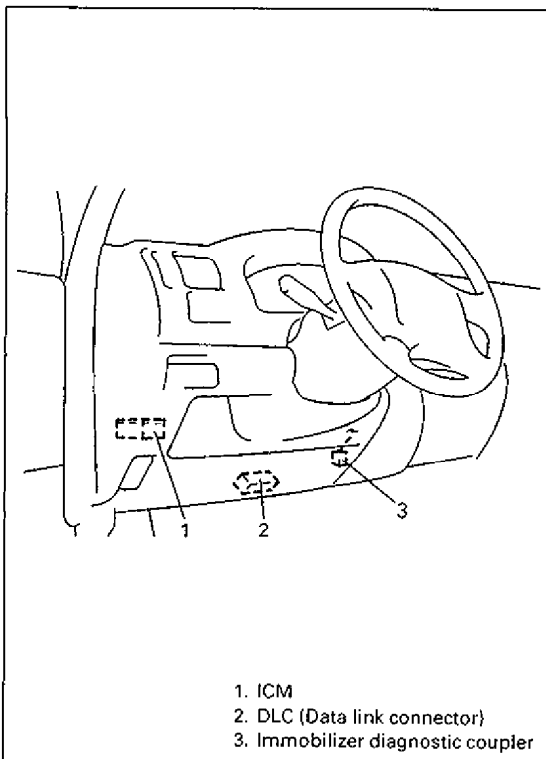
75F00-8C-3-4



COIL ANTENNA

The coil antenna is installed to the steering lock assembly. As it is energized by ICM, it transmits the transponder (TP) code of the ignition key to ICM.

75F00-8C-3-5



75F00-8C-4-2

ICM and ECM

ICM

ICM is installed to the underside of the instrument panel at the driver's seat side.

As main functions, ICM checks matching not only between the TP Code transmitted from the ignition key and that registered in ICM (Up to 4 different TP codes can be registered.) but also between the ECM/ICM code transmitted from ECM and that registered in ICM. 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/ICM 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.

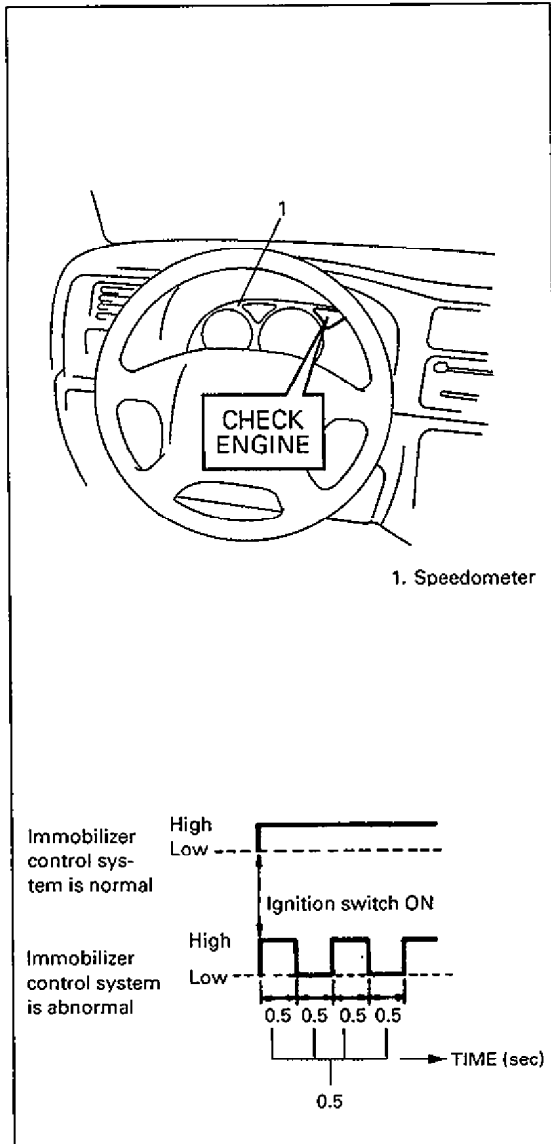
75F00-8C-4-3

On-board diagnostic system (Self-diagnosis function)

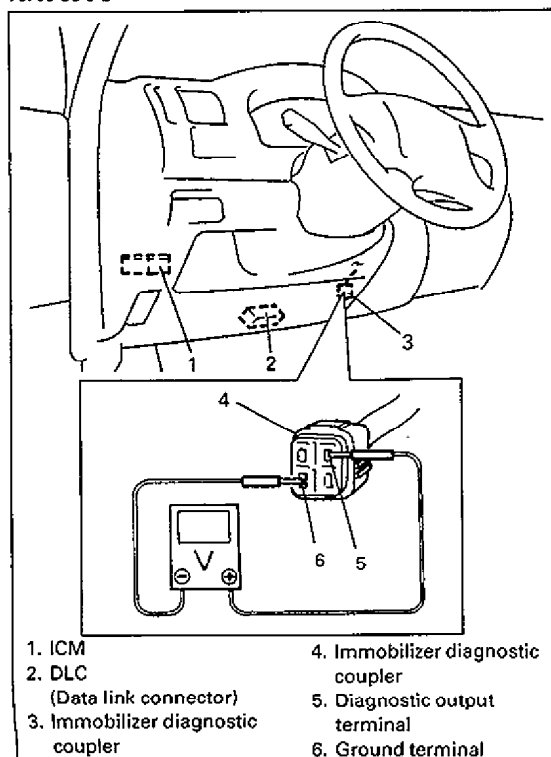
ICM and ECM diagnose troubles which may occur in the area including the following parts when the ignition switch is ON. They indicate the diagnosis result by flashing malfunction indicator lamp ("CHECK ENGINE" light) and using voltmeter.

ECM: ●ECM/ICM code
●Serial data link circuit
●ECM

ICM: ●Transponder (TP) code
●Coil antenna
●ECM/ICM code
●Serial data link circuit
●ICM
●Ignition signal



75F00-8C-5-2



75F00-8C-5-5

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 ICM has detected some trouble in the immobilizer control system.

NOTE:

As soon as the ignition switch is turned ON, ECM and ICM 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 ICM detects a trouble which has occurred in the above areas it stores DTC corresponding to the exact trouble area in ECM and ICM memory.

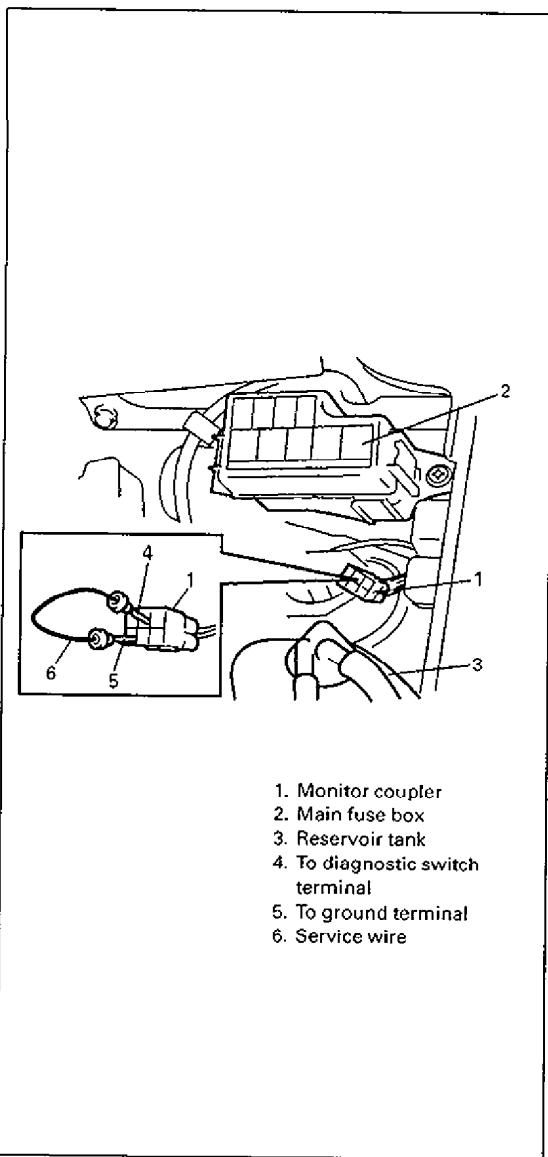
DTCs stored in memory of each controller (ICM and ECM) can be read by using the following procedure.

For ICM

With the ignition switch turned ON, ICM 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.

NOTE:

When a trouble exists in the immobilizer control system (when ICM or ECM detects a diagnostic trouble code (DTC)), ECM will stop operation of the injector and the ignitor (i.e., ignition of spark plug).



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) as listed below.

Immobilizer control system	Electronic Fuel Injection system	Malfunction indicator lamp ("CHECK ENGINE" light)
ECM doesn't detect a trouble	ECM doesn't detect a trouble	Normal code (DTC 12) is indicated.
ECM doesn't detects a trouble	ECM detects a trouble	Fault code for electronic fuel injection system is indicated.
ECM detects a trouble	ECM doesn't detect a trouble	Fault code for immobilizer control system is indicated.
ECM detects a trouble	ECM detects a trouble	Fault code of both electronic fuel injection system and immobilizer control system are indicated alternately.

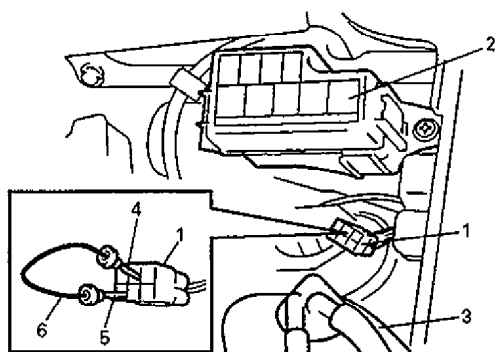
DIAGNOSIS

ECM and ICM 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.

75F00-8C-7-1

For ECM



1. Monitor coupler
2. Main fuse box
3. Reservoir tank
4. To diagnostic switch terminal
5. To ground terminal
6. Service wire

75F00-8C-7-4

PRECAUTIONS IN DIAGNOSING TROUBLES [PRECAUTIONS IN IDENTIFYING DIAGNOSTIC TROUBLE CODE]

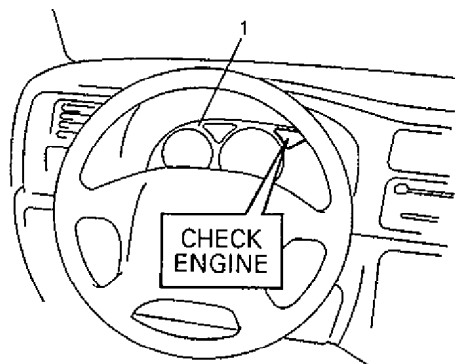
ECM

- 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.

ICM

- Take a note of diagnostic trouble code indicated first.

75F00-8C-7-5



1. Speedometer

[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 ICM 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 ICM]

- When ECM was replaced, including when replaced because rechecking by using a known-good ECM was necessary during trouble diagnosis, the ECM/ICM code must be registered in ECM and ICM by performing procedure described in "Procedure after ECM Replacement" on p.8C-26. If it is not registered, the engine would not start and accurate trouble diagnosis would not be assured.
- When ICM was replaced, including when replaced because rechecking by using a known-good ICM was necessary during trouble diagnosis, the TP code and ECM/ICM code must be registered in ICM and ECM/ICM code in ECM by performing procedure described in "Procedure after ICM Replacement" on p.8C-25. If they are not registered, the engine would not start and accurate trouble diagnosis would not be assured.

75F00-8C-9-2

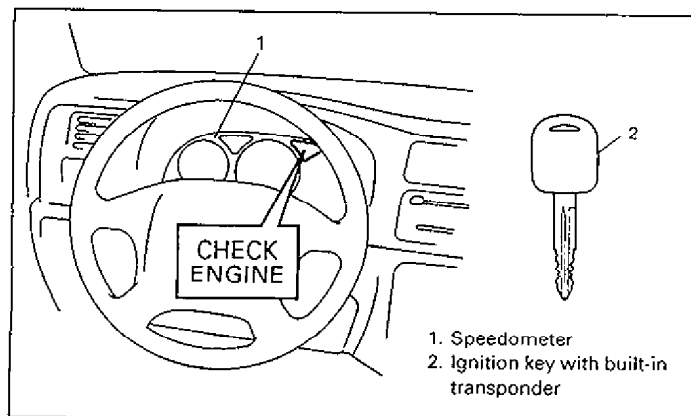
DIAGNOSTIC FLOW TABLE

STEP	ACTION	YES	NO
1	1. Prepare all transponder built-in ignition keys used for vehicle being serviced and check that the number of those keys is 4 or less. 2. Using each ignition key, check malfunction indicator lamp ("CHECK ENGINE" light) while ignition switch is ON (but without starting engine) and repeat the same check with other keys. 3. Is there any key which makes it flash at 0.5 second steady intervals?	Go to step 2.	Immobilizer control system is in good condition. Reference If malfunction indicator lamp ("CHECK ENGINE" light) flashes to indicate DTC instead or at 0.5 second steady intervals or if it does not light, Electronic Fuel Injection Control System has failed. Proceed to "Diagnostic Flow Table" in SECTION 6E1.
2	1. Using one of ignition keys which made malfunction indicator lamp ("CHECK ENGINE" light) flash, connect positive probe of analog type voltmeter to diagnostic output terminal of immobilizer diagnostic coupler and negative probe to ground terminal of immobilizer diagnostic coupler with ignition switch turned ON. (Refer to page 8C-5.) 2. Is it possible to read DTC by checking deflection of voltmeter indicator? (Refer to page 8C-11.)	Go to step 3.	Proceed to Table A "DTC is not Outputted from Diagnostic Output Terminal".

75F00-8C-10-5

3	Does deflection of voltmeter indicate normal code?	1. Using service wire, ground diagnosis switch terminal for ECM. (Refer to page 8C-6.) Then read DTC for ICM from flashing of malfunction indicator lamp ("CHECK ENGINE" light). 2. Check and repair according to flow chart corresponding to that code No. 3. After repair, make sure that DTC(s) for ICM is (are) not indicated with diagnosis switch terminal grounded and ignition switch turned ON. 4. Remove service wire and reinstall cap.	Go to step 4.
4	1. Check and repair according to flow chart corresponding to that code No. 2. After repair, 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 once turned off and then turned ON. 3. Using all ignition keys, check that normal code is indicated. Is there an ignition key not indicating normal code?	Repeat STEP 4 until only "normal" diagnostic code (none of others) is indicated.	Go to step 5.
5	Does malfunction indicator lamp ("CHECK ENGINE" light) flash at ignition switch ON?	1. Using service wire, ground diagnosis switch terminal for ECM. (Refer to page 8C-6.) Then read DTC for ICM from flashing of malfunction indicator lamp ("CHECK ENGINE" light). 2. Check and repair according to flow chart corresponding to that code No. 3. After repair, make sure that DTC(s) for ICM is (are) not indicated with diagnosis switch terminal grounded and ignition switch turned ON. 4. Remove service wire and reinstall cap.	Immobilizer control system is in good condition.

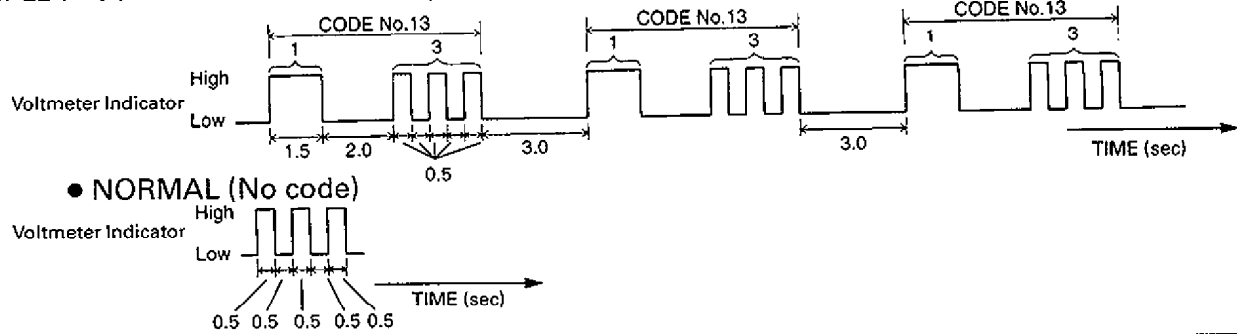
Fig. for step 1



DIAGNOSTIC TROUBLE CODE TABLE

ICM side

EXAMPLE : ● COIL ANTENNA FAILURE (CODE NO. 13)

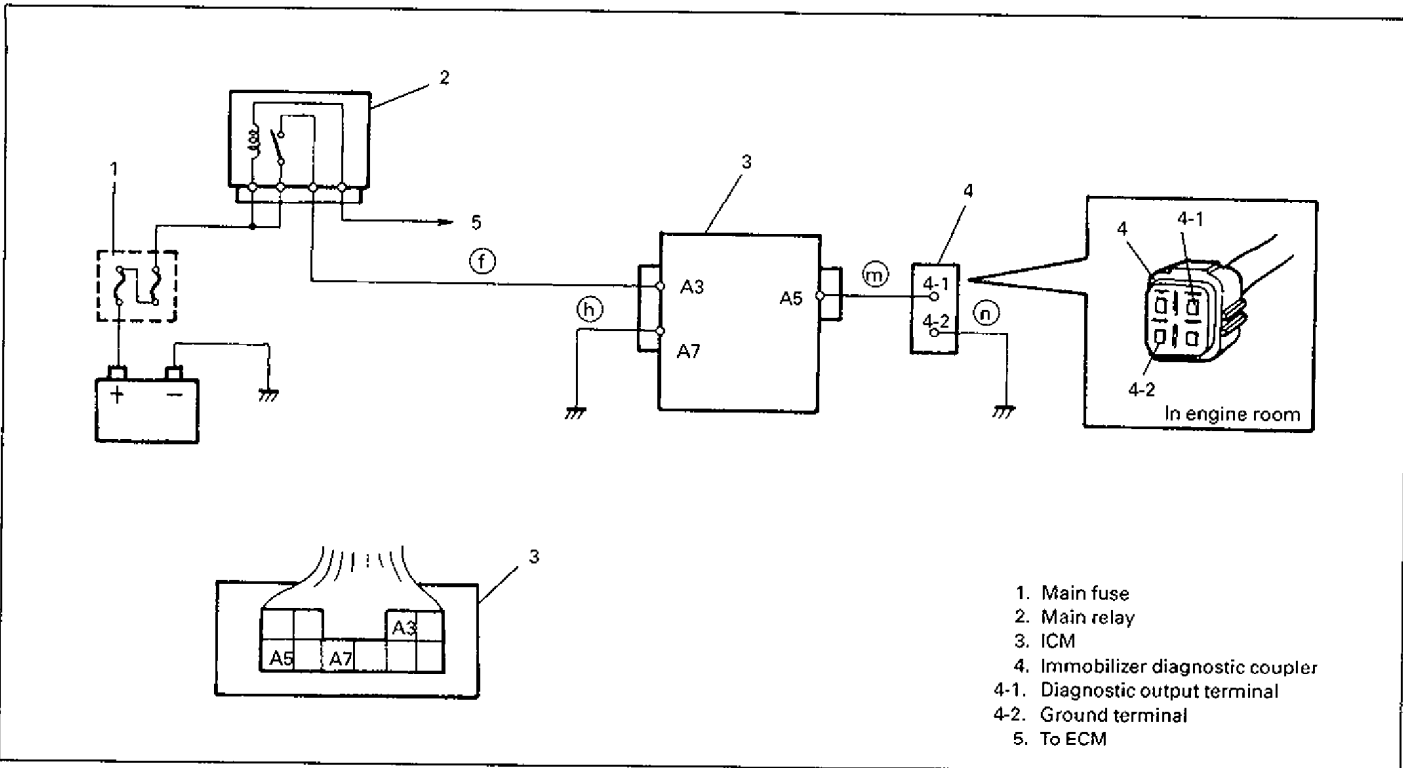


DIAGNOSTIC TROUBLE CODE		DIAGNOSTIC AREA	DIAGNOSIS
NO.	VOLTMETER INDICATION		
-		Normal (No code)	This code appears when none of the other codes are identified.
11		Transponder code (TP code)	Diagnose trouble according to "DIAGNOSTIC FLOW TABLE" corresponding to each code No.
31			
12		ICM	
13		Coil antenna or ignition key with built-in transponder	
21		ECM/ICM 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.

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/ICM 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 OUTPUTTED FROM DIAGNOSTIC OUTPUT TERMINAL

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 ICM and recheck. NOTE: After replacing with a known-good ICM, register ECM/ICM code in ECM and TP code and ECM/ICM code in ICM by performing procedure described in "Procedure after ICM 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 TP CODE NOT MATCHED

DESCRIPTION:

ICM checks if TP code transmitted from ignition key and that registered in ICM 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 TECH1A kit) and performing following steps.

NOTE:

For operation procedure of TECH1, refer to TECH1 operator's manual.

- 1) Using TECH1, execute "ENT. TP CODE" command in SELECT MODE menu.
- 2) Turn ignition switch OFF, then turn it ON and check that DTC11 is not set.

DTC31 TP CODE NOT REGISTERED

DESCRIPTION:

ICM checks if TP code transmitted from ignition key and that registered in ICM match when ignition switch is ON. If there is no TP code registered in ICM, this DTC is set.

INSPECTION:

Register ignition key with built-in transponder by using TECH1 (TECH1 cartridge for immobilizer control system and TECH1A kit) and performing following steps.

NOTE:

For operation procedure of TECH1, refer to TECH1 operator's manual.

- 1) Prepare all ignition keys with built-in transponder to be registered. Up to 4 ignition keys can be registered for vehicle.
- 2) Using TECH1, execute "ENT. TP CODE" command in SELECT MODE menu.
- 3) Turn ignition switch OFF, then turn it ON and check that DTC31 is not set.
- 4) Repeat Step 2 as many times as the number of transponder built-in ignition keys not registered yet.

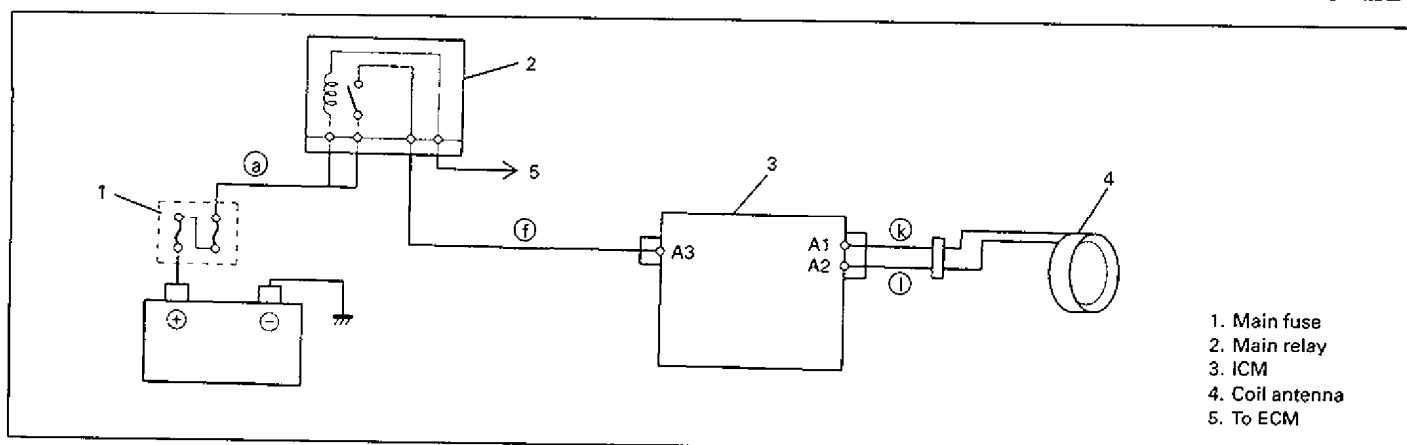
DTC12 FAULT IN ICM

DESCRIPTION:

This DTC is set when an internal fault is detected in ICM.

INSPECTION:

STEP	ACTION	YES	NO
1	1. Ignition switch "OFF". 2. Disconnect connectors from ICM. 3. Check for proper connection to ICM at all terminals. Are they in good condition?	Substitute a known-good ICM and recheck. NOTE: After replacing with a known-good ICM, register ECM/ICM code in ECM and TP code and ECM/ICM code in ICM by performing procedure described in "Procedure after ICM Replacement" section.	Repair or replace

DTC13 NO TP CODE TRANSMITTED OR COIL ANTENNA OPENED/SHORTED**DESCRIPTION:**

ICM energizes the coil antenna when the ignition switch is ON and reads TP code from the ignition key. When ICM cannot read TP 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?	Go to step 2.	Replace ignition key with built-in transponder and follow "DIAGNOSTIC FLOW CHART" again.
2	1. Disconnect coil antenna coupler with ignition switch turned OFF. 2. Is there continuity between coil antenna coupler terminals A and B?	Go to step 3.	Coil antenna open
3	Measure resistance between terminals of coil antenna coupler and body ground. Is it ∞ (infinity) Ω ?	Go to step 4.	Coil antenna shorted to ground
4	1. With coil antenna coupler disconnected, disconnect ICM coupler. 2. Measure resistance between coil antenna terminals of ICM coupler. Is it ∞ (infinity) Ω ?	Go to step 5.	"(K)" wire shorted to "(I)" wire
5	Measure resistance between terminal A1 of ICM coupler and body ground. Is it ∞ (infinity) Ω ?	Go to step 6.	"(K)" wire shorted to ground
6	Measure resistance between terminal A2 of ICM coupler and body ground. Is it ∞ (infinity) Ω ?	Go to step 7.	"(I)" wire shorted to ground
7	1. Connect coil antenna coupler. 2. Is there continuity between ICM coupler terminals A1 and A2?	Go to step 8.	• "(K)" or "(I)" wire open • Poor coil antenna-to-coupler

DTC13 NO TP CODE TRANSMITTED OR COIL ANTENNA OPENED /SHORTED

(CONTINUED)

STEP	ACTION	YES	NO
8	- Poor A1 or A2 connection. - If connections are OK, connect ICM coupler and substitute a known-good coil antenna. - 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 ICM and re-check. NOTE: After replacing with a known-good ICM, register ECM/ICM code in ECM and TP code and ECM/ICM code in ICM by performing procedure described in "Procedure after ICM Replacement" section.	Faulty ignition key

Fig. for step 1

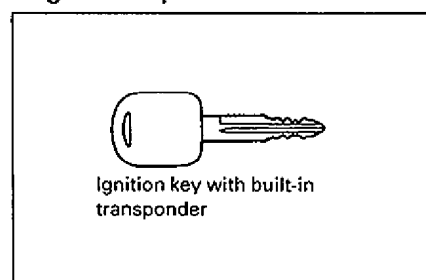


Fig. for step 2

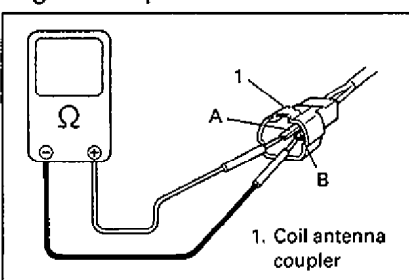


Fig. for step 3

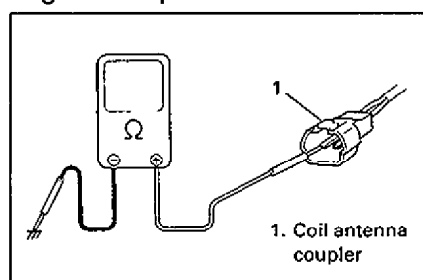


Fig. for step 4

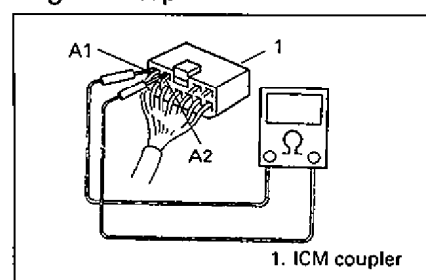


Fig. for step 5

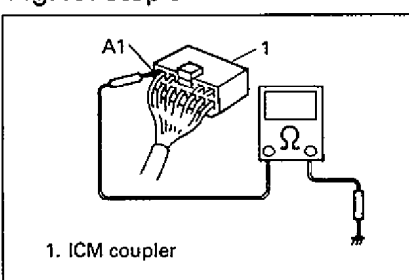


Fig. for step 6

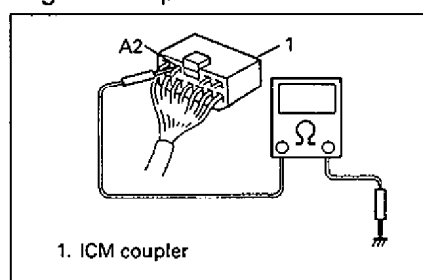
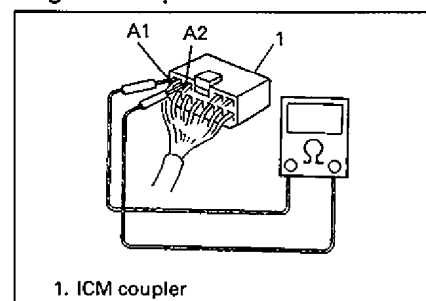


Fig. for step 7



DTC21 ECM/ICM CODE NOT MATCHED (ICM SIDE)

DTC81 ECM/ICM CODE NOT MATCHED (ECM SIDE)

DTC84 ECM/ICM CODE NOT REGISTERED

DESCRIPTION:

- **DTC21**
ICM checks if ECM/ICM code transmitted from ECM and that registered in ICM match when ignition switch is ON. If they do not, this DTC is set.
- **DTC81**
ECM checks if ECM/ICM code transmitted from ICM 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 ICM and that registered in ECM match when ignition switch is ON. If there is no ECM/ICM code registered in ECM, this DTC is set.

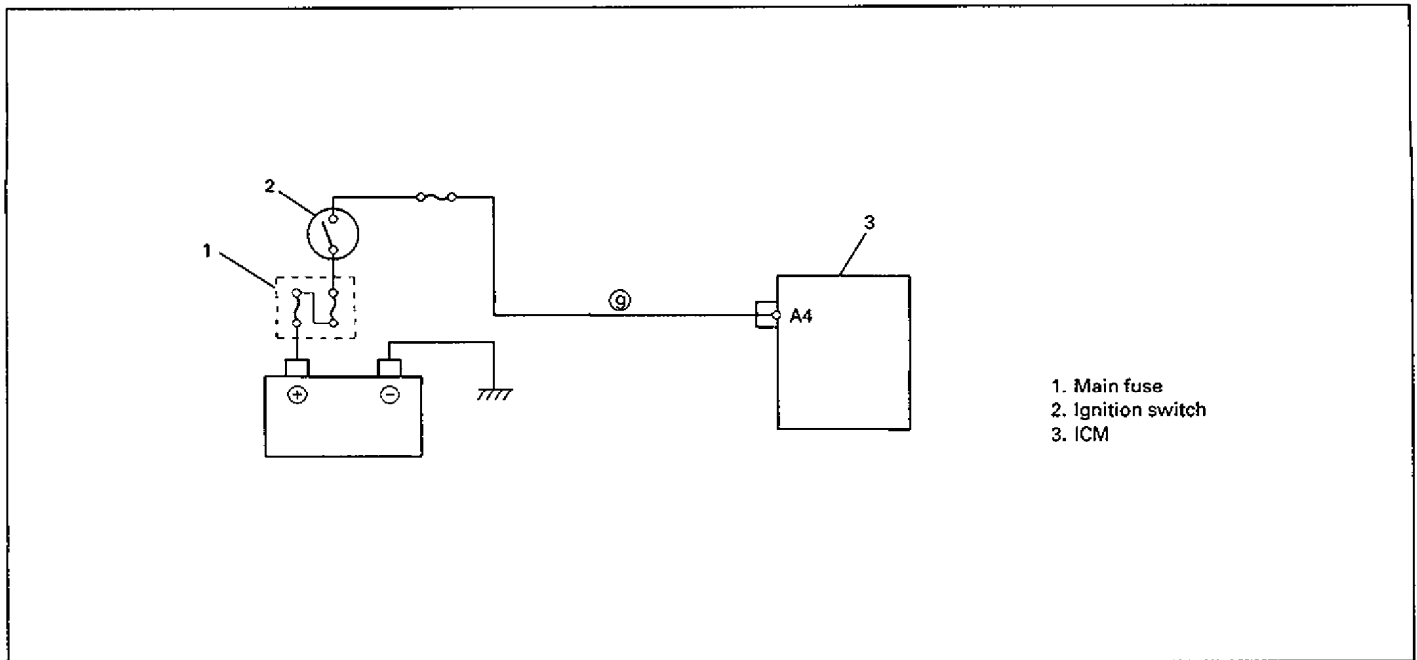
INSPECTION:

Using TECH1 (TECH1 cartridge for immobilizer control system and TECH1A kit), execute "RECORD ECM/ICM" command in SELECT MODE menu.

NOTE:

For operation procedure of TECH1, refer to TECH1 operator's manual.

DTC22 IGNITION SWITCH CIRCUIT OPEN/SHORT



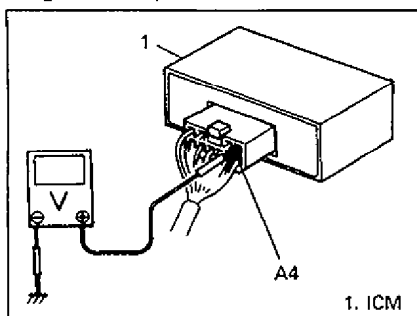
DESCRIPTION:

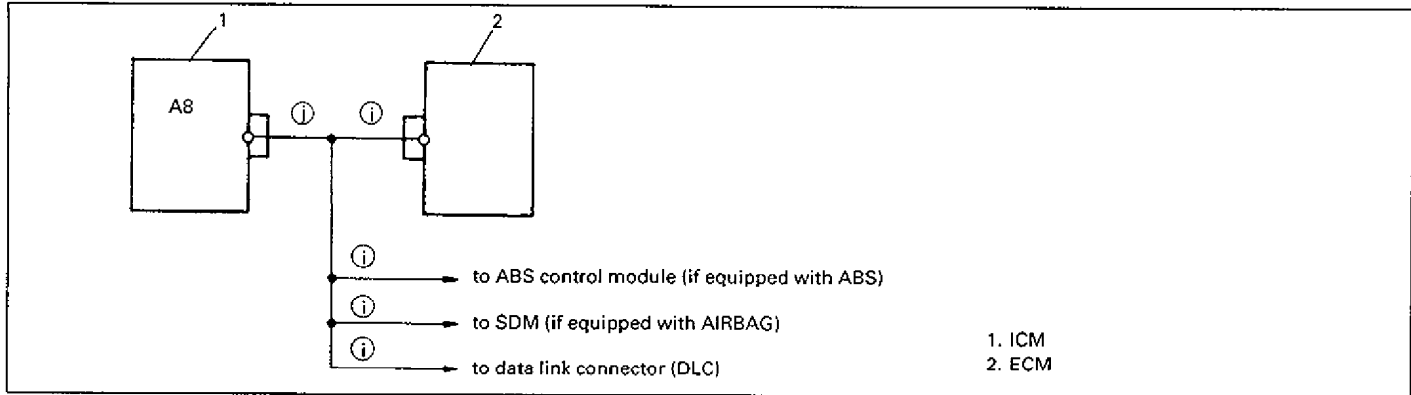
ICM monitors ignition signal when the ignition switch is ON. This DTC is set when no ignition signal input is detected by ICM.

INSPECTION:

STEP	ACTION	YES	NO
1	Check voltage between ICM coupler terminal A4 and body ground with ignition switch turned ON. Is it 10–14V?	Poor A4 terminal connection. If connection is OK, substitute a known-good ICM and recheck. NOTE: After replacing with a know-good ICM, register ECM/ICM code in ECM and TP code and ECM/ICM code in ICM by performing procedure described in "Procedure after ICM Replacement" section.	"9" wire open or short

Fig. for step 1



DTC23 NO ECM/ICM CODE TRANSMITTED FROM ECM OR DLC CIRCUIT OPENED/SHORTED**DTC83 NO ECM/ICM CODE TRANSMITTED FROM ICM OR DLC CIRCUIT OPENED/SHORTED****DESCRIPTION**

When the ignition switch is ON, ICM requests ECM and ECM requests ICM to transmit ECM/ICM code. If ECM/ICM code is not transmitted from ECM or ICM, ICM sets DTC23 and ECM sets DTC83.

INSPECTION:

STEP	ACTION	YES	NO
1	Check voltage between ICM coupler terminal A8 and body ground with ignition switch turned ON. Is it 4-5V?	Go to step 2.	"①" or "②" wire short
2	1. Disconnect ECM coupler with ignition switch turned OFF. 2. Is there continuity between ICM coupler terminal A8 and Data link connector terminal of ECM coupler? (For positions of Data link connector terminal of ECM coupler, refer to "Electronic Fuel Injection System" section in Service Manual of vehicle being serviced.)	Poor A8 connection (ICM) or Poor Data link connector terminal connection (ECM). If connections are OK, substitute a known-good ECM or ICM and recheck. NOTE : • After replacing with a known-good ECM, register ECM/ICM code in ECM by performing procedure described in "Procedure after ECM Replacement" section. • After replacing with a known-good ICM, register ECM/ICM code in ECM and TP code and ECM/ICM code in ICM by performing procedure described in "Procedure after ICM Replacement" section.	"①" or "②" wire between ICM and ECM open

Fig. for step 1

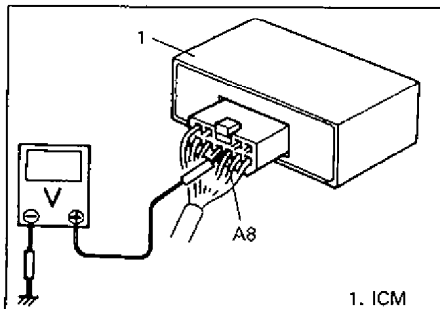
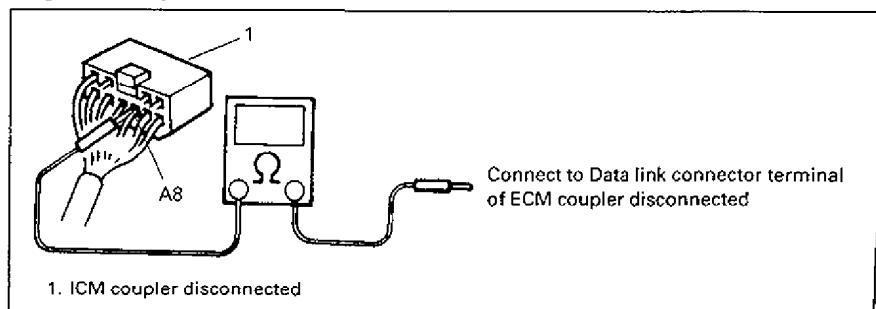


Fig. for step 2

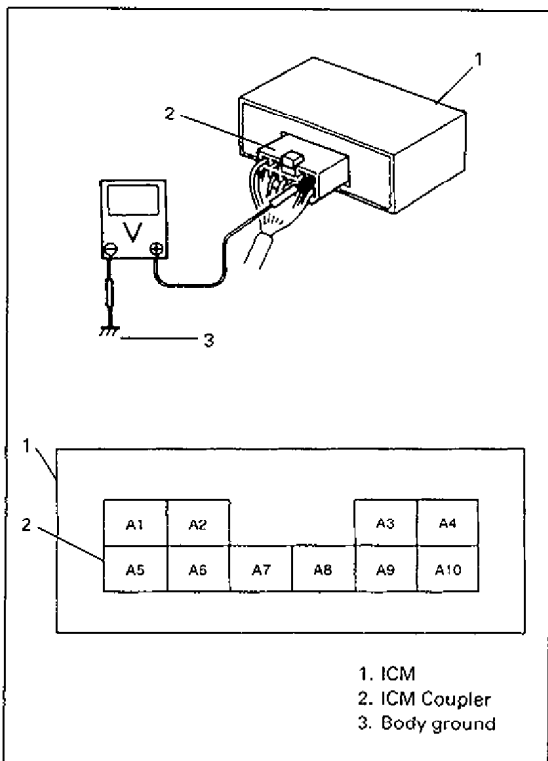


DTC82 FAULT IN ECM**DESCRIPTION:**

This DTC is set when an internal fault is detected in ECM.

INSPECTION:

STEP	ACTION	YES	NO
1	• Ignition switch "OFF". • Disconnect connectors from ECM. • 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/ICM, register ECM/ICM code in ECM by performing procedure described in "Procedure after ECM Replacement" section.	Repair or replace



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INSPECTION OF ECM, ICM AND ITS CIRCUIT

ECM, ICM and its circuit can be checked at ECM wiring couplers and ICM wiring coupler by measuring voltage and resistance. Described here is only inspection of ICM. For inspection of ECM, refer to "SECTION 6E1" section in Service Manual for the vehicle being serviced.

CAUTION:

ICM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ICM with coupler disconnected from it.

Voltage Check

- 1) Remove ICM from body with ignition switch OFF, referring to p. 8C-23.
- 2) Connect ICM coupler to ICM.
- 3) Check voltage at each terminal of coupler connected.

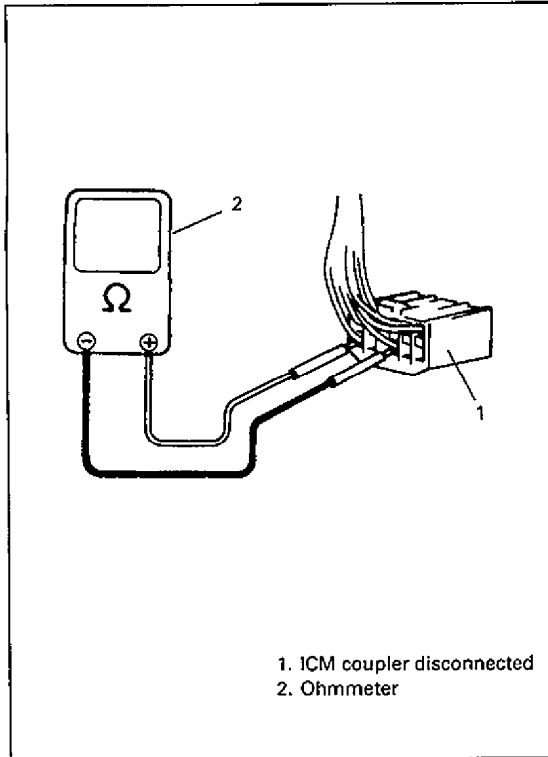
NOTE:

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.



Resistance Check

- 1) Disconnect ICM couplers from ICM with ignition switch OFF.

CAUTION:

Never touch terminals of ICM itself or connect voltmeter or ohmmeter.

- 2) Check resistance between each terminal of coupler disconnected.

CAUTION:

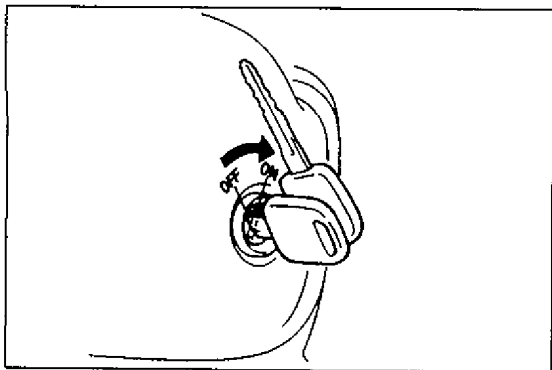
- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in table below represents that when parts temperature is 20°C (68°F).

TERMINAL	CIRCUIT	NORMAL RESISTANCE	CONDITION
A1 – A2	Coil antenna	Continuity	–

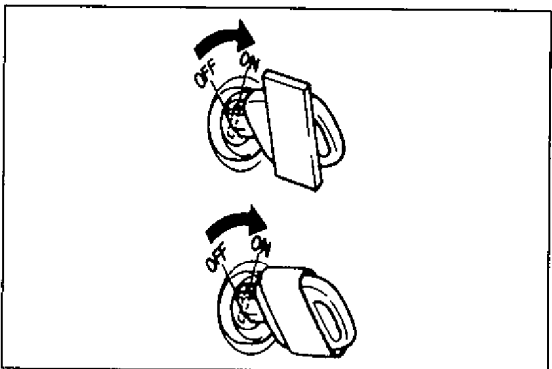
ON-VEHICLE SERVICE

PRECAUTIONS IN HANDLING IMMOBILIZER CONTROL SYSTEM

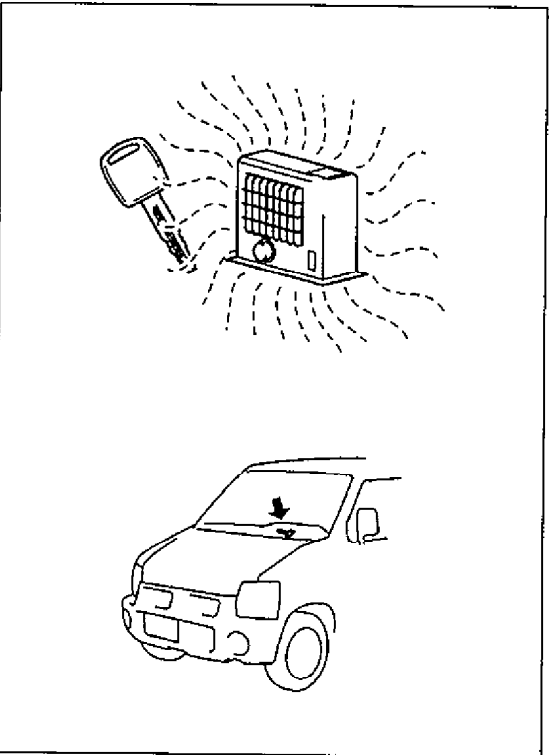
- Don't turn ON ignition switch with ignition key for immobilizer control system put together with another one or placed quite close to another one. Or the system may detect abnormal condition and prevent engine from starting.
- Do not turn ON ignition switch by using ignition key with any type of metal 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 ICM. Or the system may detect abnormal condition and prevent engine from starting.



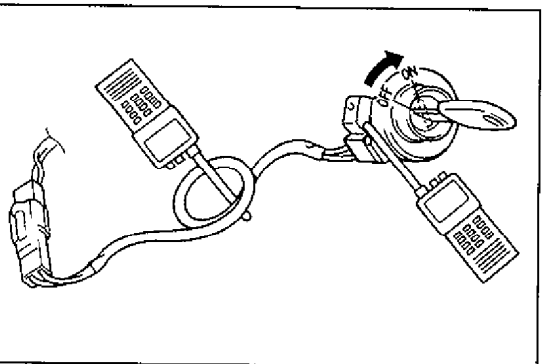
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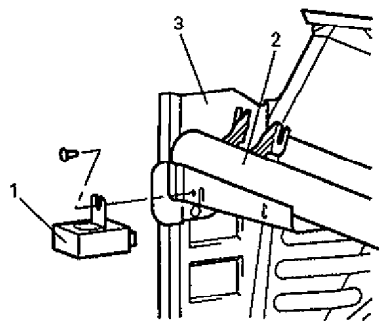
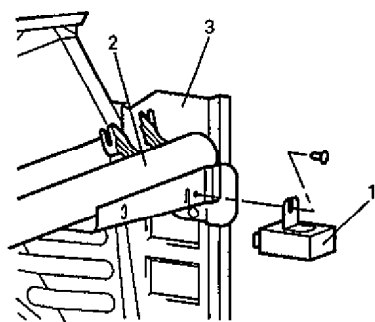
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75F00-8C-22-4

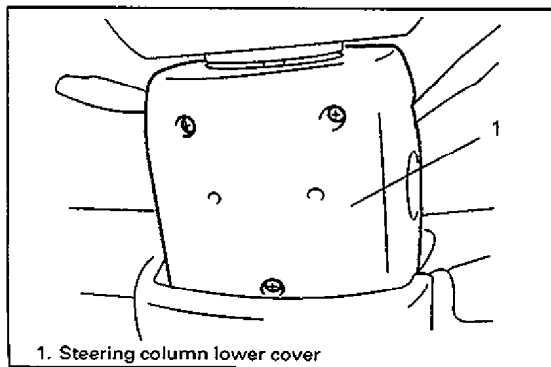


75F00-8C-22-5

For Left hand steering vehicle**For Right hand steering vehicle**

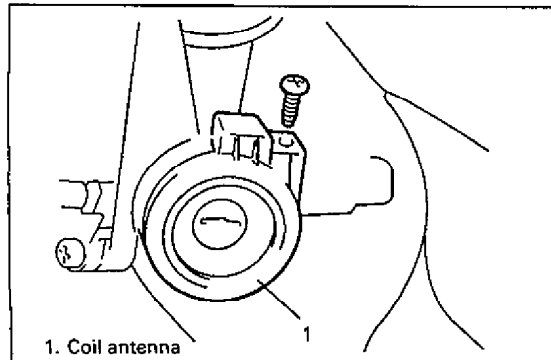
- 1. ICM
- 2. Steering support member
- 3. Dash side panel

75F00-8C-23-3



1. Steering column lower cover

75F00-8C-23-4



1. Coil antenna

75F00-8C-23-5

ICM**Removal**

- 1) Disconnect negative (-) cable at battery.
- 2) Disconnect coupler.
- 3) Remove immobilizer control module.

Installation

Reverse removal procedure for installation

NOTE:

After replacing ICM, be sure to register TP code and ECM/ICM code in ICM and ECM/ICM code in ECM by performing procedure described in "Procedure after ICM Replacement" section.

COIL ANTENNA**Removal**

- 1) Disconnect negative (-) cable at battery.
- 2) Remove steering column upper and lower cover by removing 3 screws.

- 3) Remove coil antenna

Installation

For installation, reverse removal procedure.

HOW TO REGISTER IGNITION KEY

Register the ignition key (TP code) in the immobilizer control system by using the following procedure.

- 1) Prepare ignition keys with a built-in transponder to be registered for the vehicle.

NOTE:

As up to 4 ignition keys may be used for immobilizer control system, make sure that total number of ignition keys that are used for the vehicle is 4 or less.

- 2) Prepare TECH1 (TECH1A kit and cartridge for immobilizer control system).

NOTE:

For operation procedure of TECH1, refer to TECH1 operator's manual.

- 3) If necessary, clear all TP codes registered in ICM by executing "CLEAR TP CODE" command in SELECT MODE menu with TECH1.

NOTE:

When "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 TECH1, register TP code in ICM one by one by executing "ENTER TP CODE" command in SELECT MODE menu. Then after completing registration of TP code for all ignition keys, turn ON ignition switch by using all ignition keys one by one and check that malfunction indicator lamp ("CHECK ENGINE" light) lights each time.

NOTE:

ICM does not accept registration of the same TP code.

PROCEDURE AFTER ICM REPLACEMENT

When ICM was replaced, including when replaced because re-checking by using a known-good ICM was necessary during trouble diagnosis, register TP code and ECM/ICM code in ICM and ECM/ICM code in ECM by performing following procedure.

- 1) Prepare all existing ignition keys (those that have been used for that vehicle).

NOTE:

As up to 4 ignition keys may be used for immobilizer control system, make sure that total of existing ignition keys is 4 or less

- 2) Prepare TECH1 (TECH1A kit and cartridge for immobilizer control system).

NOTE:

For operation procedure of TECH 1, refer to TECH1 operator's manual.

- 3) Check the number of TP codes registered in ICM which has been replaced by executing "DATA LIST" command in SELECT MODE menu of TECH1. If even one TP code has been registered, execute "CLEAR TP CODE" command in SELECT MODE menu.

NOTE:

When "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 TECH1, register TP code in ICM one by one by executing "ENT. TP CODE" command in SELECT MODE menu.

NOTE:

ICM does not accept registration of the same TP code.

- 5) Using TECH1, register ECM/ICM code in both ICM and ECM by executing "RECORD ECM/ICM" command in SELECT MODE menu.
- 6) Turn ON ignition switch by using all ignition keys one by one and check that malfunction indicator lamp ("CHECK ENGINE" light) lights each time.

PROCEDURE AFTER ECM REPLACEMENT

When ECM was replaced, including when replaced because rechecking by using a known-good ECM was necessary during trouble diagnosis, register ECM/ICM code in ECM by performing following procedure.

- 1) Prepare TECH1 (TECH1A kit and cartridge for immobilizer control system).

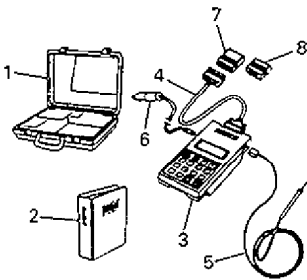
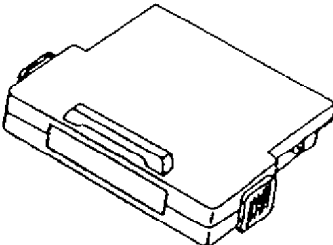
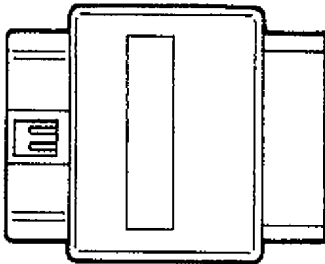
NOTE:

For operation procedure of TECH 1, refer to TECH1 operator's manual.

- 2) Using TECH1, register ECM/ICM code in ECM by executing "RECORD ECM/ICM" command in SELECT MODE menu.

75F00-8C-26-2

SPECIAL TOOLS

 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	 Tech-1 cartridge for immobilizer control system	 09931-96020 16/12 pin DLC adapter
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75F00-8C-26-4

SECTION 9

BODY SERVICE

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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:

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.

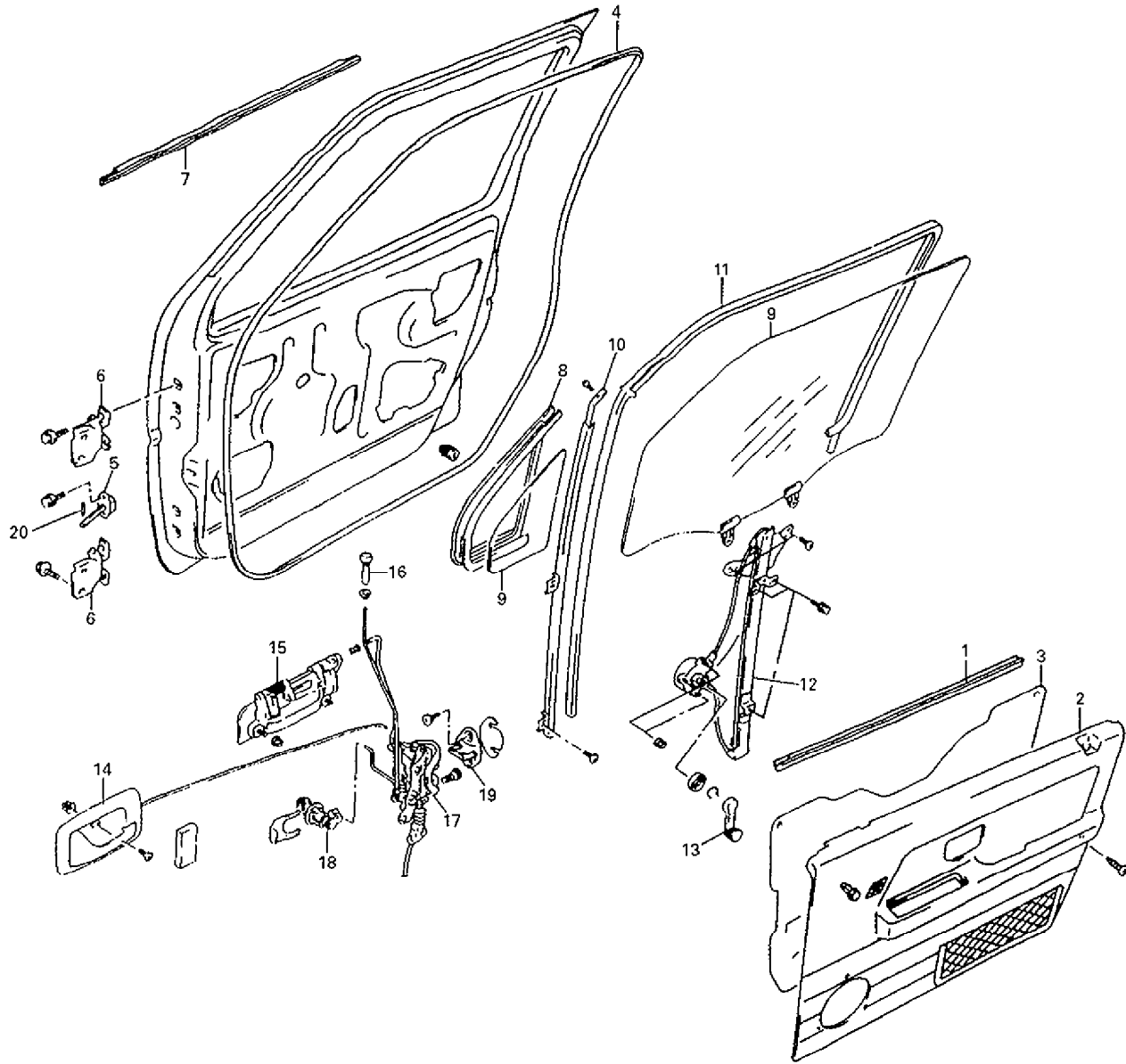
Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

CONTENTS

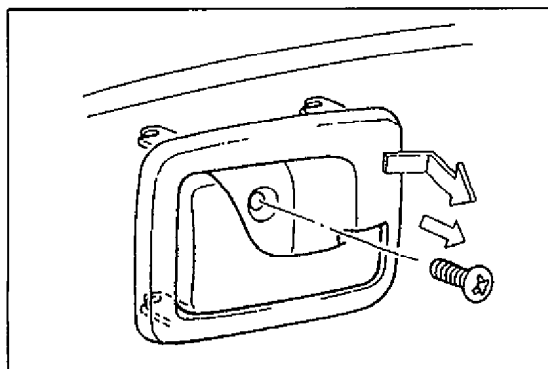
ON-VEHICLE SERVICE	9- 2	REAR QUARTER WINDOW	9-21
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Door Mirror	9- 4	FRONT FENDER	9-28
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Door Lock	9- 6	SIDE MOLDING	9-30
Door Assembly	9- 8	SEATS	9-31
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Rear Door Assembly	9-12		
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ON-VEHICLE SERVICE

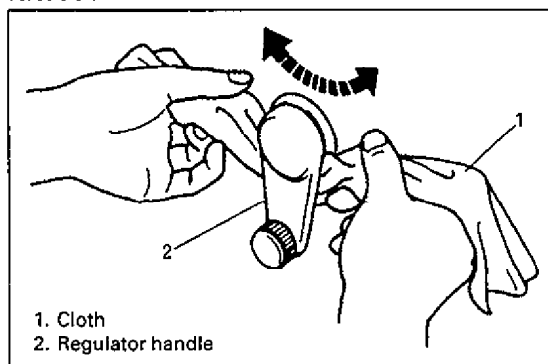
FRONT DOOR



- | | |
|------------------------------|----------------------------------|
| 1. Inner weatherstrip | 11. Glass run |
| 2. Door trim | 12. Window regulator assembly |
| 3. Door sealing cover | 13. Window regulator handle |
| 4. Door opening weatherstrip | 14. Door inside handle assembly |
| 5. Door opening stopper | 15. Door outside handle assembly |
| 6. Door hinge | 16. Inside lock knob |
| 7. Outer weatherstrip | 17. Door latch assembly |
| 8. Window weatherstrip | 18. Door lock key cylinder |
| 9. Window glass | 19. Door latch striker |
| 10. Door sash | 20. Door open stopper pin |

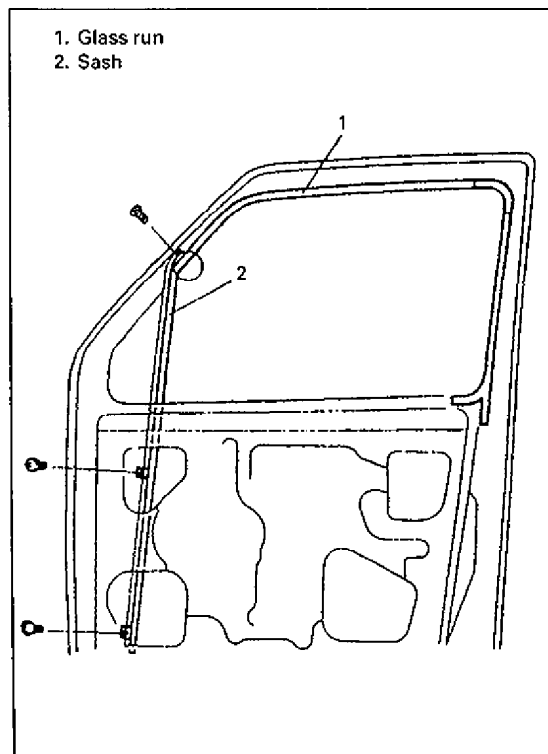


75F00-9-3-1

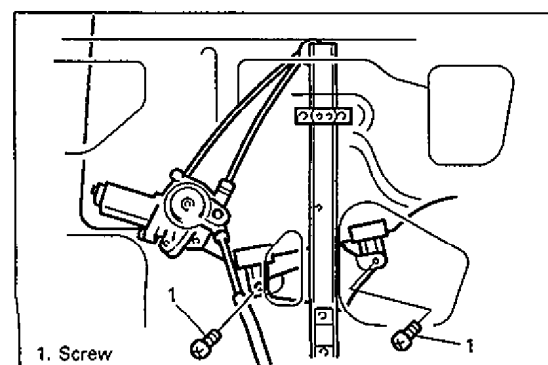


- 1. Cloth
- 2. Regulator handle

75F00-9-3-2



75F00-9-3-4

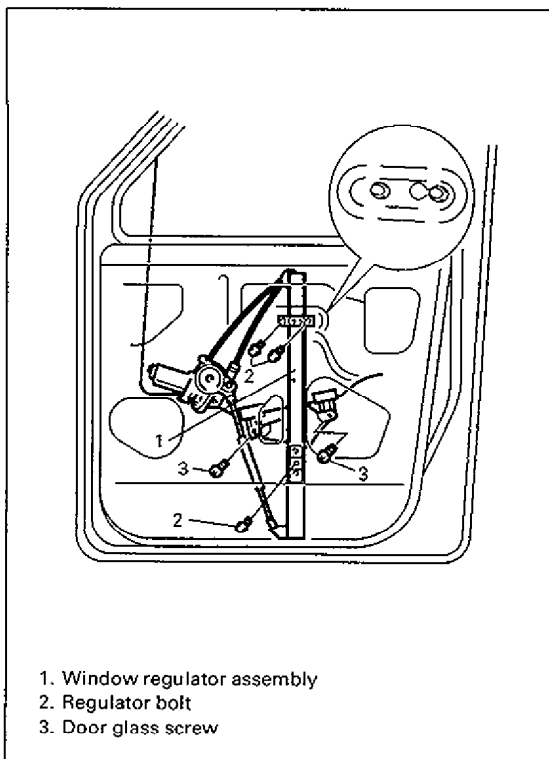


75F00-9-3-5

DOOR GLASS

REMOVAL

- 1) Remove inside handle assembly
- 2) Remove inside lock knob.
- 3) Lower door glass fully and remove outer weatherstrip.
- 4) Remove window regulator handle (if equipped).
For its removal, pull off snap by using a cloth as shown in figure.
- 5) Remove door trim, disconnecting power window switch wire harness at coupler (if equipped).
- 6) Remove sealing cover.
- 7) Remove sash with glass run.
- 8) Remove glass attaching screws.
- 9) Take out door glass.



75F00-9-4-2

INSTALLATION

Reverse removal procedure to install door glass noting following points:

- 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.

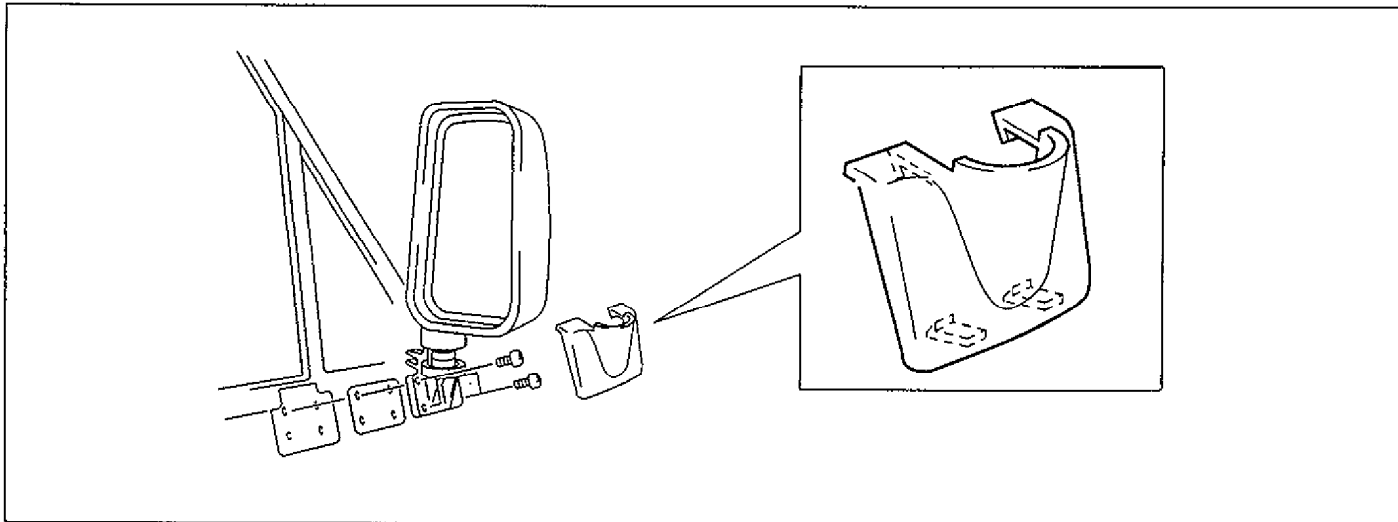
If the glass is tilted with respect to the glass run, make a fine adjustment with the bolts and screws in the figure.

- Securely seal door sealing cover with adhesive.

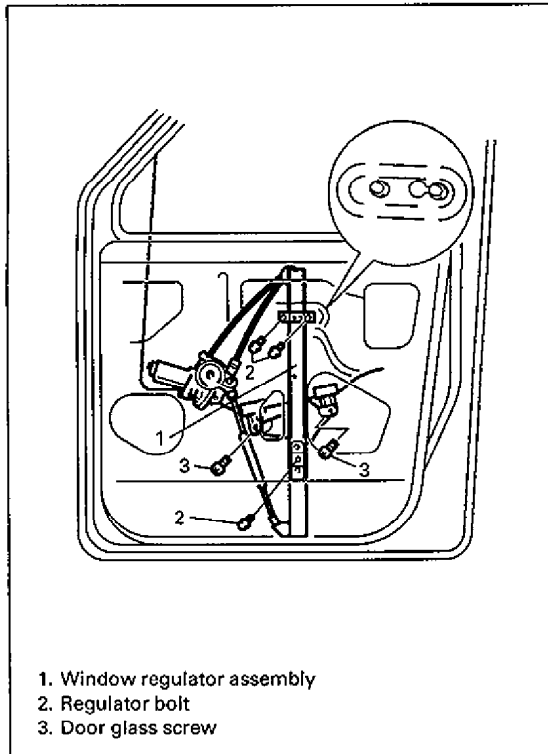
DOOR MIRROR

REMOVAL AND INSTALLATION

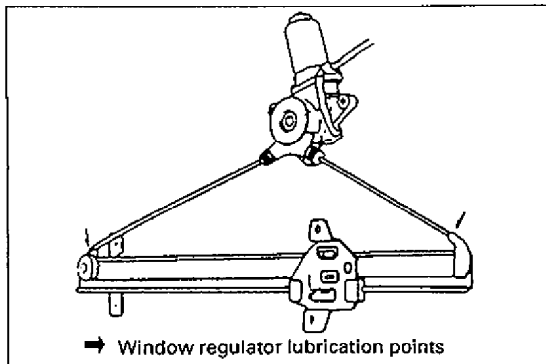
When removing or installing door mirror, refer to figure shown below.



75F00-9-4-4



75F00-9-5-2



75F00-9-5-3

WINDOW REGULATOR

REMOVAL

- 1) Remove door glass, referring to "FRONT DOOR GLASS REMOVAL" in this section.
- 2) Disconnect power window motor lead wire at coupler and loosen clamp (if equipped).
- 3) Remove regulator bolts and take out regulator through hole.

INSPECTION

- 1) Check regulator sliding and rotating parts for greasing.
- 2) Check rollers for wear and damage.
- 3) Check wire for damage.

INSTALLATION

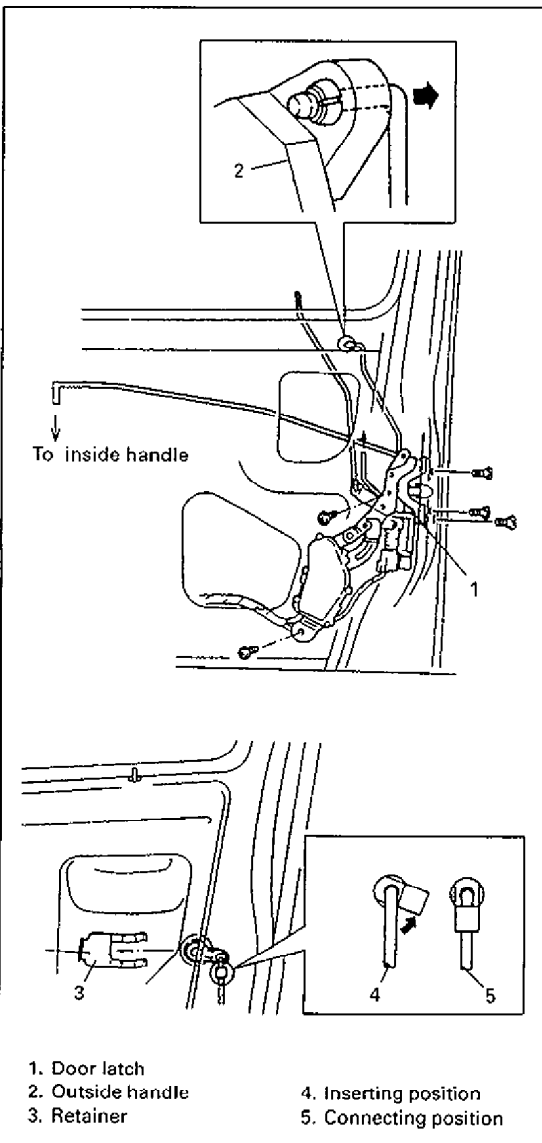
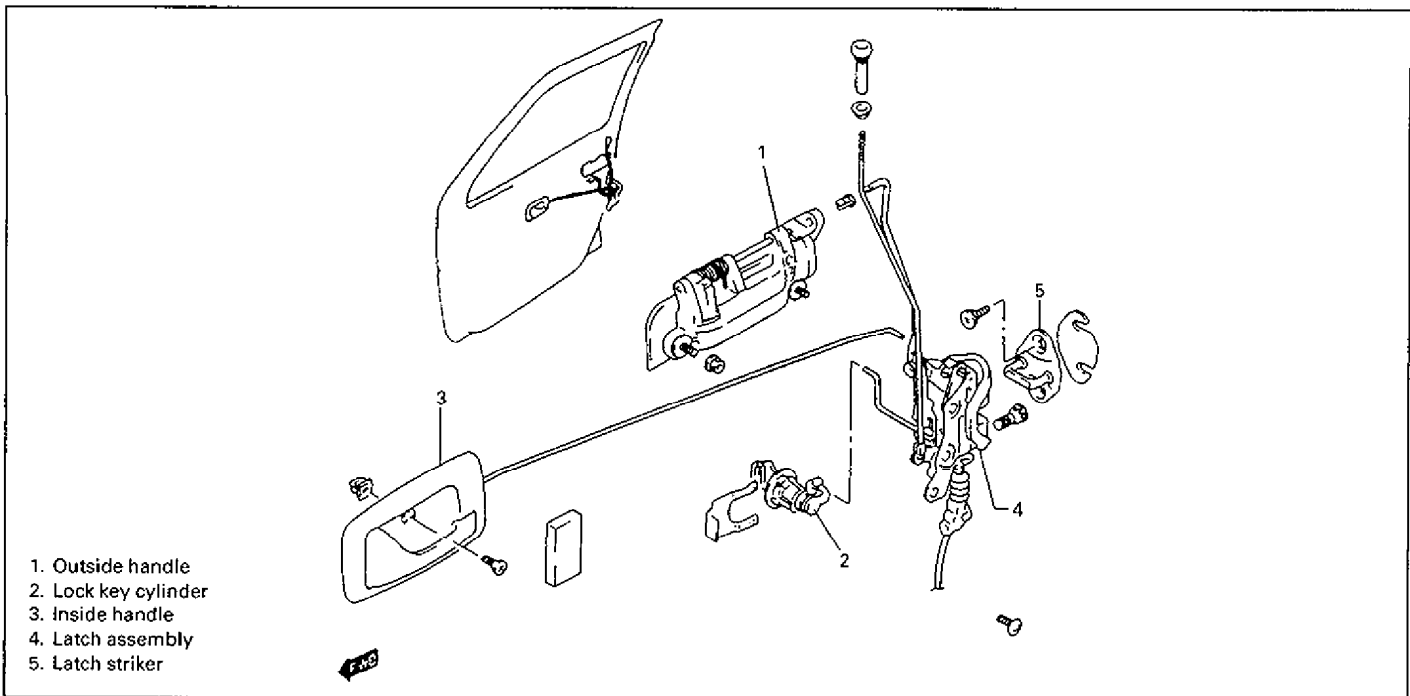
Reverse removal procedure to install window regulator noting following point.

- 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 bolts and screws in the figure.

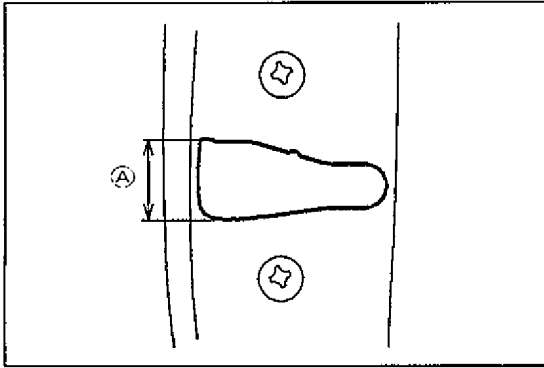
75F00-9-5-4

DOOR LOCK



REMOVAL

- 1) Remove window regulator handle (if equipped) and inside handle assembly (refer to "FRONT DOOR GLASS REMOVAL").
- 2) Remove inside lock knob.
- 3) Remove door trim, disconnecting power window switch wire harness at coupler (if equipped).
- 4) Remove sealing cover.
- 5) After disconnecting each joint of control link, remove door inside handle, outside handle and door latch ass'y.



75F00-9-7-1

INSTALLATION

Reverse removal procedure for installation, using care for following items.

- Install door latch striker.

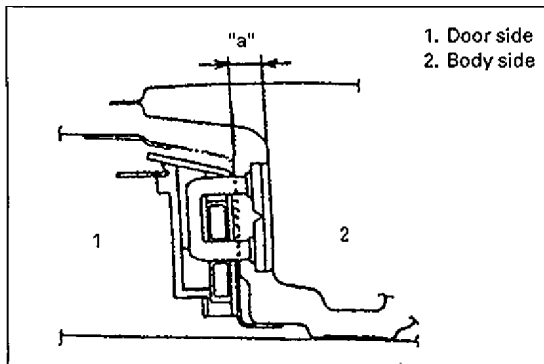
Move door latch striker up and down so that its shaft approximately aligns with the center of groove **A** of door latch.

NOTE:

Striker should be placed level and moved vertically. Do not adjust door latch.

- Adjust cushion so that door contacts body when closed.

75F00-9-7-2



75F00-9-7-3

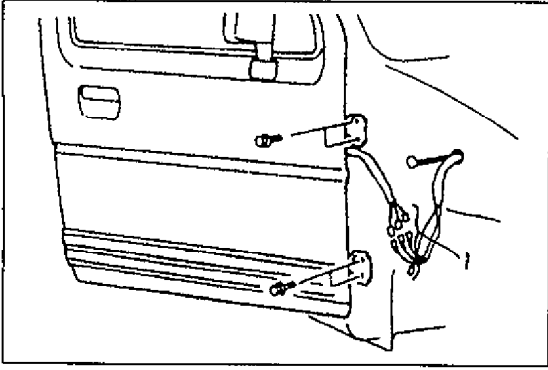
In order to correctly obtain door striker position in fore-and-aft direction, increase or decrease number of spacers inserted between body and striker to adjust it. Dimension "a" should be adjusted to specified value.

Dimension "a": 12.6 – 14.6 mm (0.50 – 0.57 in.)

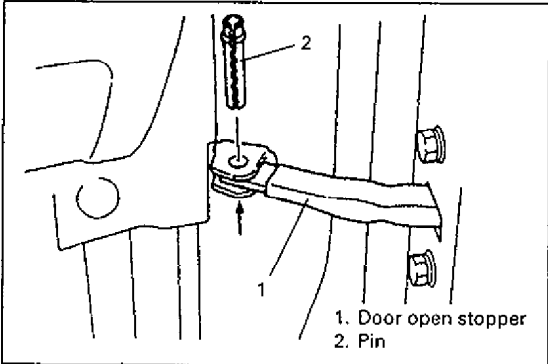
NOTE:

Apply oil or grease to striker joints periodically.

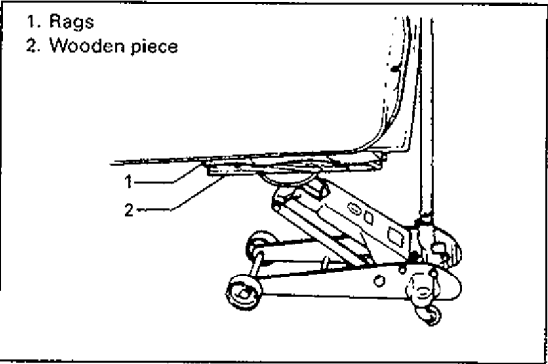
75F00-9-7-4



75F00-9-8-1



75F00-9-8-2



75F00-9-8-3

DOOR ASSEMBLY

REMOVAL

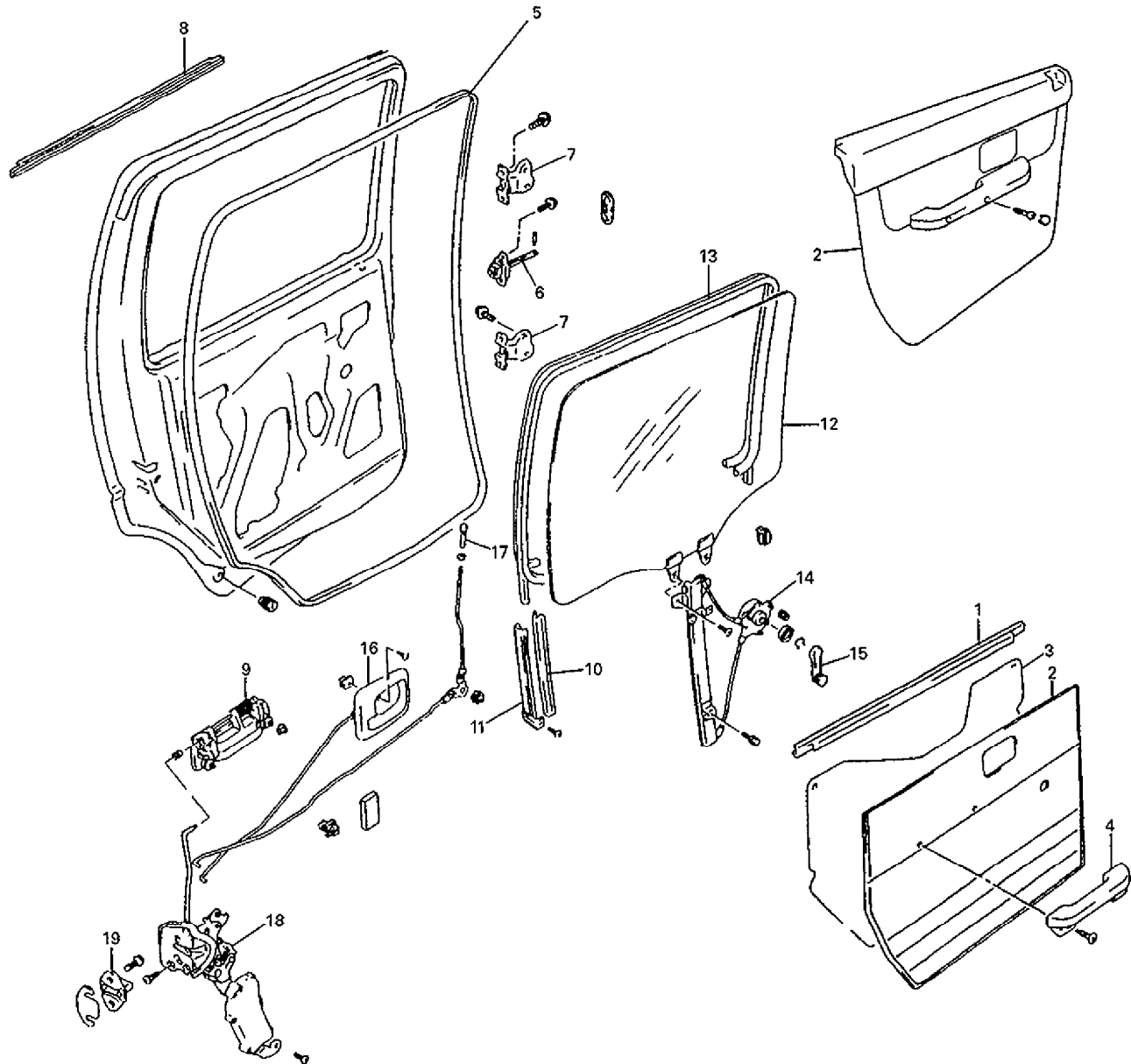
- 1) Remove front fender. Refer to "FRONT FENDER" in this section.
- 2) Disconnect door harness couplers, and remove corrugation tube from body.
- 3) Remove stopper pin upward by tapping it with hammer.
- 4) Using a jack, support door panel with a piece of wood placed between jack and panel.
- 5) Remove door ass'y by loosening hinge mounting bolts.

INSTALLATION

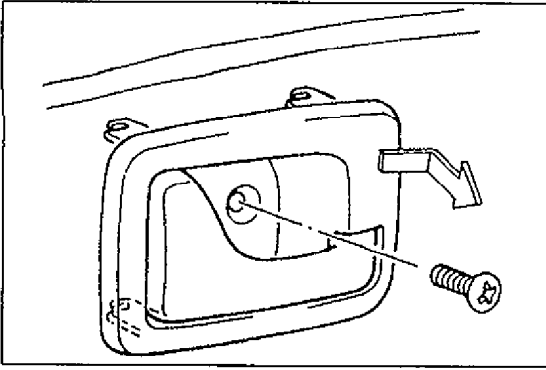
Reverse removal sequence to install front door.

- Apply sealant to hinge installation face shown in figure and grease to rotating part.
- When weatherstrip is hardened, water leak may develop. In such case, replace it with new one.
- 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.

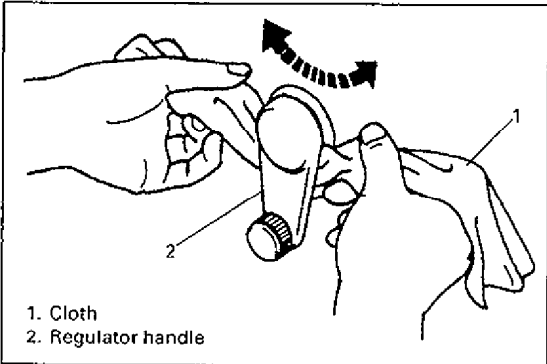
REAR DOOR



- | | |
|---------------------------------|---------------------------------|
| 1. Inner weatherstrip | 11. Door sash |
| 2. Door trim | 12. Door glass |
| 3. Door sealing cover | 13. Glass run |
| 4. Armrest | 14. Window regulator assembly |
| 5. Door opening weatherstrip | 15. Window regulator handle |
| 6. Door opening stopper | 16. Door inside handle assembly |
| 7. Door hinge | 17. Inside lock knob |
| 8. Outer weatherstrip | 18. Door latch assembly |
| 9. Door outside handle assembly | 19. Door latch striker |
| 10. Rear glass run | |

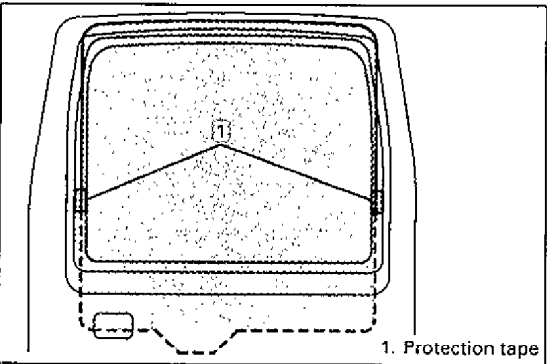


75F00-9-10-1

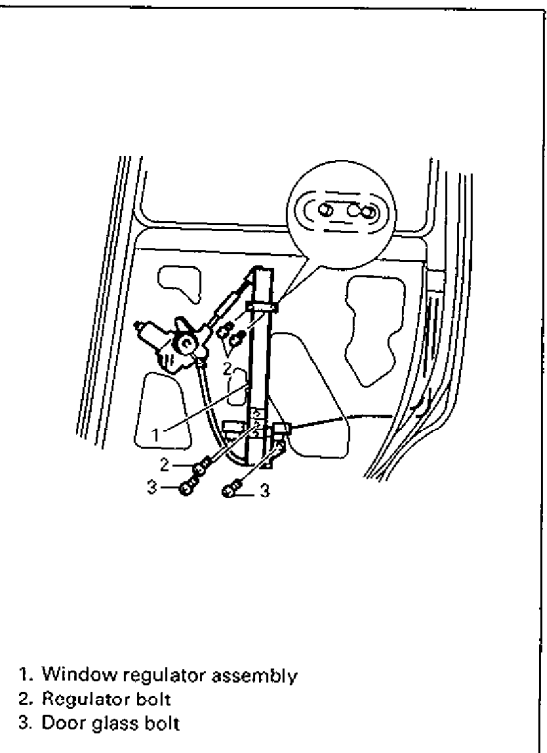


1. Cloth
2. Regulator handle

75F00-9-10-2



75F00-9-10-3



1. Window regulator assembly
2. Regulator bolt
3. Door glass bolt

75F00-9-10-5

DOOR GLASS

REMOVAL

- 1) Remove inside handle assembly.
- 2) Remove inside lock knob.
- 3) Lower glass fully and remove outer weatherstrip.
- 4) Remove window regulator handle (if equipped).
For its removal, pull off snap by using a cloth as shown in figure.
- 5) Remove door trim, disconnecting power window switch wire harness at coupler (if equipped).
- 6) Remove door sealing cover.
- 7) Remove glass run.
- 8) Remove glass attaching screws.
- 9) Take out door glass.

NOTE:

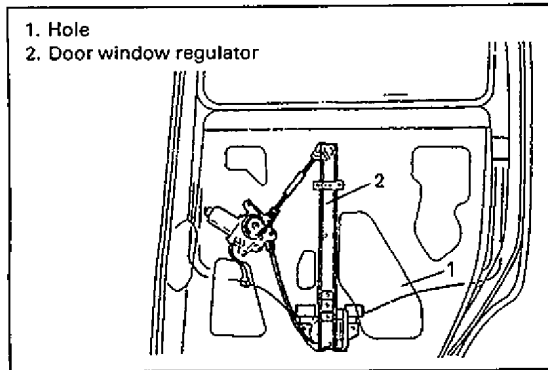
When taking out the glass, start from the cut in the door panel as shown in the figure. Attach tape to the door panel to protect the glass against interfering with the door panel which may cause damage to the glass.

INSTALLATION

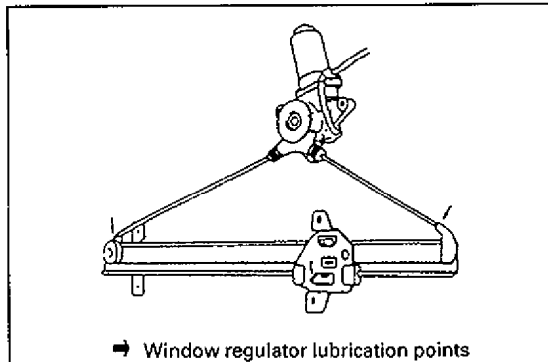
Reverse removal sequence to install door glass.

However, be careful of following points.

- 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 bolts and screws in the figure.
- Securely seal door sealing cover with adhesive.



75F00-9-11-1



75F00-9-11-2

WINDOW REGULATOR

REMOVAL

- 1) Remove door glass as previously outlined.
- 2) Disconnect power window motor lead wire at coupler and clamp (if equipped).
- 3) Remove door window regulator attaching screw and take out regulator through hole.

INSPECTION

- 1) Check regulator sliding and rotating parts for greasing.
- 2) Check rollers for wear and damage.
- 3) Check wire for damage.

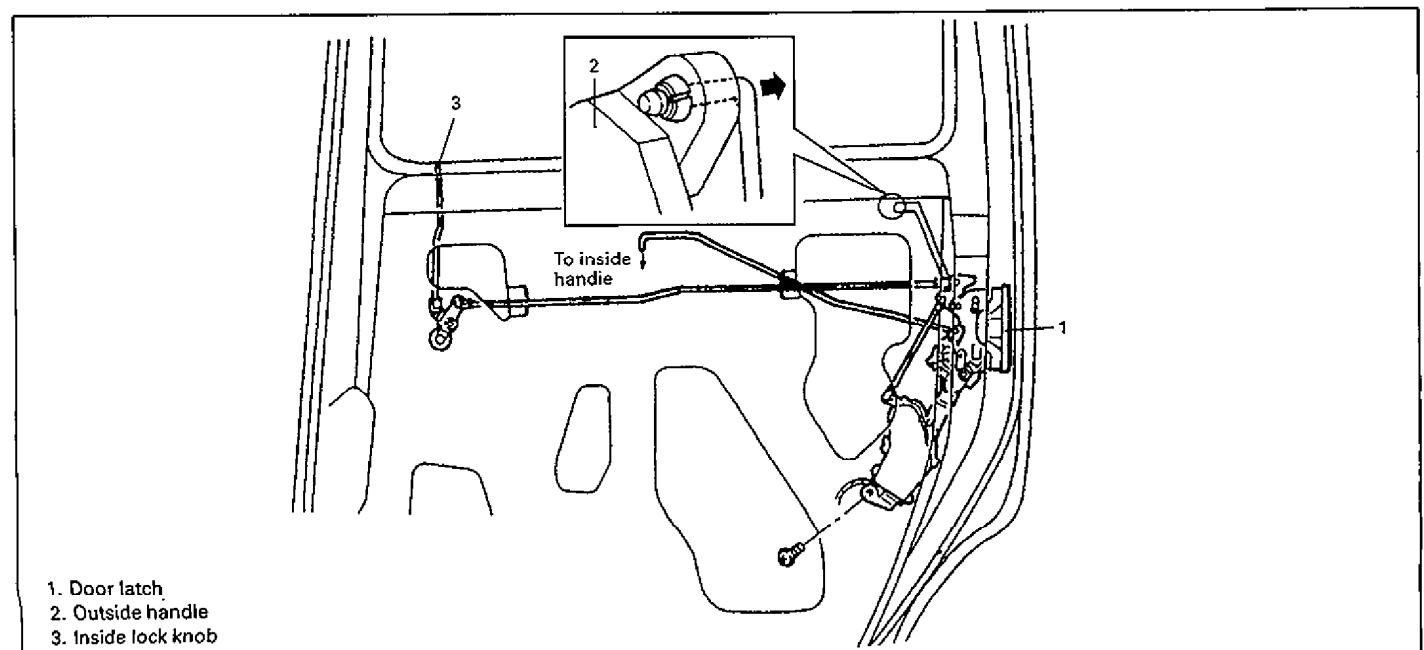
INSTALLATION

Reverse removal sequence to install door window regulator noting following points.

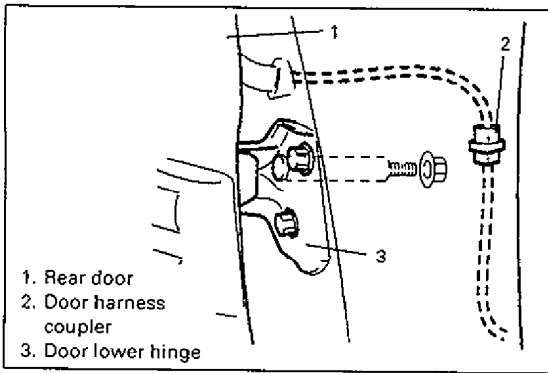
- Adjust the door glass position, referring to "REAR DOOR GLASS INSTALLATION".

75F00-9-11-3

REAR DOOR LOCK



75F00-9-11-5



REAR DOOR ASSEMBLY REMOVAL AND INSTALLATION

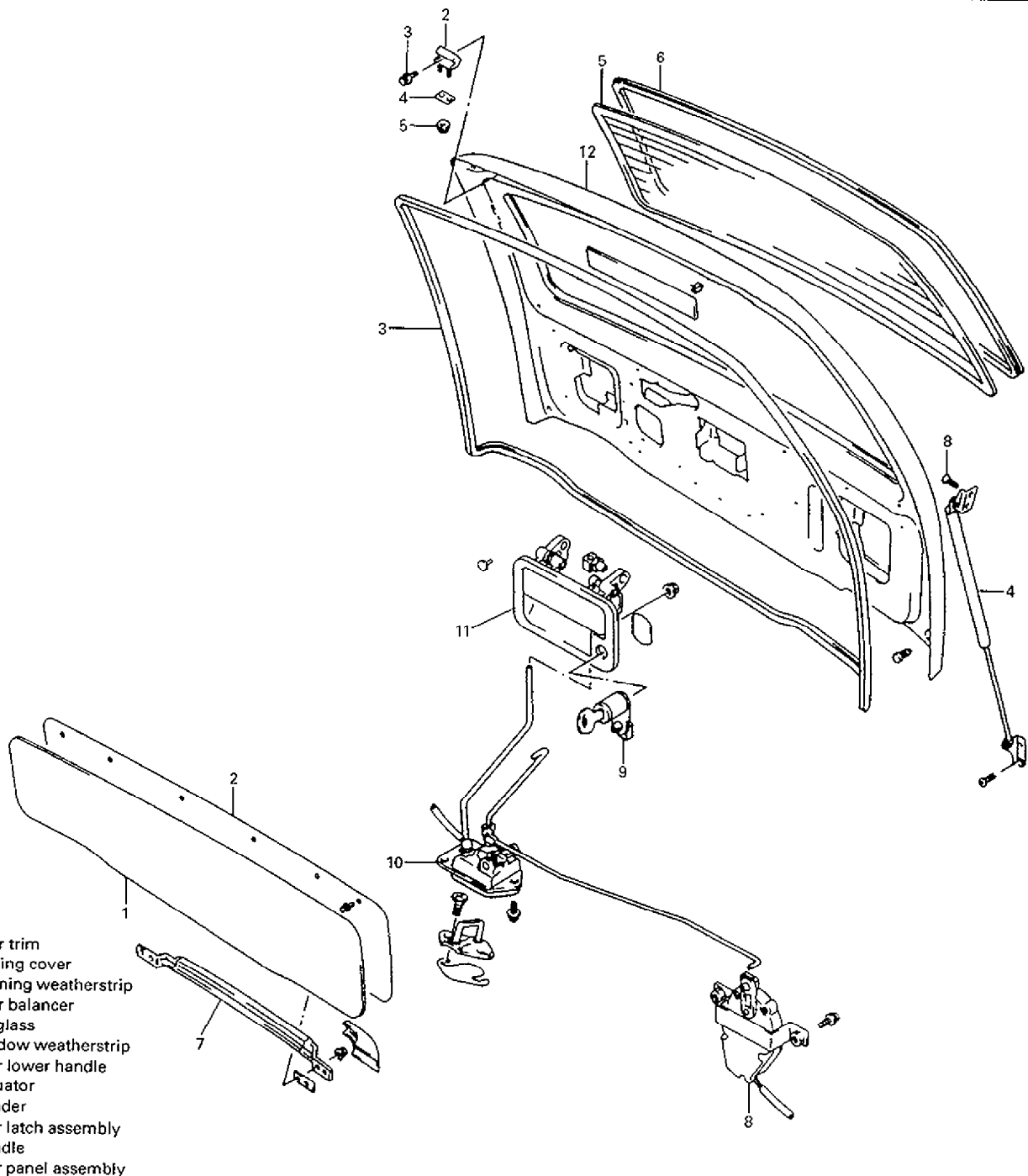
Follow procedures for Front Door removal and installation in this section.

NOTE:

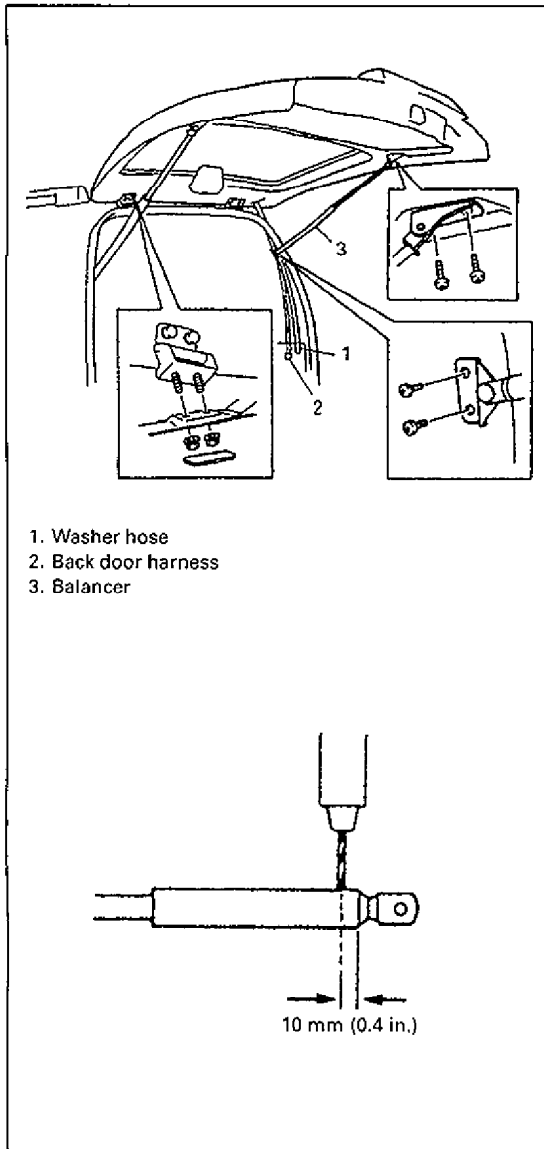
Refer to the left figure for location of rear door harness coupler.

75F00-9-12-1

BACK DOOR



75F00-9-12-5



1. Washer hose
2. Back door harness
3. Balancer

REMOVAL

- 1) Remove back door trim.
- 2) Remove sealing cover.
- 3) Disconnect wire harness coupler inside the back door.
- 4) Remove back door balancer (first at its door-side and next at its body-side).

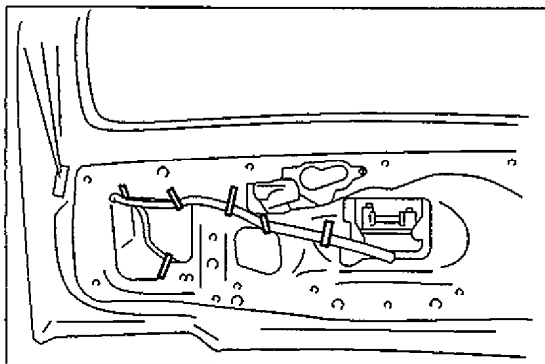
WARNING:

Handling of Back Door Balancer (Damper)

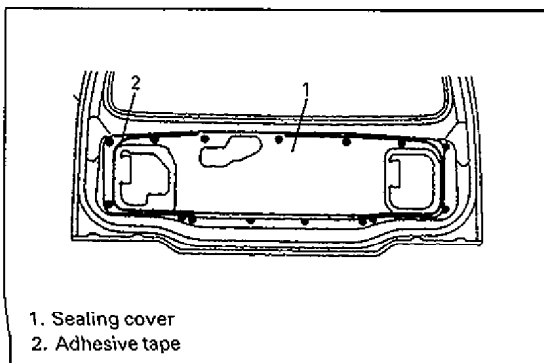
- Do not disassemble balancer because its cylinder is filled with gas.
- The gas itself is harmless but it may issue out of the hole together with chips generated by the drill. Therefore, be sure to wear goggles.
- When discarding removed back door balancer (damper), use a 2 to 3 mm (0.08 to 0.12 in.) 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.

75F00-9-13-3



75F00-9-13-4



1. Sealing cover
2. Adhesive tape

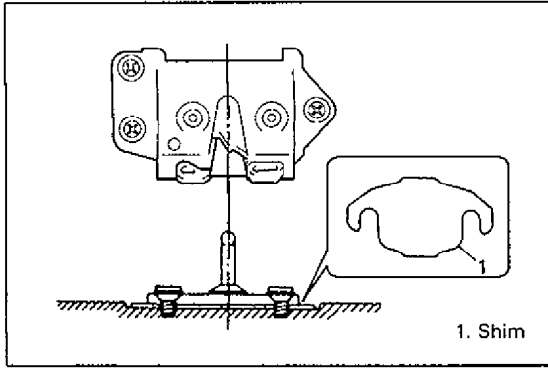
75F00-9-13-5

INSTALLATION

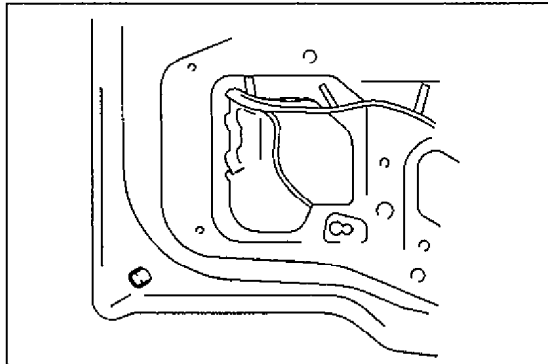
Reverse removal procedure to install back door.
Secure wiring harness.

NOTE:

Use adhesive to seal sealing cover to back door.



75F00-9-14-1



Adjust the following:

1) Door latch striker.

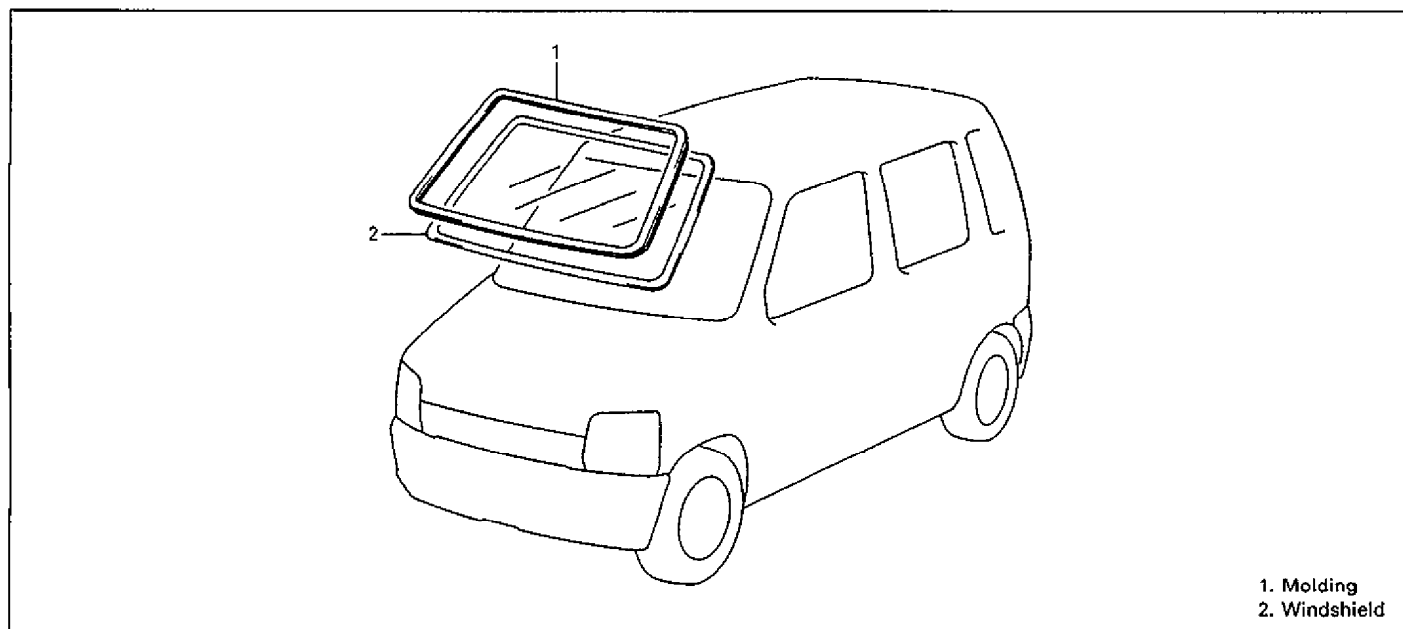
Make sure that striker center aligns with the center of groove in door latch base.

To adjust door latch and striker each other, insert proper number of shims below the bottom of striker.

2) Door rubber cushion.

Turn rubber cushions installed at the both sides of back door to adjust the contact with door.

WINDSHIELD



75F00-9-15-2

The windshield is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For windshield glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.

CAUTION:

- Described in this section is the glass replacement by using 2 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/cm² (569 lb/in²) 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 (400 g (14.1 oz.))

Primer for glass (15 g (0.5 oz.))

Primer for body (15 g (0.5 oz.))

- Eyeleteer
- Piano string
- Brush for primer application (2 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

75F00-9-16-2

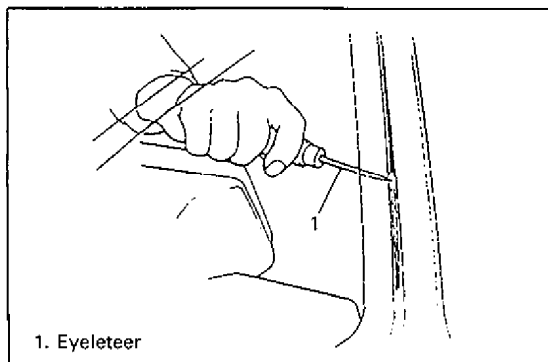
REMOVAL

- 1) Clean both inside and outside of glass and around it.
- 2) Remove wiper arms.
- 3) Remove roof molding.
- 4) Using tape, cover body surface around glass to prevent any damage.
- 5) Remove rear view mirror, sunvisor, and front pillar trims (right & left).

75F00-9-16-3

- 6) Remove instrument panel. Refer to "INSTRUMENT PANEL" in this section.
- 7) Remove head lining. Refer to "HEAD LINING" in this section.
- 8) Remove (or cut) windshield molding all around until windshield edge comes out.

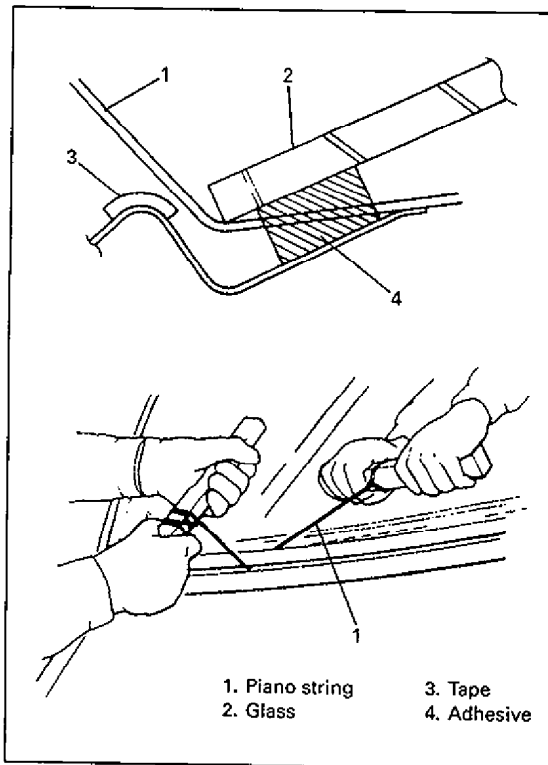
75F00-9-16-4



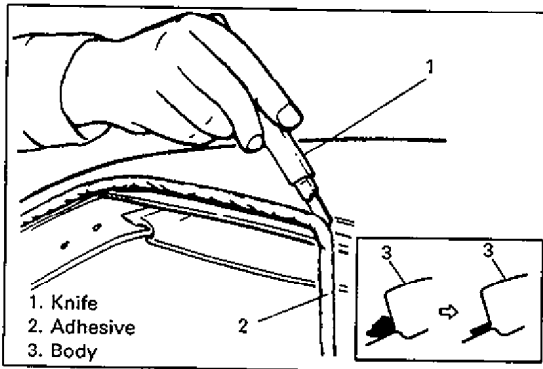
1. Eyeleteer

75F00-9-16-5

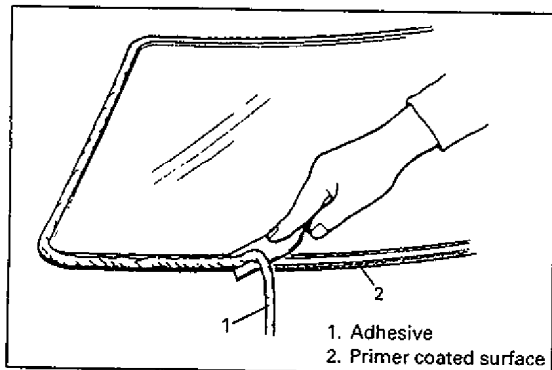
- 9) Drill hole with eyeleteer through adhesive and let piano string through it.



75F00-9-17-2



75F00-9-17-3



75F00-9-17-4

10) Cut adhesive all around glass with piano string.

NOTE:

Use piano string as close to glass as possible so as to prevent damage to body.

11) Using knife, smooth adhesive remaining on body side so that it is 1 – 2 mm thick all around.

NOTE:

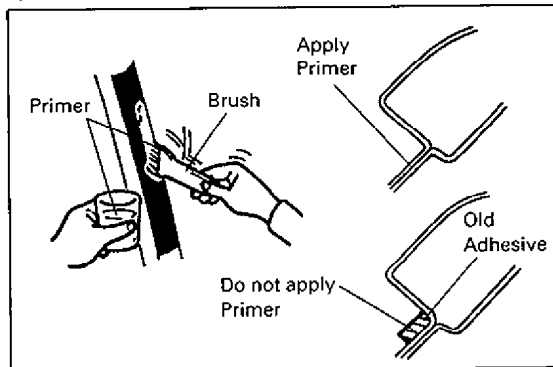
Before using knife, clean it with alcohol or the like to remove oil from it.

12) When re-using glass, remove old molding and adhesive from glass completely.

INSTALLATION

- 1) Using cleaning solvent (white gasoline), clean surface of adhesive remaining on body (or windshield edge) where windshield glass is to be adhered. (Let it dry for more than 10 minutes.)

75F00-9-18-1



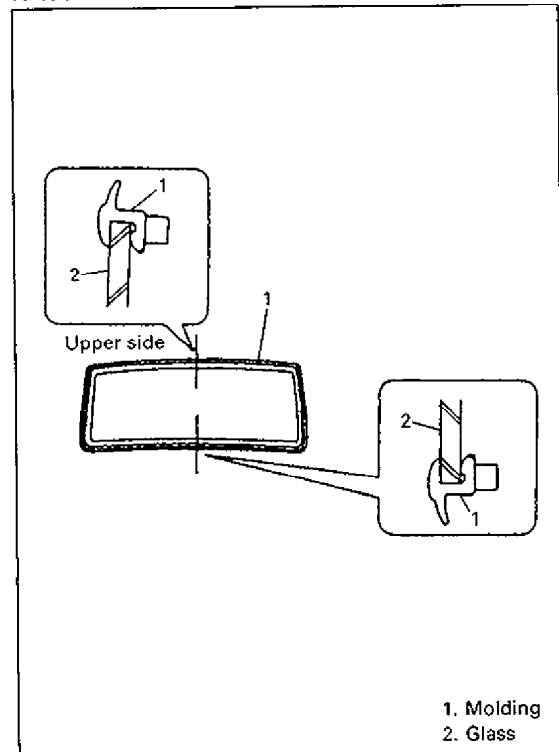
- 2) Clean contact surfaces of old adhesive, paint or bare metal thoroughly.

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:

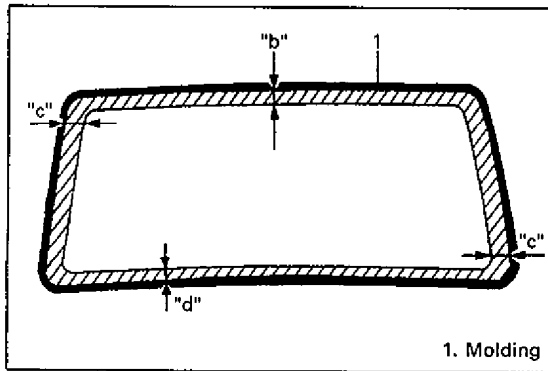
- Be sure to refer to primer maker's instruction for proper handling and drying time.
- Do not touch body and old adhesive surfaces where glass is to be adhered.

75F00-9-18-2



- 3) Install new molding to glass. Warming molding for over half an hour at 35°C (95°F) temperature will facilitate work.
- 4) Clean glass surface to be adhered to body with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.

75F00-9-18-4



- 5) Using new brush, apply sufficient amount of primer for glass along glass surface to be adhered to body.

NOTE:

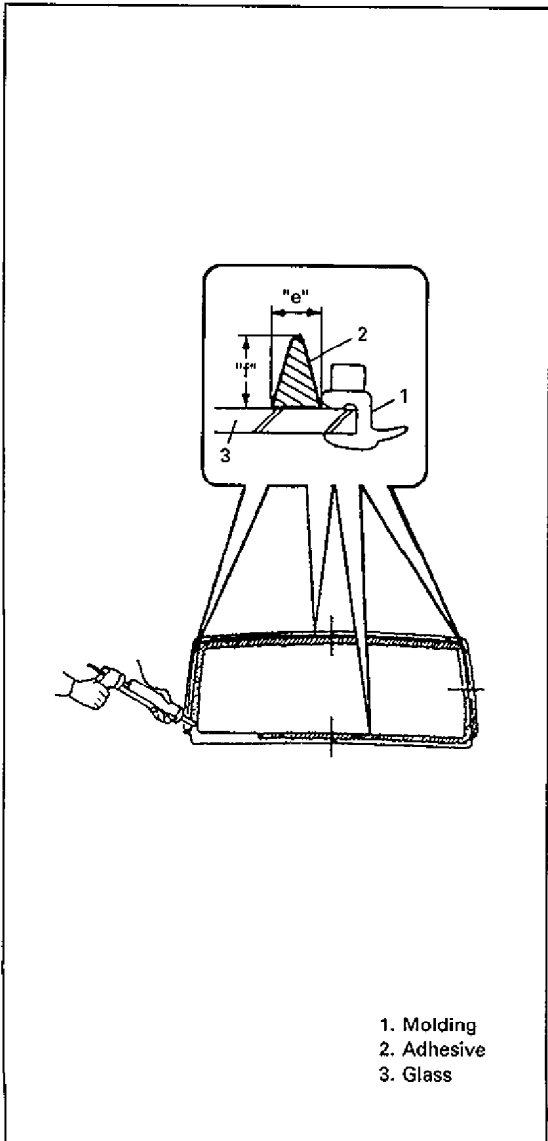
- Be sure to refer to maker's instruction for proper handling and drying time.
- Do not apply primer on outside of ceramic coated surface.
- Do not touch primer coated surface.

Width "b": Approx. 15 mm (0.59 in.)

"c": Approx. 15 mm (0.59 in.)

"d": Approx. 15 mm (0.59 in.)

75F00-9-19-2



- 6) 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.

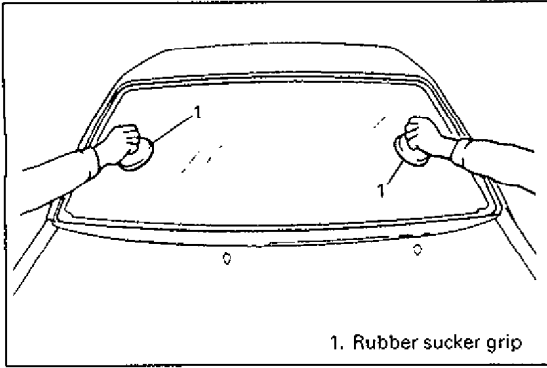
Upper, right and left sides

Width "e" : Approx. 8 mm (0.31 in.)

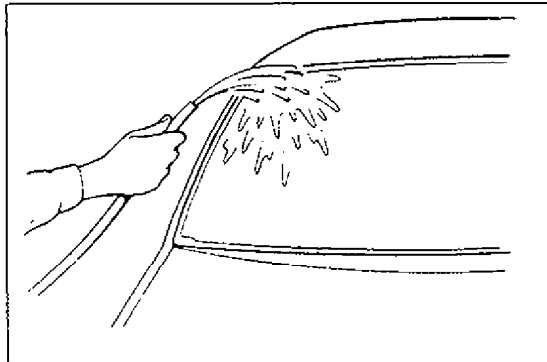
Height "f" : Approx. 16 mm (0.63 in.)

- 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 step 6) to 8) within 10 min. to ensure sufficient adhesion.
- Be sure to refer to adhesive maker's instruction for proper handling and drying time.

75F00-9-19-5



75F00-9-20-1



75F00-9-20-2

- 7) Peel remaining paper from molding and dam.
- 8) Holding rubber sucker grips, press glass onto body and place the glass securely by tapping glass surface and molding all around.

NOTE:

Use care not to damage glass surface or body.

- 9) Attach roof molding.

- 10) Check for water leakage by running water from hose over window. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

NOTE:

- Do not use high pressure water.
- Do not blow compressed air directly at adhesive applied part when drying.
- Do not use infrared lamp or the like for drying.

CAUTION:

Upon completion of installation, note the following.

- Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.
- If molding is not securely in place, hold it down with a tape until adhesive is completely set.
- Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.
- Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.

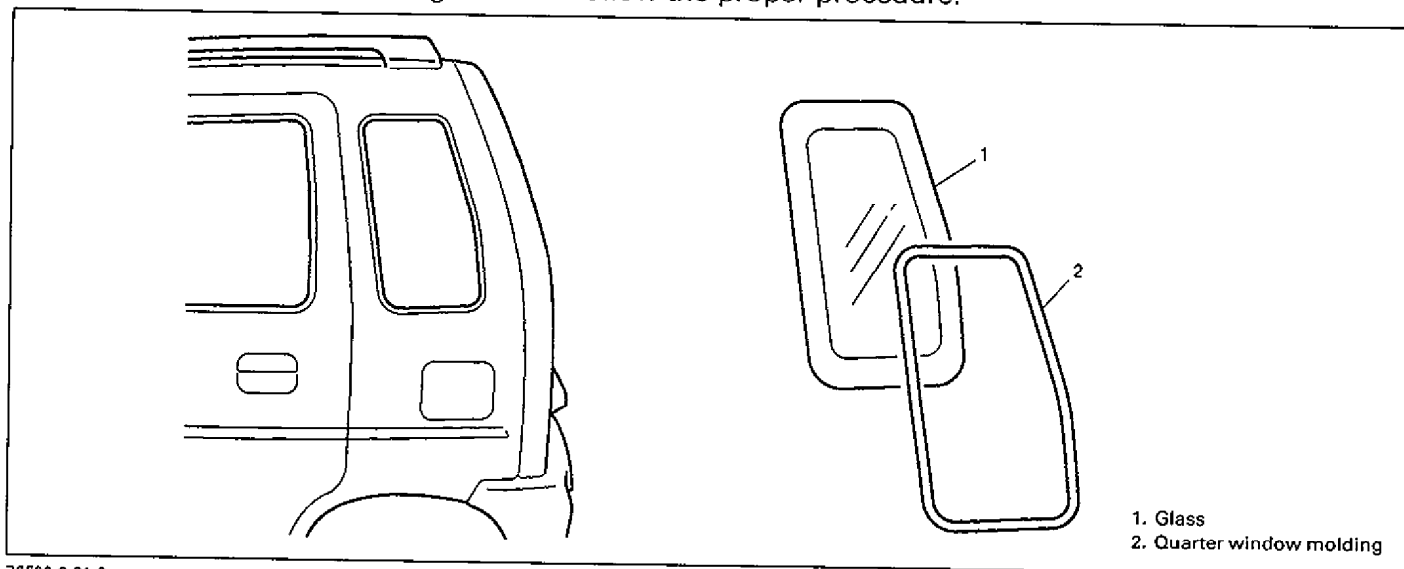
75F00-9-20-4

- 11) Install rear view mirror, roof molding, front pillar trims, sunvisor and wipers.

75F00-9-20-5

REAR QUARTER WINDOW

The rear quarter window is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For window glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.



75F00-9-21-2

CAUTION:

- Described in this section is the glass replacement by using 2 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.

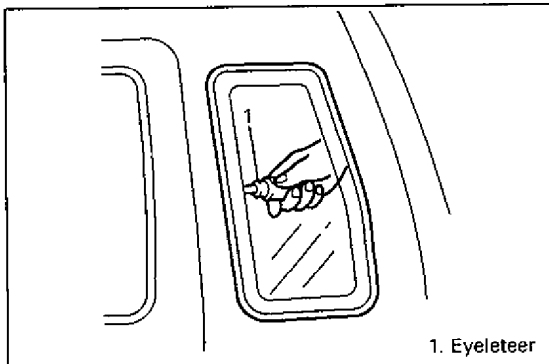
Use an adhesive of above mentioned type which has following property.

Shearing strength : 40 kg/cm² (427 lb/in²) or more

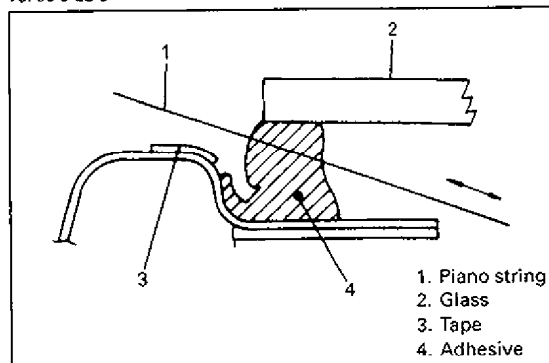
Adhesive materials and tools required for removal and installation.

- One component urethane adhesive and primers used in combination (For one sheet of window glass).
Adhesive (90 g (3.2 oz.))
Primer for glass (3 g (0.1 oz.))
Primer for body (3 g (0.1 oz.))
- Eyeleteer
- Piano string
- Brush for primer application (2 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

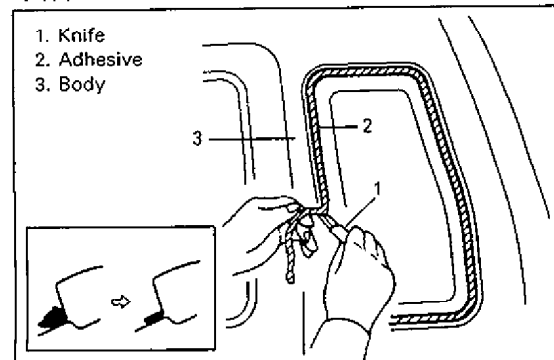
75F00-9-22-2



75F00-9-22-3



75F00-9-22-4



75F00-9-22-5

REMOVAL

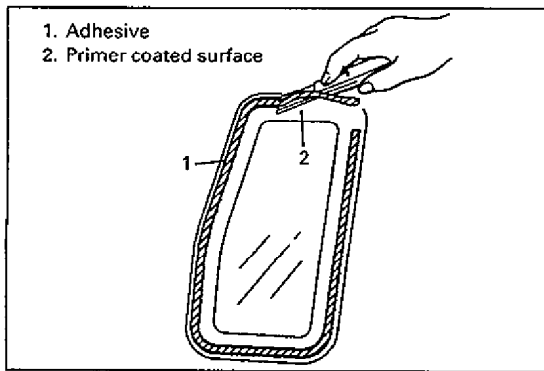
- 1) Remove quarter inner upper trim and quarter window trim.
- 2) Remove roof lining of quarter window part.
- 3) Remove quarter window molding.
- 4) Using a tape, cover body surface around quarter window glass to prevent any damage.
- 5) Drill a hole with an eyeleteer through adhesive and let a piano string through it.

- 6) Cut adhesive all around quarter glass with piano string.

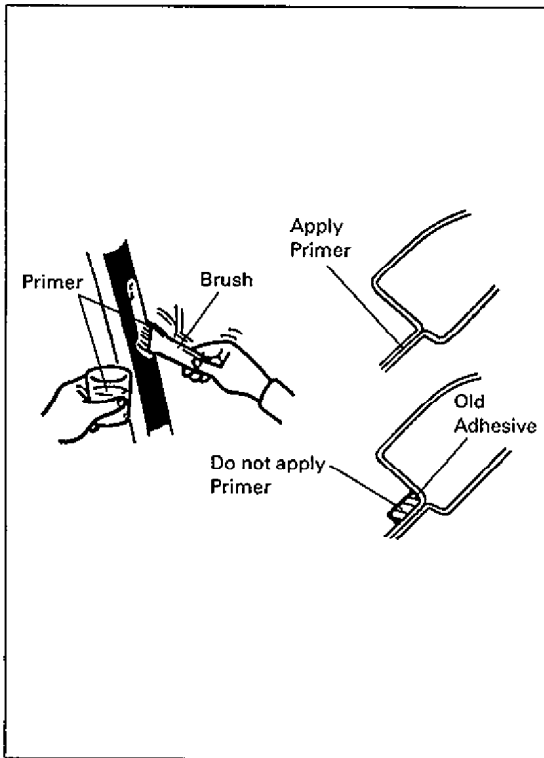
NOTE:

Use piano string as close to glass as possible so as to prevent damage to body.

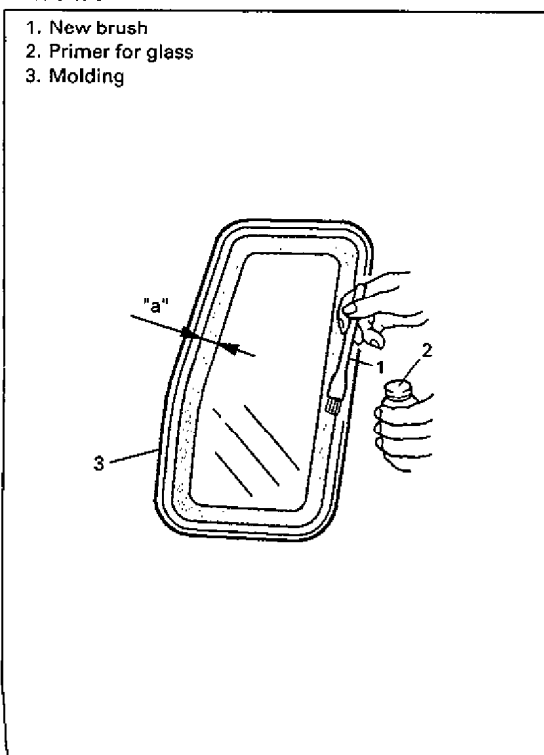
- 7) Using a knife, smooth adhesive remaining on body side so that it is 1 – 2 mm thick all around.
- 8) Where adhesive dam will be attached, remove adhesive until painted surface is exposed and clean.



75F00-9-23-1



75F00-9-23-3



75F00-9-23-5

- 9) When re-using glass, remove old molding and adhesive from glass, using care not to damage primer coated surface.

INSTALLATION

- 1) Using cleaning solvent (white gasoline), clean window opening edge where window glass is to be adhered. (Let it dry for more than 10 minutes.)
- 2) 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:

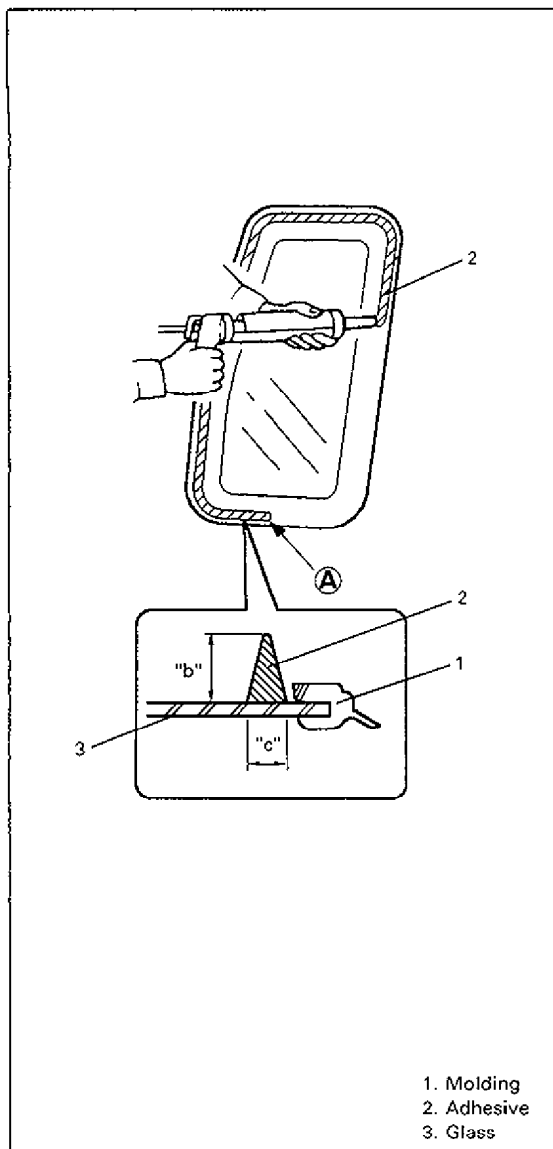
- Be sure to refer to primer maker's instruction for proper handling and drying time.
- Do not touch body and old adhesive surfaces where glass is to be adhered.

- 3) Clean glass surface to be adhered to window with clean cloth. If unleaded gasoline is used, let it dry for more than 10 minutes.
- 4) Attach glass into new molding.
- 5) Using a new brush, apply sufficient amount of primer for glass along glass surface to be adhered to window.

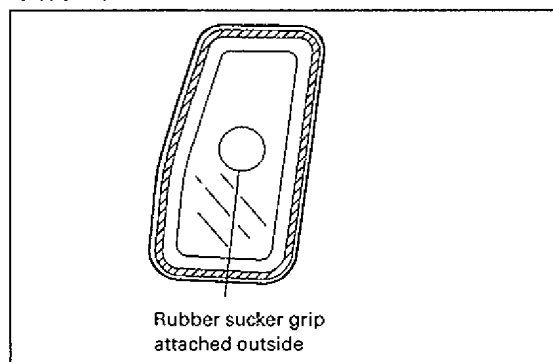
NOTE:

- Be sure to refer to maker's instruction for proper handling and drying time.
- Do not touch primer coated surface.

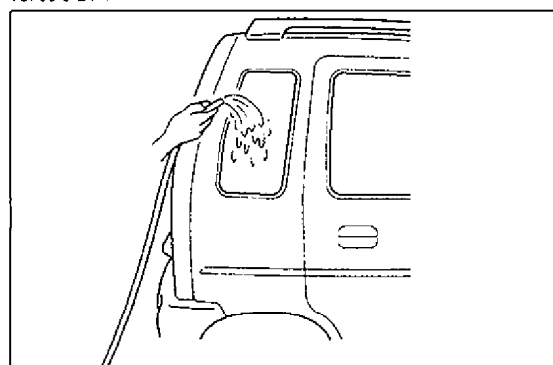
Width "a": Approx. 15 mm (0.59 in.)



75F00-9-24-3



75F00-9-24-4



75F00-9-24-5

6) Apply adhesive as shown.

NOTE:

- Start from bottom side (A) of glass.

Height "b": Approx. 14 mm (0.55 in.)

Width "c": Approx. 6 mm (0.24 in.)

- Press glass against body quickly after adhesive is applied.
- Perform step 6) to 8) within 10 min. to ensure sufficient adhesion.
- Be sure to refer to maker's instruction for proper handling and drying time.

7) Attach rubber sucker grip to outside of glass.

Use of a rubber sucker grip is helpful to hold and carry glass after adhesive is applied.

8) Press glass against body and place the glass securely by tapping glass surface and molding all around.

NOTE:

Use care not to damage glass or body.

9) Check for water leakage by running water from hose over window. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

NOTE:

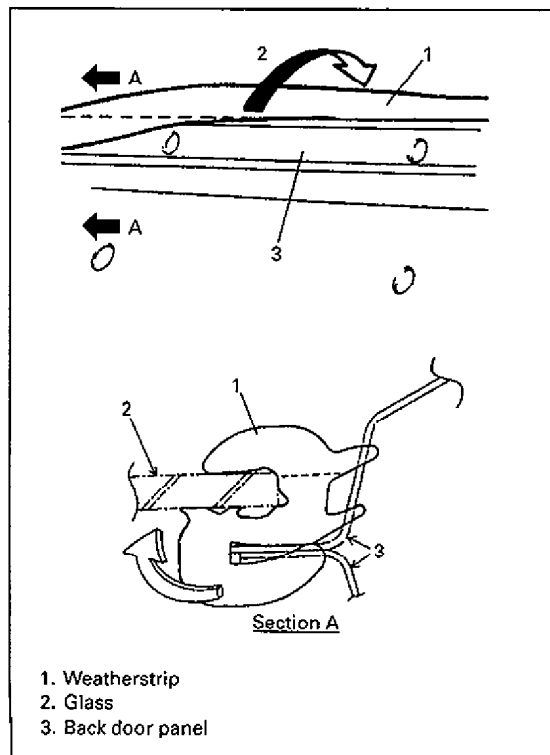
- Do not use high pressure water.
- Do not blow compressed air directly at adhesive applied part when drying.
- Do not use an infrared lamp or the like for drying.

CAUTION:

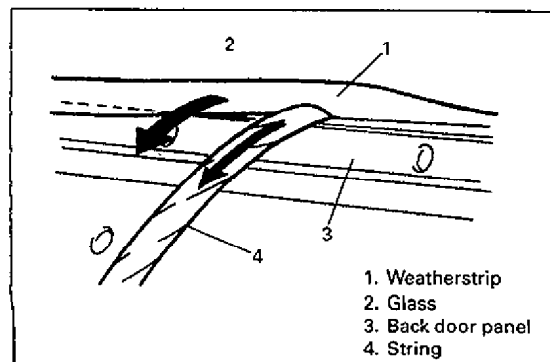
Upon completion of installation, note the following.

- Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.
- Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.
- Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.

75F00-9-25-2



75F00-9-25-4



75F00-9-25-5

BACK DOOR GLASS

REMOVAL

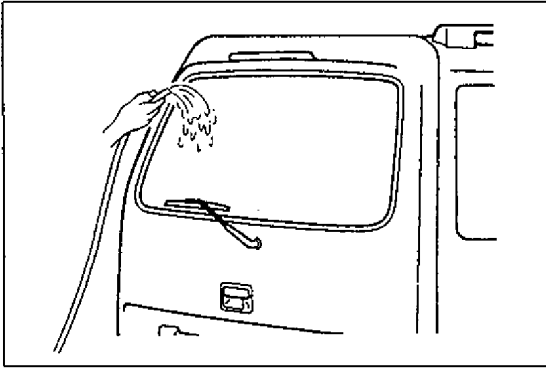
- 1) Remove rear wiper arm.
- 2) Disconnect rear defogger coupler.
- 3) As rear window shield is fixed by means of back door window weatherstrip, remove glass and weatherstrip together by removing end of weatherstrip little by little while pushing the entire glass from inside toward outside as shown in figure.

NOTE:

Do not apply an excessive force to glass locally.

INSTALLATION

- 1) Install weatherstrip to glass.
- 2) Pass string through outer groove of weatherstrip (groove where back door panel fits in) so that weatherstrip can be installed to back door.
- 3) Apply soap water to outer edge of weatherstrip and install glass and weatherstrip together to back door by pulling the string little by little.
- 4) Connect rear defogger coupler.
- 5) Install rear wiper arm.

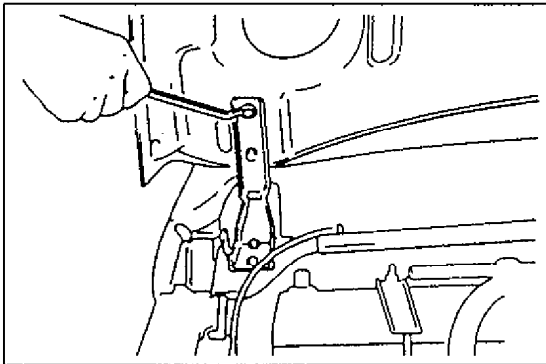


75F00-9-26-1

- 6) Check for water leakage by running water from hose over window. If leakage is found, complete the installation of leaky point. If water still leaks even after that, remove glass and start installation procedure all over again.

NOTE:

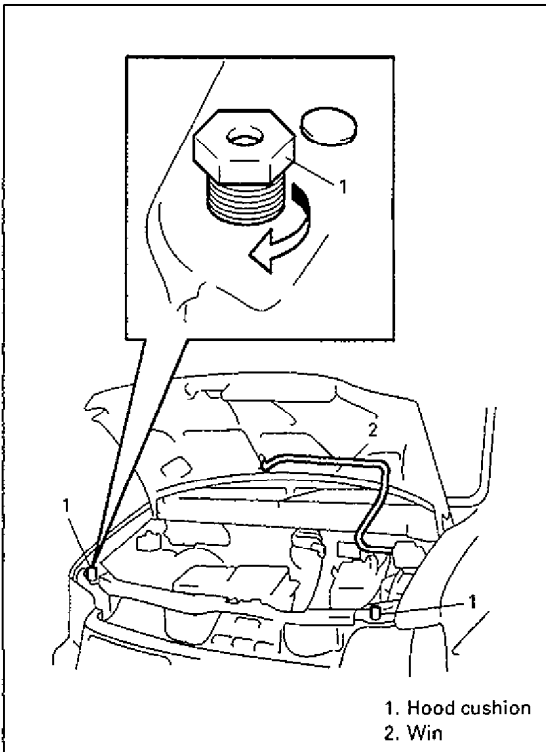
- Do not use high pressure water.



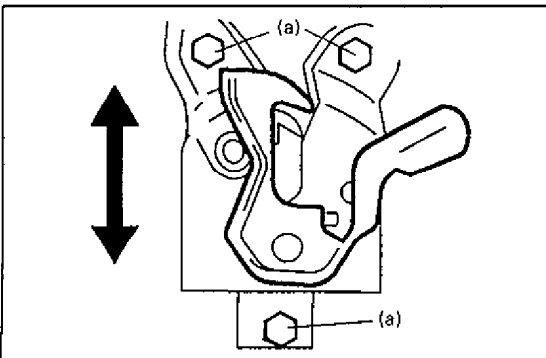
75F00-9-26-2

HOOD**ADJUSTMENT**

- Fore-and-aft and right-and-left adjustment.
Loosen four mounting bolts for adjustment.
- 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.



75F00-9-26-4

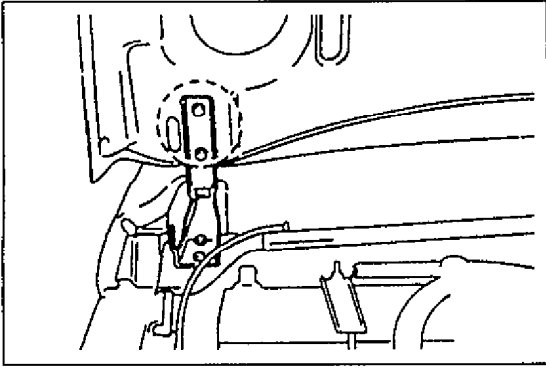


75F00-9-26-5

- Hood lock adjustment
Loosen hood lock bolts for hood locking adjustment.

Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)



75F00-9-27-1

REMOVAL

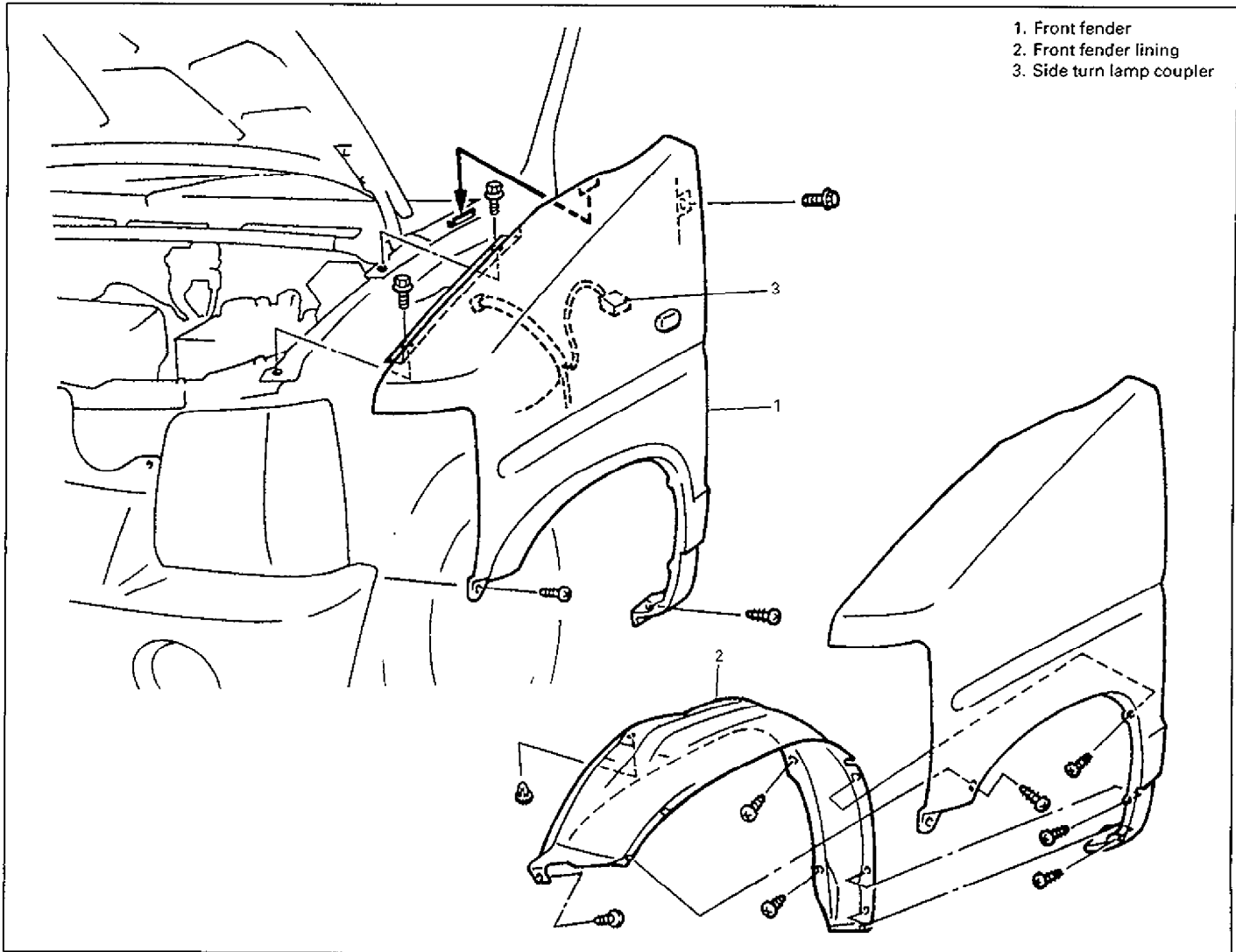
- 1) Remove window washer hose from hood.
- 2) Remove four mounting bolts to detach hood.

INSTALLATION

- 1) Reverse removal procedure to install hood.
- 2) 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.

75F00-9-27-2

FRONT FENDER



75F00-9-28-3

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.

75F00-9-28-4

INSTALLATION

- 1) Reverse removal procedure to install front fender.

75F00-9-28-5

BUMPERS

NOTE:

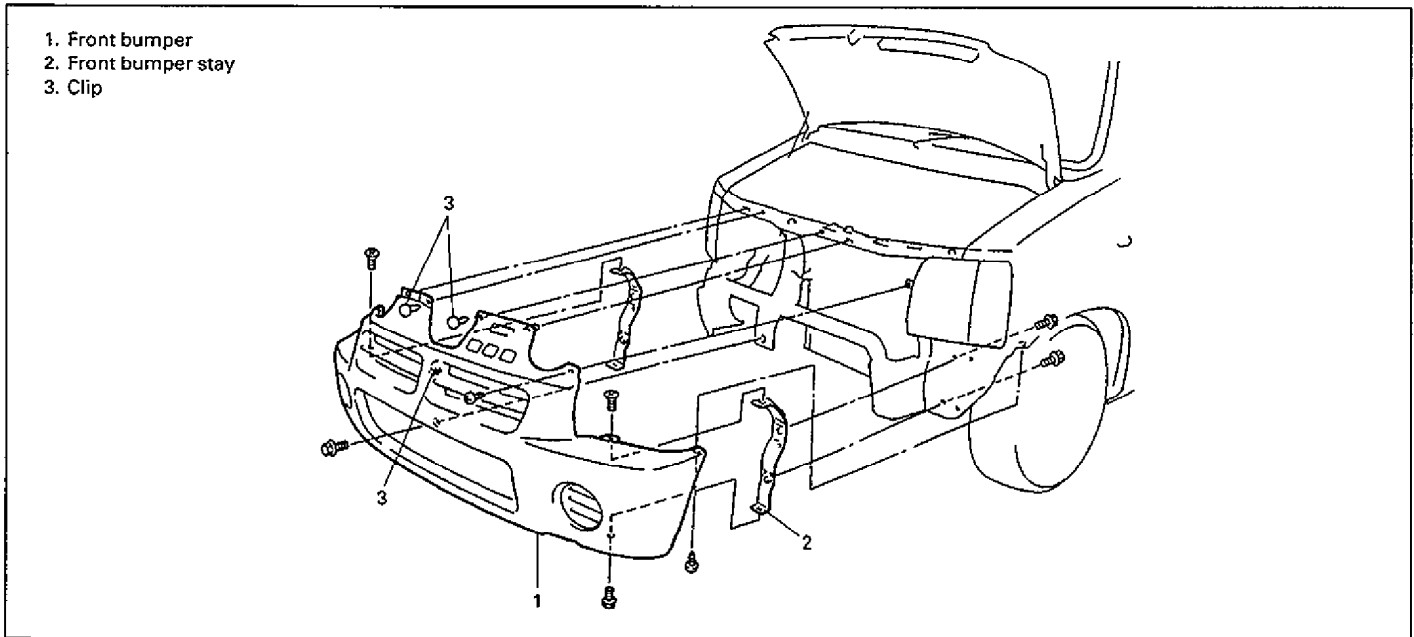
Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.

Do not use a replacement part of lesser quality or substitute design.

FRONT BUMPER

REMOVAL AND INSTALLATION

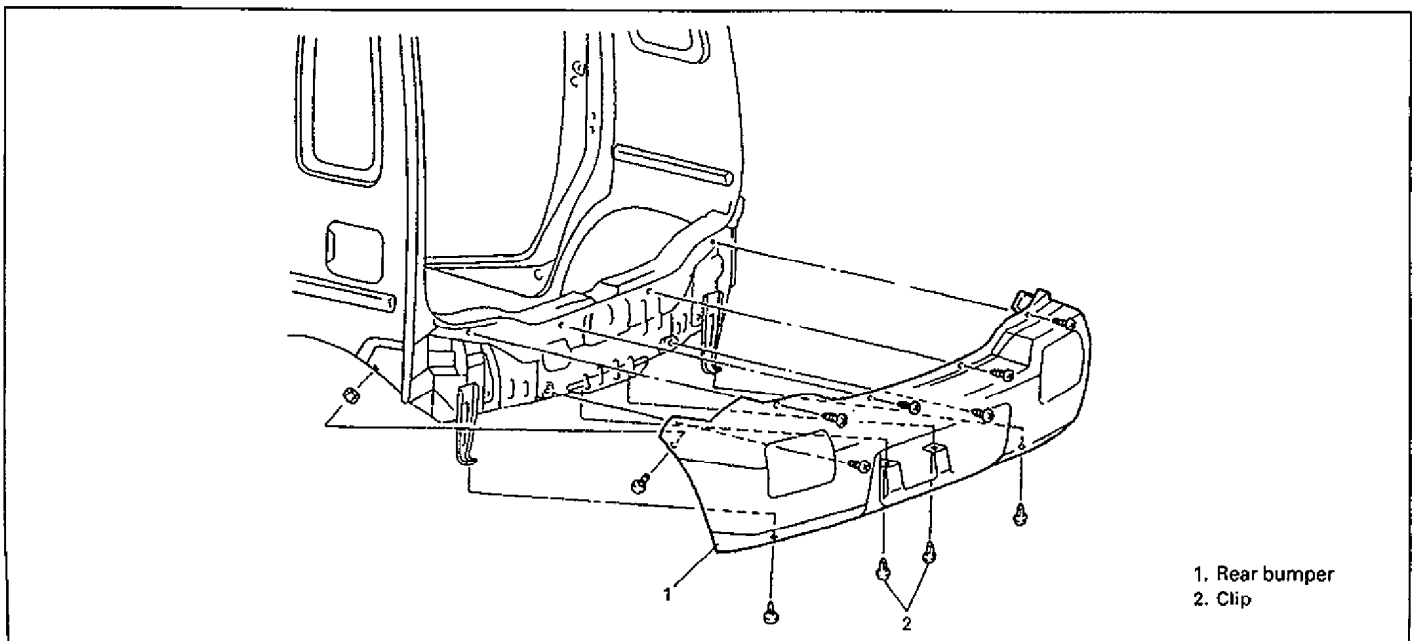
- Remove front bumper together with front bumper stay.
- Check each clip for damage and replace it if necessary.



REAR BUMPER

REMOVAL AND INSTALLATION

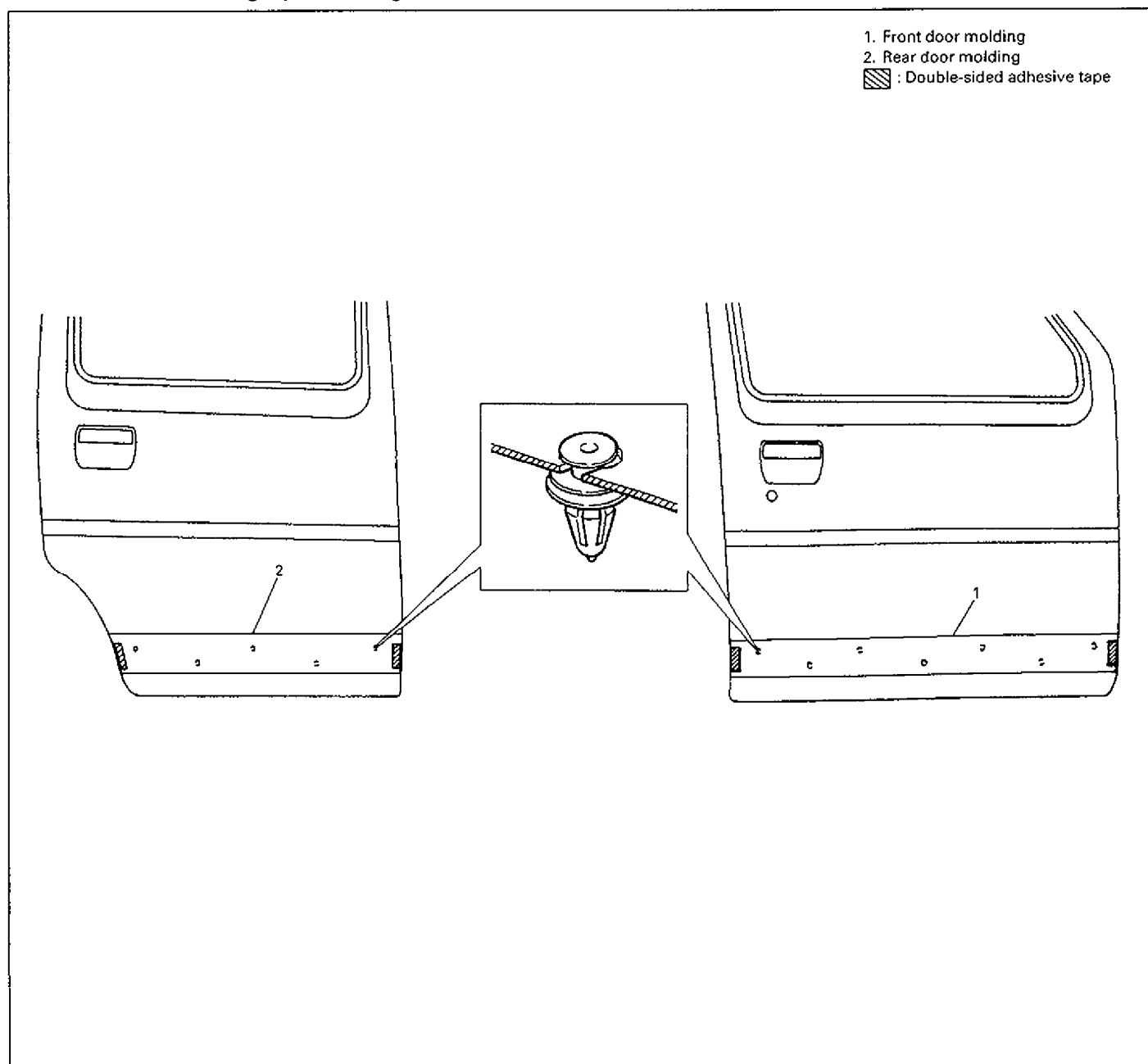
When removing or installing rear bumper, refer to figure shown below.



SIDE MOLDING

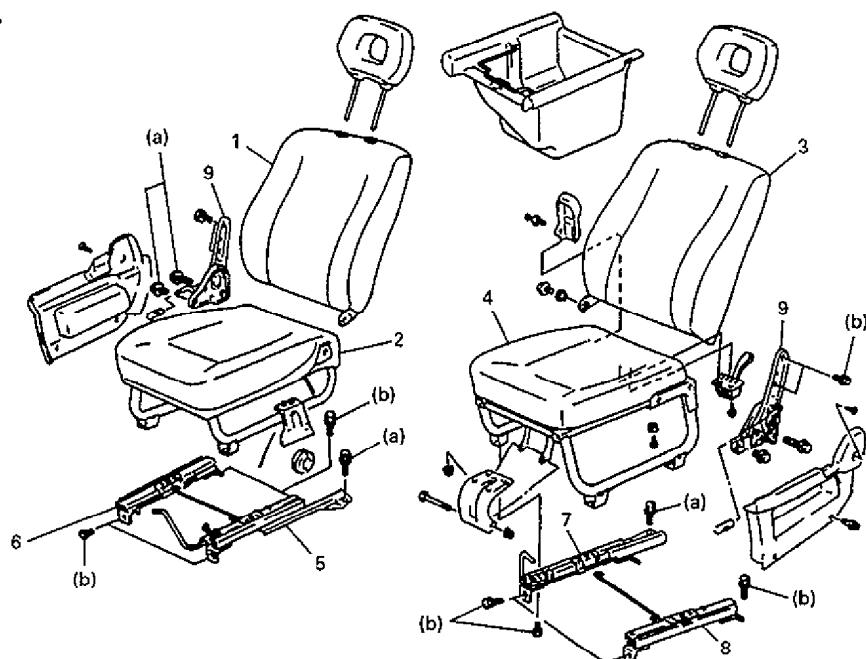
REMOVAL AND INSTALLATION

- With the glass raised fully, remove trim and door sealing cover and then remove door molding by fastening each clip with fingers from the back of the door.
- Install door molding by attaching double-sided adhesive tape where marked in the figure.

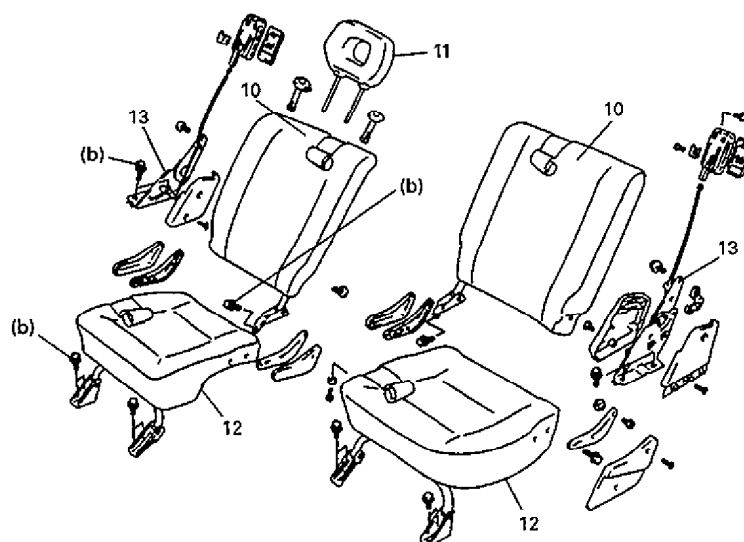


SEATS

FRONT SEAT



REAR SEAT



1. Right front seatback assembly
2. Right front seat cushion assembly
3. Left front seatback assembly
4. Left front seat cushion assembly
5. Right front seat inside adjuster
6. Right front seat outside adjuster
7. Left front seat inside adjuster
8. Left front seat outside adjuster
9. Seat reclining control assembly
10. Rear seatback
11. Head restraint ass'y
12. Rear seat cushion
13. Rear reclining ass'y

REMOVAL

- 1) Remove seat rail mounting bolts. Then, remove seat ass'y with seat rail (front seats).
- 2) Disassemble and repair seat as necessary.

INSTALLATION

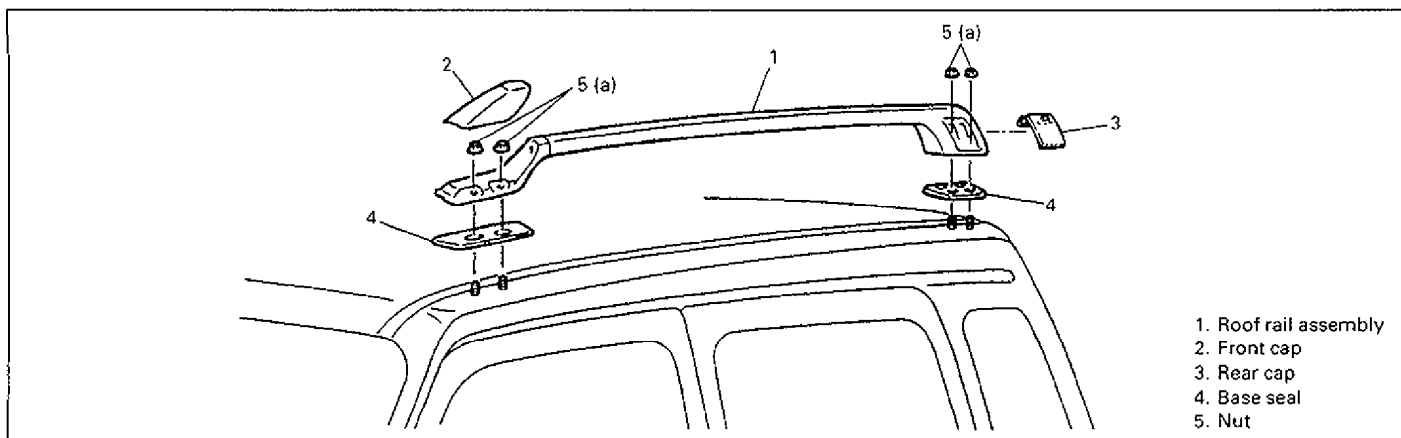
Reverse removal procedure to install front seat.
Torque it to specifications, as given below.

Tightening Torque

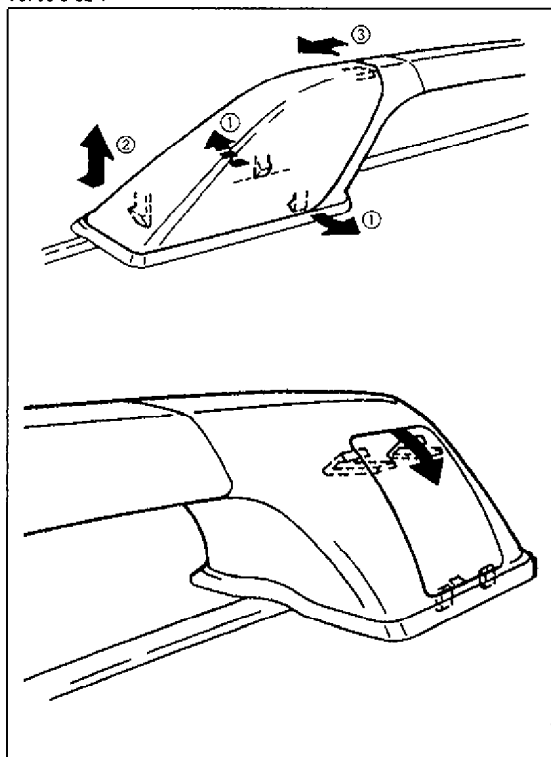
(a): 35 N·m (3.5 kg-m, 25.5 lb-ft)

(b): 23 N·m (2.3 kg-m, 17.0 lb-ft)

ROOF RAIL



75F00-9-32-1



75F00-9-32-3

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.

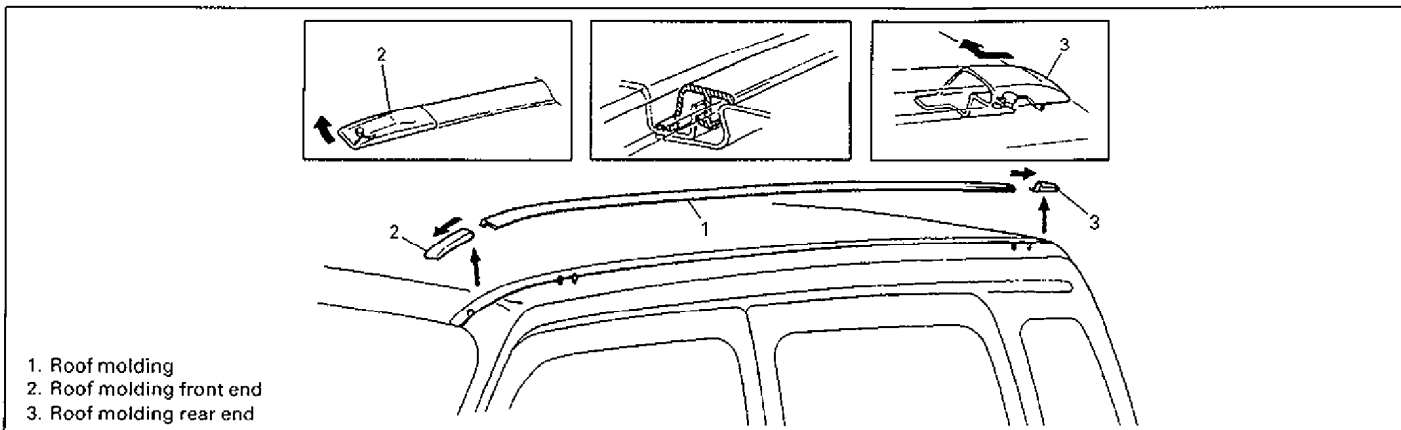
Tightening Torque

(a): 10 N·m (1.0 kg-m, 7.5 lb-ft)

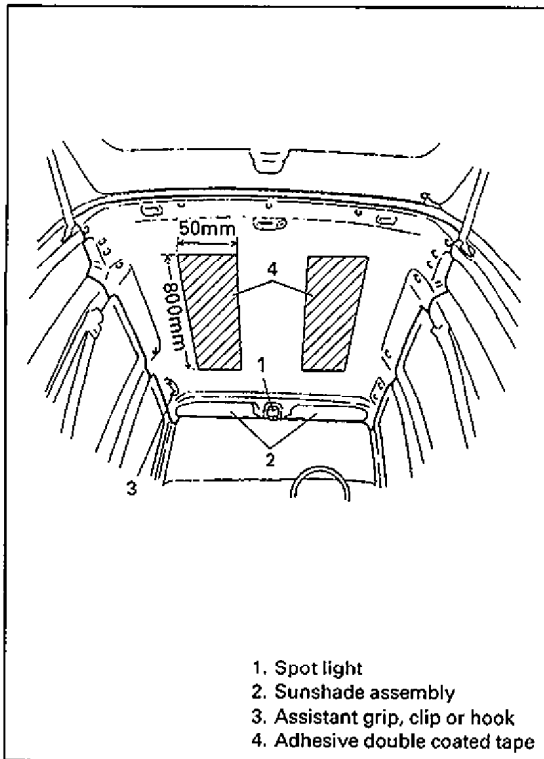
ROOF MOLDING

REMOVAL AND INSTALLATION

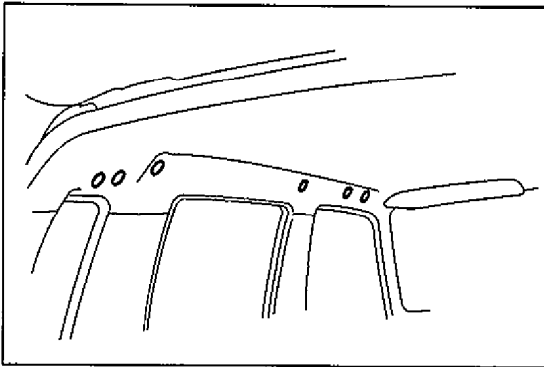
- If roof rail is equipped, remove it in advance (refer to "ROOF RAIL" section).
- When reusing roof molding, be careful not to make roof molding warped.



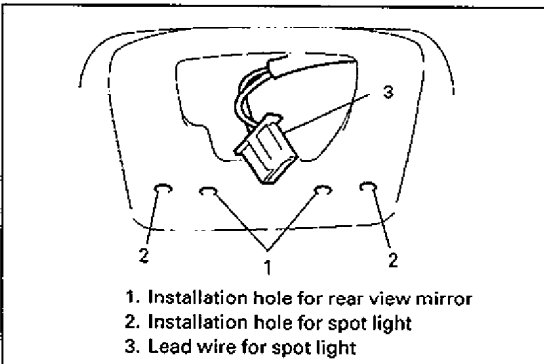
75F00-9-32-5



75F00-9-33-2



75F00-9-33-3



75F00-9-33-4

HEAD LINING

REMOVAL

- 1) Remove inside rear view mirror.
- 2) Remove spot light.
- 3) Remove sunshade assembly.
- 4) Remove room light and spacer.
- 5) Remove assistant grips.
- 6) Remove inner trims covering head lining.
- 7) Remove clips and then head lining.

NOTE:

Adhesive double coated tape is used to attach head lining. Detach head lining from roof after removing all above parts.

INSTALLATION

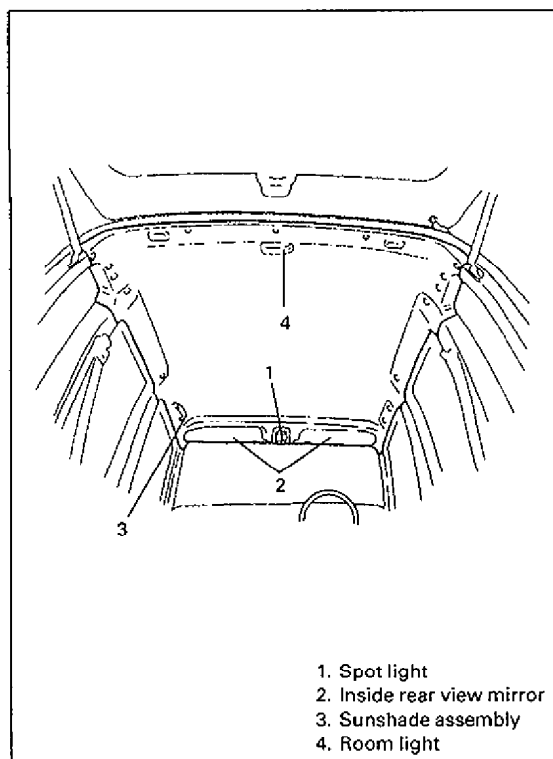
- 1) Clean roof where adhesive double coated tape of head lining will be attached.
- 2) Peel off release liner of adhesive double coated tape on head lining and install it to body by using grips and clips.

- 3) Align installation hole for rear view mirror with that of head lining.

NOTE:

Above alignment should be in both direction.

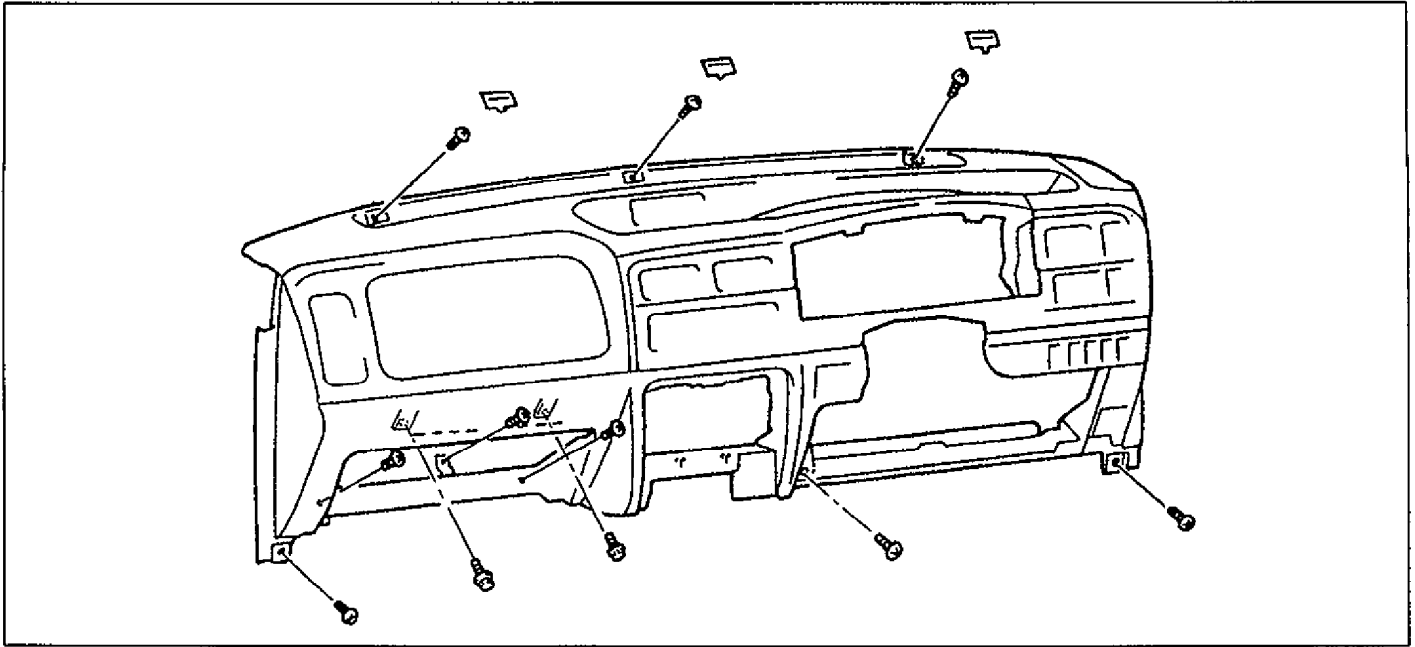
- 4) Install assistant grips and clips.



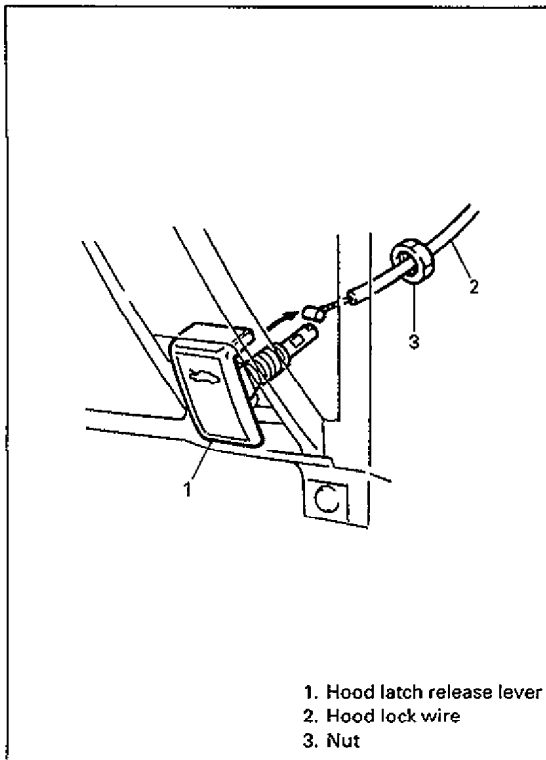
75F00-9-34-1

- 5) Install spot light, inside rear view mirror, sunshade assembly, room light and inner trims covering head lining.

INSTRUMENT PANEL



75F00-9-35-2



75F00-9-35-4

WARNING:

See **WARNING** at the beginning of this section.

REMOVAL

- 1) Disconnect negative (–) cable at battery.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" in Section 3C1.
- 3) Remove glove box and column hole cover.
- 4) Disconnect wires and cables from heater unit and blower motor assembly.
- 5) Remove steering column assembly. Refer to Section 3C1.
- 6) Remove speedometer assembly.
- 7) Remove hood latch release lever.
- 8) Disconnect couplers which need to be disconnected for removal for instrument panel.
- 9) Remove instrument panel mounting bolts and screws.
- 10) Remove instrument panel.

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 3C1 "Steering Column".
- 2) Adjust control cables. Refer to Section 1A "HEATER CONTROL CABLES".
- 3) Enable air bag system. Refer to "Enabling Air Bag System" in Section 3C1.

75F00-9-35-5

SECTION 10

RESTRAINT SYSTEM

WARNING:

For vehicles equipped with Air Bag System

- 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 CAUTIONS in SECTION 10B or 10B1 and Precautions, Air Bag System Components and Wiring Location View in SECTION 10B or 10B1 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:

To determine if the vehicle is equipped with seat belt pretensioner, refer to Owner's Manual.

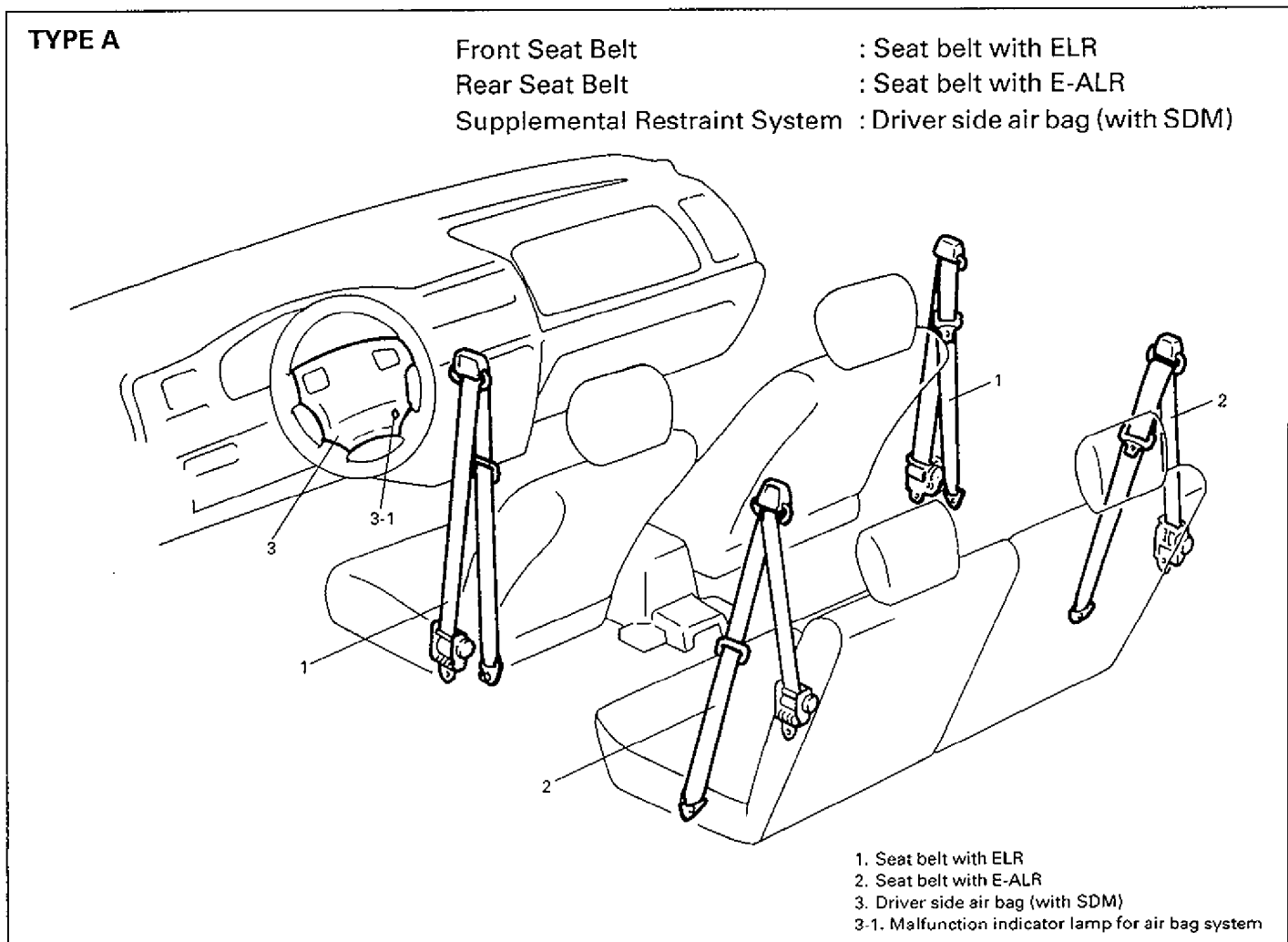
SEAT BELT SYSTEM	SECTION 10A
AIR BAG SYSTEM (WITHOUT SEAT BELT PRETENSIONER)	SECTION 10B
AIR BAG SYSTEM (WITH SEAT BELT PRETENSIONER)	SECTION 10B1

CONTENTS

GENERAL DESCRIPTION	10-2
DIAGNOSIS	Refer to "Diagnosis" in each SECTION.

GENERAL DESCRIPTION

There are two types of restraint system used for this vehicle.



75F00-10-2-3

- **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 E-ALR**

The emergency and locking retractor works as an emergency locking retractor (ELR) till its webbing is pulled all the way out and then on as an auto locking retractor (ALR) till it is retracted fully.

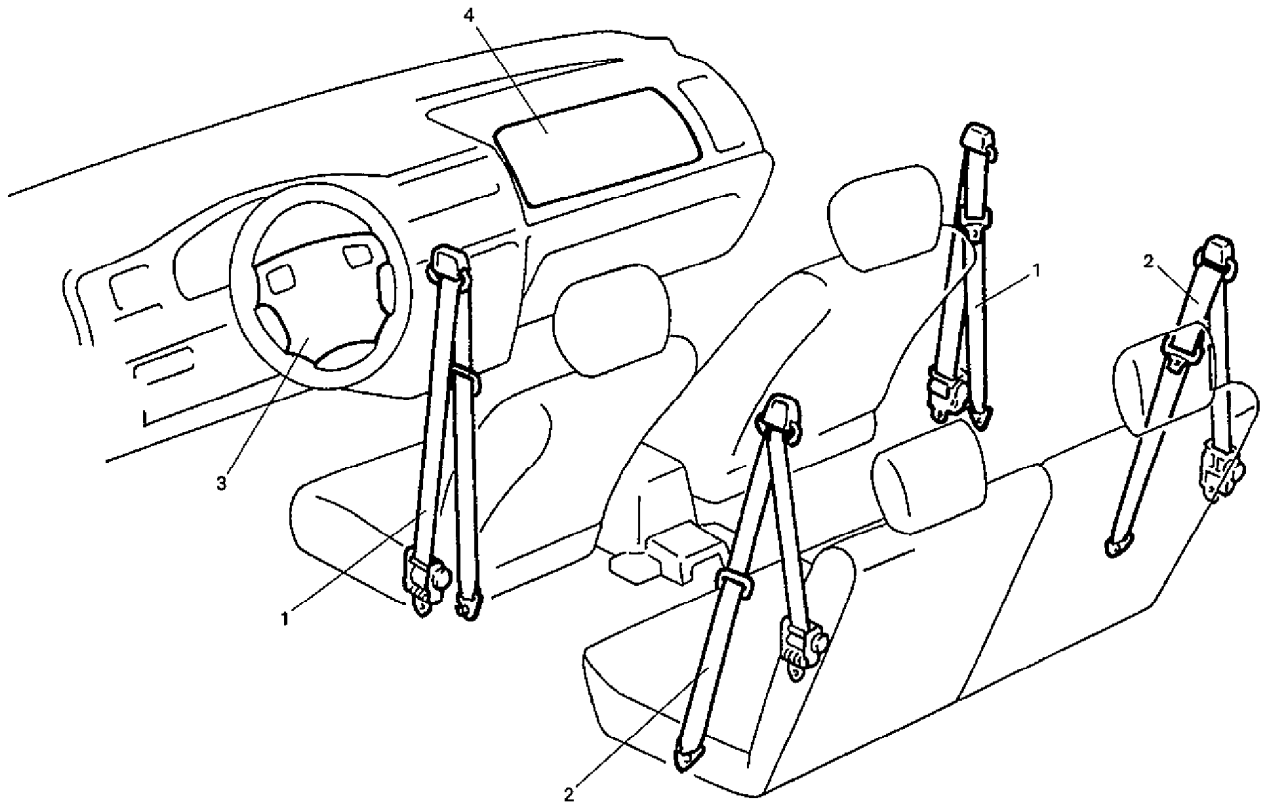
- **Driver side air bag (with SDM)**

With the air bag system which includes only a driver side air bag with SDM, the driver air bag (inflator) module is deployed from the center of the steering column in occurrence of a front collision with an impact larger than a certain set value to supplement protection offered by the driver seat belt.

For more information, refer to SECTION 10B "Air Bag System (Without Seat Belt Pretensioner)".

TYPE B

Front Seat Belt	: Seat belt with ELR and pretensioner
Rear Seat Belt	: Seat belt with E-ALR
Supplemental Restraint System	: Driver and front passenger side air bags and pretensioners



1. Seat belt with ELR and pretensioner
2. Seat belt with E-ALR
3. Driver side air bag
4. Passenger side air bag

75F00-10-3-3

- **Seat belt with E-ALR**

Refer to previous page.

- **Seat belt with ELR and pretensioner**

The seat belt with ELR and a pretensioner has a pretensioner mechanism which operates in linkage with the air bag in addition to the above described ELR. The pretensioner takes up the sag of the seat belt in occurrence of a front collision with an impact larger than a certain set value, thereby enhancing restraint performance.

- **Driver and front passenger side air bags and seat belt pretensioners**

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, 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 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.

For more information, refer to SECTION 10B1 "Air Bag System (With Seat Belt Pretensioner)".

SECTION 10A

SEAT BELT

WARNING:

For vehicles equipped with a seat belt pretensioner

(To check whether the vehicle is equipped with a seat belt pretensioner or not, refer to the Owner's Manual.)

The procedures in this section must be followed in the order listed to disable the air bag system temporarily and prevent false diagnostic trouble codes from setting.

Failure to follow procedures could result in possible activation of the air bag system, personal injury or otherwise unneeded air bag system repairs.

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.

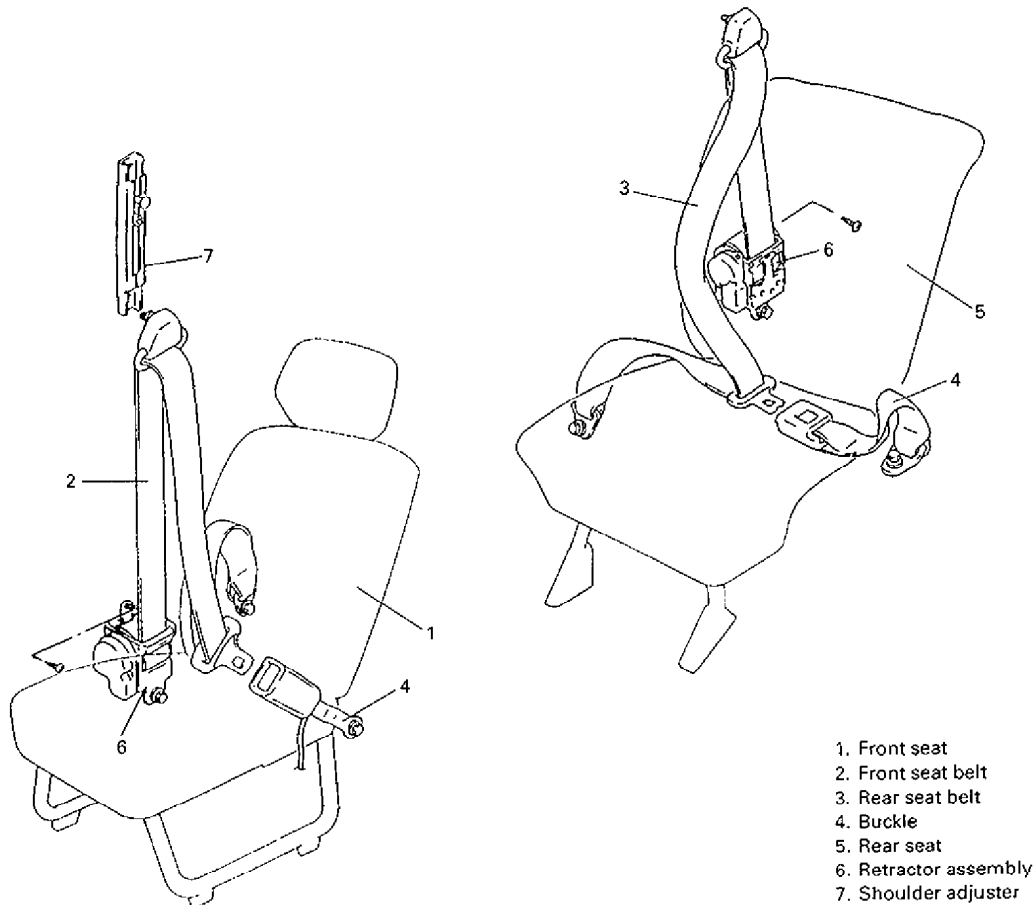
CONTENTS

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Enabling air bag system	10A- 7
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GENERAL DESCRIPTION

SEAT BELT

The seat belt for driver's and front passenger's seats is provided with an Emergency Locking Retractor (ELR) and seat belt for rear passenger's seats is provided an Emergency and Auto Locking Retractor (E-ALR, which works as an ELR till its webbing is pulled all the way out and then on as an ALR till it is retracted fully).



75F00-10A-2-4

ELR : Locks the seat belt (to prevent the webbing from being pulled out of the retractor any further) as soon as any one of the following specified conditions is detected.

The conditions are the speed at which the webbing is pulled out of the retractor, acceleration or deceleration of the vehicle speed and inclination.

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.

75F00-10A-2-5

SEAT BELT PRETENSIONER (IF EQUIPPED)

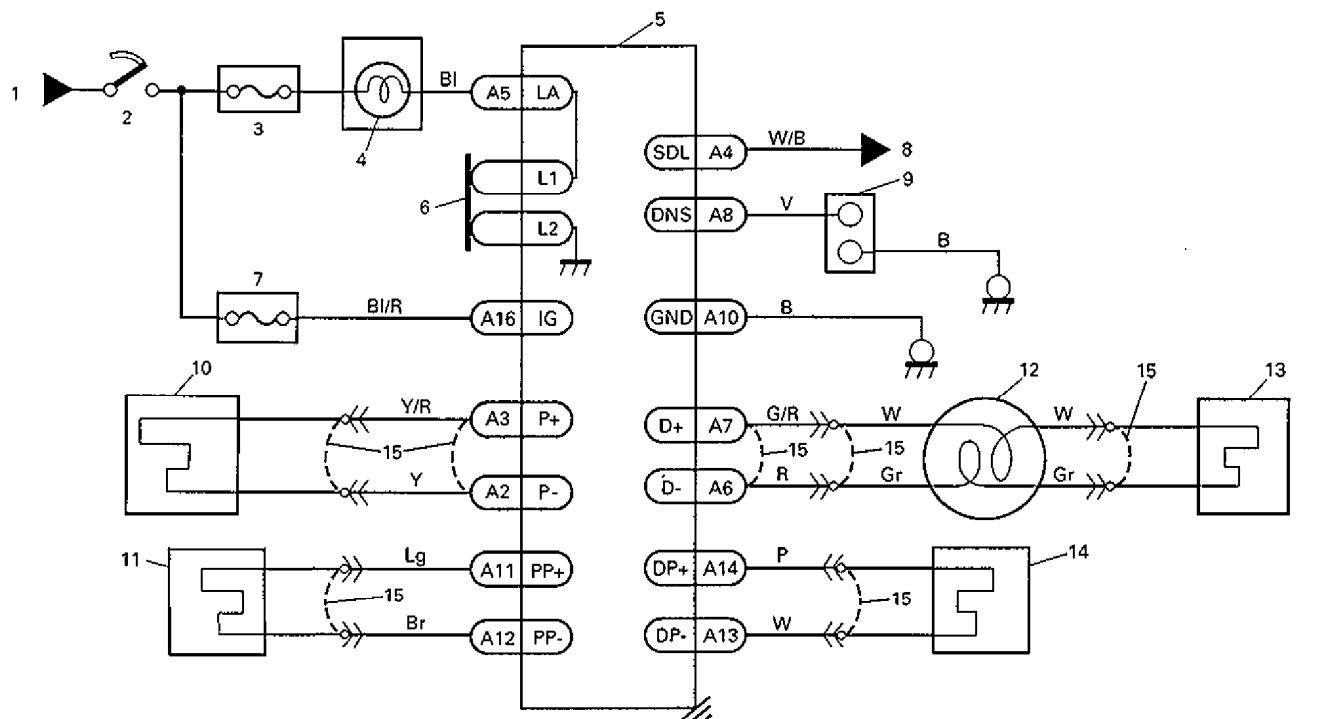
Some seat belts of the driver and front passenger seats are provided with a pretensioner as an optional function unit. The pretensioner is incorporated in retractor assembly and controlled by SDM as one of air bag system components. It will be activated at the same time as the air bag when an impact at the front of vehicle exceeds the specified value.

When servicing seat belt (retractor assembly) with pretensioner, be sure to observe all WARNINGS and CAUTIONS. Refer to "Precautions" later in this section, and to SECTION 10B1.

CAUTION:

Do not reuse the seat belt pretensioner (retractor assembly) that has operated but replace it with a new one as an assembly. For checking procedure of its operation, refer to "Handling Precaution" in this section.

AIR BAG SYSTEM WIRING DIAGRAM



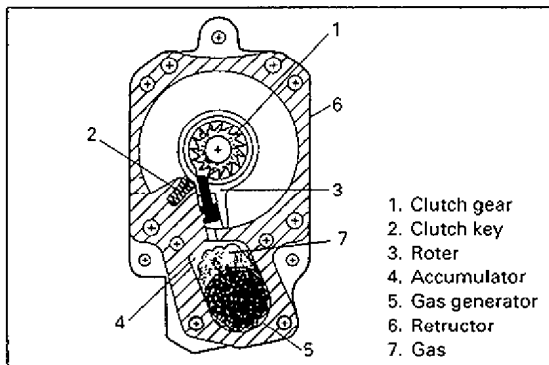
1. From battery
2. Ignition switch
3. "IG COIL METER" fuse
4. "AIR BAG" warning lamp in combination meter
5. SDM
6. Connection detection pin
7. "AIR BAG" fuse
8. To DLC
9. Monitor coupler
10. Passenger air bag (inflator) module
11. Passenger seat belt pretensioner
12. Contact coil
13. Driver air bag (inflator) module
14. Driver seat belt pretensioner
15. Shorting bar

OPERATION OF SEAT BELT PRETENSIONER AT COLLISION

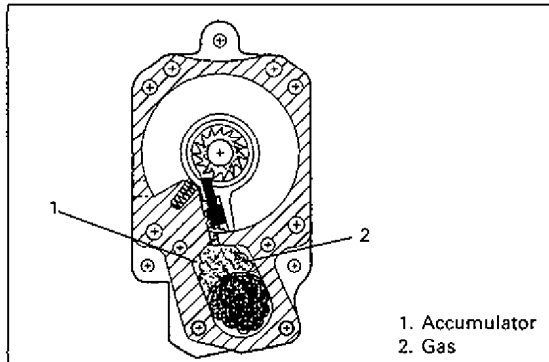
The seat belt pretensioner operates in the order as described below.

- 1) When SDM senses an impact exceeding the specified value, it supplies ignition current to the initiator circuit of the seat belt pretensioner and the air bag (inflator) module. (For air bag (inflator) module operation after this, refer to SECTION 10B1.)

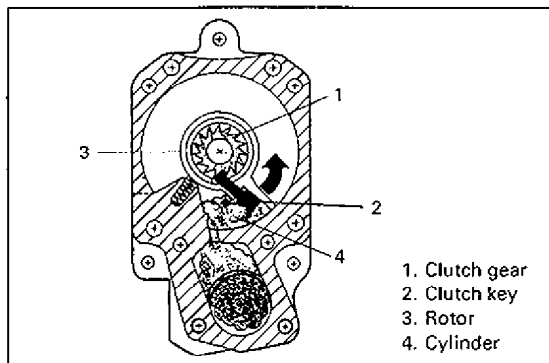
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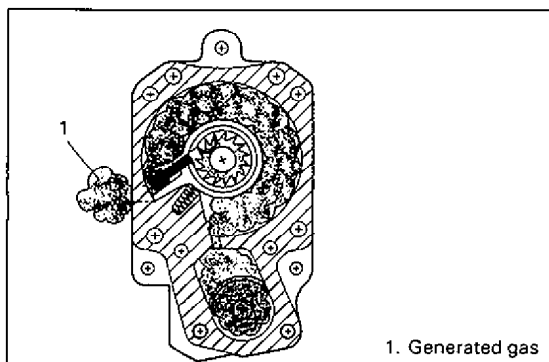
75F00-10A-4-2



75F00-10A-4-3



75F00-10A-4-4



75F00-10A-4-5

- 2) The ignition current causes gas generator to generate highly pressurized gas.

- 3) The gas increases the pressure in accumulator.

- 4) The pressure pushes out clutch key which then becomes engaged with clutch gear.
- 5) The generated gas increases the pressure in the cylinder as well.
- 6) The pressure causes the clutch gear and rotor to rotate as one unit. Then the drum meshed with rotor also rotates and thereby rolls in the webbing.

- 7) When gas pressure force to turn the rotor and tensile force applied to the webbing become balanced, retracting webbing stops. While the rotor is turning, generated gas (nitrogen gas) is exhausted from retractor assembly.
- 8) The driver and front passenger move forward due to inertia force and seat belts are pulled out.
- 9) ELR operates to lock seat belts.

DIAGNOSIS

For diagnosis of the seat belt pretensioner, refer to SECTION 10B1.

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 10B1.

75F00-10A-5-1

PRECAUTIONS

SERVICE PRECAUTION

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 or latch plate.
- Do not bleach or dye belt webbing. (Use only mild soap and lukewarm water to clean it.)
- When installing a seat belt anchor bolt 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/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, dashbord, or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.
- 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.

75F00-10A-5-5

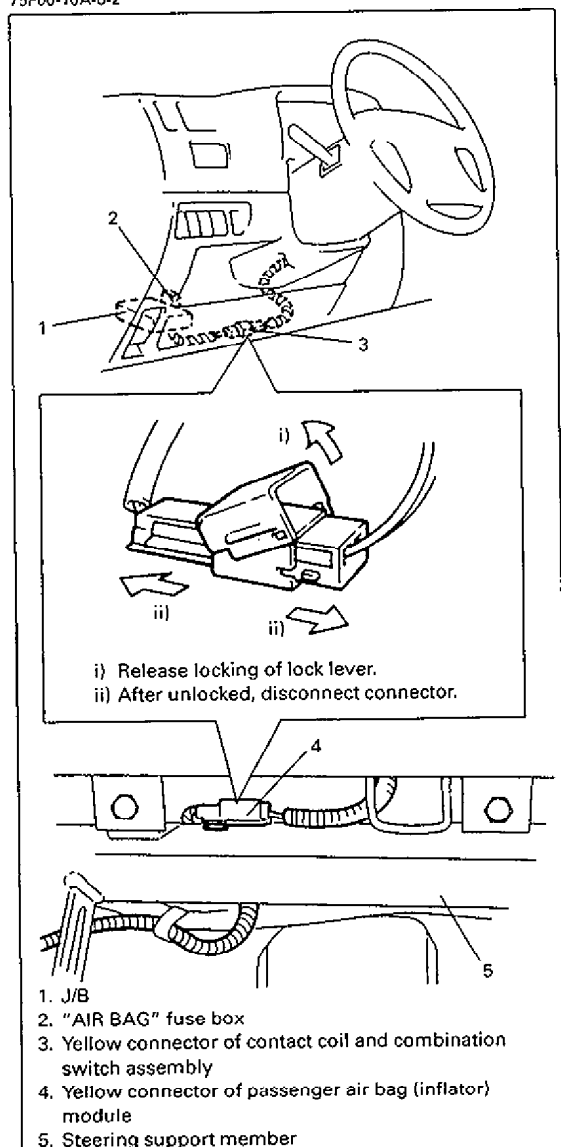
- When using electric welding, be sure to disconnect air bag (inflator) module and seat belt pretensioner connectors (driver and passenger) respectively.
- When applying paint around the air bag system related parts, use care so that the harness or connector will not be exposed to the paint mist.
- Never 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.

75F00-10A-6-2



75F00-10A-6-5

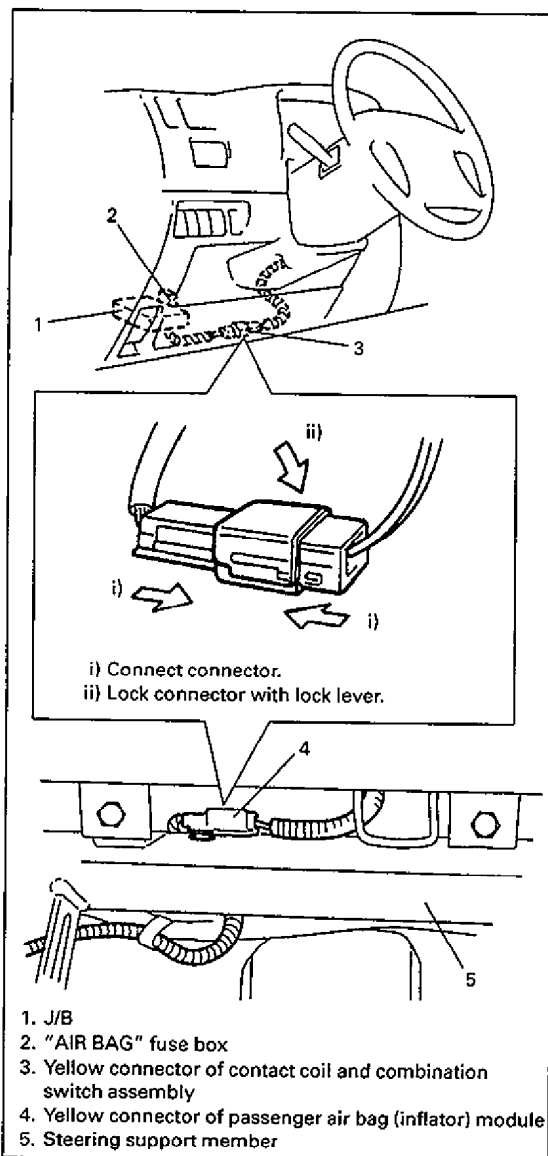
DISABLING AIR BAG SYSTEM

- 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.
- 5) Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector of passenger air bag (inflator) module.

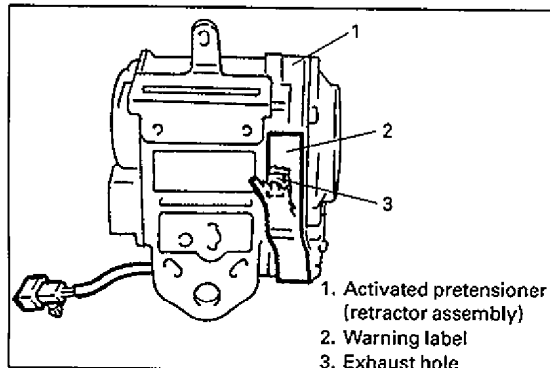
NOTE:

With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.

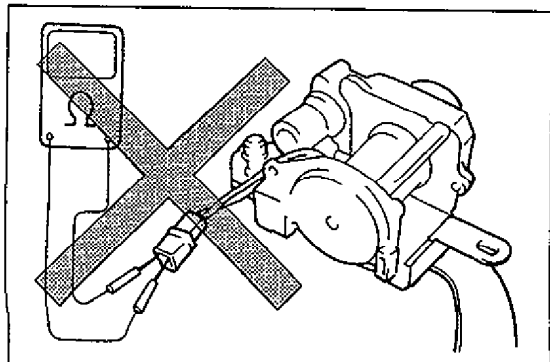
This is normal operation and does not indicate a air bag system malfunction.



75F00-10A-7-3



75F00-10A-7-4



75F00-10A-7-5

ENABLING AIR BAG SYSTEM

- 1) Turn ignition switch to "LOCK" and remove key.
- 2) Connect Yellow connector of passenger air bag (inflator) module and Yellow connector of contact coil and combination switch assembly respectively, and be sure to lock each connector with lock lever.
- 3) Install glove box.
- 4) Install "AIR BAG" fuse to "AIR BAG" fuse box.
- 5) Turn ignition switch to "ON" and verify that "AIR BAG" warning lamp comes on for 6 seconds and then turns off. If it does not operate as described, perform "Air Bag Diagnostic System Check" in SECTION 10B1.

HANDLING PRECAUTION

NOTE:

Whether the pretensioner has activated or not can be judged by the warning label attached on retractor assembly. If it has been torn by generated gas, the pretensioner has activated.

LIVE (INACTIVATED) 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 pretensioner (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) pretensioner, be sure to activate it before discarding it. (Refer to "Seat Belt Pretensioners Disposal" in SECTION 10B1.)
- 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 91.4 cm (3 ft) or more, it should be replaced.

75F00-10A-8-2

WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.
- When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.

Otherwise, personal injury may result.

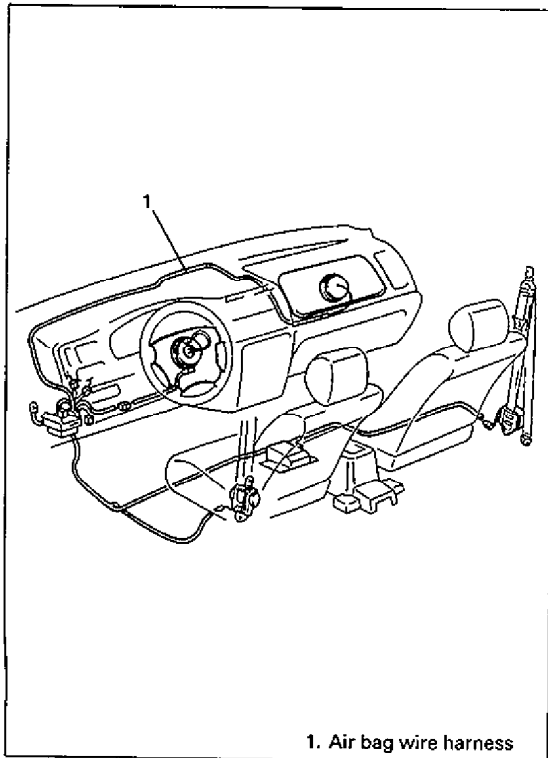
ACTIVATED PRETENSIONER

WARNING:

- Immediately after activation, the 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 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 10B1, for details.

75F00-10A-9-2



1. Air bag wire harness

75F00-10A-9-4

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.

75F00-10A-9-5

DISPOSAL PRECAUTION

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 10B1 and then dispose it. Refer to SECTION 10B1 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.

ON-VEHICLE SERVICE

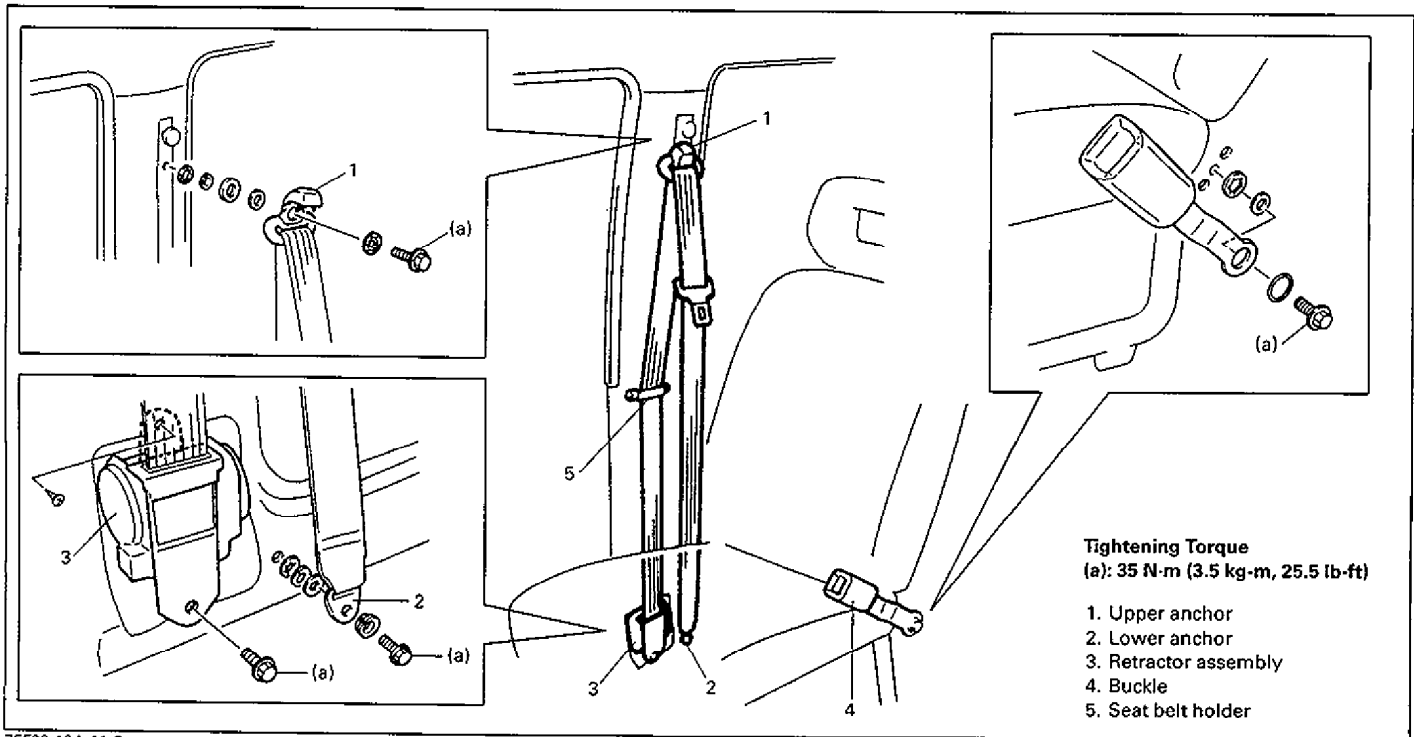
FRONT SEAT BELT WITHOUT PRETENSIONER

WARNING:

Be sure to read "Precautions" before starting to work and observe every precaution during work.

REMOVAL

Refer to the figure below to remove front seat belts.



75F00-10A-11-3

INSPECTION

Seat belts and attaching parts can affect the vital components and systems of a vehicle.

Therefore, they should be inspected carefully and replaced with genuine parts only.

1) Seat belt

Its webbing or strap should be free from damage.

2) Retractor 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.

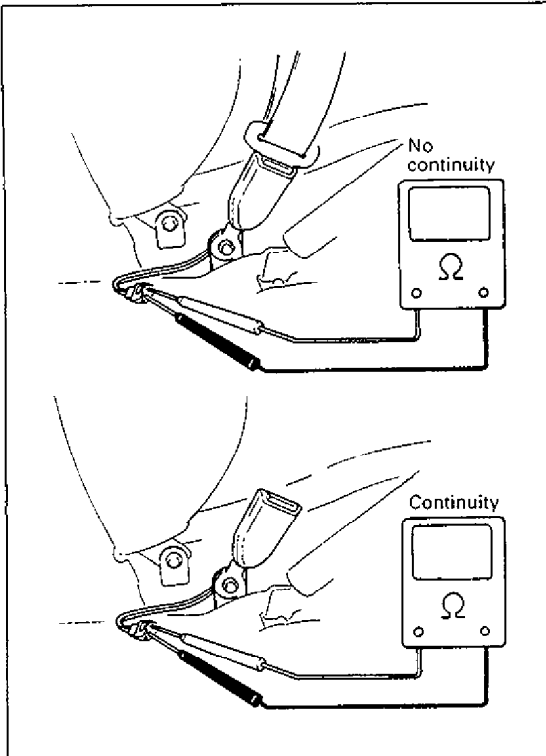
3) Anchor bolt

Anchor bolts should be torqued to specification.

4) Belt latch

It should be secure when latched.

- 5) Warning system (if equipped)
Check driver's seat belt strap switch.



75F00-10A-12-2

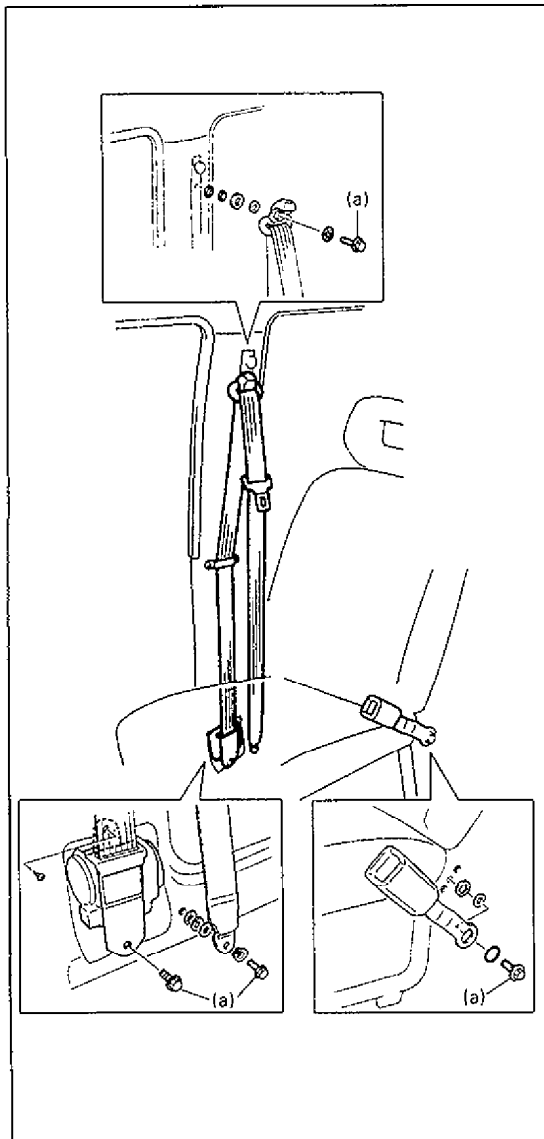
INSTALLATION

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)



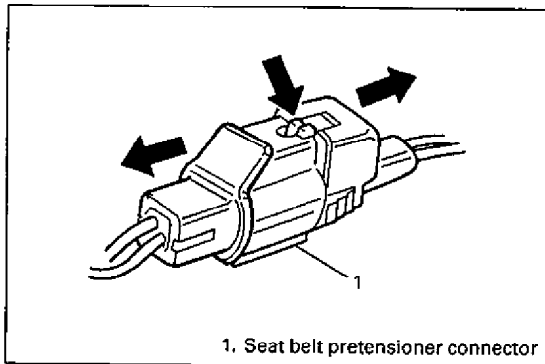
75F00-10A-12-5

FRONT SEAT BELT WITH PRETENSIONER

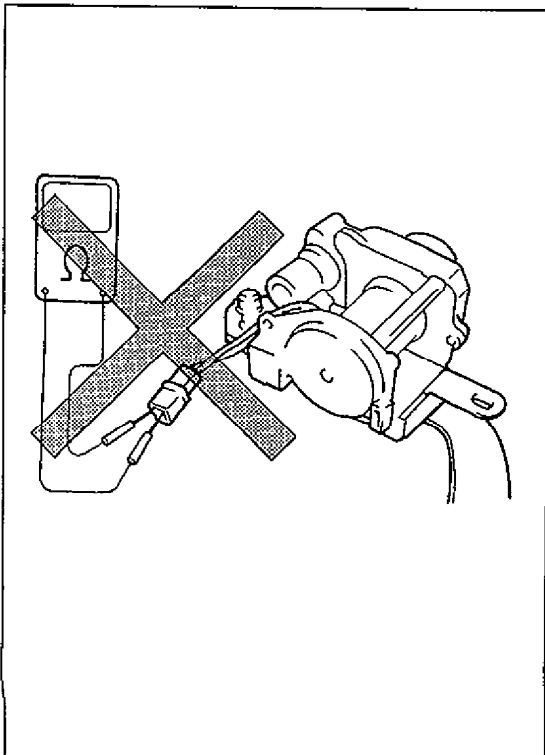
WARNING:

- 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 "Precautions" before starting to work and observe every precaution during work. Neglecting them may result in personal injury or unactivation of the seat belt pretensioner when necessary.

75F00-10A-13-2



75F00-10A-13-3



75F00-10A-13-5

REMOVAL

- 1) Disconnect negative battery cable from battery.
- 2) Disable air bag system. Refer to "Disabling Air Bag System" earlier in this section.
- 3) Disconnect Yellow connector for seat belt pretensioner.
- 4) Remove front seat belts from the vehicle in the same way as when removing them without pretensioner described on page 10A-11.

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-11 and 10A-12.

WARNING:

Never measure resistance of pretensioner or disassemble it. Otherwise, personal injury may result.

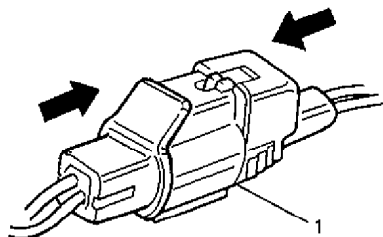
CAUTION:

If seat belt pretensioner (retractor assembly) was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.

Check retractor assembly with seat belt pretensioner appearance visually for following symptoms and if any one of them is applicable, replace it with a new one as an assembly.

- Pretensioner has activated.
- There is a crack in seat belt pretensioner (retractor assembly).
- Wire harness or connector is damaged.
- Seat belt pretensioner (retractor assembly) is damaged or a strong impact (e.g., dropping) was applied to it.

75F00-10A-14-1



1. Seat belt pretensioner connector

75F00-10A-14-3

INSTALLATION

- 1) Install front seat belts to the vehicle in the same way as when installing them without pretensioner described on page 10A-12.
- 2) Connect Yellow connector for seat belt pretensioner securely and fit seat belt pretensioner connector onto body.
- 3) Connect negative battery cable to battery.
- 4) Enable air bag system. Refer to "Enabling Air Bag System" earlier in this section.

REAR SEAT BELT

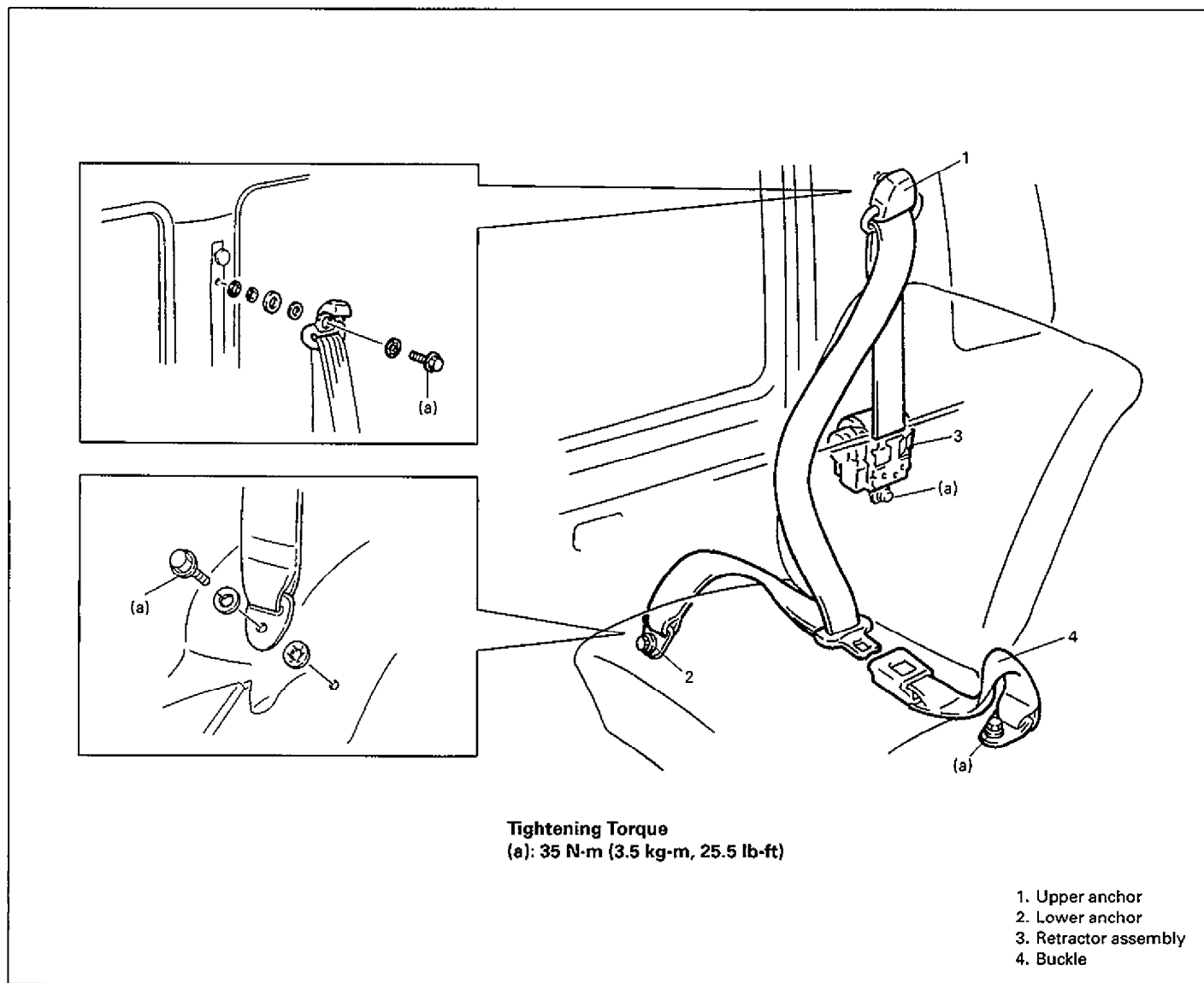
WARNING:

Be sure to read "Precautions" before starting to work and observe every precaution during work.

REMOVAL

Refer to the figure below to remove rear seat belts.

75F00-10A-15-1



75F00-10A-15-4

INSPECTION

Check the rear seat belt in the same way as when inspecting front seat belt without pretensioner. (Refer to pages 10A-11 and 10A-12.)

INSTALLATION

Install the rear seat belt observing the same precautions as when installing front seat belt without pretensioner. (Refer to page 10A-12.)

75F00-10A-15-5

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			
Buckle bolt			

SECTION 10B

AIR BAG SYSTEM (WITHOUT SEAT BELT PRETENSIONER)

WARNING:

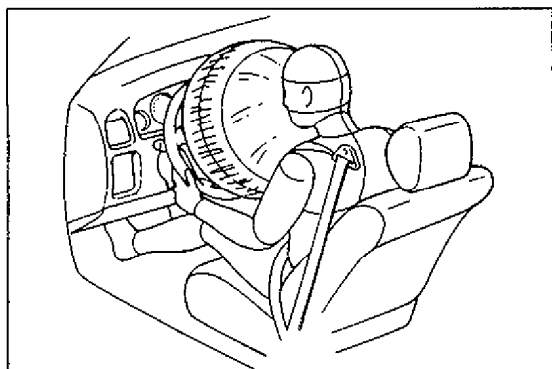
Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and CAUTIONS in this section and Precautions, Air Bag System Components and Wiring Location View in this section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintended activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.

CAUTION:

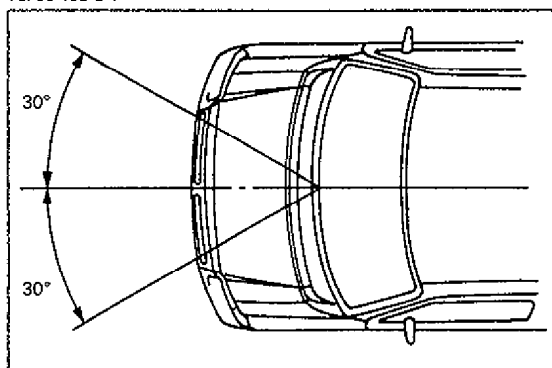
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

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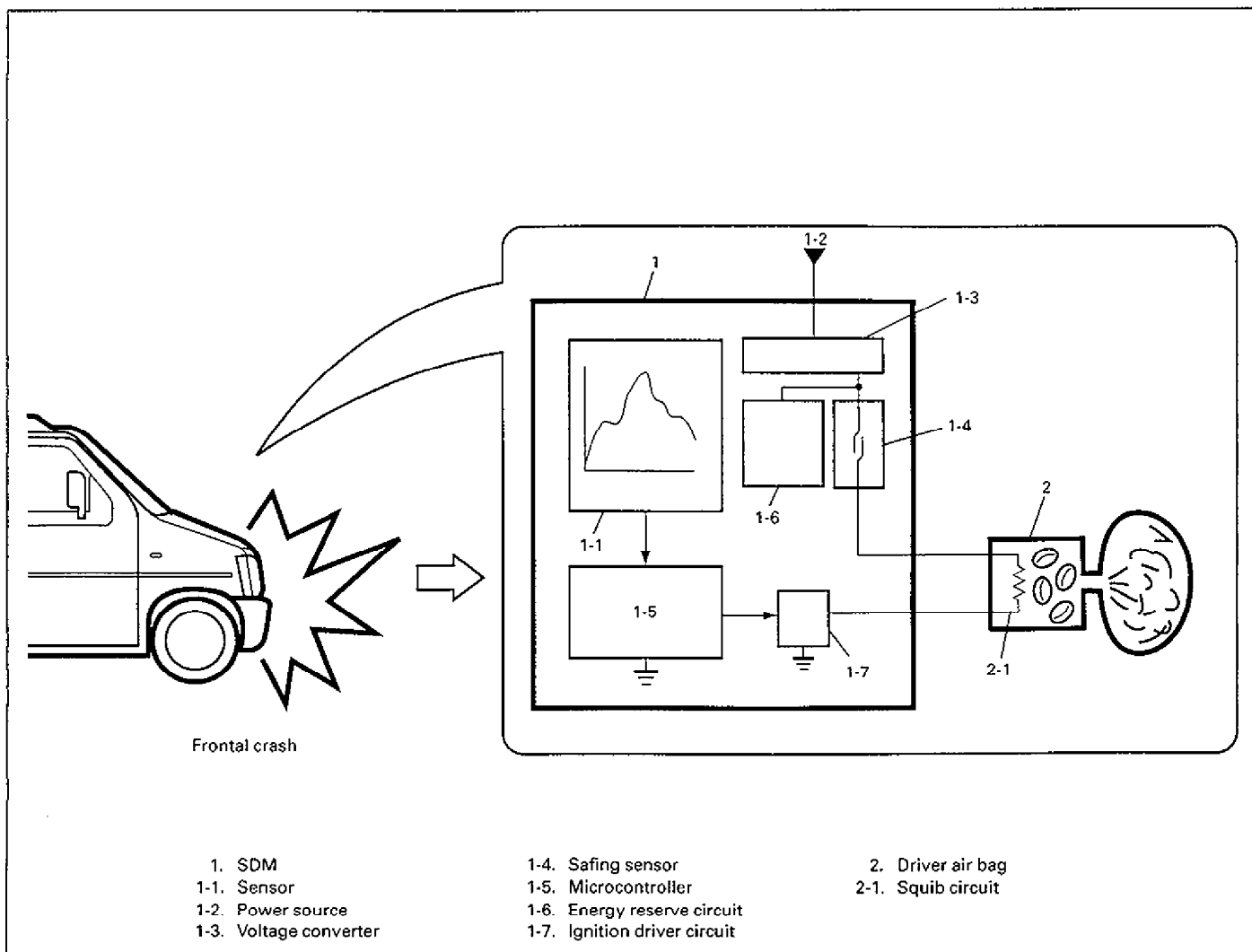
75F00-10B-2-2

GENERAL DESCRIPTION

The supplemental restraint air bag system consists of an SDM incorporated driver air bag (inflator) module assembly and the air bag harness. When the system operates, the air bag deploys from the center of the steering wheel.

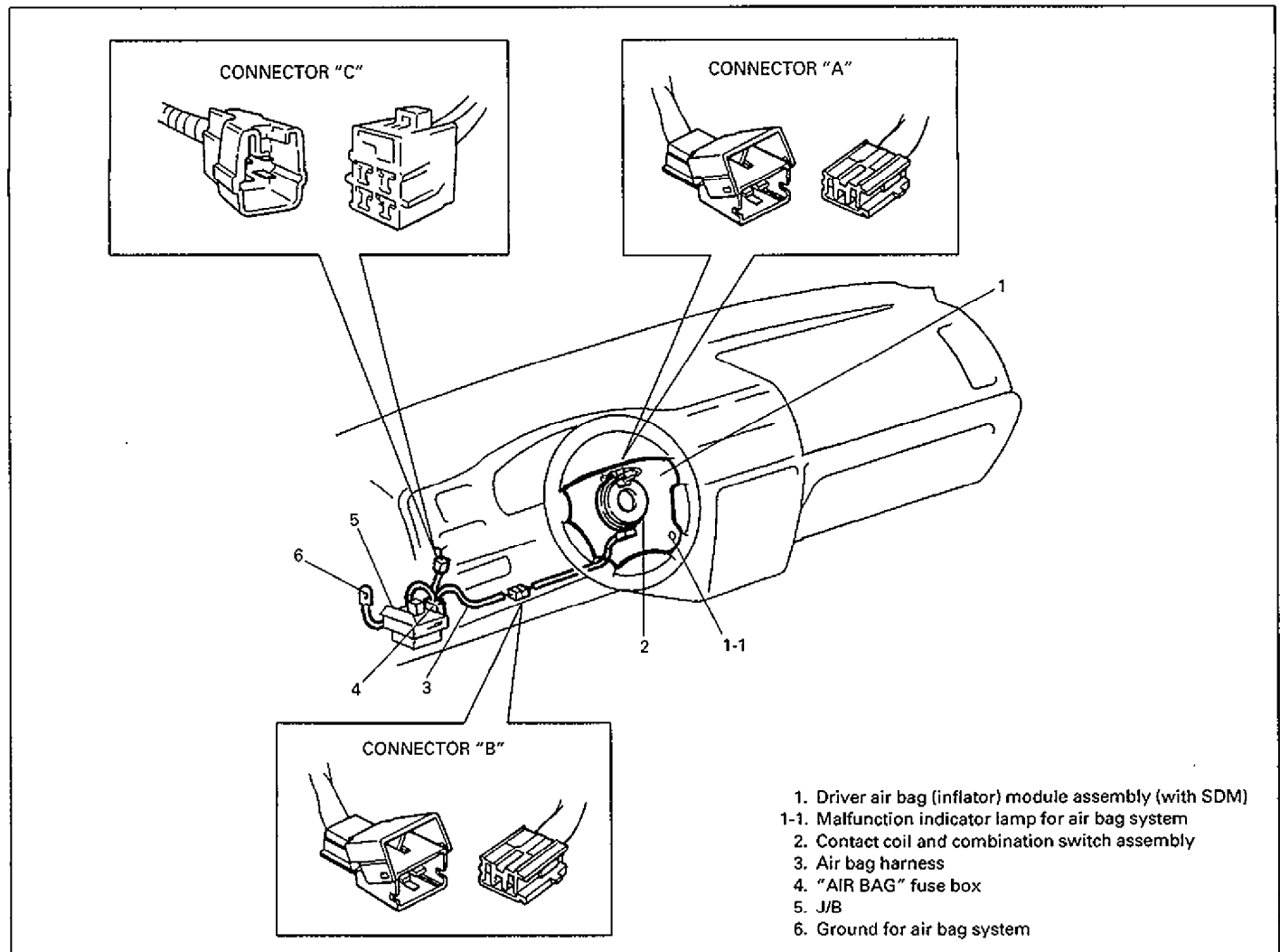
The air bag deploys when the vehicle is involved in a frontal crash of sufficient force up to about 30 degrees off the center-line of the vehicle.

OPERATION OF AIR BAG SYSTEM AT COLLISION



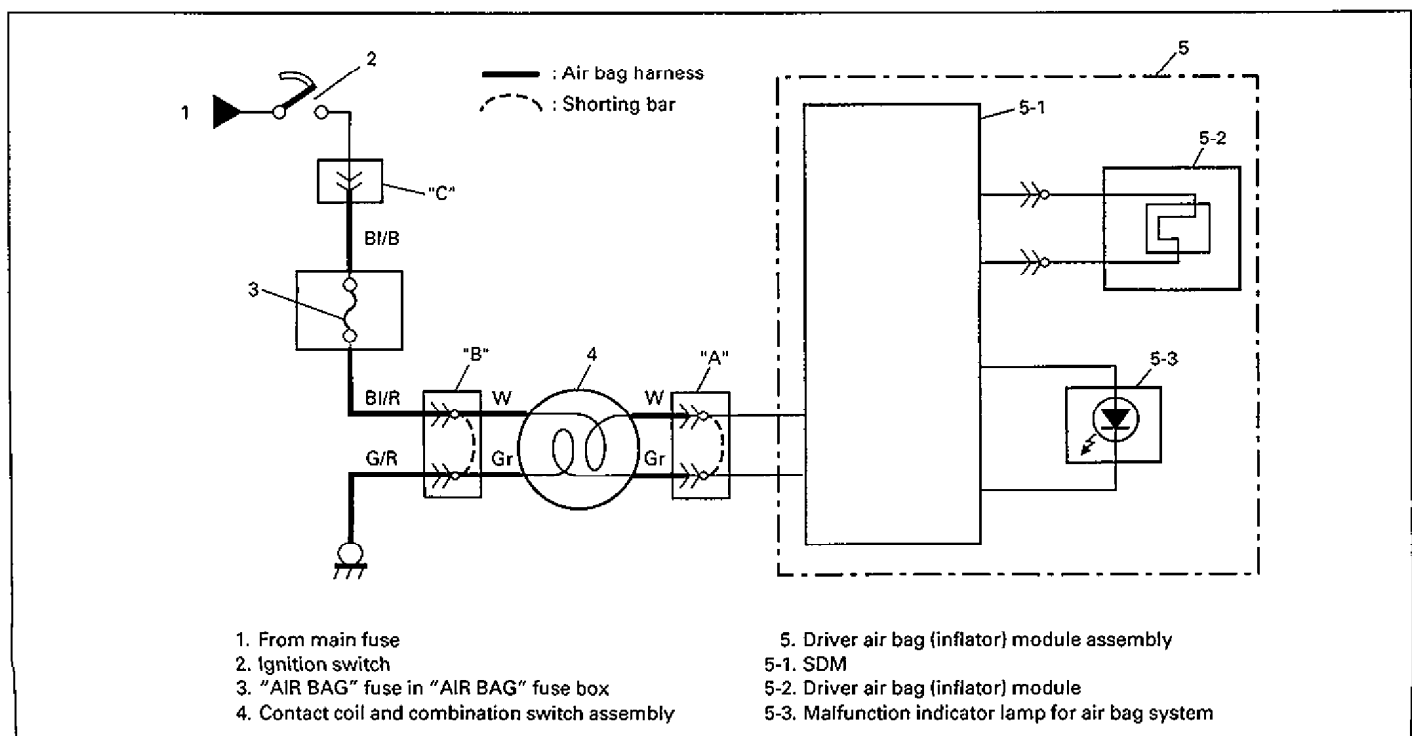
75F00-10B-2-5

SYSTEM COMPONENTS AND WIRING LOCATION VIEW AND CONNECTORS



75F00-10B-3-3

SYSTEM WIRING DIAGRAM



75F00-10B-3-5

COMPONENTS DESCRIPTION

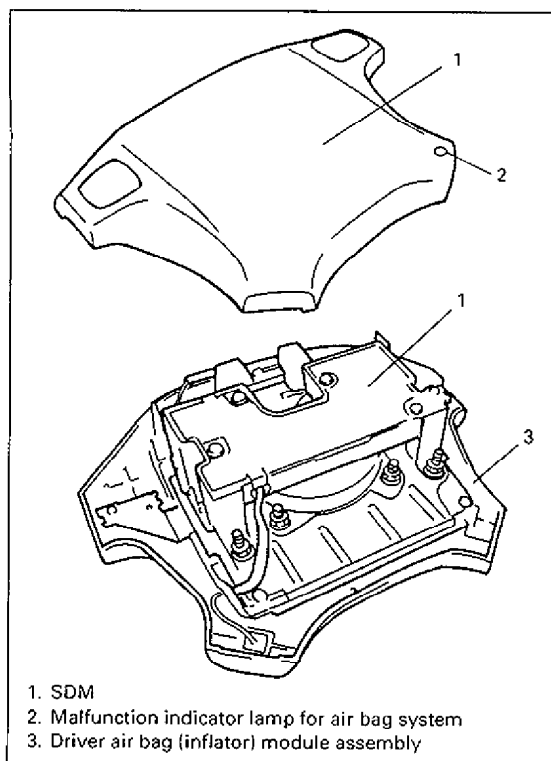
SDM (SENSING AND DIAGNOSTIC MODULE)

WARNING:

- During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).
- Be sure to read "Precautions" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

CAUTION:

- Do not separate the SDM and the driver air bag (inflator) module.
- 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.

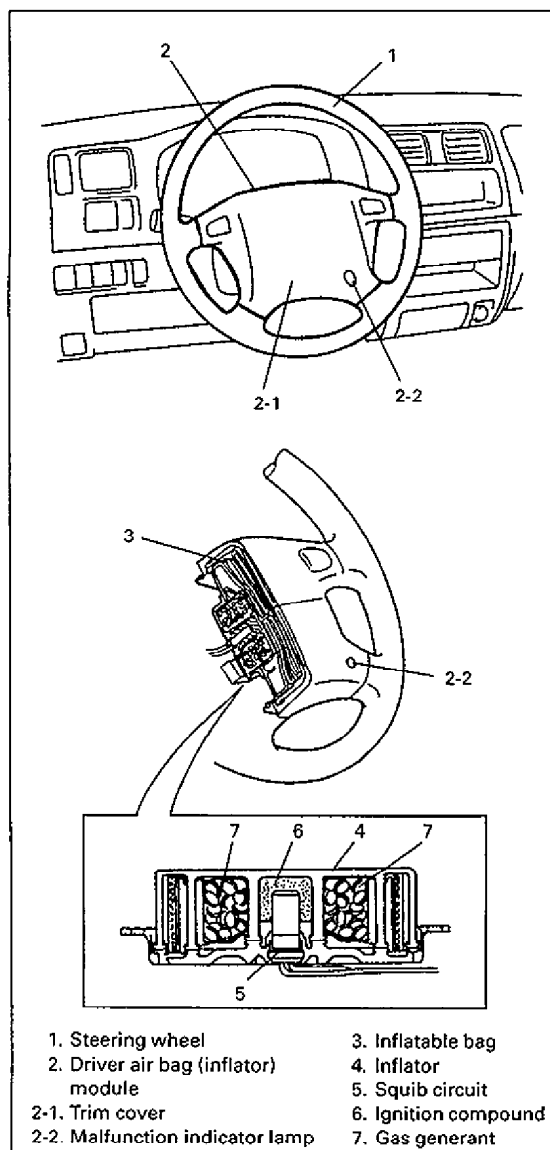


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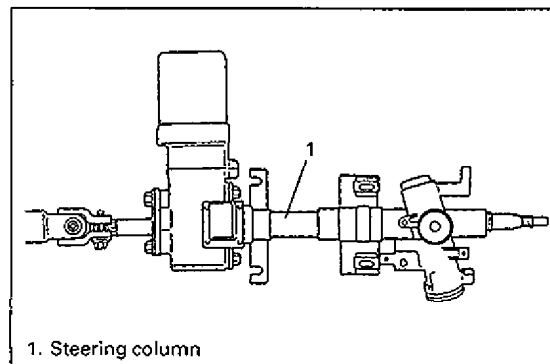
The Sensing and Diagnostic Module (SDM) is designed to perform the following functions in the air bag system:

- Energy Reserve
 - The SDM maintains a reserve energy supply to provide deployment energy after ignition voltage is lost in a frontal crash.
- Frontal Crash Detection
 - The SDM monitors vehicle velocity changes to detect frontal crashes which are severe enough to warrant deployment.
- Air Bag Deployment
 - When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the air bag (inflator) module to deploy the air bag.
- Malfunction Detection
 - The SDM performs diagnostic monitoring of the air bag system electrical components and sets a diagnostic trouble code when a malfunction is detected.
- Driver Notification
 - The SDM warns the vehicle driver of air bag system malfunctions by controlling the malfunction indicator lamp for air bag system.

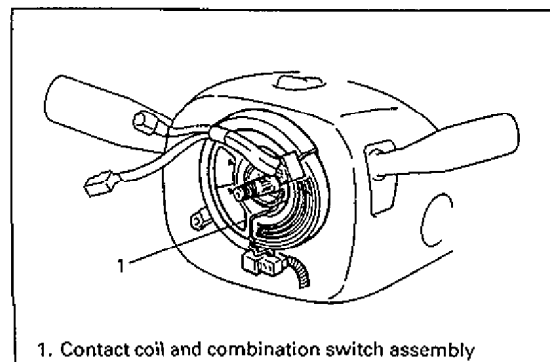
75F00-10B-4-4



75F00-10B-5-3



75F00-10B-5-4



75F00-10B-5-5

DRIVER AIR BAG (INFLATOR) MODULE

WARNING:

- Never attempt to disassemble or repair the driver air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.
- Be sure to read "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.

The driver air bag (inflator) module consists of an inflatable bag, an inflator and a trim cover, and is mounted to the center of the steering wheel.

The driver inflator consists of a squib circuit, an ignition compound and a gas generant.

When a collision occurs the deployment current from SDM flows through the squib circuit to ignite the ignition compound by which the gas generant ignites instantly.

As the gas generant burns, a large amount of nitrogen gas is generated and deploys the inflatable bag quickly.

When the inflatable bag deploys, its expansion force causes the trim cover.

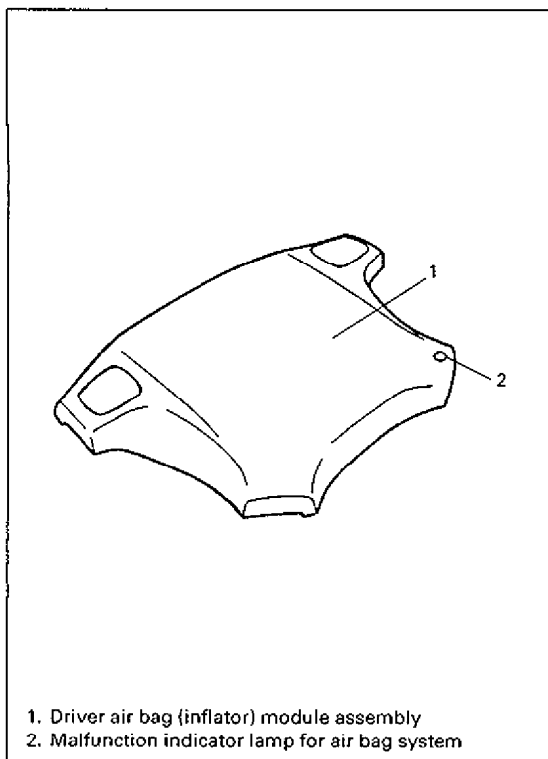
Nitrogen gas in the inflatable bag is let out through two exhaust holes in the back of the bag at the right and left.

STEERING COLUMN

This steering column uses a collapsible type column which absorbs the energy when an impact is applied to it.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

The contact coil assembly consists of three current carrying coils; two for the air bag system circuit and one for the horn circuit. The contact coil assembly is combined with the combination switch assembly and mounted together on the steering column, allowing rotation of the steering wheel while maintaining continuous contact of the power and ground circuit to SDM installed in the driver air bag (inflator) module assembly.



75F00-10B-6-2

MALFUNCTION INDICATOR LAMP FOR AIR BAG SYSTEM

The malfunction indicator lamp is located on the driver air bag (inflator) module assembly and controlled by SDM.

The malfunction indicator lamp is used in the air bag system to do the following:

- Verify lamp and SDM operation by coming on about 6 seconds when the ignition switch is first turned "ON".
- Warn the vehicle driver of air bag electrical system malfunctions which could potentially affect the operation of the air bag system. These malfunctions could result in undeployment in case of a frontal crash or deployment for conditions less severe than intended.

The malfunction indicator lamp is the key to driver notification of air bag system malfunctions. For proper lamp operation, refer to the "Air Bag Diagnostic System Check" in this section.

AIR BAG WIRE HARNESS AND CONNECTORS

CAUTION:

When an open in wire harness, damaged wire harness, connector or terminals is found, replace wire harness, connectors and terminals as an assembly.

The air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

Each air bag connector has a terminal lock mechanism (operated by the terminal retainer), connectors "A" and "B" have a short mechanism (operated by shorting bar) and a connector lock mechanism (operated by connector lock lever).

Terminal retainer (Terminal position assurance: TPA):

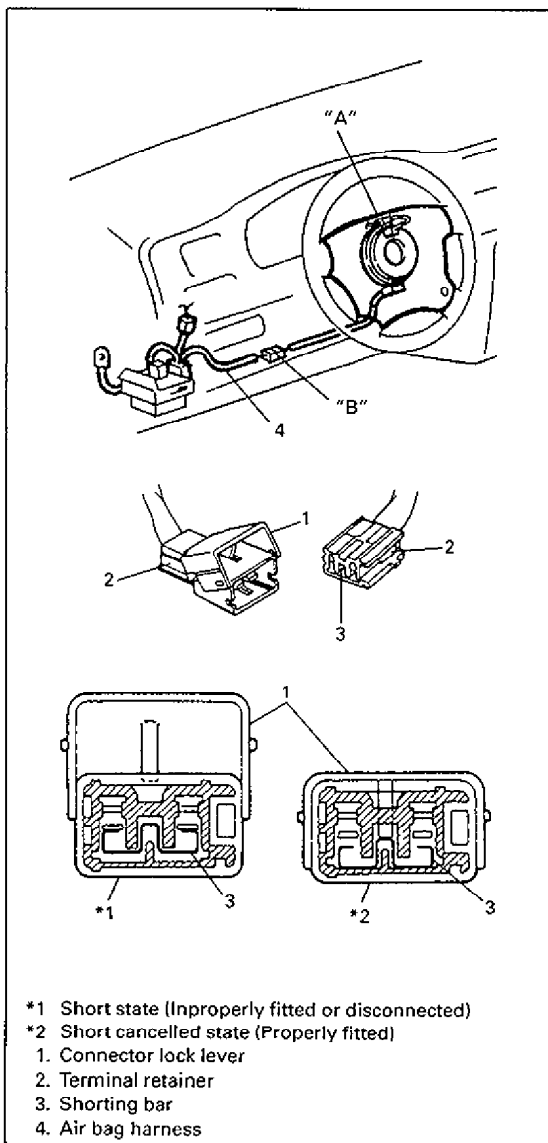
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

Shorting bar:

Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

Connector lock lever:

Functions of the connector lock lever are: to connect connectors securely, to cancel shorts and to lock connectors against disconnection.



75F00-10B-6-5

DEFINITIONS

AIR BAG – An inflatable cloth cushion designed to deploy in certain frontal crashes. It supplements the protection offered by the seat belts by distributing the impact load more evenly over the vehicle occupant's head and torso.

AIR BAG WIRE HARNESS – The wires and connectors that electrically connect the components in the air bag system.

B+ – Battery voltage, the voltage available at the battery at the time of the indicated measurement. With the key "ON" and the engine not running, the system voltage will likely be between 10 and 14 volts. At idle the voltage may be 14 to 16 volts. The voltage could be as low as 7 to 10 volts during engine cranking.

BULB CHECK – The SDM will cause the malfunction indicator lamp for air bag system to come on about 6 seconds and then go "OFF" whenever the ignition switch transitions to the "ON" position from any other ignition switch position and no malfunctions are detected.

DEPLOY – To inflate the air bag.

DEPLOYMENT LOOPS – The circuits which supply current to the air bag (inflator) module to deploy the air bag.

INITIATOR – The electrical component inside the air bag (inflator) module which, when sufficient current flows, sets off the chemical reaction that inflates the air bag.

IGNITION COMPOUND – Compound that ignites instantly when heated by the current flowing through the heat wire.

SAFING SENSOR – This sensor has a function to set the squib circuits in operation whenever deployment is required and out of operation in normal driving states. SDM contains this sensor.

SDM – Sensing and Diagnostic Module which provides reserve energy to the deployment loop, deploys the air bag when required and performs diagnostic monitoring of all air bag system component.

RESERVE VOLTAGE – The reserve energy supply (voltage) from the SDM which provides deployment power when vehicle voltage is lost in a frontal crash.

DIAGNOSIS

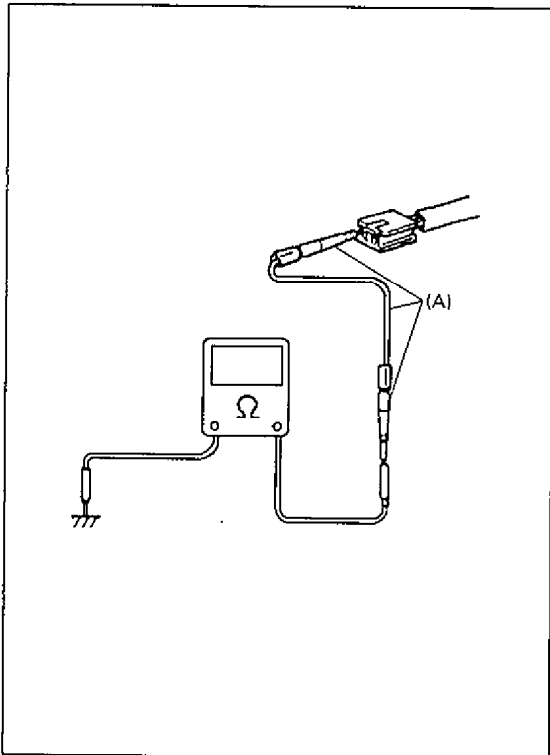
USE OF SPECIAL TOOLS

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 in this section under the heading "Special Tools". You should be able to measure voltage and resistance. You should be familiar with proper use of Connector Test Adapter Kit, and the Digital Multimeter.

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Special Tool (Connector Test Adapter Kit)**(A): 09932-76010**

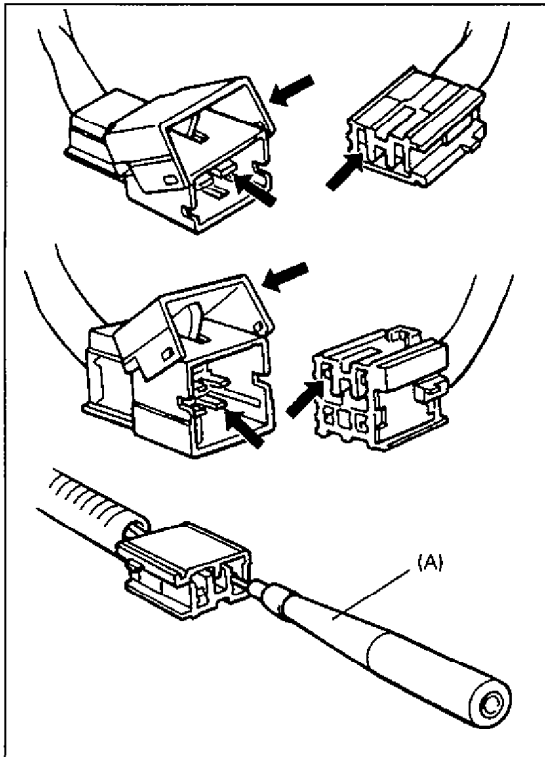
This must be used whenever a diagnostic procedure requests checking or probing a terminal.

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.

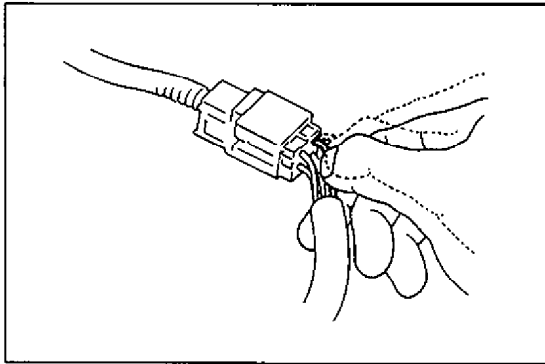
The adapter will also give an idea of whether contact tension is sufficient, helping to find an open or intermittent open due to poor terminal contact.

INTERMITTENTS AND POOR CONNECTIONS

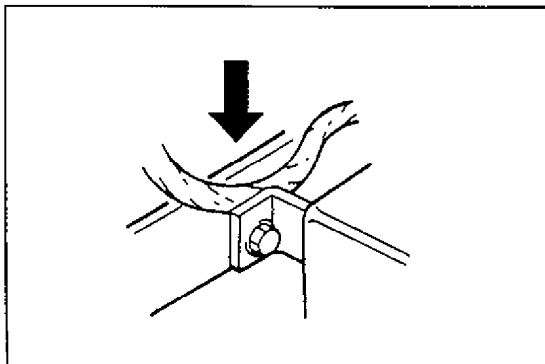
Most intermittents are caused by faulty electrical connections or wiring. When a check for proper connection is requested in a diagnostic flow table, perform careful check of suspect circuits for:



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- 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.
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

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.

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 table 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 malfunction indicator lamp for air bag system operation.

B. REPEAT THE "AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE" AFTER ANY REPAIR OR DIAGNOSTIC PROCEDURES HAVE BEEN PERFORMED.

Performing the "Air Bag Diagnostic System Check Flow Table" after all repair or diagnostic procedures will ensure that the repair has been made correctly and that no other malfunctions exist.

FLOW TABLE TEST DESCRIPTION

STEP1: Check that malfunction indicator lamp lights.

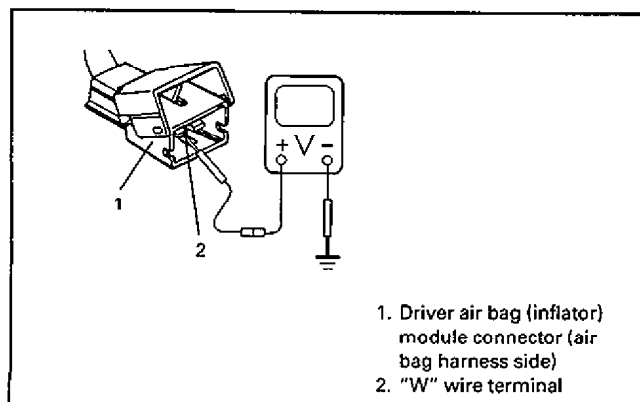
STEP2: Check that malfunction indicator lamp turns off about 6 seconds after ignition switch is turned on.

STEP3: Check power source circuit.

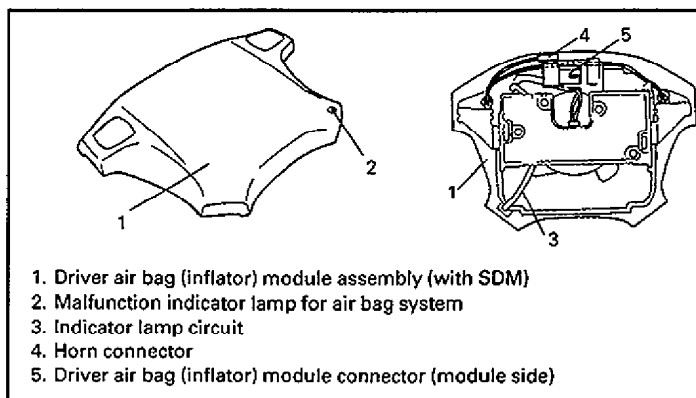
AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE

STEP	ACTION	YES	NO
1	1) Make sure that battery voltage is about 11V or higher. 2) Note malfunction indicator lamp for air bag system as ignition switch is turned ON. 3) Does malfunction indicator lamp come ON when ignition switch is turned ON?	Go to step 2.	• Contact coil open or short • "AIR BAG" fuse blown • Power source ("BI/R" wire) circuit open or short • Ground ("G/R" wire) circuit open or short • Poor connection in each connector • Malfunction indicator lamp circuit open or short If wire and connection are OK, substitute a known-good driver air bag (inflator) module (with SDM) and recheck.
2	After coming ON for about 6 seconds, then does malfunction indicator lamp turn OFF?	Air bag system is in good condition.	Go to step 3.
3	1) Remove driver air bag (inflator) module assembly (with SDM), referring to SECTION 3C1. 2) Ignition switch ON. 3) Measure voltage from "W" wire terminal of driver air bag (inflator) module connector to body ground. 4) Is voltage 8 V or more?	Substitute a known-good driver air bag (inflator) module (with SDM) and recheck.	• Contact coil short • "AIR BAG" fuse blown • Power source circuit short • Ground ("G/R" wire) circuit short • Poor connection in each connector • Malfunction indicator lamp circuit short If wire and connection are OK, substitute a known-good driver air bag (inflator) module (with SDM) and recheck.

Fig. for STEP 3



Reference



PRECAUTIONS

SERVICE PRECAUTION

WARNING/CAUTION labels are attached on each part of air bag system components (Driver air bag (inflator) module (with SDM)). Be sure to follow the instructions.

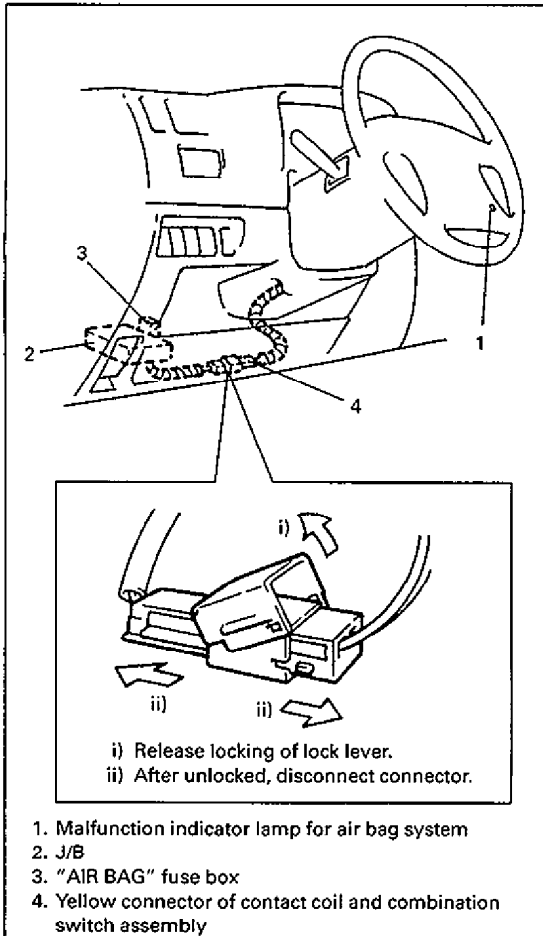
WARNING:

- 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 deployment.
- Do not modify the steering wheel or any other air bag system component. Modifications can adversely affect air bag system performance and lead to injury.
- Failure to follow procedures could result in possible air bag deployment, personal injury or unneeded air bag system repairs.

- Many of service procedures require disconnection of "AIR BAG" fuse and air bag (inflator) module from deployment loop to avoid an accidental deployment.
- 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 malfunction indicator lamp for air bag system operation and will lead you to the correct step 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 deployment.
- When servicing, if shocks may be applied (e.g., dropped from a height of 91.4 cm (3 feet) or more) to air bag system component parts, remove those parts beforehand.
- When using electric welding, be sure to disconnect air bag (inflator) module connector.
- 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:

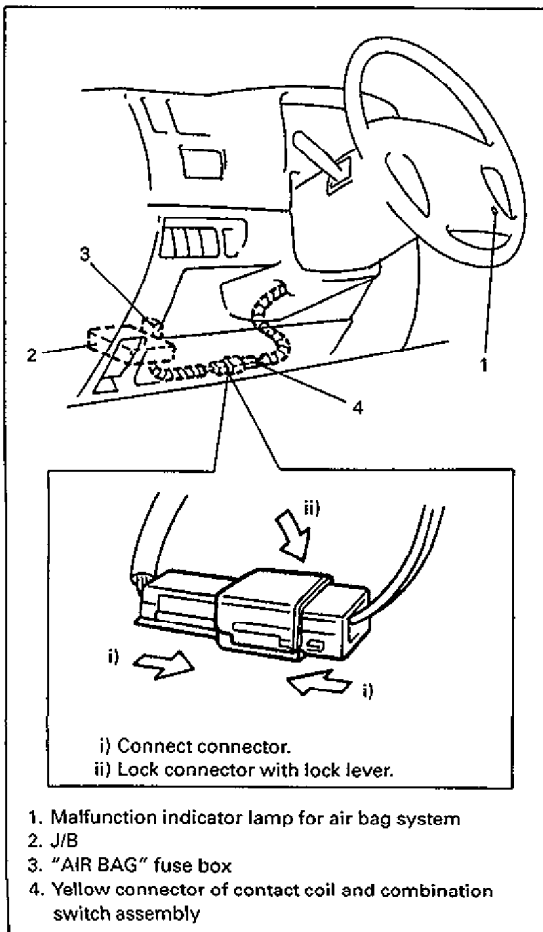
When performing service on or around air bag system components or air bag wiring, follow the procedures listed in next page to temporarily disable the air bag system. Refer to appropriate service manual procedures. Failure to follow procedures could result in possible air bag deployment, personal injury or unneeded air bag system repairs.



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DISABLING AIR BAG SYSTEM

- 1) Turn steering wheel so that vehicle's wheels (front tires) are pointing straight ahead.
- 2) Turn ignition switch to "LOCK" position and remove key.
- 3) Remove "AIR BAG" fuse from "AIR BAG" fuse box.
- 4) Disconnect Yellow connector of contact coil and combination switch assembly.

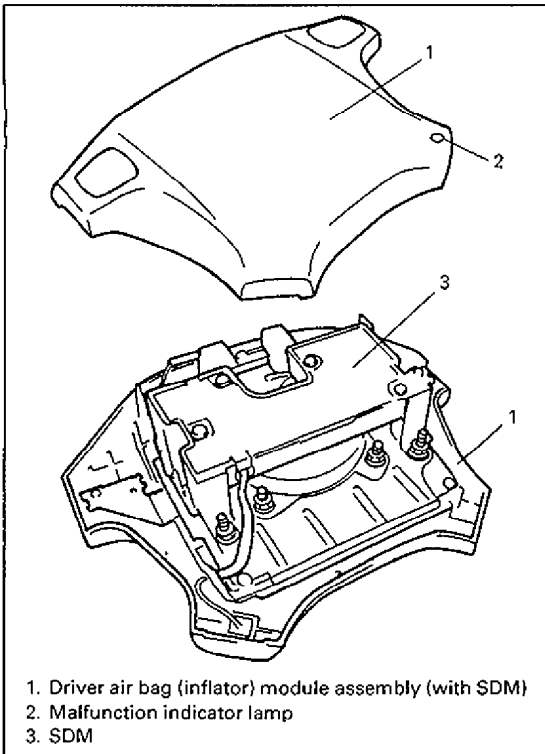


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ENABLING AIR BAG SYSTEM

- 1) Turn ignition switch to "LOCK" and remove key.
- 2) Connect Yellow connect of contact coil and combination switch assembly, and be sure to lock connector with lock lever.
- 3) Install "AIR BAG" fuse to the "AIR BAG" fuse box.
- 4) Turn ignition switch to "ON" and verify that malfunction indicator lamp on driver air bag (inflator) module comes on about 6 seconds and then turns OFF.

If it does not operate as described, perform "Air Bag Diagnostic System Check" in diagnosis section.



75F00-10B-14-2

HANDLING PRECAUTION

SDM

WARNING:

Never power up air bag system when driver air bag (inflator) module assembly (with SDM) is not rightly attached to the vehicle. Otherwise, personal injury may result.

CAUTION:

- Do not separate the SDM and the driver air bag (inflator) module.
- 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.
- If installation part of SDM was damaged, repair that part completely before reinstallation.

LIVE (UNDEPLOYED) AIR BAG (INFLATOR) MODULE

Special care is necessary when handling and storing a live (undeployed) air bag (inflator) module. The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

WARNING:

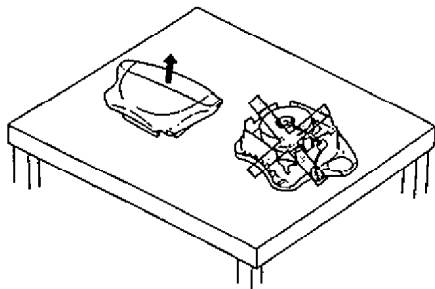
Never attempt to measure the resistance of the air bag (inflator) module. It is very dangerous as the electric current from the tester may deploy the air bag.

- Never attempt disassembly of the air bag (inflator) module.
- When storing the live (undeployed) air bag (inflator) module, select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- If the live (undeployed) air bag (inflator) module was dropped from a height of 91.4 cm (3 ft) or more or if it is found to be damaged or deformed, replace it with a new one.
- 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) module, wipe it off immediately with a dry cloth.

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.



75F00-10B-15-3

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.
- When placing a live air bag (inflator) module on bench or other surface, always face the bag up, away from the surface.

It is also prohibited to place anything on top of the trim cover and stack air bag (inflator) module.

This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

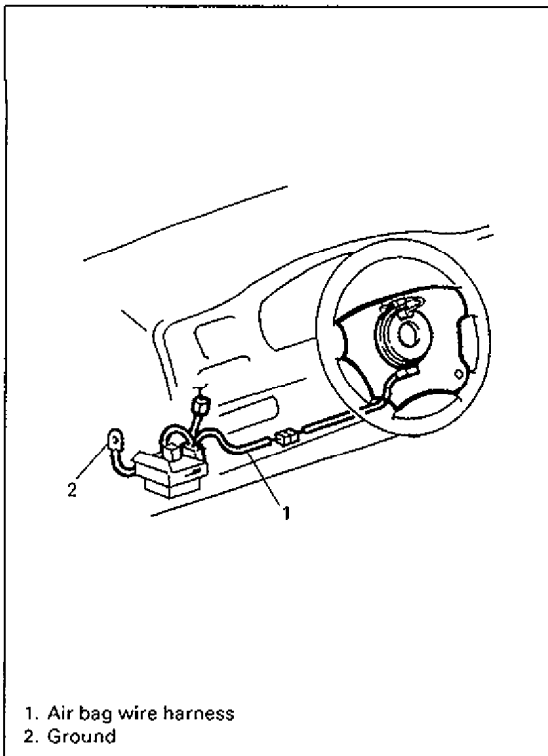
Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULE

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) Module Disposal" in this section.



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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 air bag system grounding point is clean and ground is securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

DISPOSAL PRECAUTION

Do not dispose of live (undeployed) air bag (inflator) module. When disposal is necessary, be sure to deploy the air bag according to deployment procedure described under "Air Bag (Inflator) Module Disposal" in this section.

WARNING:

Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which could cause personal injury. Undeployed air bag (inflator) 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.

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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 a deployment 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 air bag (inflator) module assembly (with 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.

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ACCIDENT WITH DEPLOYMENT

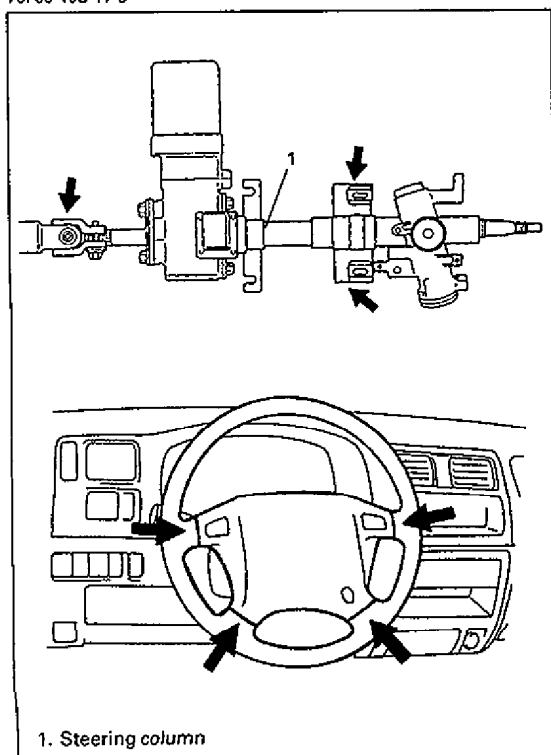
– COMPONENT REPLACEMENT

Certain air bag system component must be replaced.

That component is:

- Driver air bag (inflator) module assembly (with SDM)
 - Replace with new one.

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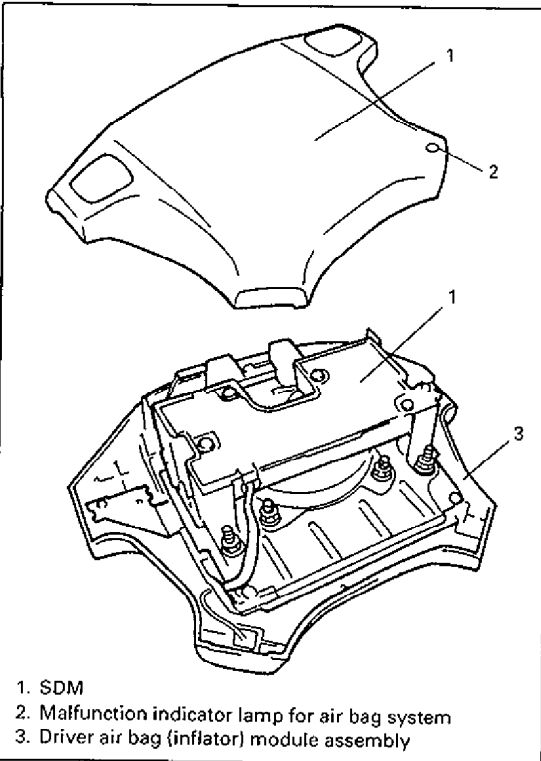
ACCIDENT WITH OR WITHOUT DEPLOYMENT

– COMPONENT INSPECTIONS

Certain air bag system components must be inspected after any crash, whether the air bag deployed or not. Those components are:

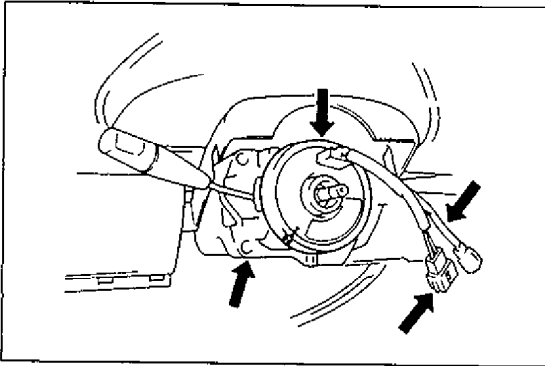
- Steering column and shaft joints.
 - Check for length, damage and bend according to "Inspection" under "Steering Column" in SECTION 3C1.
- Steering column bracket.
 - Check for damage and bent. If any, replace.
- Steering wheel and driver air bag (inflator) module assembly.
 - Check for damage or air bag (inflator) module assembly 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.



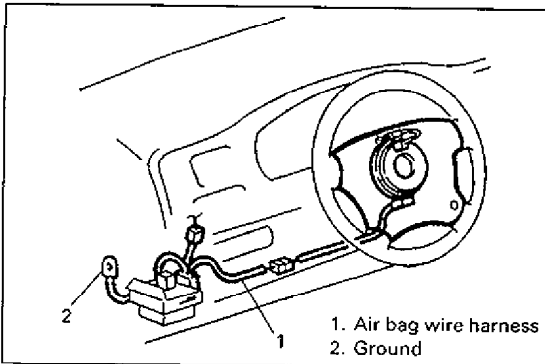
75F00-10B-18-2

- SDM (installed in driver air bag (inflator) module assembly)
 - 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 driver air bag (inflator) module, 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.
 If any faulty condition is found in above checks, replace.
- Malfunction indicator lamp (on driver air bag (inflator) module assembly)
 - After vehicle is completely repaired, perform "Air Bag Diagnostic System Check" described in diagnosis section.



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- 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.



75F00-10B-18-4

- Air bag wire harness and connections
 - Check for damages, deformities or poor connections. (Refer to "Intermittents and Poor Connections" in this section.)
 - Check wire harness clamps for tightness.
 If any faulty condition is found, correct or replace.

- Instrument panel member, reinforcement
 - Check for any distortion, bending, cracking or other damage.
 If any, repair or replace.
- Seat belts and mounting points.
 - Refer to "Seat Belt" in SECTION 10A.

ON-VEHICLE SERVICE

SDM

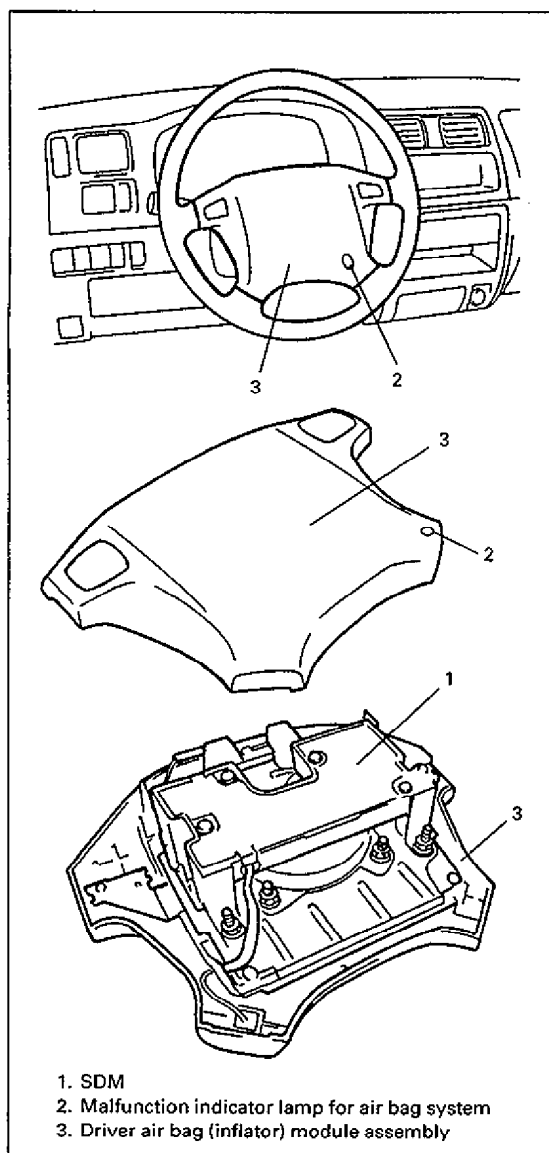
CAUTION:

Do not separate the SDM and the driver air bag (inflator) module. When replacement of the SDM is necessary, replace the driver air bag (inflator) module assembly.

Refer to SECTION 3C1 for removal, inspection and installation.

DRIVER AIR BAG (INFLATOR) MODULE ASSEMBLY

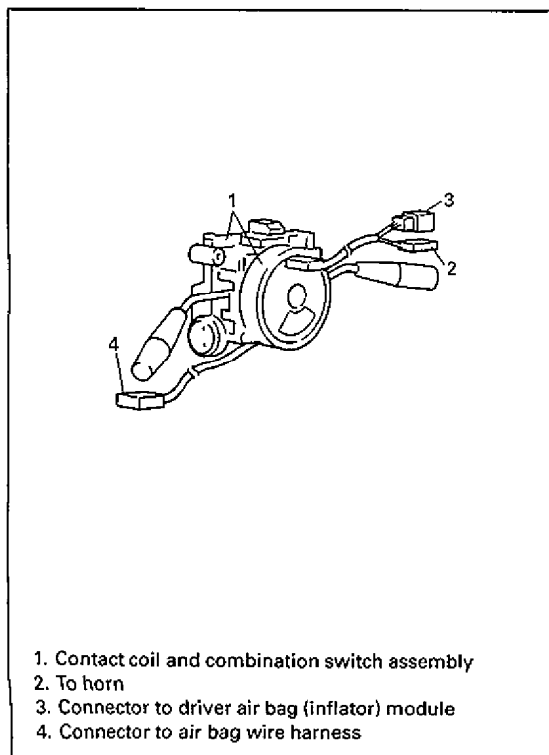
Refer to SECTION 3C1 for removal, inspection and installation.



75F00-10B-19-3

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

Refer to SECTION 3C1 for removal, inspection and installation.



75F00-10B-19-5

AIR BAG (INFLATOR) MODULE 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.

Do not dispose of the live (undeployed) air bag (inflator) module. When disposal of the air bag (inflator) module is necessary, deploy the air bag according to the procedure described under "Deployment".

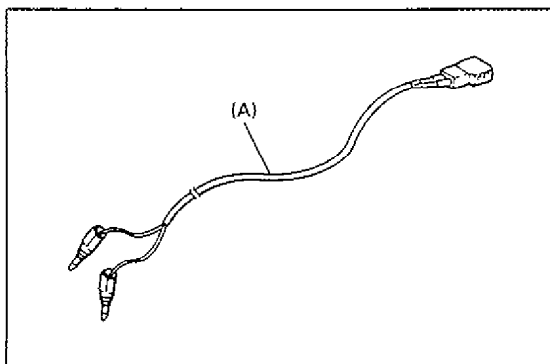
DEPLOYMENT

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 "Precautions" in this section for the air bag (inflator) module beforehand.
- Never connect deployment harness to any power source before connecting deployment harness to the air bag (inflator) module. Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.
- Since a large amount of smoke is produced when air bag is deployed, select a well-ventilated area.
- The air bag (inflator) module will immediately deploy the air bag when a power source is connected to it. Wear safety glasses throughout this entire deployment and disposal procedure.
- Wear suitable ear protection when deploying air bag. Also, advise those who are in the area close to deployment site to wear suitable ear protection.

The following procedure requires use of special tools (deployment harness and air bag deployment adapter kit). Do not attempt procedure without them.

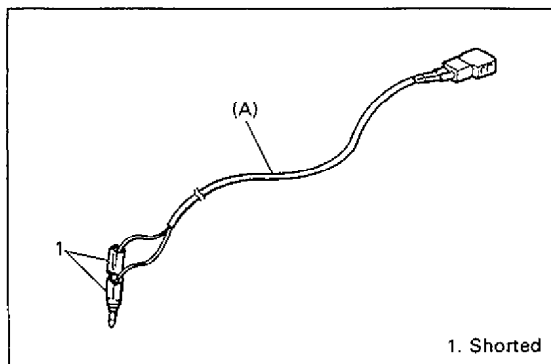


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- 1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
- 2) Check that there is no open, short or damage in special tool (Deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool (Deployment Harness)

(A): 09932-75030



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- 3) Short the two deployment harness leads together by fully seating one banana plug into the other.

WARNING:

Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.

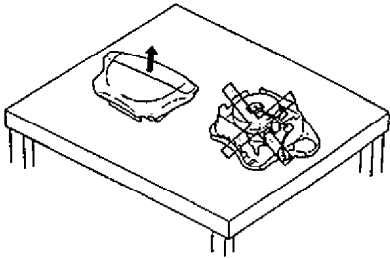
Special Tool (Deployment Harness)

(A): 09932-75030

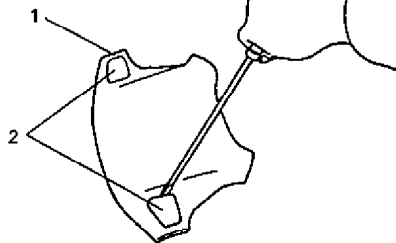
ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.

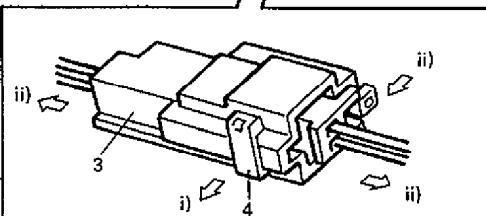
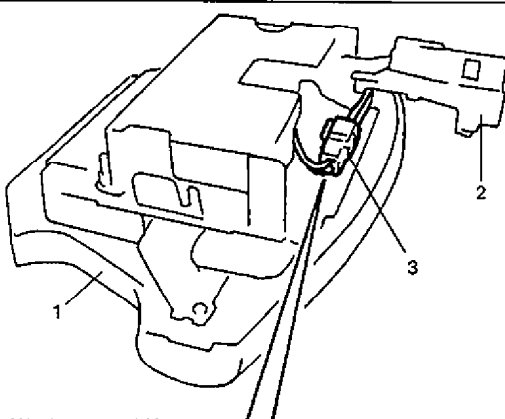


75F00-10B-21-2



1. Driver air bag (inflator) module assembly
2. Horn button

75F00-10B-21-3



1. Driver air bag (inflator) module assembly (with SDM)
2. Connector holder
3. Inflator connector
4. Connector lock

75F00-10B-21-5

- 4) Remove driver air bag (inflator) module assembly from vehicle referring to SECTION 3C1.

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. 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.

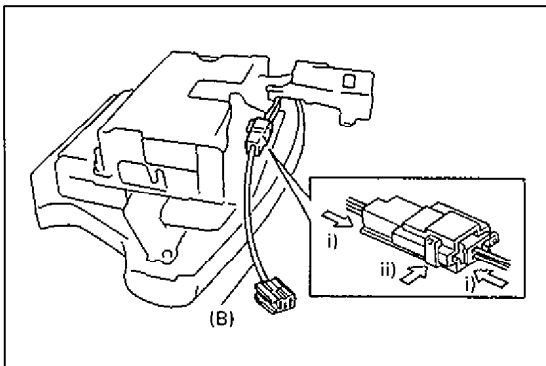
- 5) Temporarily place driver air bag (inflator) module on the workbench or the vise according to above WARNING.

- 6) Remove horn lead and horn buttons from driver air bag (inflator) module assembly.

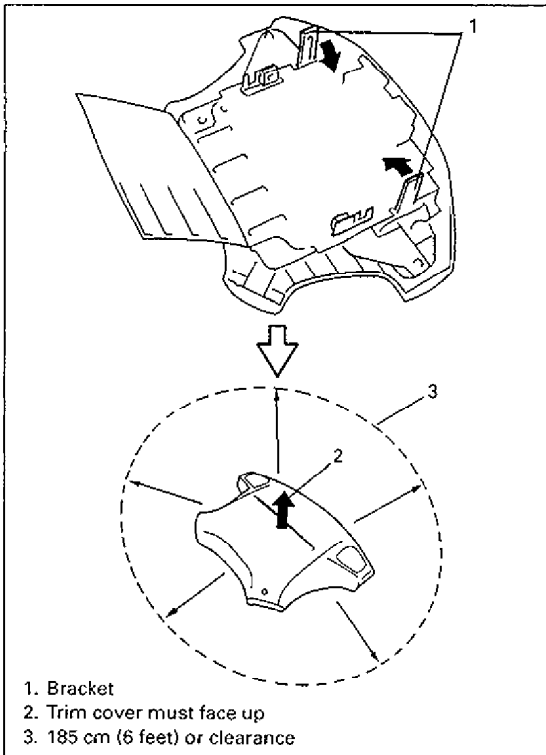
- 7) Remove connector holder.

- 8) Disconnect inflator connector.

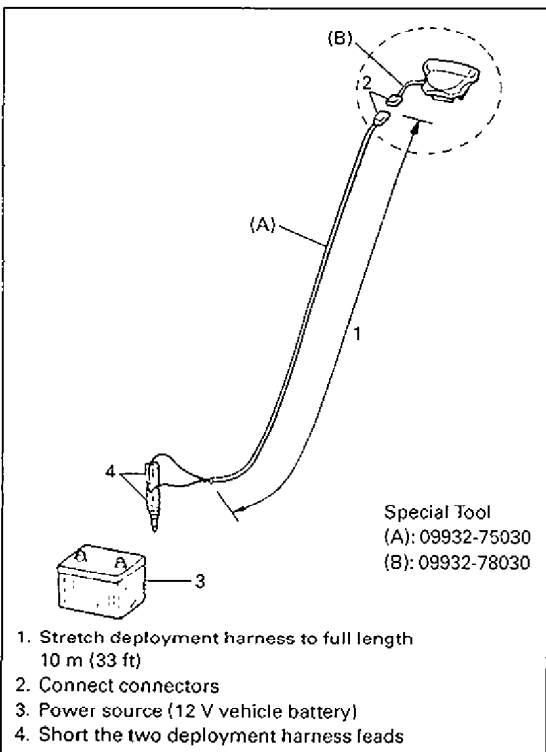
- i) Remove connector lock.
- ii) With claw of connector pressed, pull out connector on the SDM side.



75F00-10B-22-1



75F00-10B-22-3



75F00-10B-22-5

- 9) Connect special tool (air bag deployment adapter kit) to inflator connector.
 - i) Connect connector
 - ii) Lock connector with connector lock

Special Tool (Air Bag Deployment Adapter Kit)

(B): 09932-78030

- 10) Bend the bracket on the back side of the driver air bag (inflator) module fully in the direction of the arrow in the figure.
- 11) 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.
- 12) Place the driver air bag (inflator) module, with its vinyl trim cover facing up, on the ground in the space just cleared.

- 13) Stretch the deployment harness from the driver air bag (inflator) module to its full length 10 m (33 ft).
- 14) 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.
- 15) Verify that the area around the driver air bag (inflator) module is clear of all people and loose or flammable objects.
- 16) Verify that the driver air bag (inflator) module is resting with its vinyl trim cover facing up.
- 17) Connect the driver air bag (inflator) module to the deployment harness connector and lock connector with lock lever.
- 18) Notify all people in the immediate area that you intend to deploy the air bag (inflator) module.

NOTE:

When the air bag deploys, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to deploy the air bag (inflator) module and suitable ear protection should be worn.

NOTE

- When the air bag deploys, the driver air bag (inflator) module may jump about 30 cm (one foot) vertically. This is a normal reaction of the driver air bag (inflator) module to the force of the rapid gas expansion inside the air bag.
- After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue.

This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction.

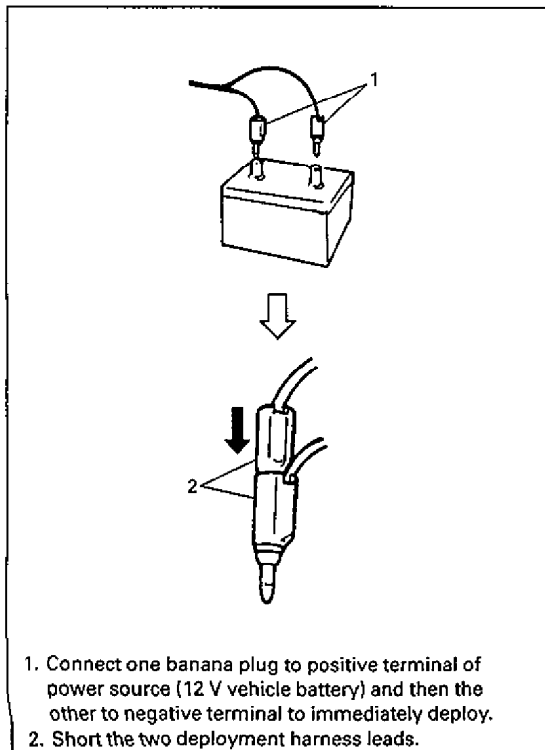
WARNING:

Safety precautions must be observed when handling a deployed air bag (inflator) module.

- After deployment, the metal surfaces of the air bag (inflator) module will be very hot. Do not touch the metal areas of the air bag (inflator) module for about 30 minutes after deployment.
- Do not place the deployed air bag (inflator) module near any flammable objects.
- Do not apply water, oil, etc. to deployed air bag (inflator) module.
- If the deployed air bag (inflator) module must be moved before it is cool, wear gloves and handle by the air bag or vinyl trim.

Failure to follow procedures may result in fire or personal injury.

75F00-10B-23-3

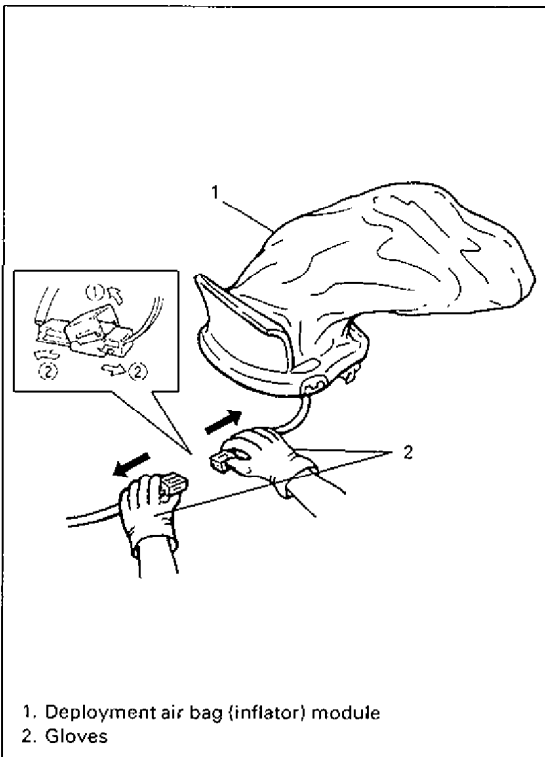


75F00-10B-23-5

- 19) Separate the two banana plugs on the deployment harness.
- 20) Connect the deployment harness to the power source (12 V vehicle battery) to immediately deploy the air bag.
- 21) Disconnect the deployment harness from power source (12 V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.

- 22) In the unlikely event that the driver air bag (inflator) module did not deploy after following these procedures, proceed immediately with Steps 27) through 30). If the air bag (inflator) module did deploy, proceed with Step 23) through 26).

75F00-10B-24-1



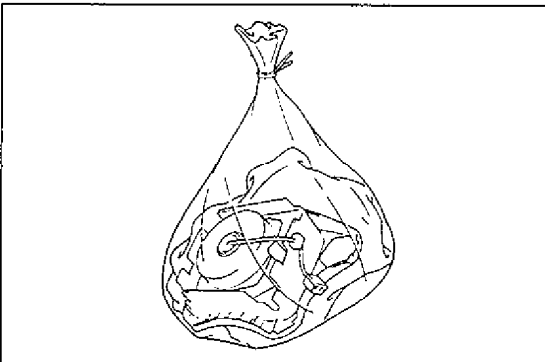
- 23) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module.

NOTE:

As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

- 24) 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.

75F00-10B-24-3



- 25) 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) Module Disposal" in detail.)

- 26) 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.

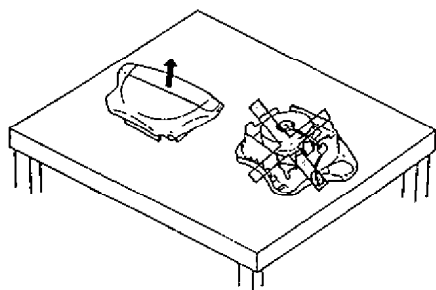
- 27) Ensure that the deployment harness has been disconnected from the power source and that its two banana plugs have been shorted together by fully seating one banana plug into the other.
- 28) Disconnect the deployment harness from the air bag (inflator) module.

75F00-10B-25-1

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.



75F00-10B-25-4

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.

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.

- 29) Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests.
- 30) Contact your local distributor for further assistance.

DEPLOYED AIR BAG (INFLATOR) MODULE DISPOSAL

WARNING:

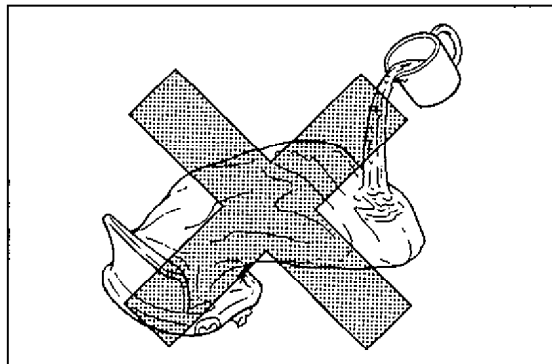
Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which may cause personal injury. Undeployed air bag (inflator) module must not be disposed of through normal refuse channels.

The undeployed air bag (inflator) module contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

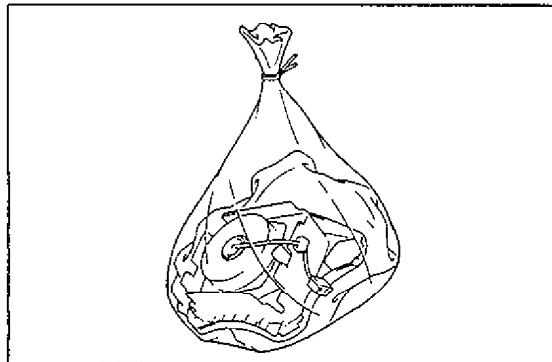
Deployed air bag (inflator) module can be disposed of through normal refuse channels just like any other parts. For their disposal, however, following points should be noted.

- 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 alone, be sure to seal it in a vinyl bag.
- When air bag (inflator) module 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.

75F00-10B-26-2



75F00-10B-26-3

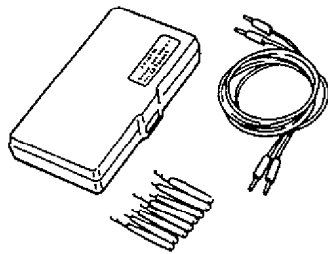
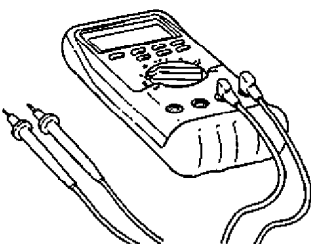
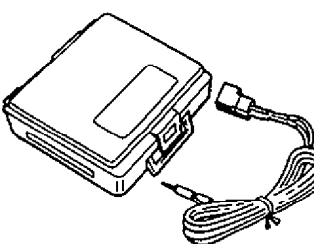
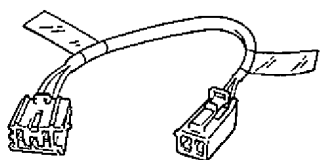


75F00-10B-26-4

TIGHTENING TORQUE SPECIFICATION

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Driver air bag (inflator) module assembly bolt	Refer to Section 3C1.		

SPECIAL TOOLS

 09932-76010 Connector test adapter kit	 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.	 09932-75030 Air bag deployment harness
 09932-78030 Air bag deployment adapter kit		

SECTION 10B1

AIR BAG SYSTEM (WITH SEAT BELT PRETENSIONER)

WARNING:

Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and CAUTIONS in this section and Precautions, Air Bag System Components and Wiring Location View in this section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintended activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.

CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

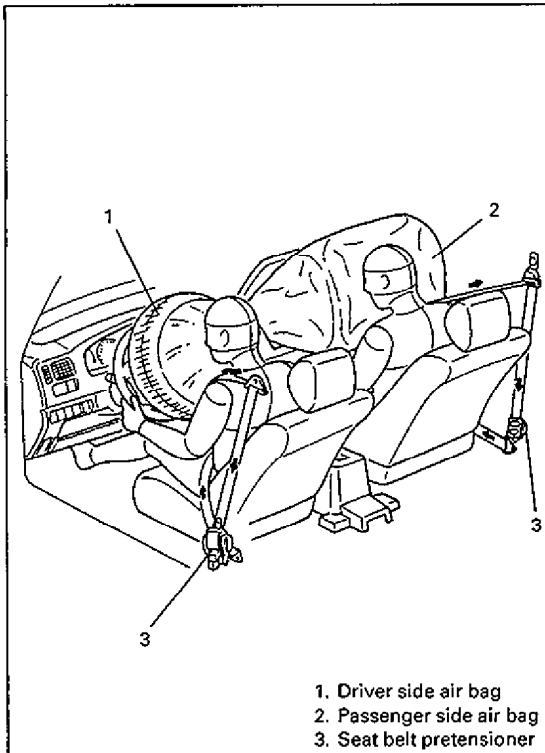
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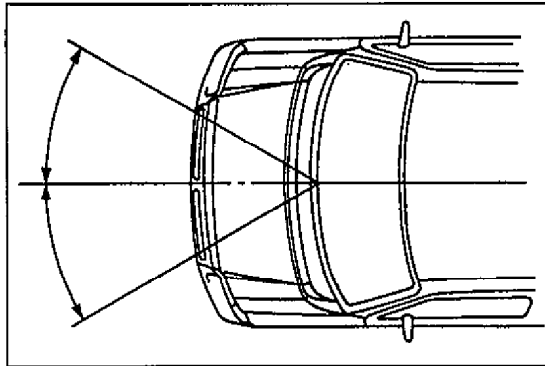
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GENERAL DESCRIPTION

With the air bag system which includes air bags for both the driver's and passenger's sides as well as the seat belt pretensioners, 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.



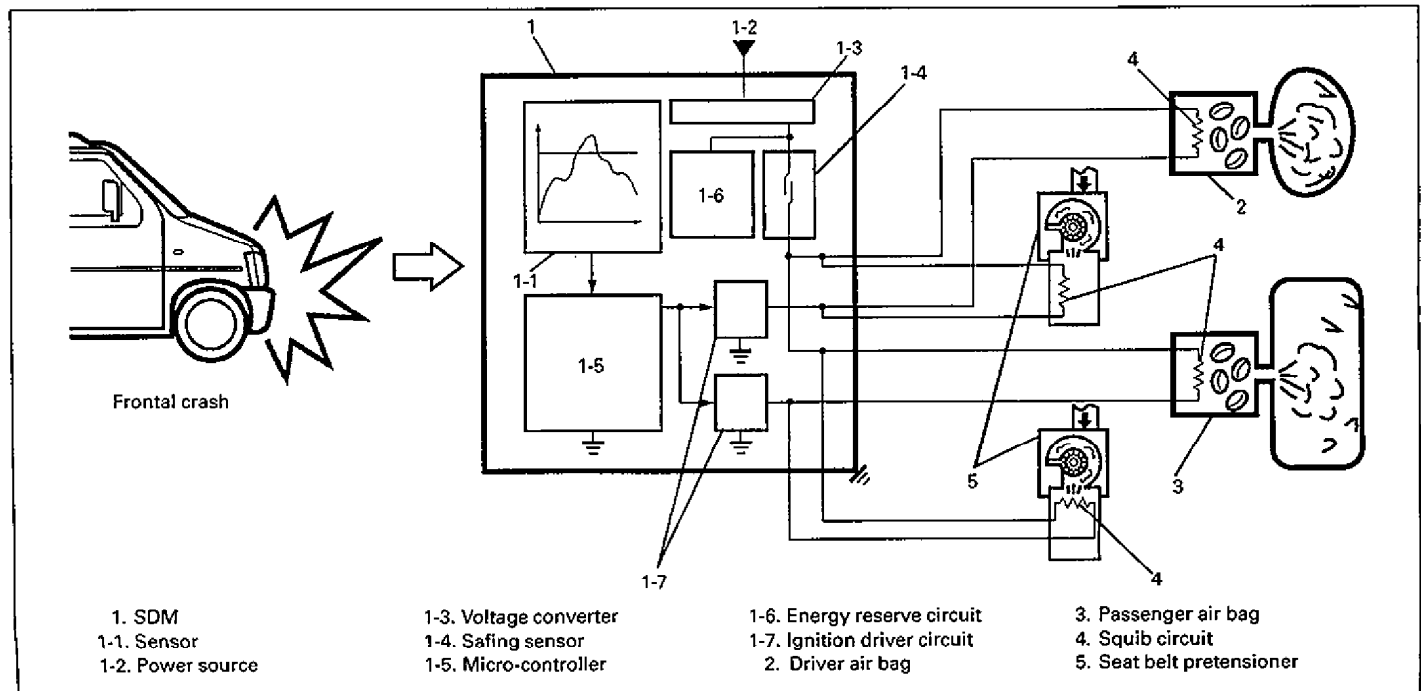
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75F00-10B1-3-3

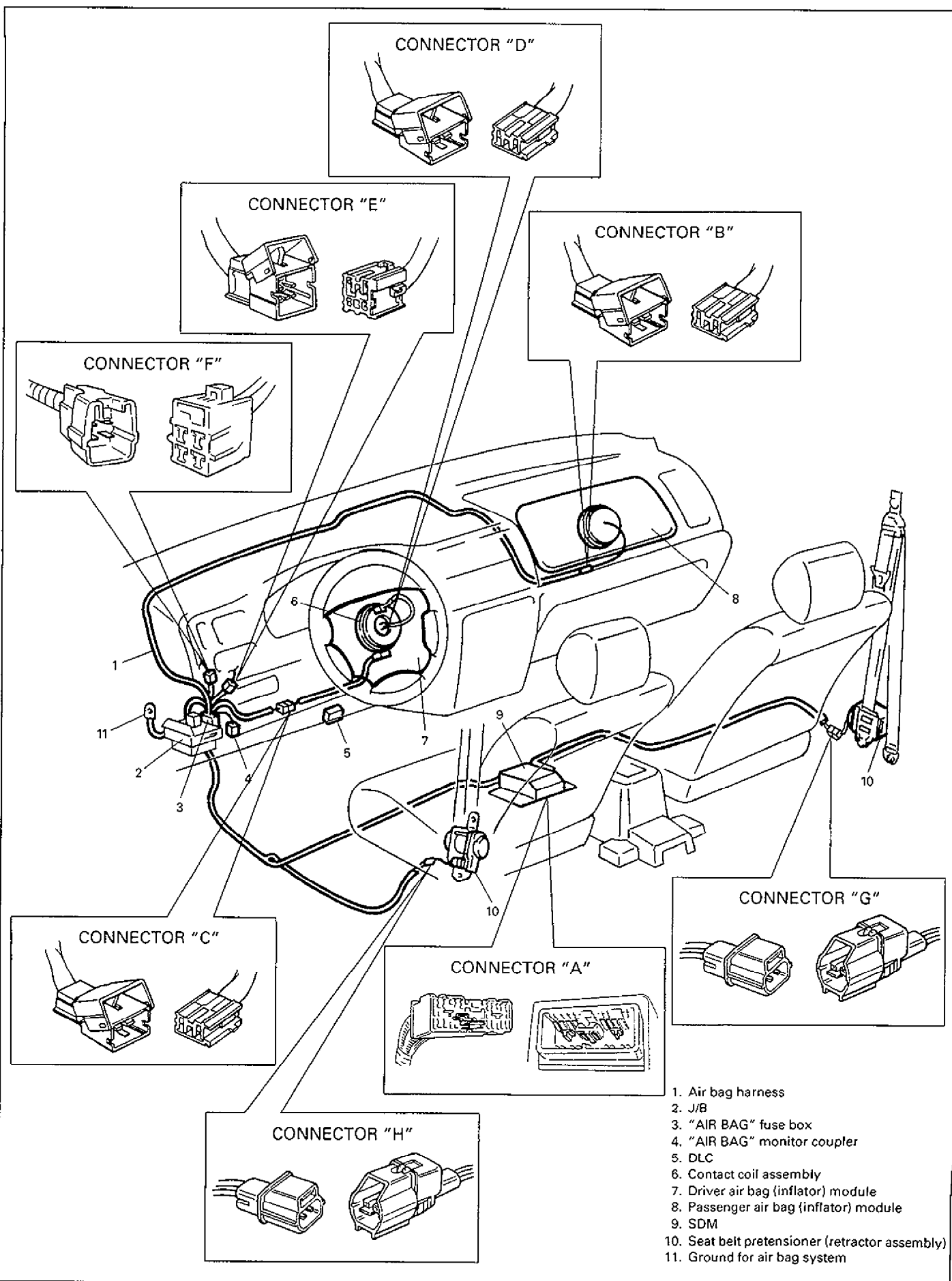
The air bag system is designed to activate only in severe frontal collisions. It is not designed to activate in rear impacts, side impacts, rollovers, or minor frontal collisions, since it would offer no protection in those types of accidents.

OPERATION OF AIR BAG SYSTEM AT COLLISION



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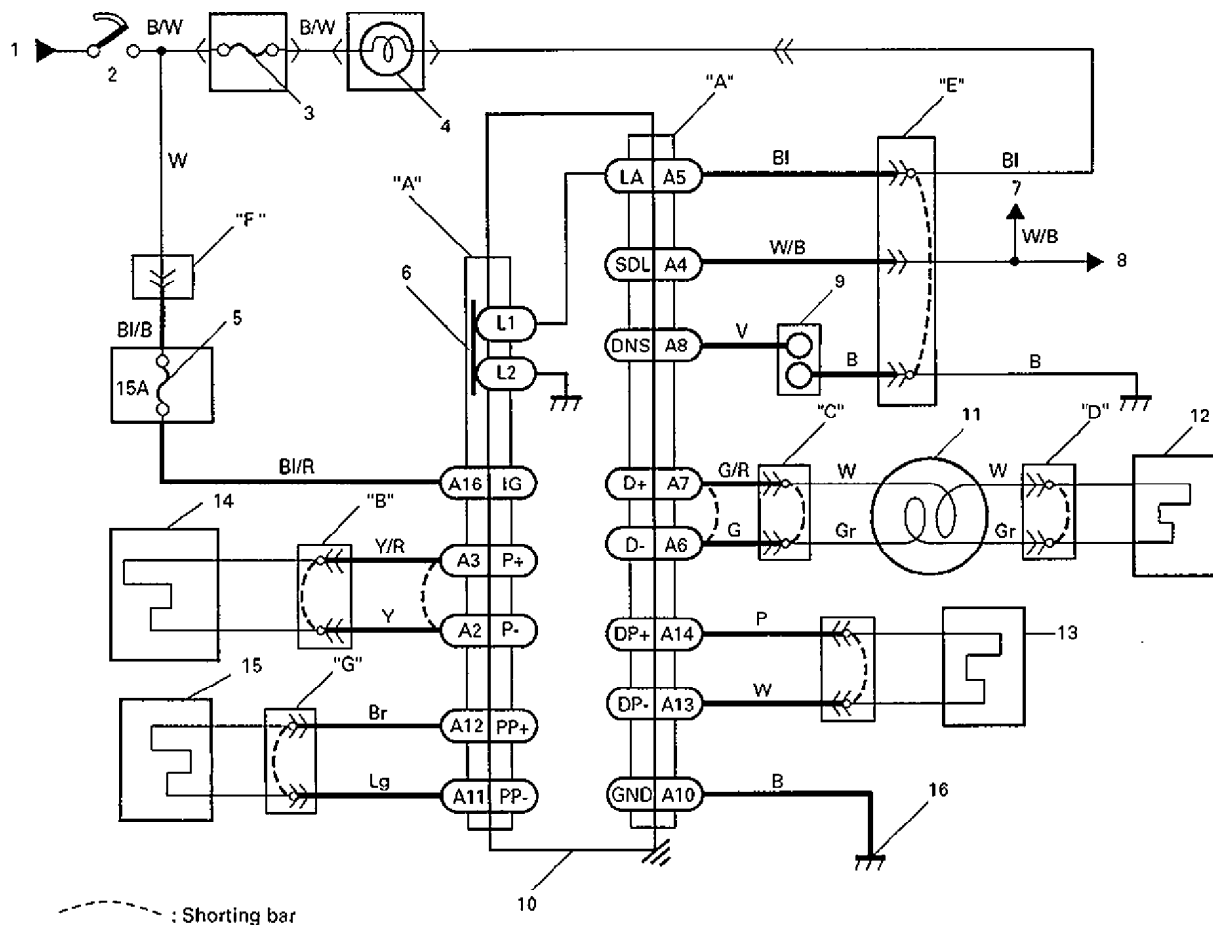
SYSTEM COMPONENTS AND WIRING LOCATION VIEW AND CONNECTORS



SYSTEM WIRING DIAGRAM

WIRE HARNESS COLOR

B : Black	G : Green	V : Violet
B/W : Black/White	Gr : Gray	Y : Yellow
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		

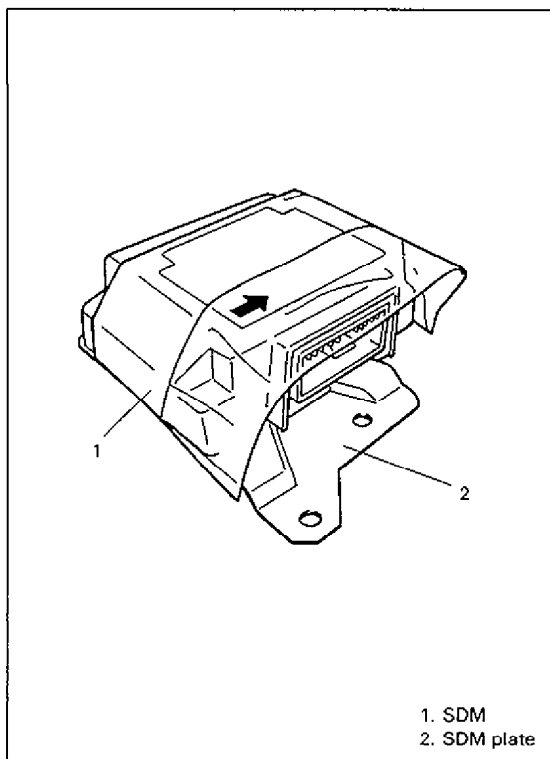


TERMINAL ARRANGEMENT OF SDM (VIEWED FROM HARNESS SIDE)

A8	A7	A6	A5	L1	L2	A4	A3	A2	A1
A16	A15	A14	A13			A12	A11	A10	A9

CONNECTOR "A" (SDM connector)

TERMINAL	CIRCUIT
A1	—
A2	—
A3	Passenger air bag (inflator) module Low High
A4	Data link connector (DLC)
A5	"AIR BAG" warning lamp
A6	—
A7	Driver air bag (inflator) module Low High
A8	Diagnosis switch
A9	—
A10	Ground
A11	—
A12	Passenger pretensioner Low High
A13	Driver pretensioner Low High
A14	—
A15	—
A16	Ignition switch (power source)



75F00-10B1-6-2

COMPONENTS DESCRIPTION

SDM (SENSING AND DIAGNOSTIC MODULE)

WARNING:

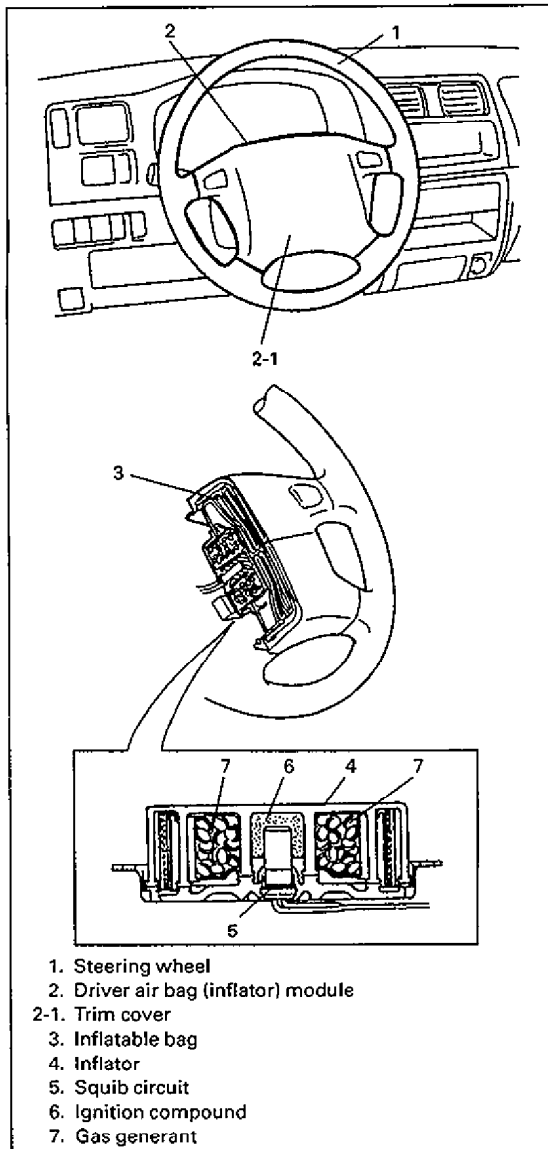
- During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).
- Be sure to read "Precautions" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or undeployment of the air bag when necessary.

CAUTION:

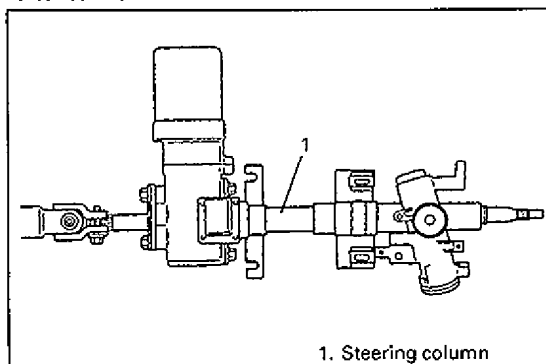
After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to "Diagnosis" when checking the SDM.

The Sensing and Diagnostic Module (SDM) is designed to perform the following functions in the air bag system:

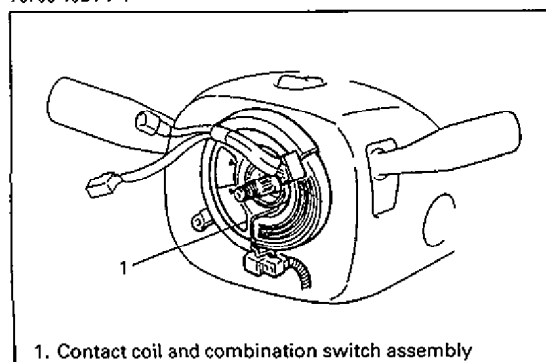
- Energy Reserve
 - The SDM maintains a reserve energy supply to provide deployment energy after ignition voltage is lost in a frontal crash.
- Frontal Crash Detection
 - The SDM monitors vehicle velocity changes to detect frontal crashes which are severe enough to warrant deployment.
- Air Bag Deployment
 - When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the air bag (inflator) modules to deploy the air bags.
- Seat Belt Pretensioner Activation
 - When a frontal crash of sufficient force is detected, the SDM will cause enough current to flow through the seat belt pretensioners to activate them.
- Malfunction Detection
 - The SDM performs diagnostic monitoring of the air bag system electrical components and sets a DTC when a malfunction is detected.
- Malfunction Diagnosis
 - • The SDM provides air bag diagnostic trouble codes by flashing "AIR BAG" warning lamp when on-board diagnosis function is used.
 - The SDM displays air bag diagnostic trouble codes and system status information through the use of special tool (Tech 1 (scan tool)).
- "AIR BAG" Warning Lamp Control
 - The light is turned ON to warn the driver of occurrence of a trouble and made to turn ON to check the burned bulb of "AIR BAG" warning lamp.
- Communication with Tech 1
 - • DTC display to DTC clear.
 - In response to the output request from Tech 1, DTC recorded in the memory, System ID, each initiator circuit resistance and power source voltage as recognized by SDM at the time of the output request are provided.



75F00-10B1-7-3



75F00-10B1-7-4



75F00-10B1-7-5

DRIVER AIR BAG (INFLATOR) MODULE

WARNING:

- Never attempt to disassemble or repair the driver air bag (inflator) module. If any abnormality is found, be sure to replace it with new one as an assembly.
- Be sure to read "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.

The driver air bag (inflator) module consists of an inflatable bag, and inflator and a trim cover, and is mounted to the center of the steering wheel.

The driver inflator consists of a squib circuit, an ignition compound and a gas generant.

When a collision occurs, the deployment current from SDM flows through the squib circuit to ignite the ignition compound by which the gas generant ignites instantly.

As the gas generant burns, a large amount of nitrogen gas is generated and deploys the inflatable bag quickly.

When inflatable bag deploys, its expansion force breaks trim cover and bag come out of the center of the steering wheel. Nitrogen gas in inflatable bag is let out through two exhaust holes in the back of the bag at the right and left.

STEERING COLUMN

This steering column uses a collapsible type column which absorbs the energy when an impact is applied to it.

CONTACT COIL AND COMBINATION SWITCH ASSEMBLY

The contact coil assembly consists of three current carrying coils; two for the deployment loop and one for the horn circuit. The contact coil assembly is combined with the combination switch assembly and mounted together on the steering column, allowing rotation of the steering wheel while maintaining continuous contact of the driver deployment loop to the driver air bag (inflator) module.

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 "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.

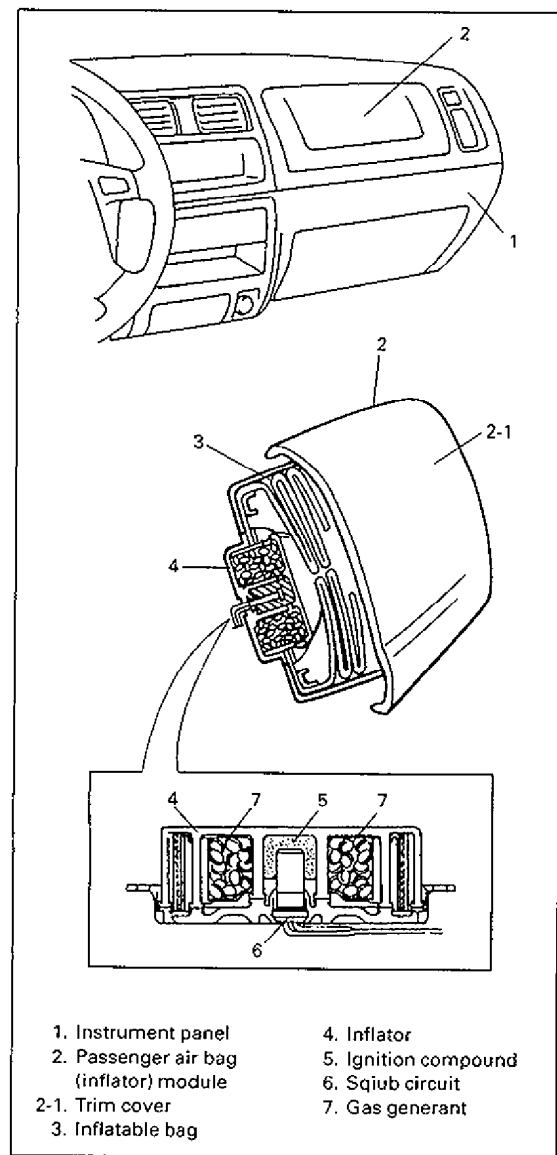
The passenger air bag (inflator) module consists of an inflatable bag, an inflator and a trim cover, and is mounted above the glove box in the instrument panel on the passenger side.

The passenger inflator consists of squib circuit, ignition compound and a gas generant.

When a collision occurs, the deployment current from SDM flows through the squib circuit to ignite the ignition compound by which the gas generant ignites instantly.

As the gas generant burns, a large amount of nitrogen gas is generated and deploys the inflatable bag quickly.

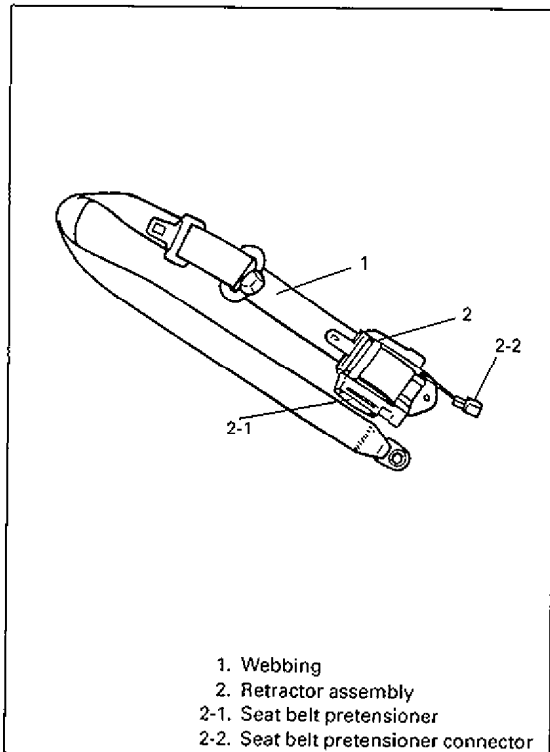
When inflatable bag deploys, its expansion force pushes up trim cover and bag comes out from the top of the glove box. Nitrogen gas in the inflatable bag is let out through two exhaust holes in the right and left sides of the bag.



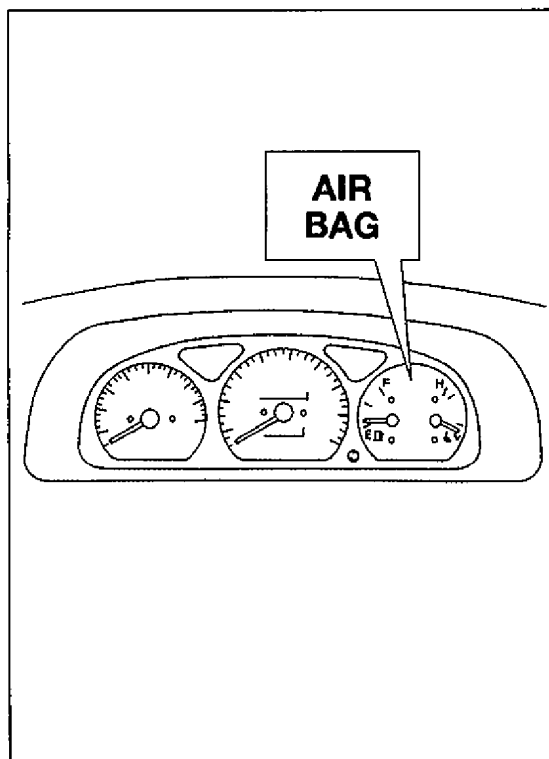
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SEAT BELT PRETENSIONER

Refer to "Seat Belt Pretensioner" under "General Description" in SECTION 10A.



75F00-10B1-8-5



75F00-10B1-9-2

"AIR BAG" WARNING LAMP

The "AIR BAG" warning lamp is located in the combination meter and controlled by SDM.

The "AIR BAG" warning lamp is used in the air bag system to do the following:

- Verify lamp and SDM operation by coming on about 6 seconds when the ignition switch is first turned "ON".
- Warn the vehicle driver of air bag electrical system malfunctions which could potentially affect the operation of the air bag system. These malfunctions could result in system inoperative in case of a frontal crash or activation of the system for conditions less severe than intended.

The "AIR BAG" warning lamp is the key to driver notification of air bag system malfunctions. For proper lamp operation, refer to the "Air Bag Diagnostic System Check Flow Table" in this section.

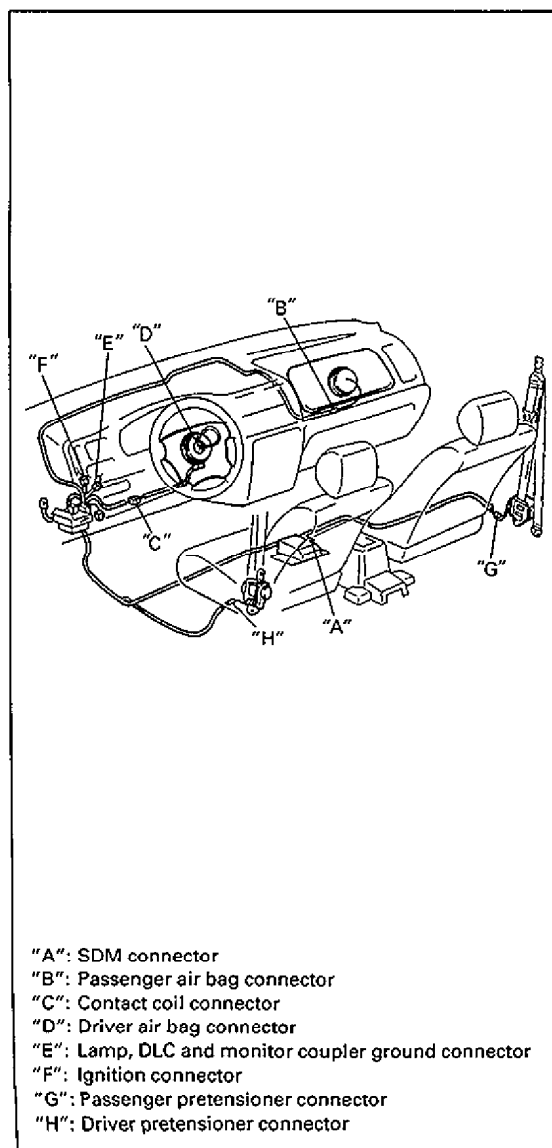
AIR BAG WIRE HARNESS AND CONNECTORS

CAUTION:

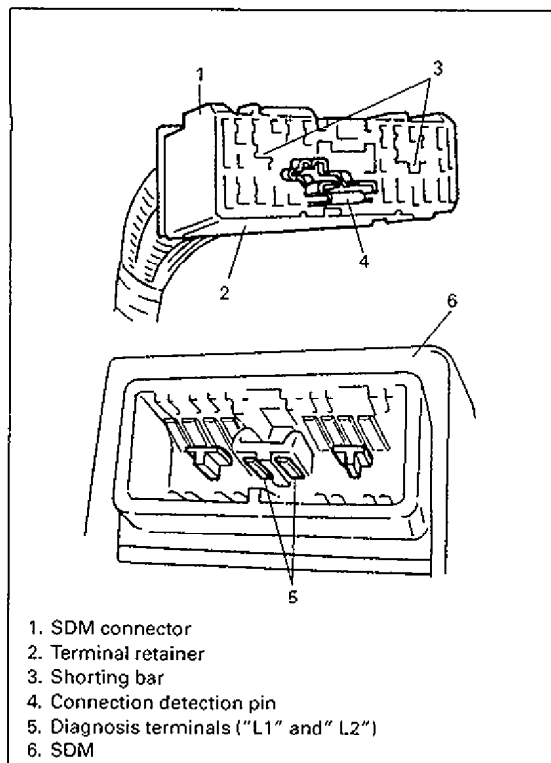
When an open in wire harness, damaged wire harness, connector or terminals is found, replace wire harness, connectors and terminals as an assembly.

The air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

Each connector has a terminal lock mechanism (operated by the terminal retainer), connectors "A", "B", "C", "D" and "E" have a short mechanism (operated by shorting bar), connectors "B", "C", "D" and "E" have a connector lock mechanism (operated by connector lock lever) and connector "A" has electrical connection check mechanism (operated by connection detection pin).



75F00-10B1-9-5



75F00-10B1-10-2

"A": SDM connector**Terminal retainer (Terminal position assurance: TPA):**

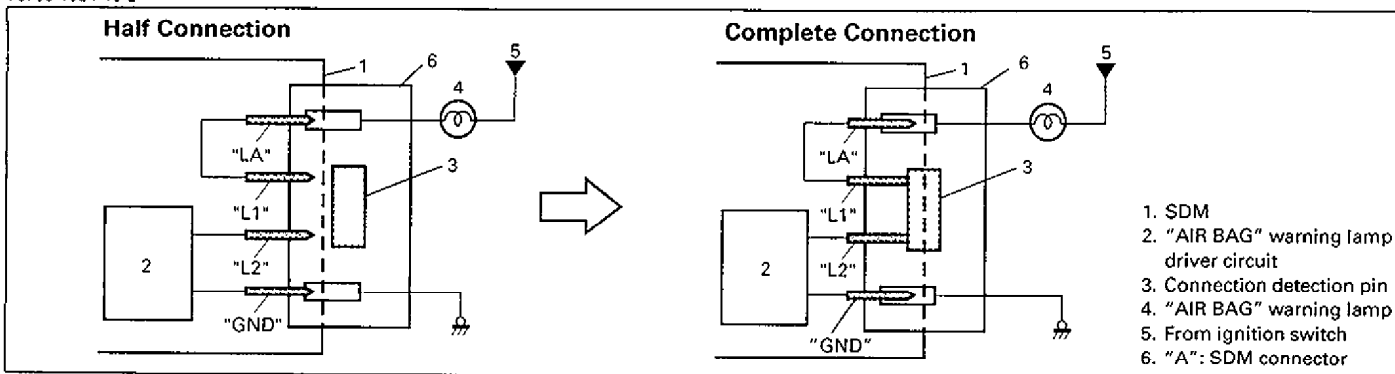
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

Shorting bar:

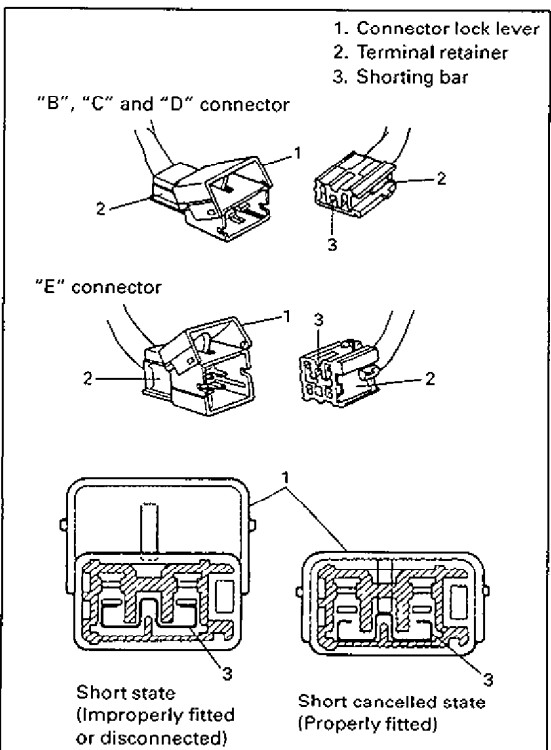
Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

Electrical connection check mechanism:

This mechanism is designed to electrically check if connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the connection detection pin connects with the diagnosis terminals when the connector housing lock is in the locked condition.



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75F00-10B1-10-5

"B": Passenger air bag connector**"C": Contact coil connector****"D": Driver air bag connector****"E": Lamp, DLC and monitor coupler ground connector****Terminal retainer (Terminal position assurance: TPA):**

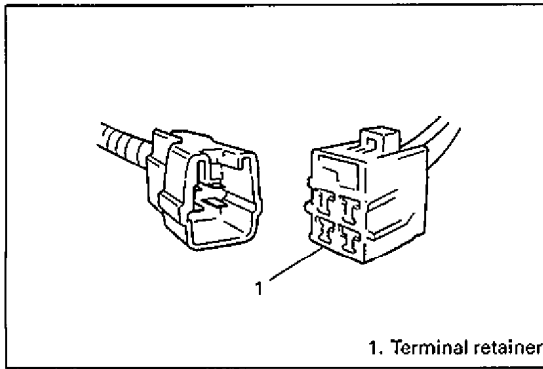
The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

Shorting bar:

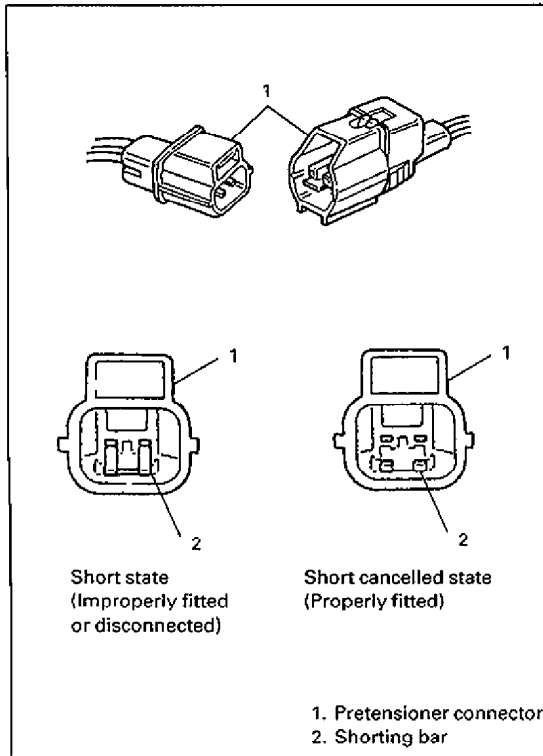
Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

Connector lock lever:

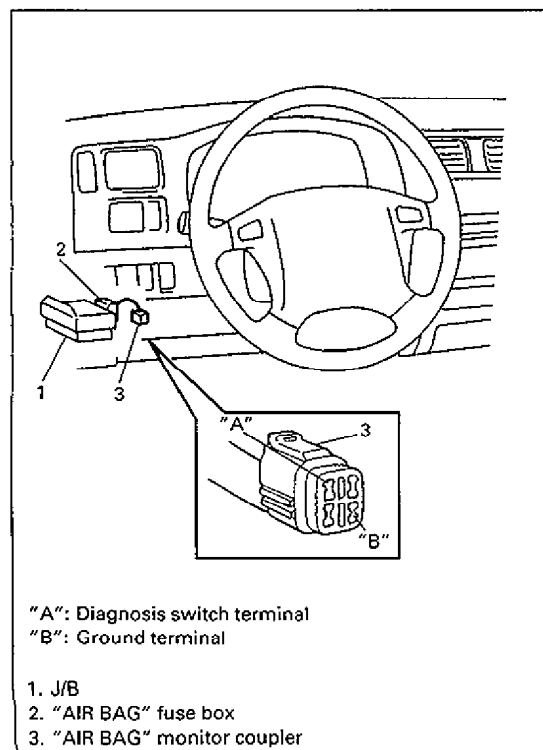
Functions of the connector lock lever are: to connect connectors securely, to cancel shorts and to lock connectors against disconnection.



75F00-10B1-11-1



75F00-10B1-11-3



75F00-10B1-11-5

"F": Ignition connector

Terminal retainer (Terminal position assurance: TPA):

The function of the TPA is to keep the terminal securely seated in the connector body. The TPA is not to be removed from the connector body.

"G": Passenger pretensioner connector

"H": Driver pretensioner connector

Shorting bar:

Function of the shorting bar is to short circuit the "HI" and "LO" terminals of the initiator circuit on its module side when the connector is disconnected. This prevents potential difference from occurring between both terminals to avoid malfunction.

"AIR BAG" MONITOR COUPLER

"AIR BAG" monitor coupler has a diagnosis switch terminal and a ground terminal.

When diagnosis switch terminal is grounded, diagnosis signal is fed to SDM and SDM outputs DTC (diagnostic trouble code). This code is indicated by flashing "AIR BAG" warning lamp in combination meter.

(For details of DTC (diagnostic trouble code), refer to 10B1-17.)

DEFINITIONS

AIR BAG – An inflatable cloth cushion designed to deploy in certain frontal crashes. It supplements the protection offered by the seat belts by distributing the impact load more evenly over the vehicle occupant's head and torso.

AIR BAG WIRE HARNESS – The wires and connectors that electrically connect the components in the air bag system.

B+ – Battery voltage, the voltage available at the battery at the time of the indicated measurement. With the key "ON" and the engine not running, the system voltage will likely be between 10 and 14 volts. At idle the voltage may be 14 to 16 volts. The voltage could be as low as 7 to 10 volts during engine cranking.

BULB CHECK – The SDM will cause the "AIR BAG" warning lamp to come on about 6 seconds and then go "OFF" whenever the ignition switch transitions to the "ON" position from any other ignition switch position and no malfunctions are detected.

DATA LINK CONNECTOR (DLC) – Formerly "ALDL", a connector which is connected by wires to multiple on-board computers allowing communication with an off-board computer, such as a Tech-1(scan tool).

DEPLOY – To inflate the air bag.

DEPLOYMENT LOOPS – The circuits which supply current to the air bag (inflator) modules to deploy the air bags.

DIAGNOSTIC TROUBLE CODE (DTC) – A numerical designator used by the SDM to indicate specific air bag system malfunctions.

INITIATOR – The electrical component inside the air bag (inflator) module and seat belt pretensioner which, when sufficient current flows, sets off the chemical reaction that inflates the air bag and activates pretensioner.

IGNITION COMPOUND – Compound that ignites instantly when heated by the current flowing through the heat wire.

SAFING SENSOR – This sensor has a function to set the squib circuits in operation whenever activation of the system is required and out of operation in normal driving states. SDM contains this sensor.

SCAN TOOL – An off-board computer, such as a Tech-1 used to read diagnostic information from on-board computers via the data link connector (DLC).

SDM – Sensing and Diagnostic Module which provides reserve energy to the initiator circuit, deploys the air bags and activates the pretensioners when required and performs diagnostic monitoring of all air bag system components.

SERIAL DATA – This is a series of data exchanged between SDM or other controller and Tech-1 (scan tool) for communication.

RESERVE VOLTAGE – The reserve energy supply (voltage) from the SDM which provides deployment and activation power when vehicle voltage is lost in a frontal crash.

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.

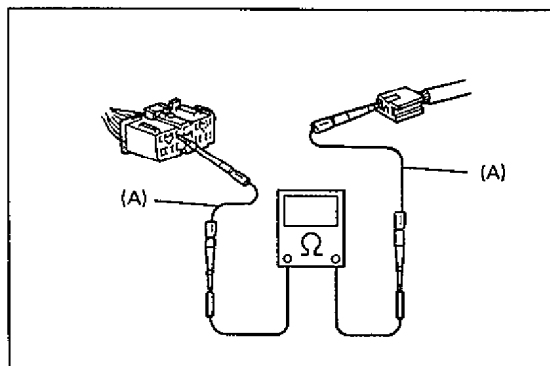
USE OF SPECIAL TOOLS

WARNING:

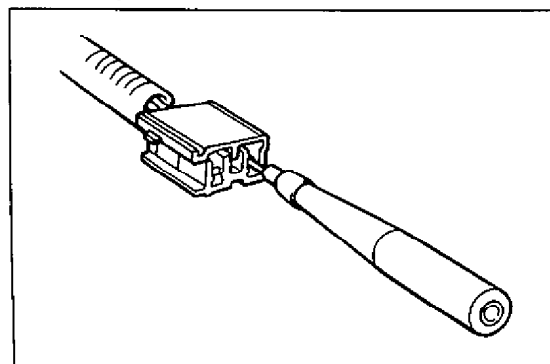
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

You should be familiar with the tools listed in this section under the heading "Special Tools." 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, Pretensioner Service Adapter Kit, Connector Test Adapter Kit and the Digital Multimeter.

75F00-10B1-13-3



75F00-10B1-13-4



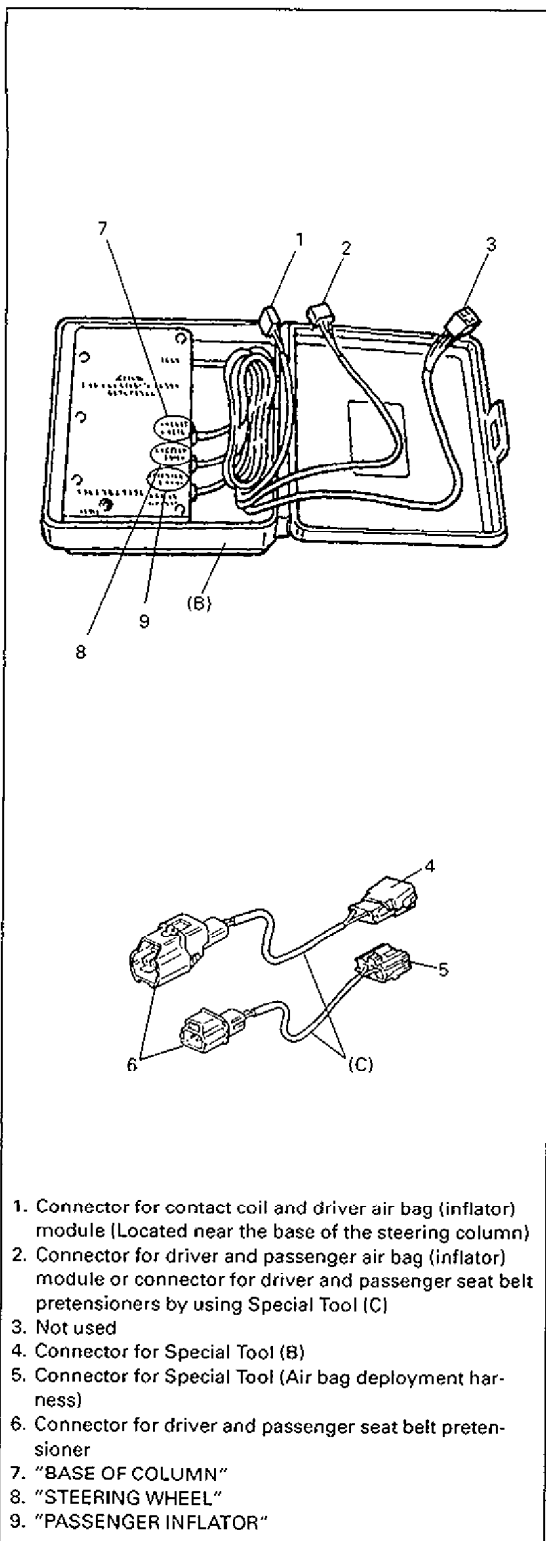
75F00-10B1-13-5

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 ("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 through special tool (C).

Another connector ("BASE OF COLUMN") is used to substitute the load of the driver air bag (inflator) module and the contact coil assembly when it is connected at the base of the column to the air bag wire harness.

The third connector ("PASSENGER INFLATOR") is 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.

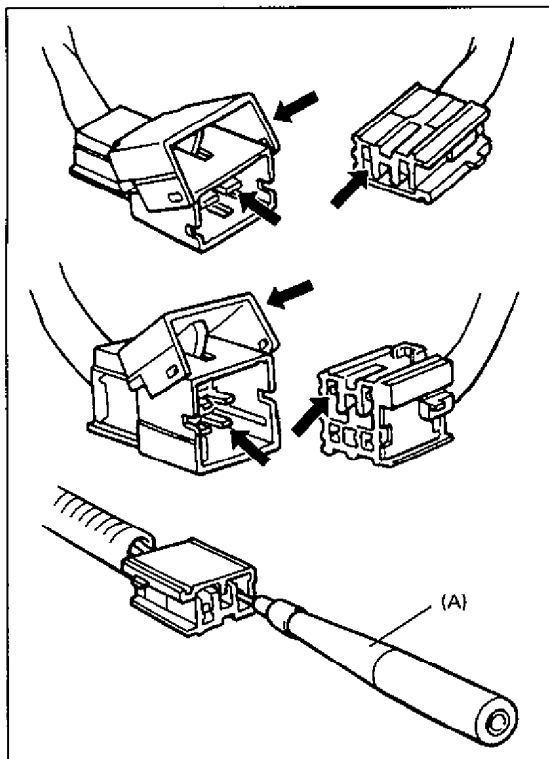
Special Tool (Pretensioner Service Adapter Kit)

(C): 09932-78020

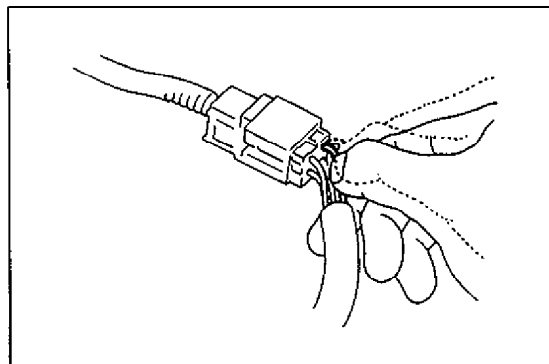
When diagnosing the driver and passenger seat belt pretensioners, this tool is used with special tool (B). It is also used when deploying the air bag. (For more information, refer to Seat Belt Pretensioners Disposal".)

INTERMITTENTS AND POOR CONNECTIONS

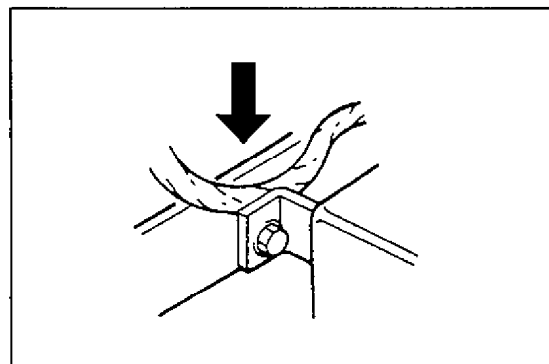
Most intermittents are caused by faulty electrical connections or wiring. When a check for proper connection is requested in a diagnostic flow table, perform careful check of suspect circuits for:



75F00-10B1-15-2



75F00-10B1-15-3



75F00-10B1-15-4

- 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.
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.

FLOW TABLE TEST DESCRIPTION

STEP1: Check that "AIR BAG" warning lamp lights.

STEP2: Check diagnosis switch circuit.

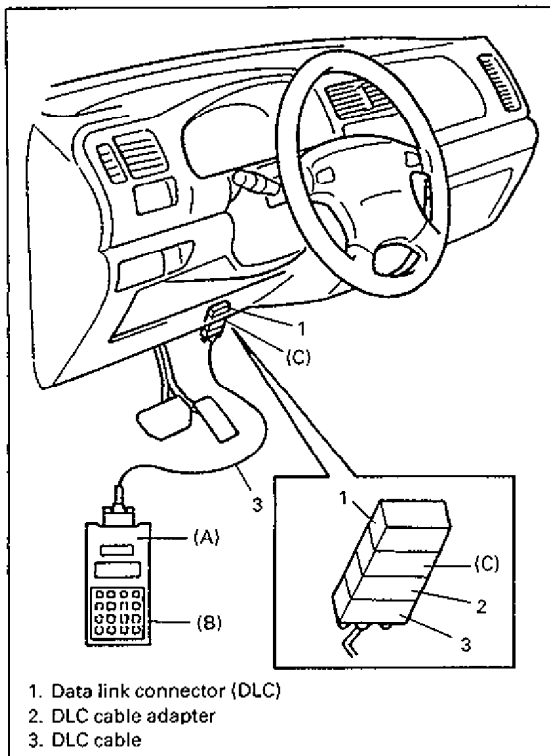
STEP3: Check that "AIR BAG" warning lamp turns off about 6 seconds after ignition switch is turned ON.

STEP4: Check that history codes are in SDM memory.

STEP5: Check that current code is in SDM memory.

AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE

STEP	ACTION	YES	NO
1	1) Make sure that battery voltage is about 11V or higher. 2) Note "AIR BAG" warning lamp as ignition switch is turned ON. 3) Does "AIR BAG" warning lamp come ON when ignition switch is turned ON?	Go to step 2.	"AIR BAG" warning lamp does not come "ON" Proceed to "Table B" on p.10B1-24.
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.10B1-26.	Go to step 3.
3	After coming ON for about 6 seconds, then does "AIR BAG" warning lamp turn OFF?	Go to step 4.	Go to step 5.
4	1) Check DTC, referring to "Diagnostic Trouble Code (DTC) Check" on p.10B1-18. 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.10B1-28. [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.10B1-19.) and repeat this table.
5	1) Check DTC, referring to "Diagnostic Trouble Code (DTC) Check" on p.10B1-18. 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.10B1-28. [Not using SUZUKI scan tool (Tech 1)] Is DTC 12 indicated ?	"AIR BAG" warning lamp come "ON" steady Proceed to "Table A" on p.10B1-22.	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.



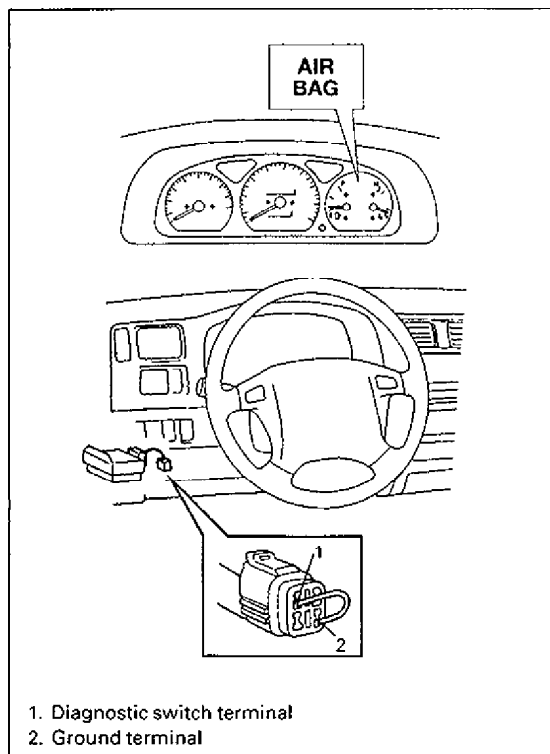
75F00-10B1-18-2

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 (including BCM 2.0 or later)****(C): 09931-96020 (16/12 pin DLC adapter)**

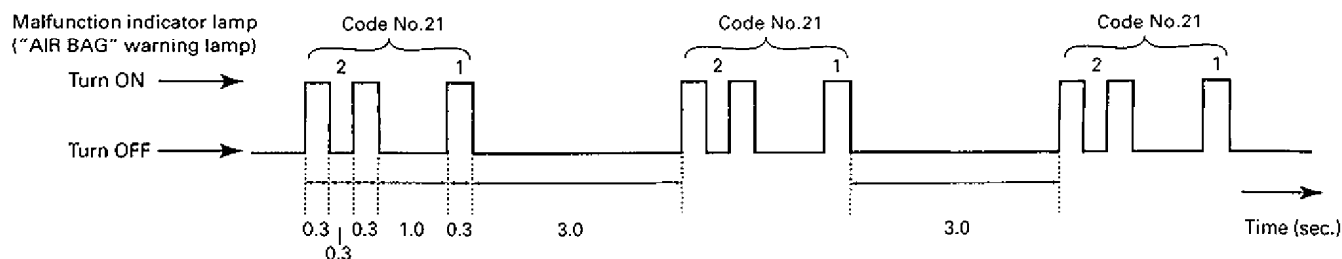
- 3) Turn ignition switch ON.
- 4) Read DTC according to instructions displayed on Tech 1 and print it or write it down. Refer to Tech 1 operator's manual for further details.
- 5) After completing the check, turn ignition switch OFF and disconnect Tech 1 from data link connector (DLC).



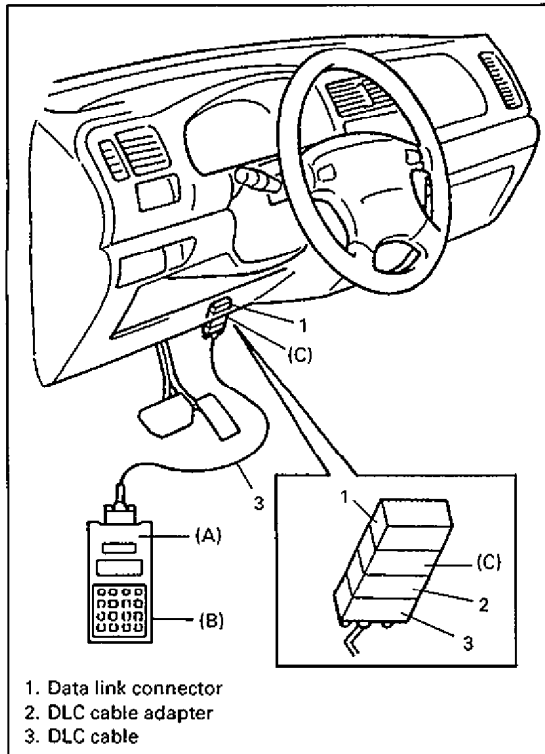
75F00-10B1-18-4

[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.10B1-24.
- 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.10B1-20 and 10B1-21.)
- 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

75F00-10B1-18-5



75F00-10B1-19-2

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 (including BCM 2.0 or later)****(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 (DTC 12) is displayed and not malfunction DTC.

NOTE:

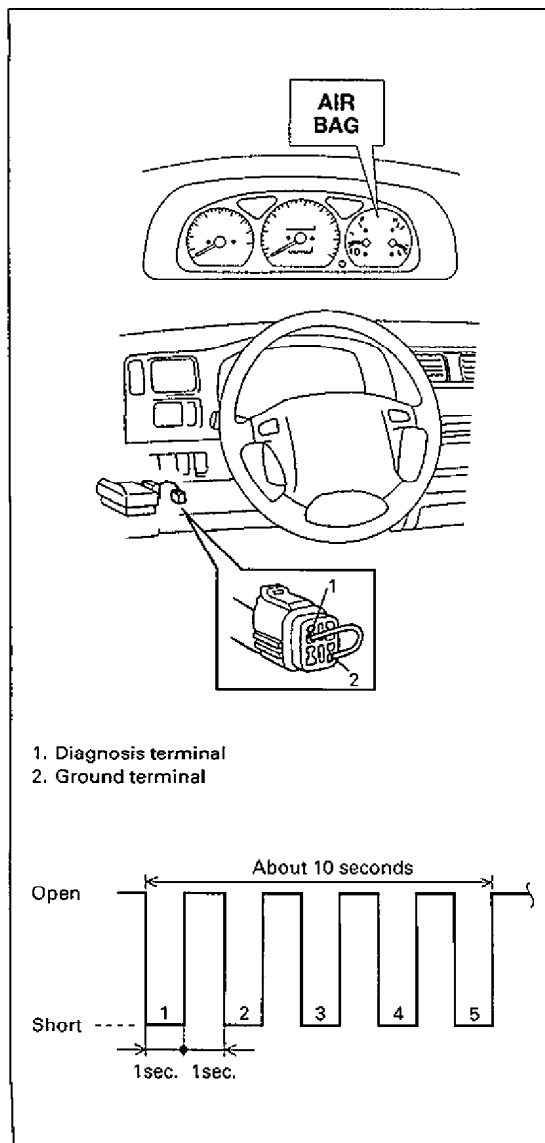
If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.

[Not using SUZUKI scan tool (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:

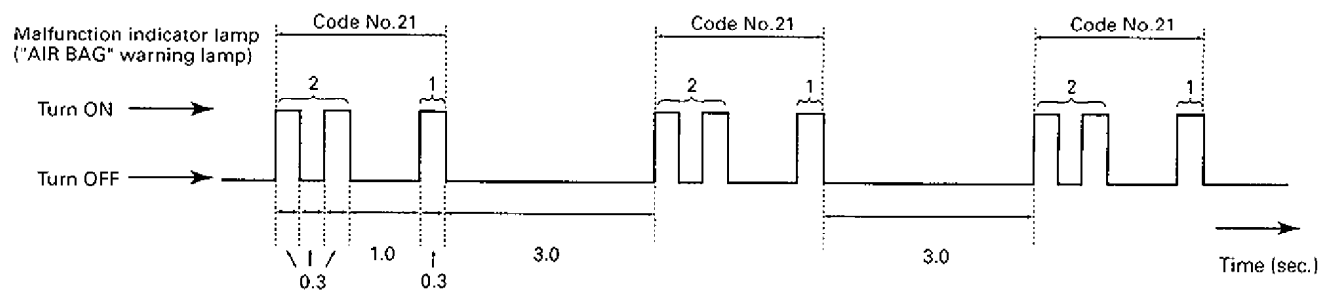
If DTC 51 or DTC 71 is stored in SDM, it is not possible to clear DTC.



75F00-10B1-19-5

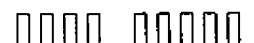
DIAGNOSTIC TROUBLE CODE TABLE (Page 1 of 2)

EXAMPLE: WHEN DRIVER AIR BAG INITIATOR CIRCUIT OPEN (CODE NO.21) IS SET



DIAGNOSTIC TROUBLE CODE		DIAGNOSIS		
NO.	MODE			
12		Normal		—
15		Passenger air bag circuit	Resistance high	Diagnose trouble according to "Diagnostic Flow Table" corresponding to each code No.
16			Resistance low	
18			Short to ground	
19			Short to power circuit	
21		Driver air bag circuit	Resistance high	
22			Resistance low	
24			Short to ground	
25			Short to power circuit	
31		Power source voltage	Too high	
32			Too low	

DIAGNOSTIC TROUBLE CODE TABLE (Page 2 of 2)

DIAGNOSTIC TROUBLE CODE		DIAGNOSIS		
NO.	MODE			
41		Driver pretensioner circuit	Resistance high	Diagnose trouble according to "Diagnostic Flow Table" corresponding to each code No.
42			Resistance low	
43			Short to ground	
44			Short to power circuit	
45		Passenger pretensioner circuit	Resistance high	
46			Resistance low	
47			Short to ground	
48			Short to power circuit	
51		SDM	Frontal crash detected	
71			Internal fault	
13			Specifications different between air bag system and SDM	

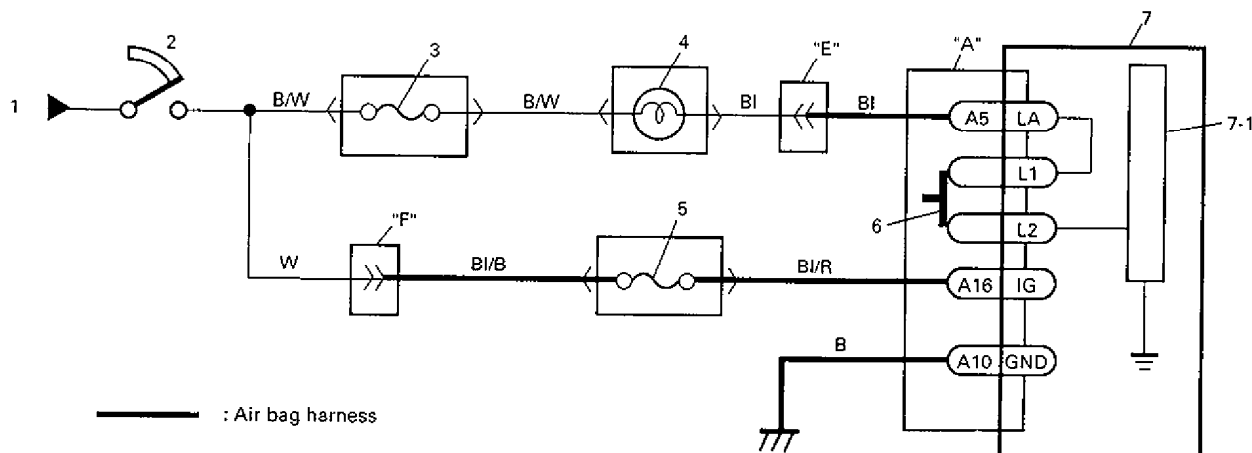
NOTE:

- When 2 or more codes are indicated, the lowest numbered code will appear first.
- If a code not listed on the table is displayed, then the SDM is faulty.
- Current DTC and history DTC can be identified by lighting and flashing of "AIR BAG" warning lamp as follows.

	Current DTC is set. (Abnormality exists at present.)	History DTC is set only. (Faulty condition occurred once in the past but normal condition is restored at present.)
"AIR BAG" warning lamp after ignition switch ON	Remains ON.	Light up for 6 seconds and turns off.
"AIR BAG" warning lamp when grounding diagnosis switch	Current DTC is displayed.	History DTC is displayed.

However, if a multiple number of DTC'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)



75F00-10B1-22-2

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 “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.

TABLE TEST DESCRIPTION

STEP1: Check “AIR BAG” fuse.

STEP2: Check power source circuit.

STEP3: Check “AIR BAG” warning lamp circuit.

TABLE A – "AIR BAG" WARNING LAMP COMES "ON" STEADY (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Ignition switch "OFF". 2) Remove and inspect "AIR BAG" fuse. 3) Is fuse good?	Go to step 2.	"BI/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 8V or more?	Go to step 3.	"BI/R" wire (between "AIR BAG" fuse and SDM connector) open "BI/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 8B. 2) Check resistance between "A5" terminal of SDM connector and body ground. 3) Is resistance 1 k Ω or more?	Substitute a known-good SDM and re-check.	"BI" wire (between combination meter and SDM connector) short to ground

Fig. for STEP 2

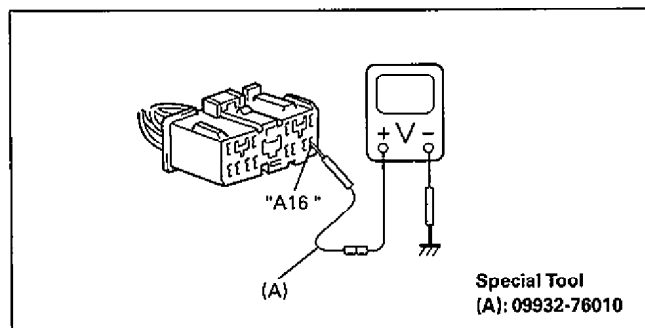
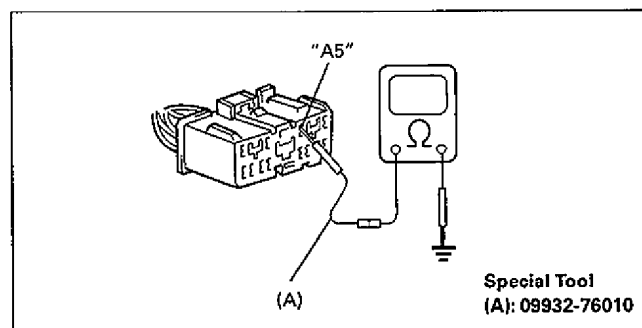
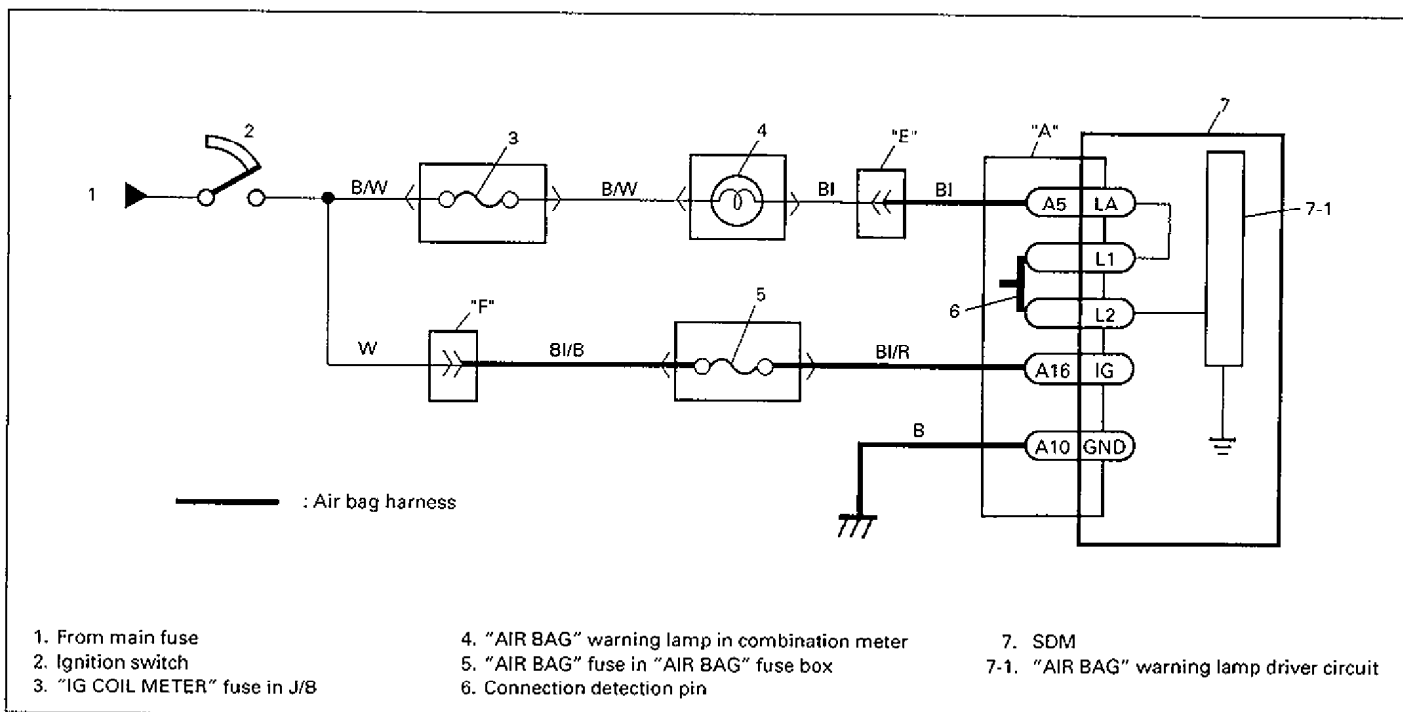


Fig. for STEP 3

**NOTE:**

Upon completion of inspection and repair work, perform 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.10B1-17 to confirm that the trouble has been corrected.

TABLE B – "AIR BAG" WARNING LAMP DOES NOT COME "ON" (Page 1 of 2)

75F00-10B1-24-2

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 "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.

TABLE TEST DESCRIPTION

STEP1: Check combination meter power feed circuit.

STEP2: Check electrical connection check mechanism in SDM connector.

STEP3: Check "AIR BAG" warning lamp circuit.

STEP4: Check open in "AIR BAG" warning lamp circuit.

STEP5: Check short from "AIR BAG" warning lamp circuit to power circuit.

STEP6: Check "AIR BAG" bulb.

75F00-10B1-24-4

TABLE B – “AIR BAG” WARNING LAMP DOES NOT COME “ON” (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Set parking brake. 2) Note combination meter as ignition switch is turned ON. 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, referring to p.10B1-10. 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 9V or more?	Substitute a known-good SDM and recheck.	Go to step 4.
4	1) Remove combination meter, referring to SECTION 8B. 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 “BI” 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 “BI” 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 9V or more?	Repair short from “BI” 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

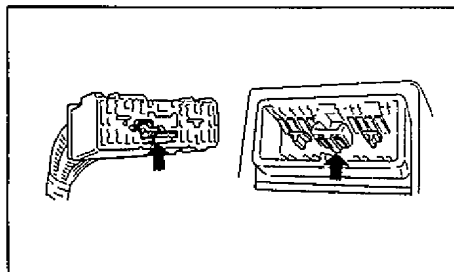


Fig. for STEP 3 and 5

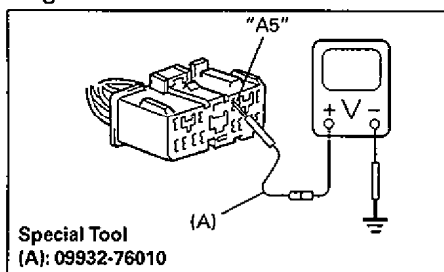
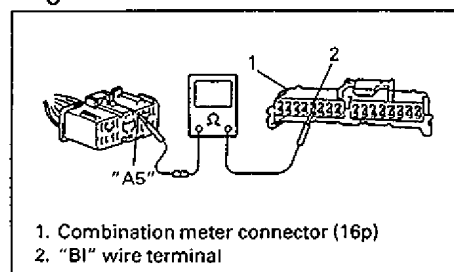


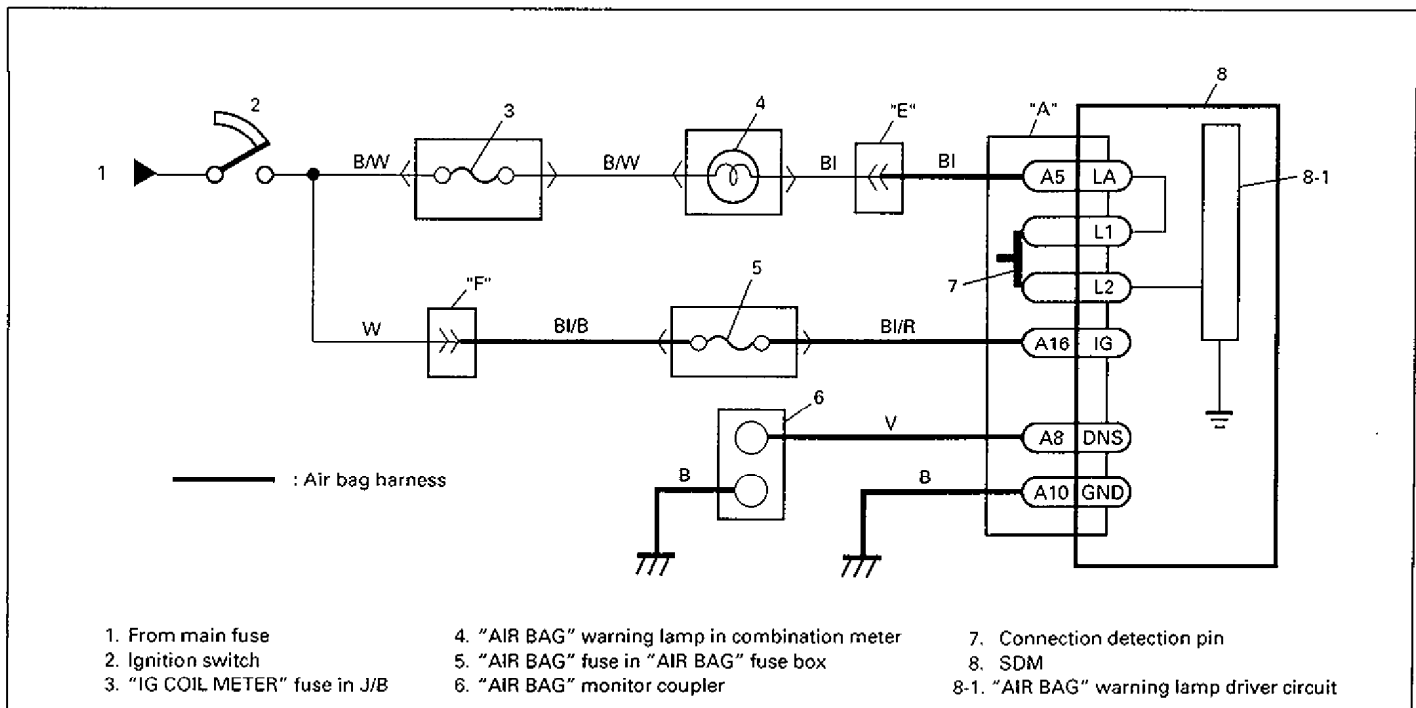
Fig. for STEP 4

**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.10B1-17 to confirm that the trouble has been corrected.

TABLE C – "AIR BAG" WARNING LAMP FLASHES (Page 1 of 2)



75F00-10B1-26-2

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 "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.

TABLE TEST DESCRIPTION

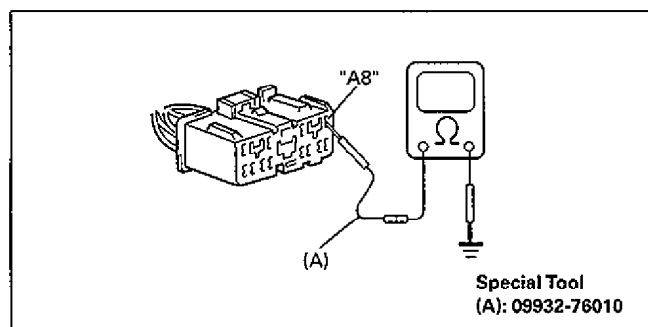
STEP 1: Check "AIR BAG" monitor coupler.

STEP 2: Check diagnosis switch circuit for air bag system.

TABLE C – “AIR BAG” WARNING LAMP FLASHES (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Check “AIR BAG” monitor coupler. 2) Is it connected diagnosis switch terminal and ground terminal in “AIR BAG” monitor coupler by service wire?	Go to step 2.	Remove service wire.
2	1) With ignition switch OFF, disconnect SDM. 2) Measure resistance between “A8” terminal of SDM connector and body ground. 3) Is resistance 1 k Ω or more?	Substitute a known-good SDM and recheck.	Repair short from “V” wire circuit to ground.

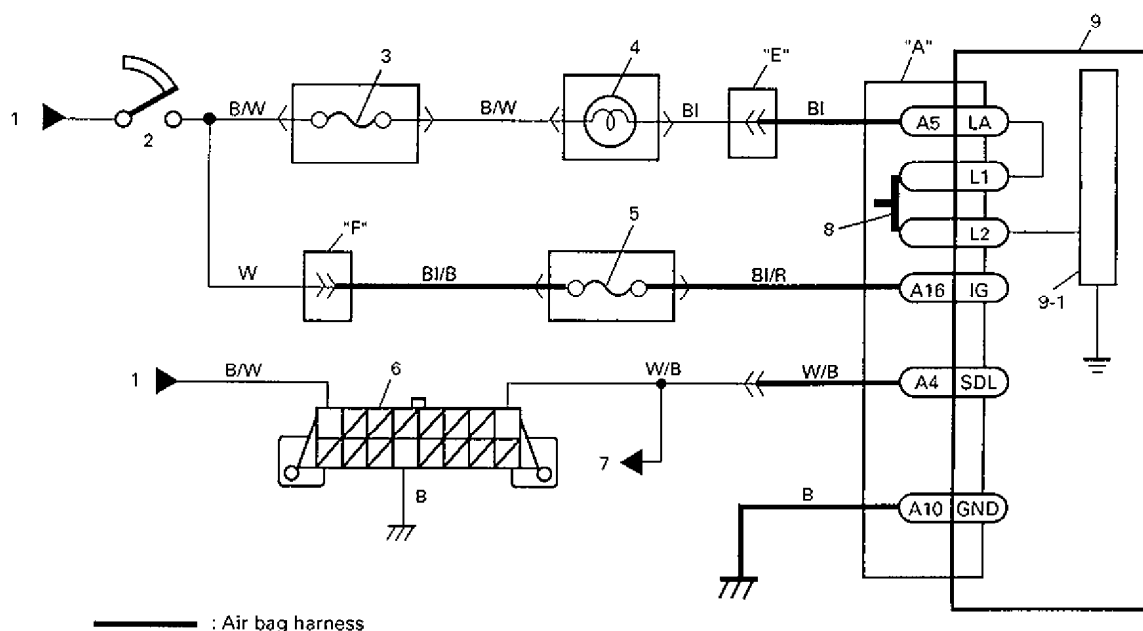
Fig. for STEP 2

**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.10B1-17 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, TCM (if equipped), ICM (if equipped) and ABS controller (if equipped)
8. Connection Detection pin
9. SDM
- 9-1. "AIR BAG" warning lamp driver circuit

75F00-10B1-28-3

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.

TABLE TEST DESCRIPTION

STEP 1: Check connection of scan tool (Tech 1) to DLC.

STEP 2: Check serial data link circuit.

STEP 3: Check high resistance or open in serial data link circuit (in air bag harness).

TABLE D – SDM CANNOT COMMUNICATE THROUGH THE SERIAL DATA CIRCUIT (Page 2 of 2)

STEP	ACTION	YES	NO
1	1) Make sure that 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.	Properly connect scan tool to DLC.
2	1) Check if communication is possible by trying communication with other controller (ECM, TCM, 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" connector ("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

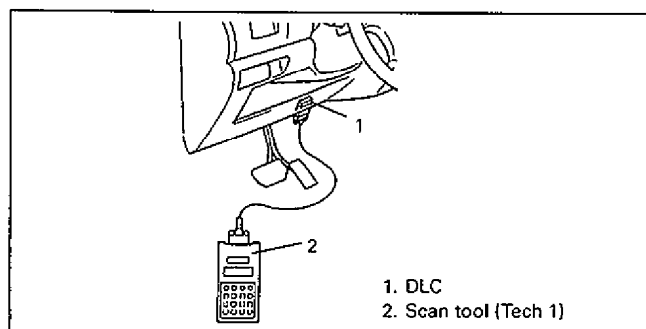
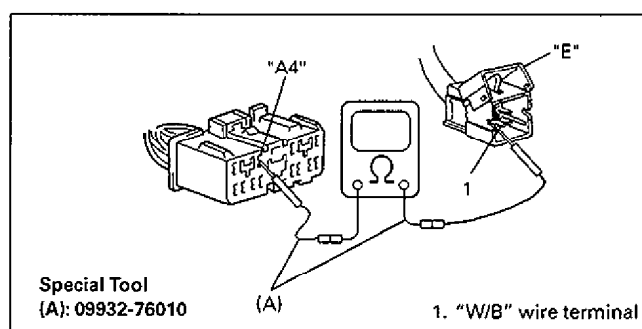
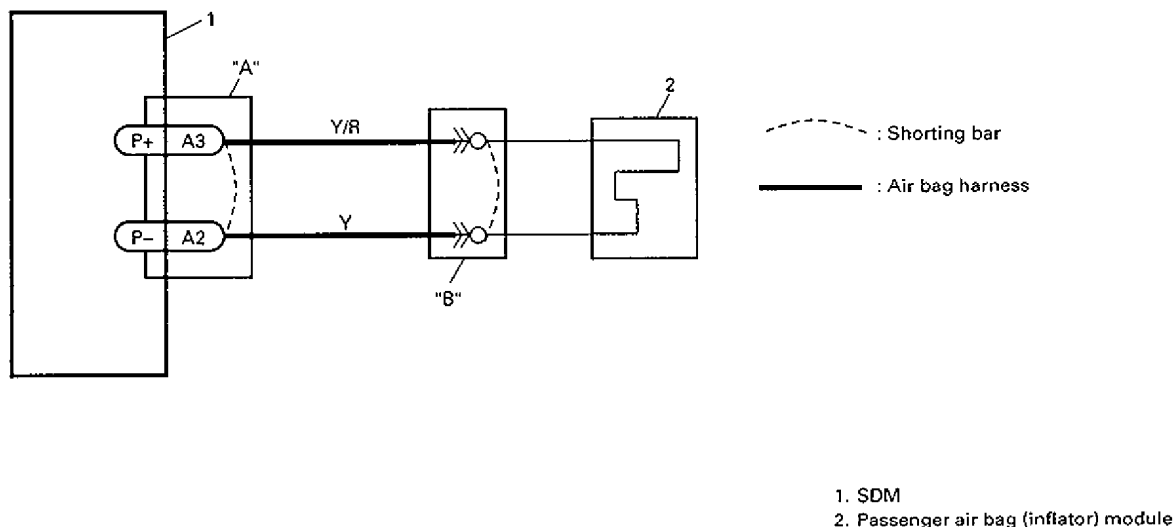


Fig. for STEP 3

**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.10B1-17 to confirm that the trouble has been corrected.

CODE 15 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 1 of 2)

75F00-10B1-30-2

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 "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 passenger air bag (inflator) module, harness wiring and connector terminal contact is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

75F00-10B1-30-4

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

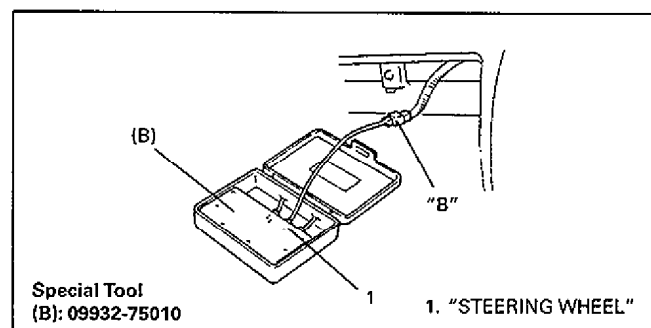
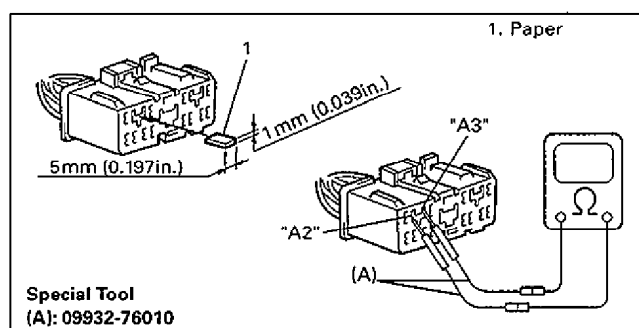
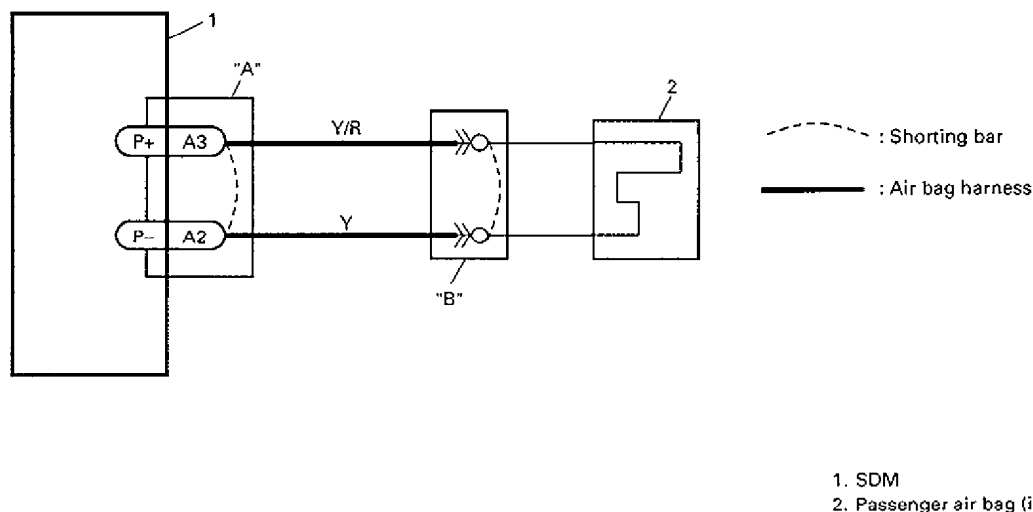


Fig. for STEP 2

**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.10B1-17 to confirm that the trouble has been corrected.

CODE 16 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 1 of 2)

75F00-1081-32-2

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 "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 passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

75F00-1081-32-4

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

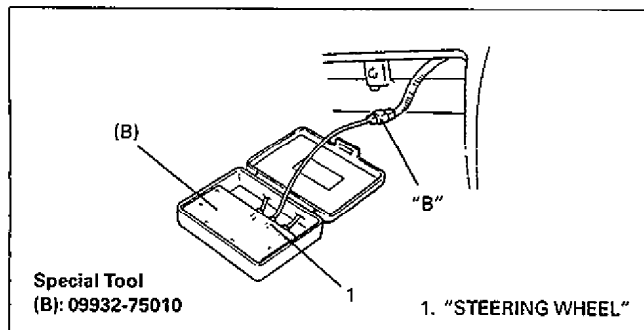
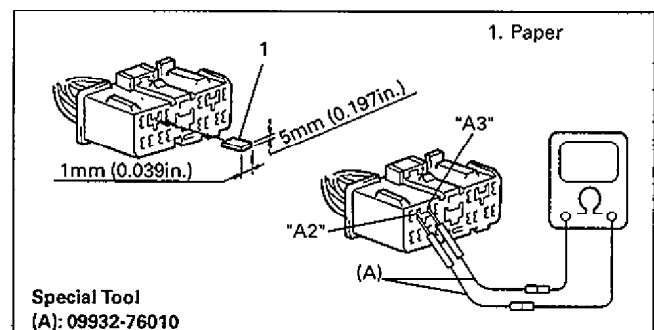


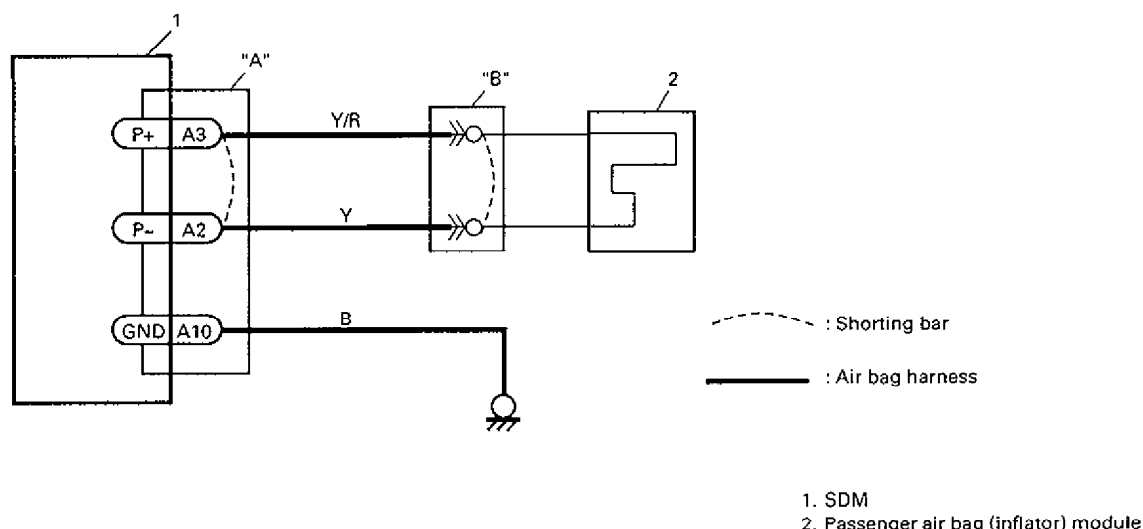
Fig. for STEP 2



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.10B1-17 to confirm that the trouble has been corrected.

CODE 18 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 1 of 2)

75F00-10B1-34-2

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 "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 voltage measured at passenger air bag initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

75F00-10B1-34-4

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

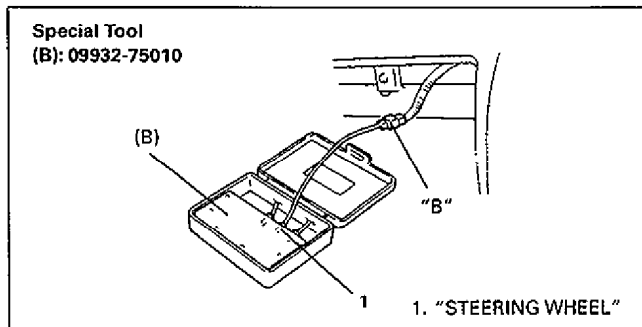
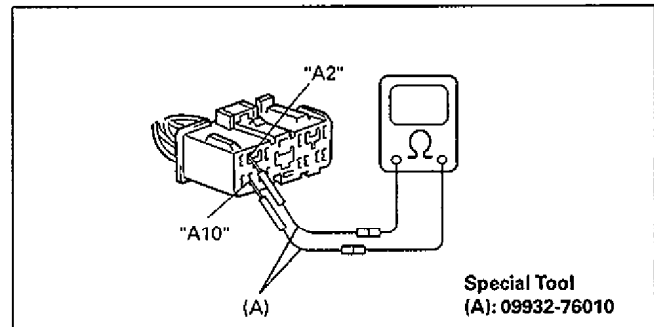


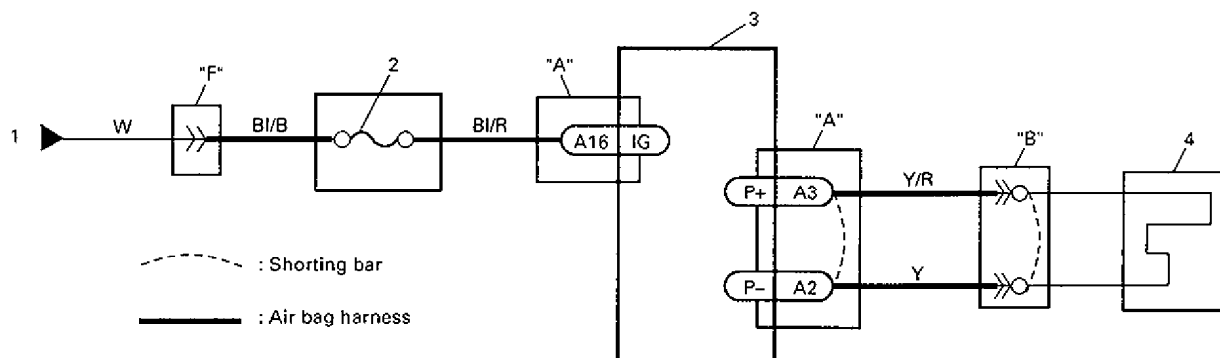
Fig. for STEP 2



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.10B1-17 to confirm that the trouble has been corrected.

CODE 19 – PASSENGER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 1 of 2)

75F00-10B1-36-2

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 "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 voltage measured at passenger air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in passenger air bag (inflator) module.

STEP 2: Check passenger air bag (inflator) module initiator circuit in air bag harness.

75F00-10B1-36-4

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

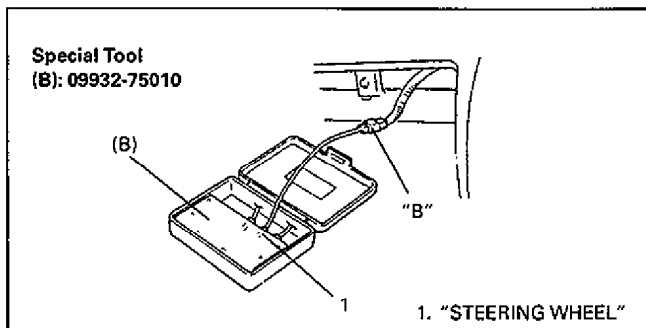
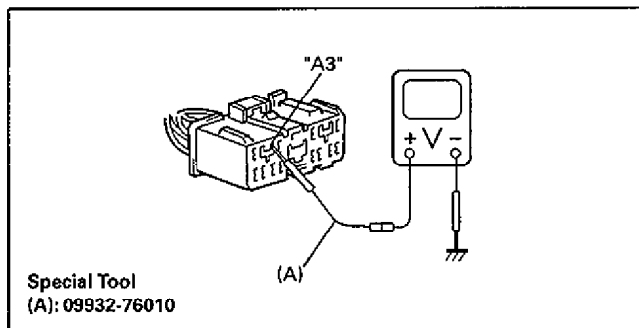


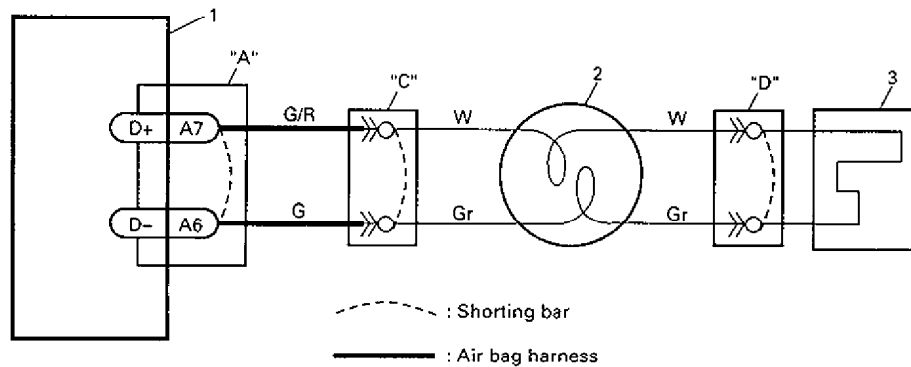
Fig. for STEP 2



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.10B1-17 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

75F00-10B1-38-2

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 "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.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.

STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.

STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

75F00-10B1-38-4

CODE 21 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE HIGH (Page 2 of 2)**NOTE:**

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1. 4) With ignition switch ON, is DTC 21 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A6" and "A7". 3) Release shorting bar in SDM connector, referring to the figure below. 4) If OK then measure resistance between "A6" and "A7" terminals with connected Special Tool (B). 5) Is resistance 3.5 Ω or less?	Substitute a known-good SDM and re-check.	Repair high resistance or open in "G" or "G/R" wire circuit.
3	1) With ignition switch OFF, disconnect Special Tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect Special Tool (B) to driver air bag (inflator) module disconnected at step 1. 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

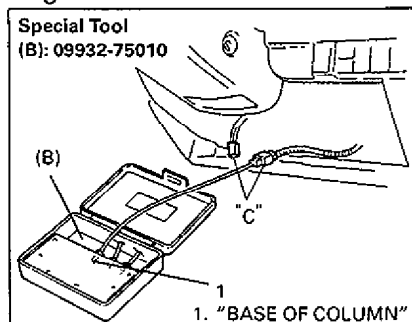


Fig. for STEP 2

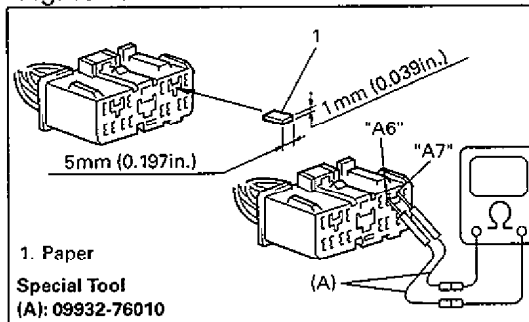
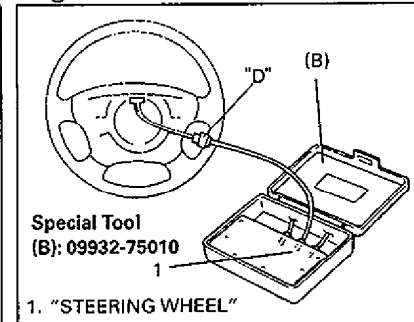
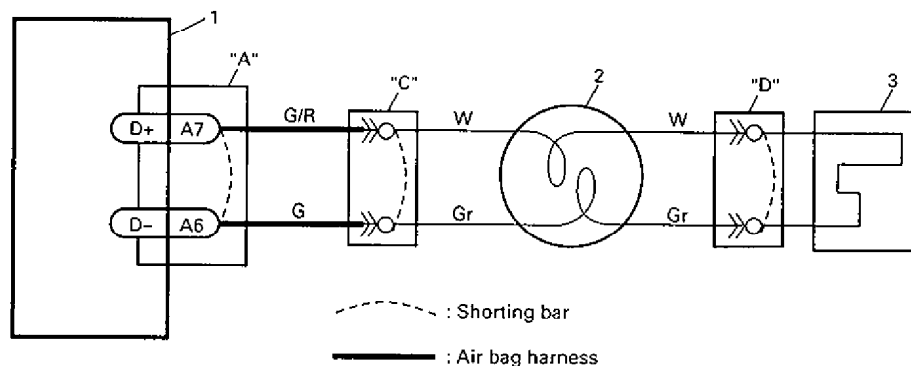


Fig. for STEP 3

**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.10B1-17 to confirm that the trouble has been corrected.

CODE 22 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 1 of 2)

75F00-10B1-40-2

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 "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 below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.

STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.

STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

75F00-10B1-40-4

CODE 22 – DRIVER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 2 of 2)**NOTE:**

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1. 4) With ignition switch ON, is DTC 22 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A6" and "A7". 3) Release shorting bar in SDM connector, referring to the figure below. 4) If OK then measure resistance between "A6" and "A7" terminals with connected Special Tool (B). 5) Is resistance 1.7 Ω or more?	Substitute a known-good SDM and re-check.	Repair short from "G" wire circuit to "G/R" wire circuit or from "G" or "G/R" wire circuit to other wire circuit.
3	1) With ignition switch OFF, disconnect Special Tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect Special Tool (B) to driver air bag (inflator) module disconnected at step 1. 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

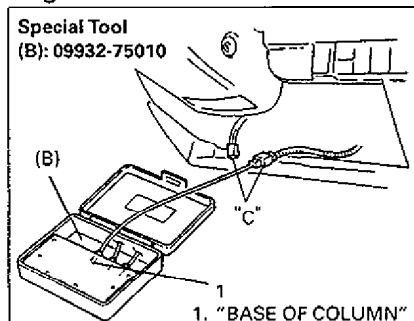


Fig. for STEP 2

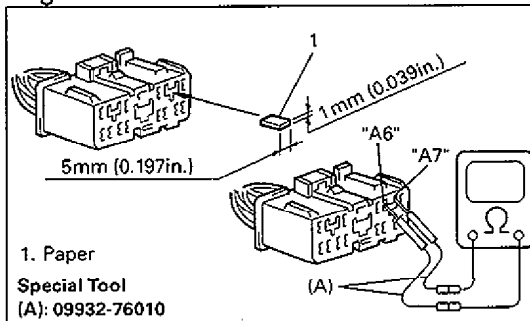
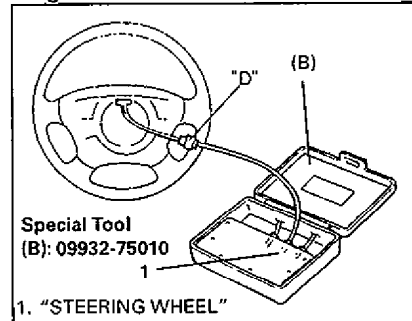
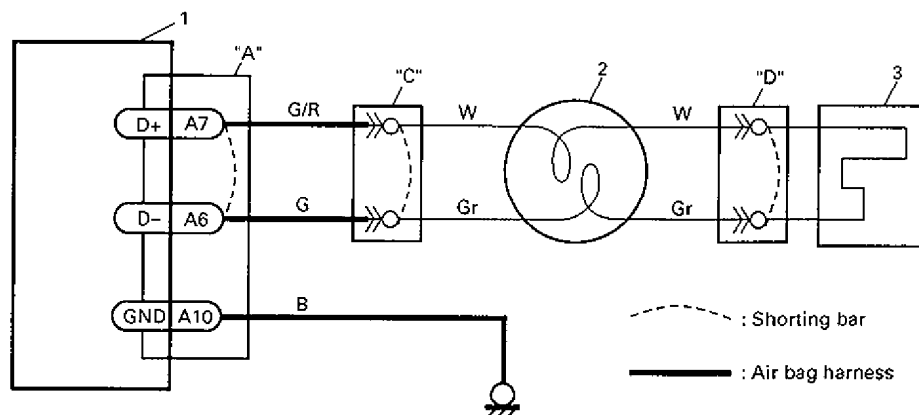


Fig. for STEP 3

**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.10B1-17 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

75F00-10B1-42-2

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 "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 voltage measured at driver air bag initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.

STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.

STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

75F00-10B1-42-4

CODE 24 –DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO GROUND (Page 2 of 2)**NOTE:**

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1. 4) With ignition switch ON, is DTC 24 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure resistance between "A6" and "A10" terminals. 3) Is resistance 1 kΩ or more?	Substitute a known-good SDM and re-check.	Repair short from "G" or "G/R" wire circuit to ground.
3	1) With ignition switch OFF, disconnect Special Tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect Special Tool (B) to driver air bag (inflator) module disconnected at step 1. 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

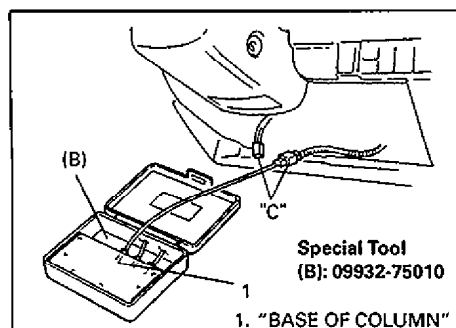


Fig. for STEP 2

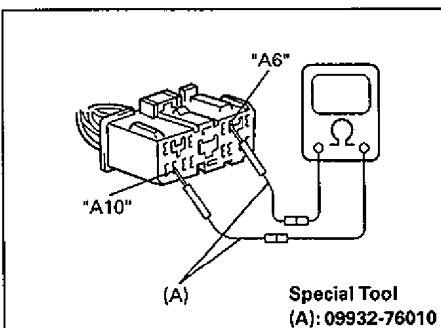
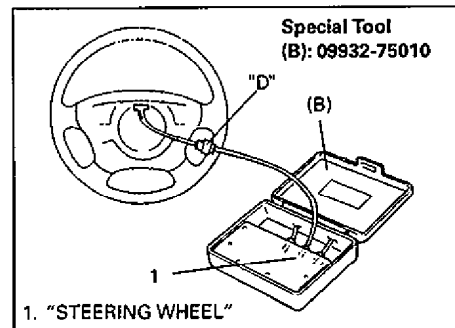
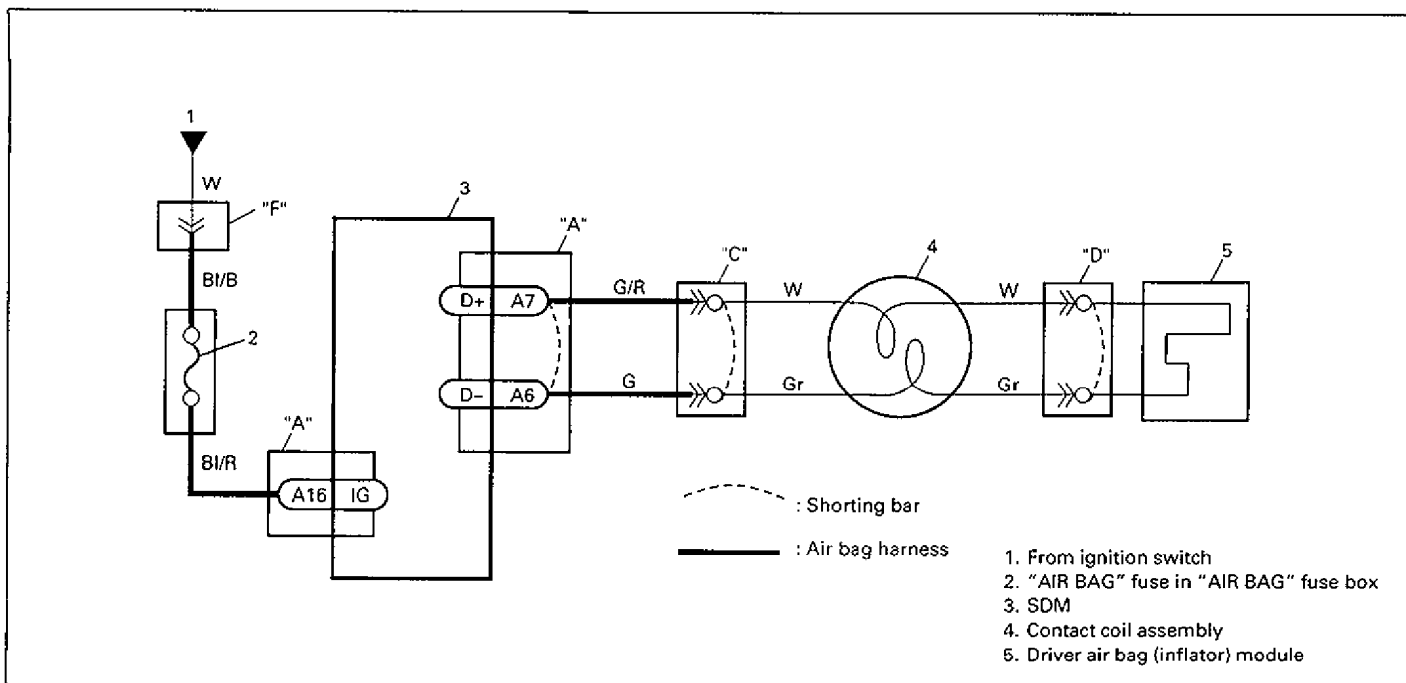


Fig. for STEP 3

**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.10B1-17 to confirm that the trouble has been corrected.

CODE 25 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 1 of 2)

75F00-10B1-44-2

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 "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 voltage measured at driver air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.

STEP 2: Check driver air bag (inflator) module initiator circuit in air bag harness.

STEP 3: Check whether malfunction is in contact coil or driver air bag (inflator) module.

75F00-10B1-44-4

CODE 25 – DRIVER AIR BAG INITIATOR CIRCUIT SHORT TO POWER CIRCUIT (Page 2 of 2)**NOTE:**

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect contact coil connector located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "C" connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1. 4) With ignition switch ON, is DTC 25 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure voltage from "A7" terminal to body ground. 3) With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and re-check.	Repair short from "G" or "G/R" wire circuit to power circuit.
3	1) With ignition switch OFF, disconnect Special Tool (B) then reconnect contact coil connector located near the base of the steering column. 2) Remove driver air bag (inflator) module from steering wheel (Refer to SECTION 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "D" connector. 4) If OK then connect Special Tool (B) to driver air bag (inflator) module disconnected at step 1. 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

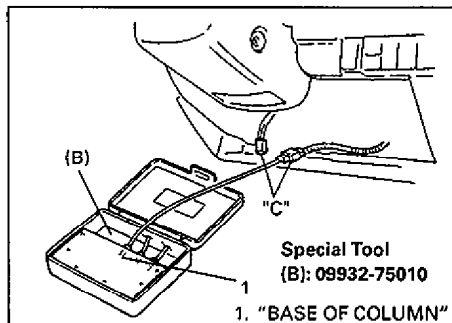


Fig. for STEP 2

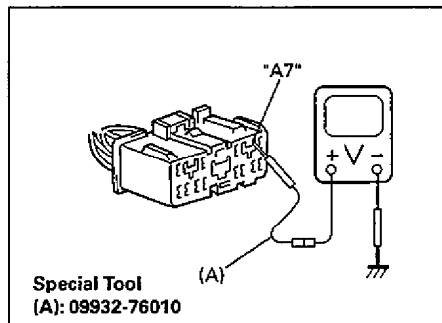
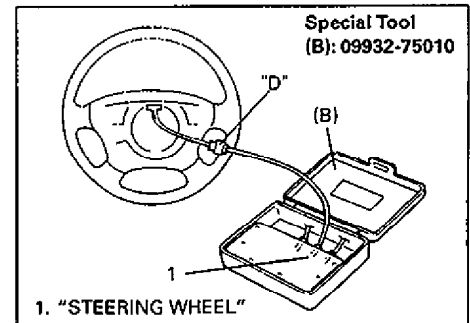
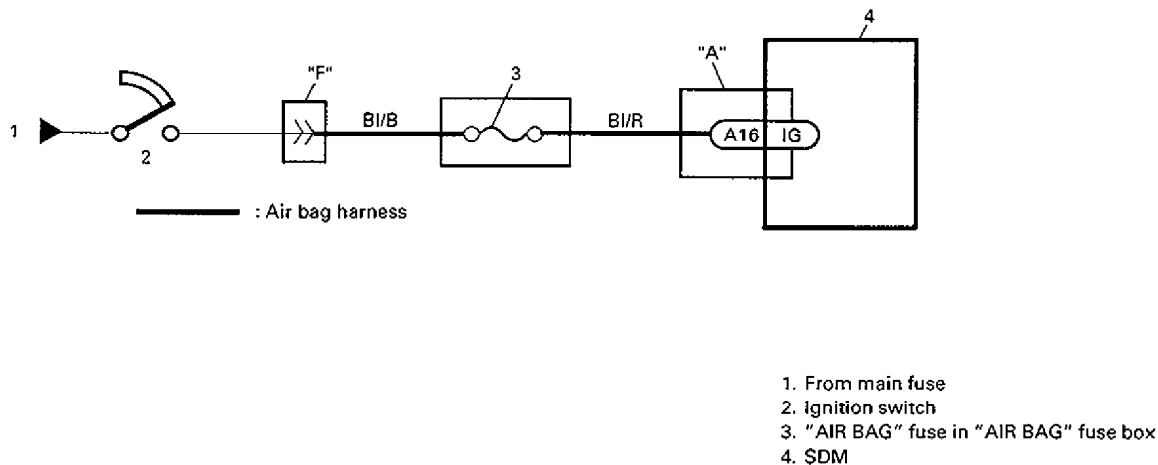


Fig. for STEP 3

**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.10B1-17 to confirm that the trouble has been corrected.

CODE 31 – POWER SOURCE VOLTAGE HIGH (Page 1 of 2)

75F00-10B1-46-2

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 "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 power source voltage to SDM is above specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check if voltage applied to SDM is within normal range.

STEP 2: Check if DTC 31 still exists.

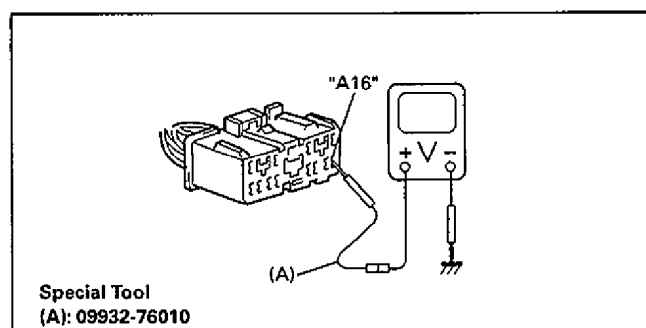
75F00-10B1-46-4

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".

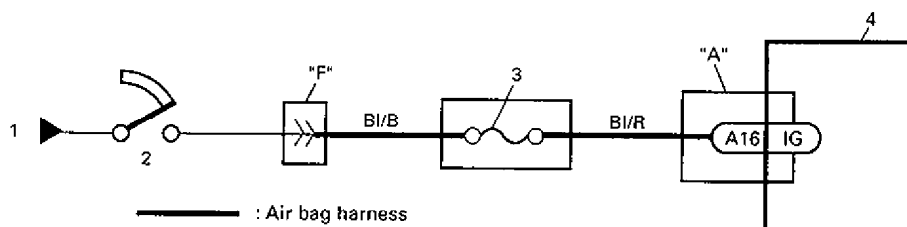
STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at "A16" terminal. 3) If OK then ignition switch ON, and then check voltage from "A16" terminal on SDM harness connector to body ground. 4) Is voltage 14 V or less?	Go to step 2.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Charging 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 "Charging System")

Fig. for STEP 1

**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.10B1-17 to confirm that the trouble has been corrected.

CODE 32 – POWER SOURCE VOLTAGE LOW (Page 1 of 2)

75F00-10B1-48-2

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 "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 power source voltage is below an approx. 8 V for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check if voltage applied to SDM is within normal range.

STEP 2: Check if DTC 32 still exists.

75F00-10B1-48-4

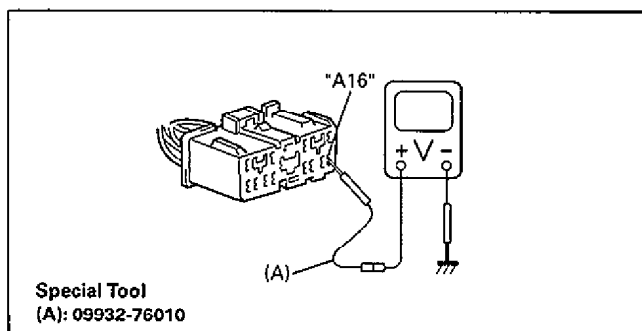
CODE 32 – POWER SOURCE VOLTAGE LOW (Page 2 of 2)

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 re-check.	Check Charging System and repair as necessary. (Refer to SECTION 6H "Changing System")

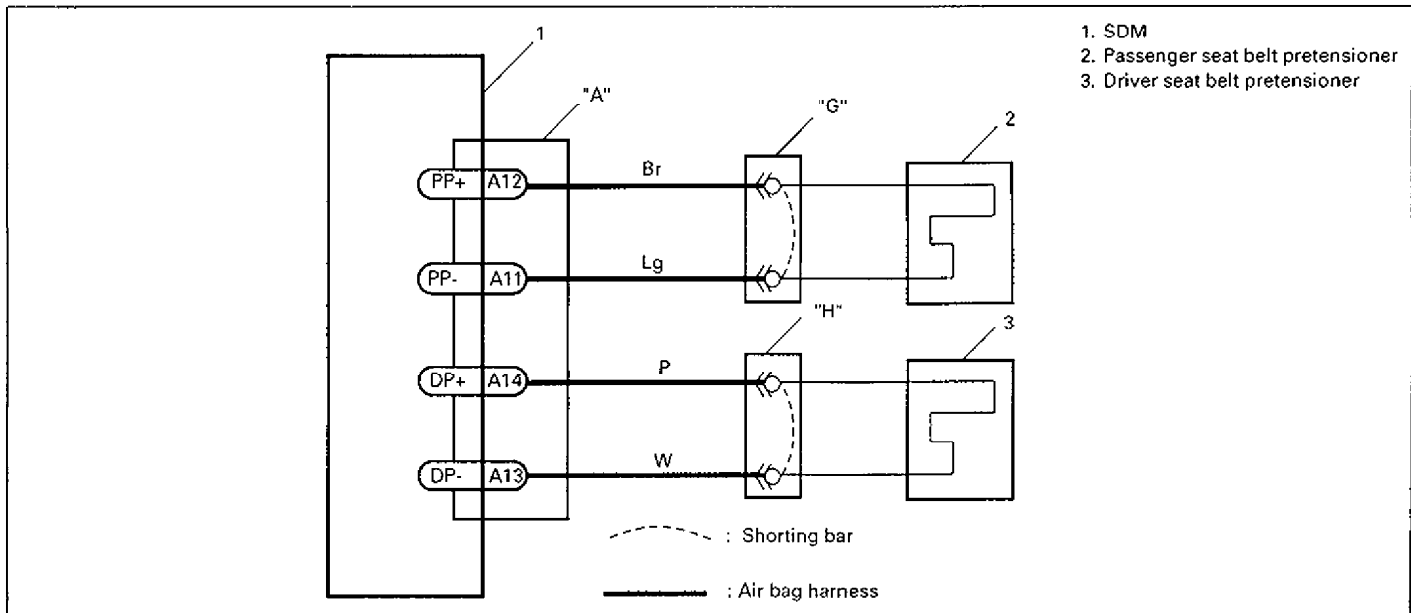
Fig. for STEP 2



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.10B1-17 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)**

75F00-10B1-50-2

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 "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 resistance of driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

75F00-10B1-50-4

CODE 41 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH
CODE 45 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE HIGH (Page 2 of 2)

NOTE:

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. 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

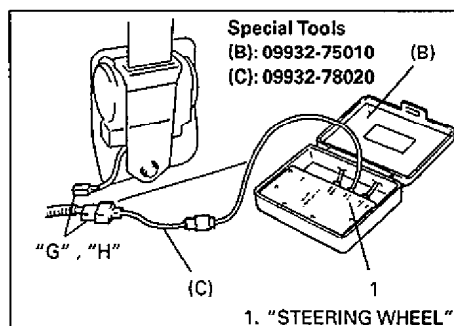
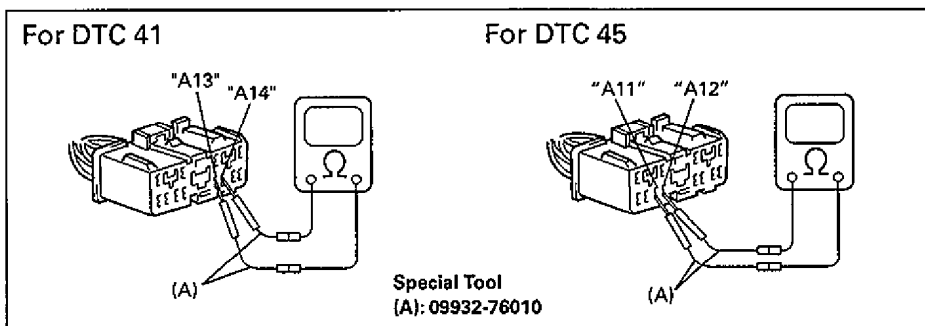


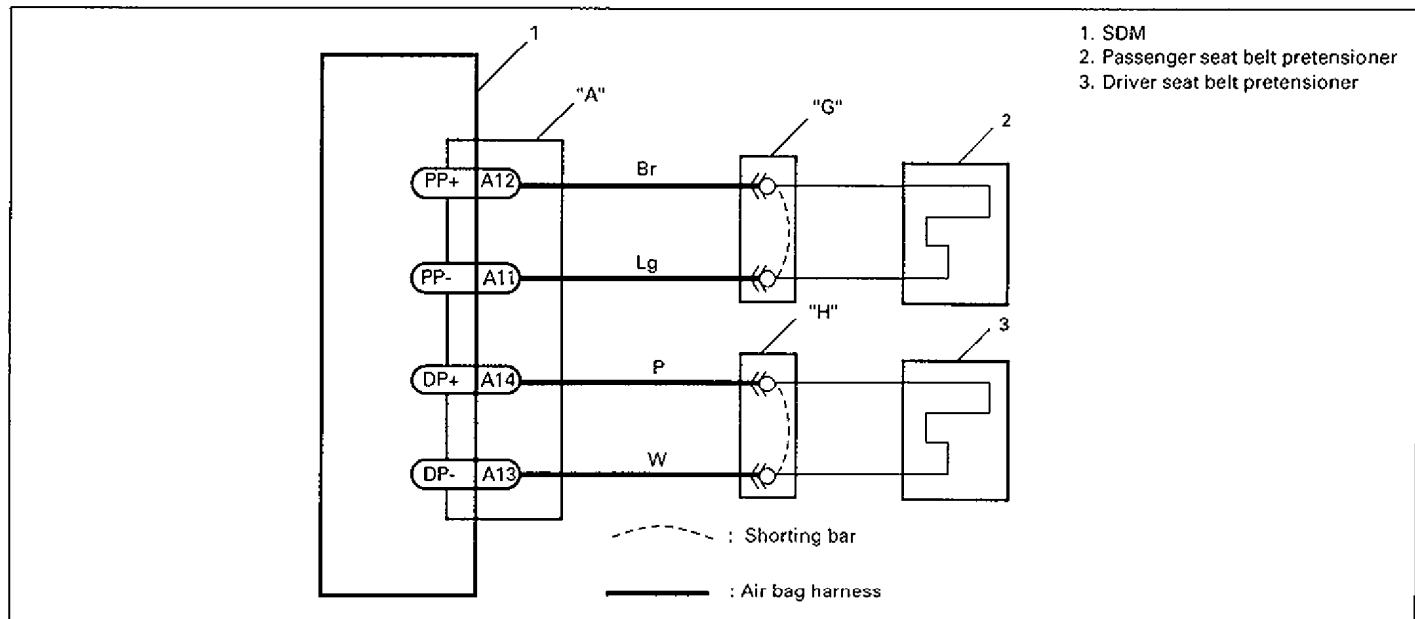
Fig. for STEP 2



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.10B1-17 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)**

75F00-10B1-52-2

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 "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 resistance of driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

75F00-10B1-52-4

CODE 42 – DRIVER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW**CODE 46 – PASSENGER PRETENSIONER INITIATOR CIRCUIT RESISTANCE LOW (Page 2 of 2)****NOTE:**

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. 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

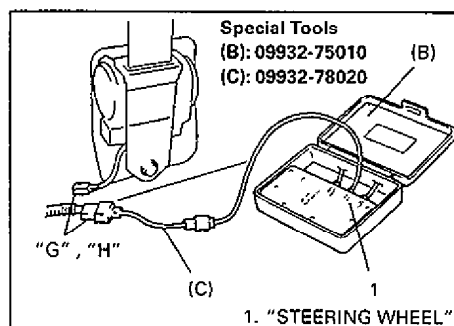
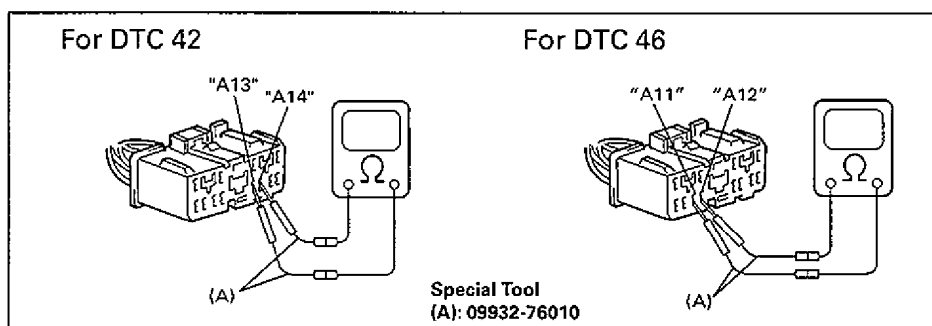
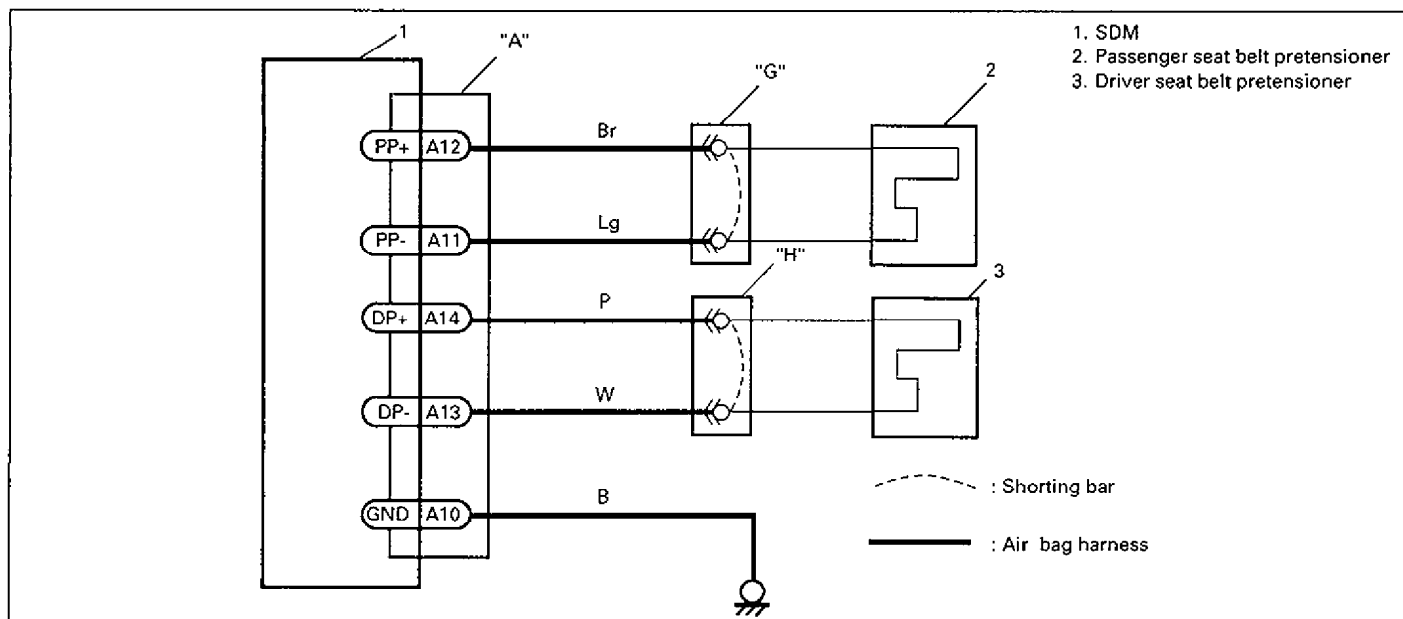


Fig. for STEP 2

**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.10B1-17 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)**

75F00-10B1-54-2

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 "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 voltage measured at driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

75F00-10B1-54-4

CODE 43 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND**CODE 47 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO GROUND (Page 2 of 2)****NOTE:**

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. 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 k Ω 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

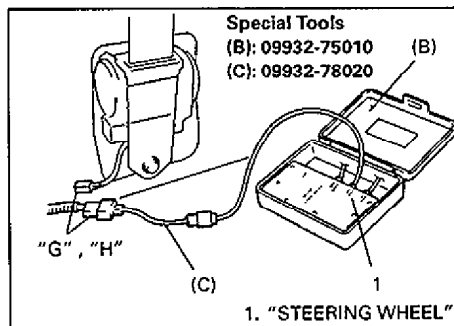
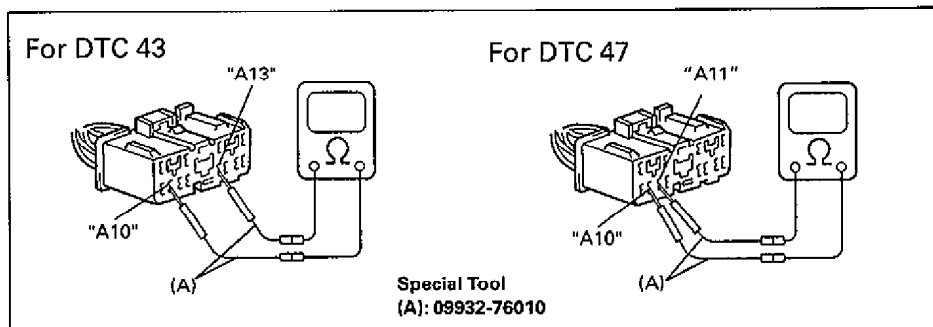


Fig. for STEP 2

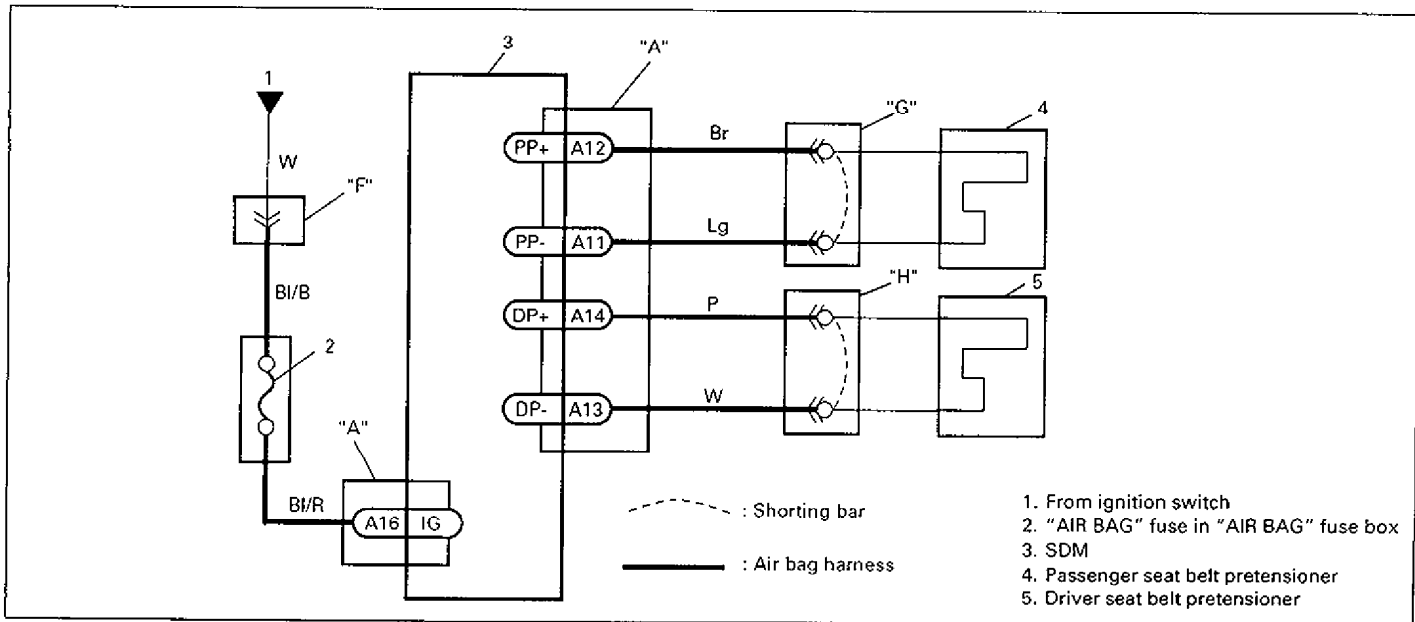
**NOTE:**

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.10B1-17 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)



75F00-10B1-56-2

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 "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 voltage measured at driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

STEP 1: Check whether malfunction is in seat belt pretensioner.

STEP 2: Check seat belt pretensioner initiator circuit in air bag harness.

75F00-10B1-56-4

CODE 44 – DRIVER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT
CODE 48 – PASSENGER PRETENSIONER INITIATOR CIRCUIT SHORT TO POWER CIRCUIT
 (Page 2 of 2)

NOTE:

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "G" or "H" connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. 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

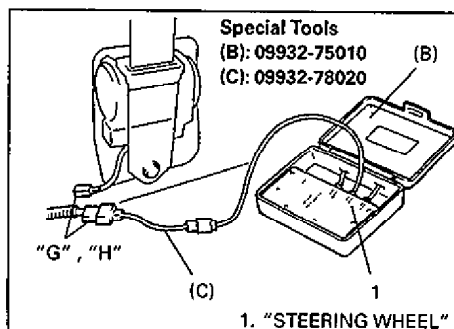
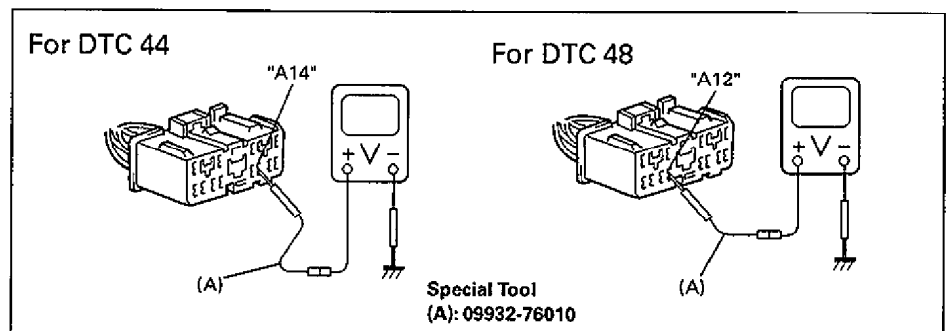


Fig. for STEP 2



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.10B1-17 to confirm that the trouble has been corrected.

CODE 51 – FRONTAL CRASH DETECTED (SYSTEM ACTIVATION COMMANDED OUT PUTTED)

DTC WILL SET WHEN:

The SDM detects a frontal crash of sufficient force to warrant activation of the air bag system. (SDM outputs a deployment/activation command.)

TABLE TEST DESCRIPTION

STEP 1: Check that DTC51 has been set although air bag has not been deployed.

STEP 2: Check that DTC has been set due to failure of SDM.

NOTE:

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	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:

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.10B1-17 to confirm that the trouble has been corrected.

CODE 71 – INTERNAL SDM FAULT

DTC WILL SET WHEN:

An internal SDM fault is detected by SDM.

NOTE:

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

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.10B1-17.

CODE 13 – SYSTEM SPECIFICATIONS DIFFERENT FROM SDM SPECIFICATIONS

DTC WILL SET WHEN:

Specifications of the air bag system differ from those of SDM.

NOTE:

Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

- 1) Ignition switch OFF.
- 2) Replace SDM.
- 3) Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B1-17.

PRECAUTIONS

SERVICE PRECAUTION

WARNING/CAUTION labels are attached on each part of air bag system components (SDM, air bag (inflator) modules and seat belt pretensioners). 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 (e.g., dropped from a height of 91.4 cm (3 feet) or more.) to air bag system component parts, remove those parts beforehand.
 - When using electric welding, be sure to disconnect air bag (inflator) module and seat belt pretensioner connectors (driver and passenger) respectively.
 - When applying paint around the air bag system related parts, use care so that the harness or connector will not be exposed to the paint mist.
 - Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.

WARNING:

When performing service on or around air bag system components or air bag wiring, follow the procedures listed in the following pages to temporarily disable the air bag system. Refer to appropriate service manual procedures. Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system repairs.

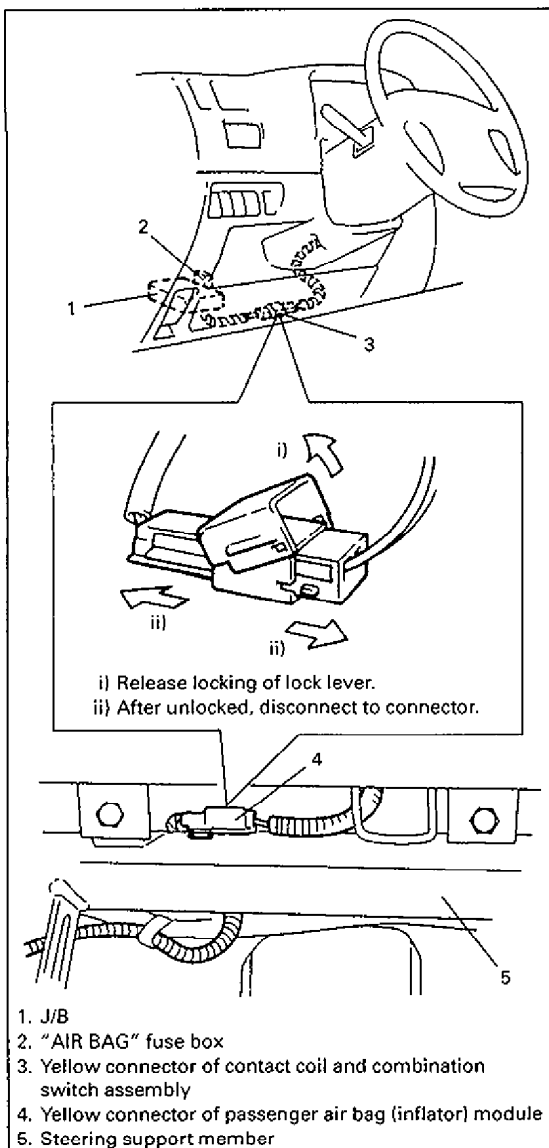
DISABLING AIR BAG SYSTEM

- 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.
- 5) Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector of passenger air bag (inflator) module.

NOTE:

With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.

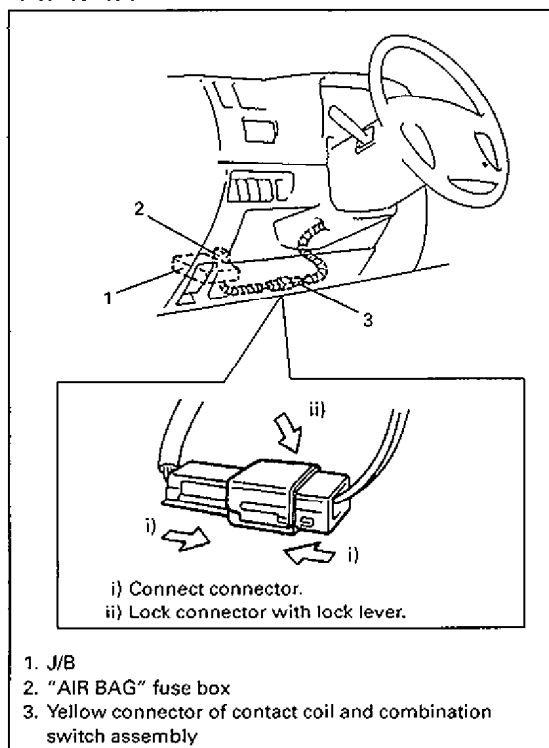
This is normal operation and does not indicate a air bag system malfunction.



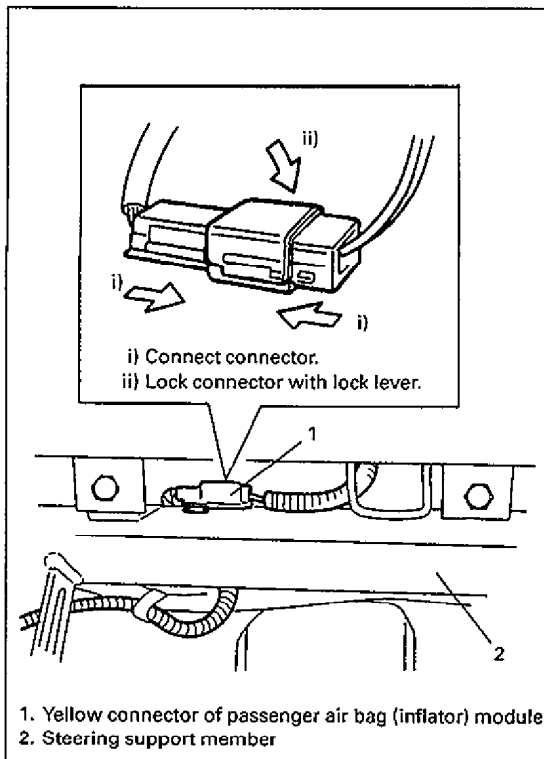
75F00-10B1-60-3

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.



75F00-10B1-60-5



75F00-10B1-61-2

- 3) Connect Yellow connector of passenger air bag (inflator) module, and be sure to 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 comes on for 6 seconds and then turns off. If it does not operate as described, perform "Air Bag Diagnostic System Check" in this section.

HANDLING PRECAUTION

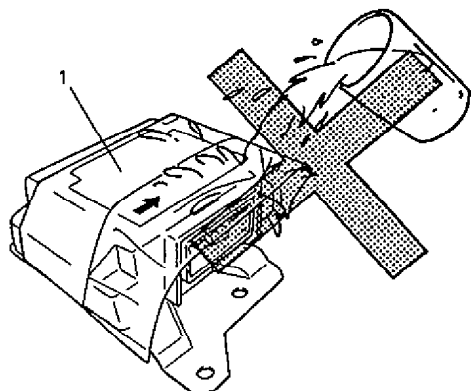
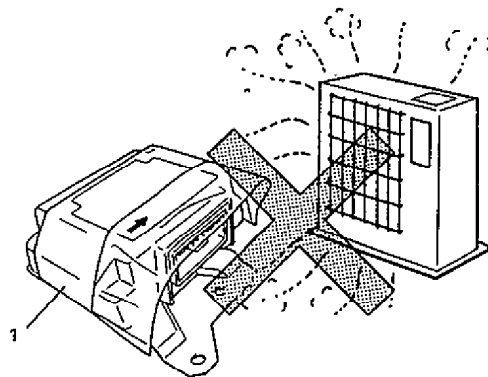
SDM

WARNING:

Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

CAUTION:

After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to "Diagnosis" when checking the SDM.



1. SDM

75F00-10B1-61-5

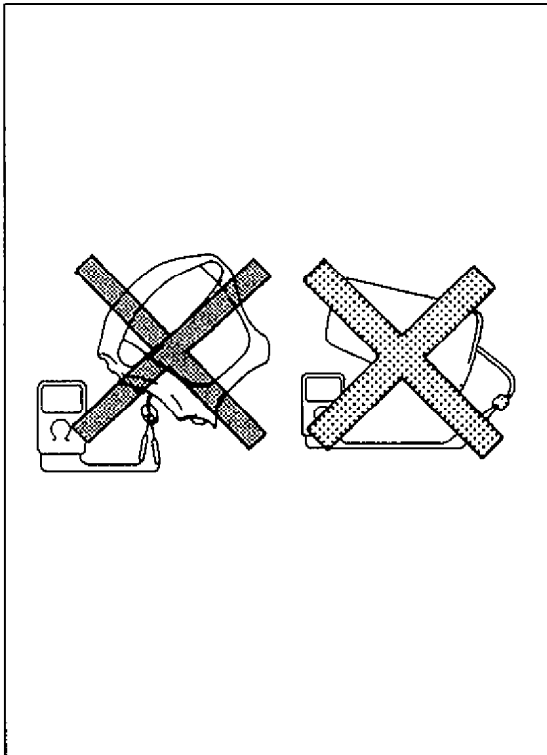
- Never attempt disassembly of SDM.
- When storing SDM, select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- If SDM was dropped from a height of 91.4 cm (3 ft) or more or if it is found to be damaged or deformed, replace it with a new one.
- If installation part of SDM was damaged, repair that part completely before reinstallation.
- All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointed toward the front of the vehicle to ensure proper operation of the air bag system.

LIVE (UNDEPLOYED) AIR BAG (INFLATOR) MODULES

Special care is necessary when handling and storing a live (undeployed) air bag (inflator) modules.

The rapid gas generation produced during deployment of the air bag could cause the air bag (inflator) module, or an object in front of the air bag (inflator) module, to be thrown through the air in the unlikely event of an accidental deployment.

75F00-10B1-62-1



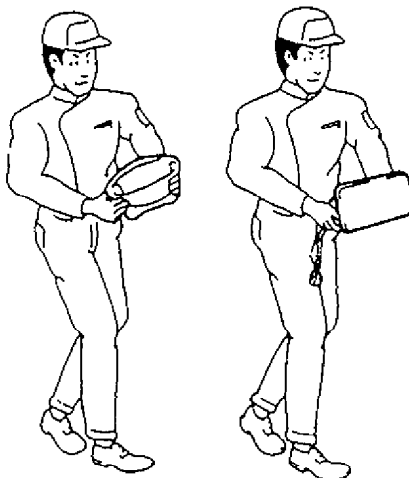
WARNING:

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 91.4 cm (3 ft) or more, it should be replaced with a new one as an assembly.

75F00-10B1-62-3

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



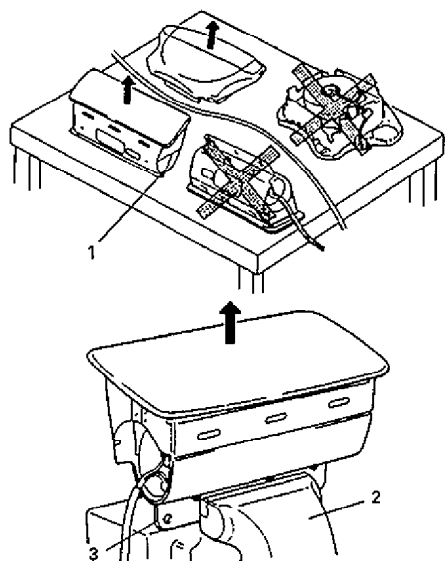
WARNING:

- 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.

75F00-10B1-62-5

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

75F00-10B1-63-2

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.

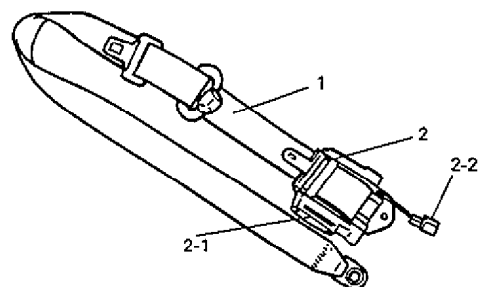
Otherwise, personal injury may result.

LIVE (INACTIVATED) SEAT BELT PRETENSIONERS

Special care is necessary when handling and storing a live (inactivated) seat belt pretensioners.

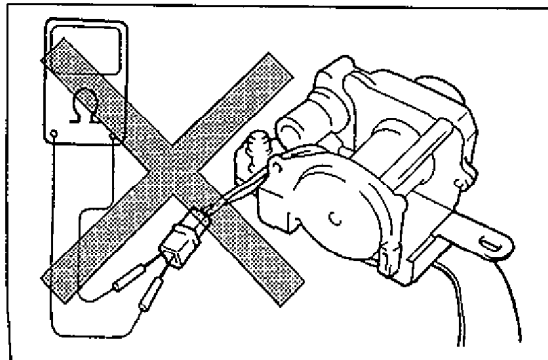
Also, when the seat belt pretensioners activate, gas is generated and the seat belt is retracted into the retractor quickly.

Note, therefore, that if they activate accidentally, the seat belt pretensioners and other object(s) around them may be thrown through the air.



1. Webbing
2. Retractor assembly
- 2-1. Seat belt pretensioner
- 2-2. Seat belt pretensioner connector

75F00-10B1-63-4



75F00-10B1-63-5

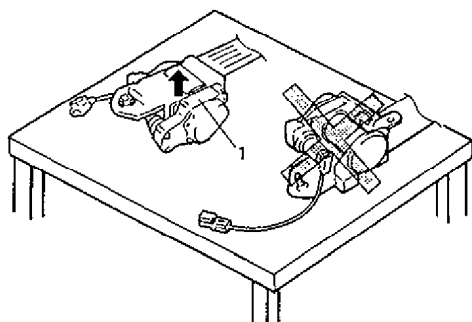
WARNING:

Never attempt to measure the resistance of the seat belt pretensioners. It is very dangerous as the electric current from the tester may activate pretensioner.

- Never attempt to disassemble the seat belt pretensioners (retractor assembly).
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (inactivated) seat belt pretensioner, be sure to activate it before discarding it.
- When grease, cleaning agent oil, water, etc., got on the seat belt pretensioners (retractor assembly), wipe it off immediately with a dry cloth.
- If seat belt pretensioner was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced with a new one as an assembly.

75F00-10B1-64-2

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

75F00-10B1-64-4

WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.
- When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners. Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULES

WARNING:

- The air bag (inflator) module immediately after deployment is very hot. Wait for at least 30 minutes to cool it off before proceeding the work.
- Do not apply water, oil, etc. to deployed air bag (inflator) module.
- After an air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.
- Wash your hands with mild soap and water after completing the work.

Refer to the procedure described under "Deployed Air Bag (Inflator) Modules Disposal" in this section.

75F00-10B1-65-2

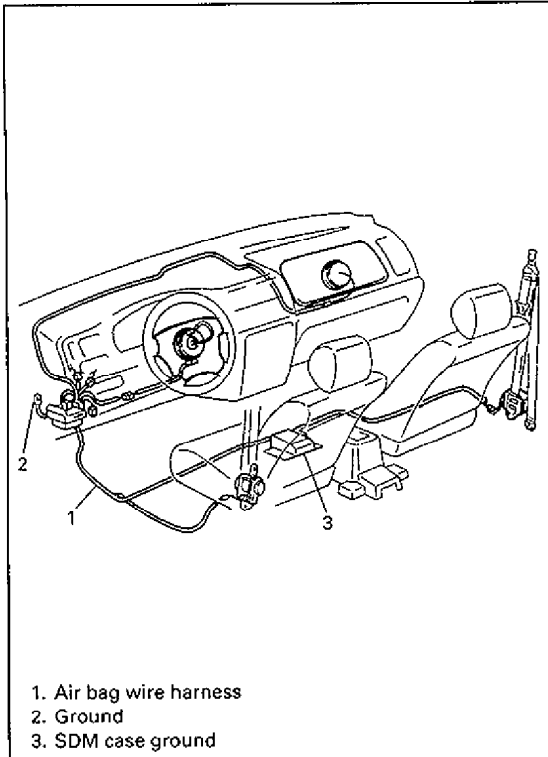
ACTIVATED SEAT BELT PRETENSIONERS

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.

75F00-10B1-65-4



75F00-10B1-66-2

AIR BAG WIRE HARNESS AND CONNECTORS

Air bag wire harness can be identified easily as it is covered with a yellow protection tube. Be very careful when handling it.

- When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.
- When installing it, be careful so that the air bag wire harness is not caught or does not interfere with other parts.
- Make sure all air bag system grounding points are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

DISPOSAL PRECAUTION

Do not dispose of the live (undeployed) air bag (inflator) modules and the live (inactivated) seat belt pretensioners. When disposal is necessary, be sure to deploy the air bag according to deployment procedure described under "Air Bag (Inflator) Modules Disposal" and to activate the pretensioner according to activation procedure described under "Seat Belt Pretensioners Disposal".

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.

75F00-10B1-67-3

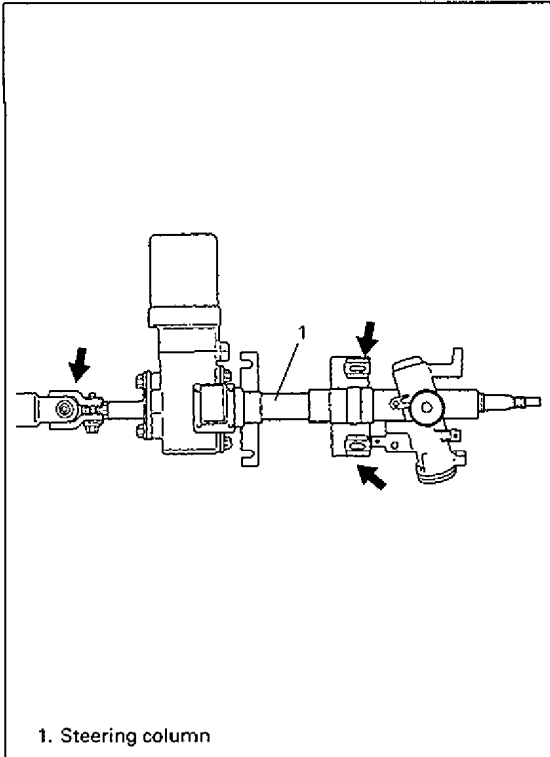
ACCIDENT WITH DEPLOYMENT

– COMPONENT REPLACEMENT

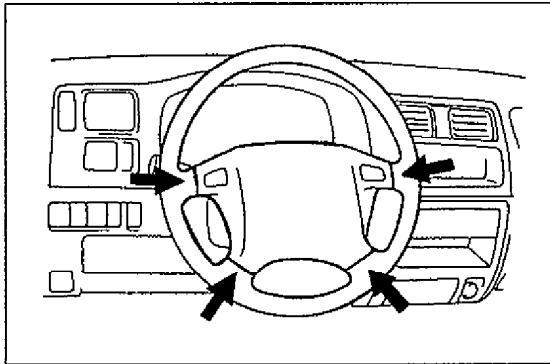
Certain air bag system components must be replaced. Those components are:

- 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.

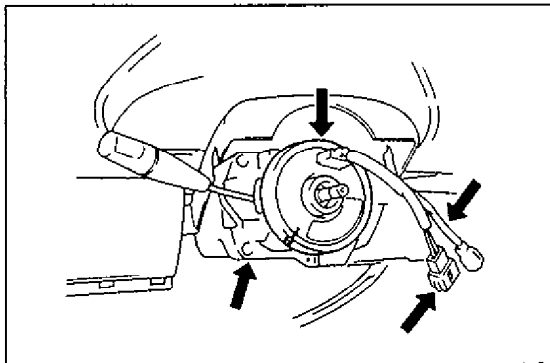
75F00-10B1-67-5



75F00-10B1-68-2



75F00-10B1-68-3



75F00-10B1-68-4

ACCIDENT WITH OR WITHOUT DEPLOYMENT

– COMPONENT INSPECTIONS

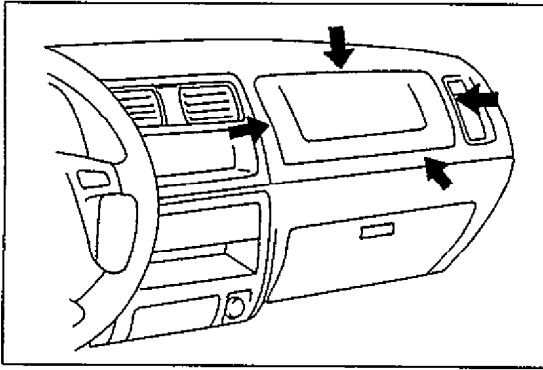
Certain air bag and restraint system components must be inspected after any crash, whether the air bag deployed or not. Those components are:

- 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.

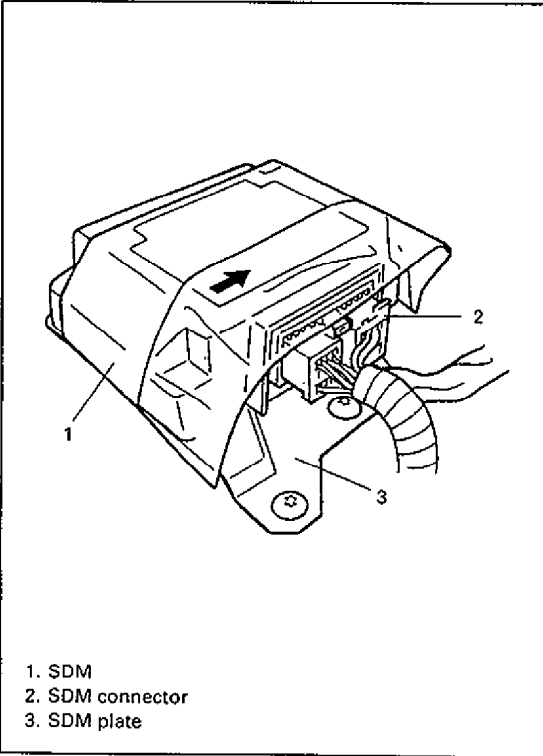
- Contact coil and combination switch assembly
 - Check wire harness and connectors for damage or tightness.
 - Check contact coil case for damage.
- If any faulty condition is found in above checks, replace.

- Instrument panel member and reinforcement
 - Check for any distortion, bending, cracking or other damage.
- If any faulty condition is found in above checks, replace.



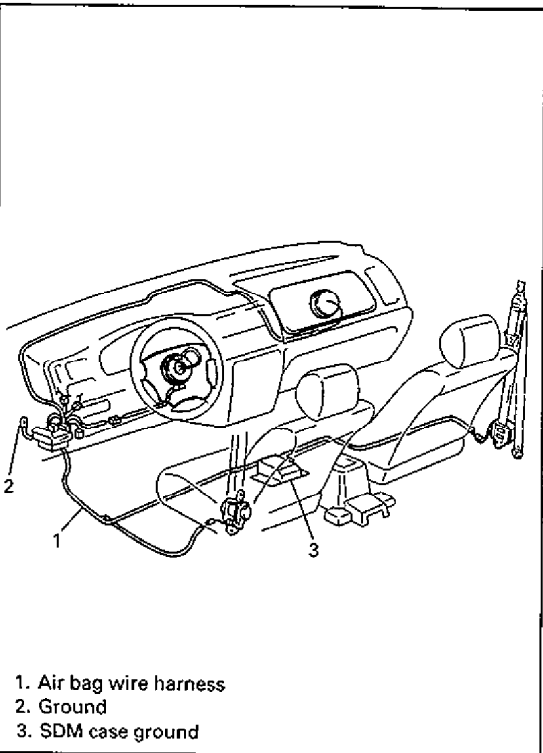
75F00-10B1-69-1

- 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.



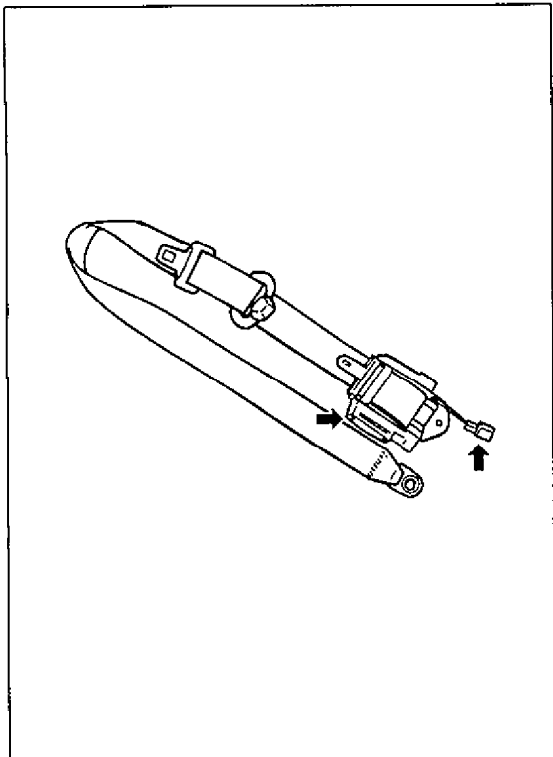
75F00-10B1-69-3

- SDM and SDM plate
 - Check for external damage such as deformation, scratch, crack, peeled paint, etc.
 - Check that SDM cannot be installed properly due to a cause in itself. (There is a gap between SDM and SDM plate, or it cannot be fixed securely.)
 - Check that connector or lead wire of SDM has a scorching, melting or damage.
 - Check that connector is connected securely or locked.
 - Check SDM connector and terminals for tightness.
 - Check SDM sets a diagnostic trouble code (Refer to p.10B1-18) and the diagnostic table leads to a malfunctioning SDM.
 If any faulty condition is found in above checks, replace.



75F00-10B1-69-6

- Air bag wire harness and connections
 - Check for damages, deformities or poor connections. (Refer to "Intermittents and Poor Connections" in this section.)
 - Check wire harness clamps for tightness.
 If any faulty condition is found, correct or replace.



75F00-10B1-70-2

- 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 "Seat Belt" in SECTION 10A.
- "AIR BAG" warning lamp (air bag system)
 - After vehicle is completely repaired, perform "Air Bag Diagnostic System Check" described in diagnosis section.

75F00-10B1-70-3

ON-VEHICLE SERVICE

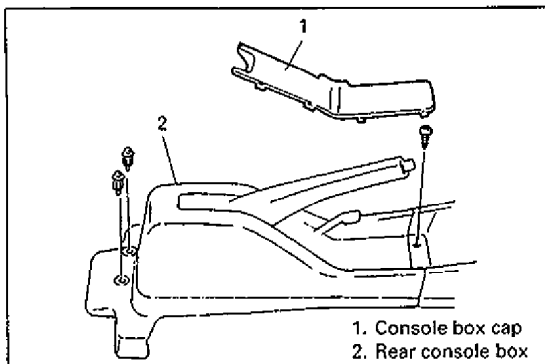
SDM

WARNING:

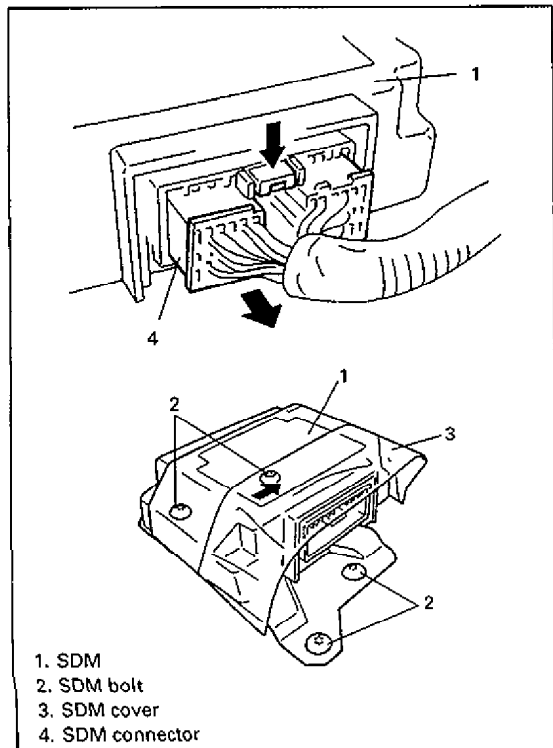
During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).

Be sure to read "Precautions" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or inactivation of the air bag system when necessary.

75F00-10B1-71-2



75F00-10B1-71-3



75F00-10B1-71-5

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 console box by removing screw and clips.

- 4) Disconnect SDM connector from SDM.
- 5) Remove SDM (with SDM plate) as an assembly from vehicle.

NOTE:

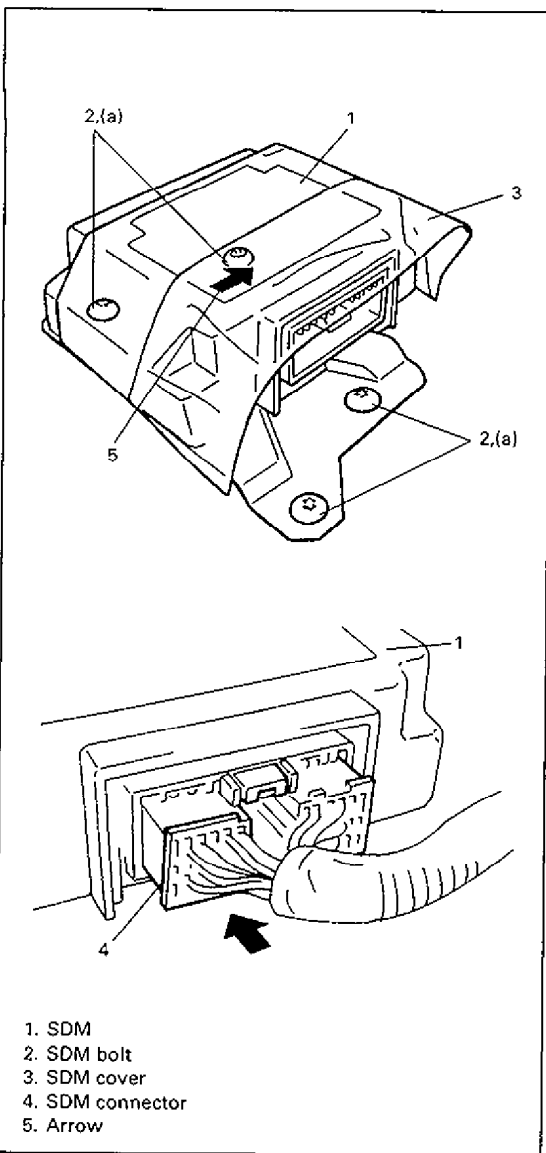
Do not separate SDM and SDM plate.

INSPECTION

CAUTION:

- Do not connect a tester whatever type it may be.
- Never repair or disassemble SDM.
- If SDM was dropped from a height of 91.4 cm (3 ft) or more, it should be replaced.

- Check SDM and SDM plate for dents, cracks or deformation.
 - Check SDM connector for damage, cracks or lock mechanism.
 - Check SDM terminal for bent, corrosion or rust.
- If any faulty condition is found in above checks, replace.



75F00-10B1-72-3

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.

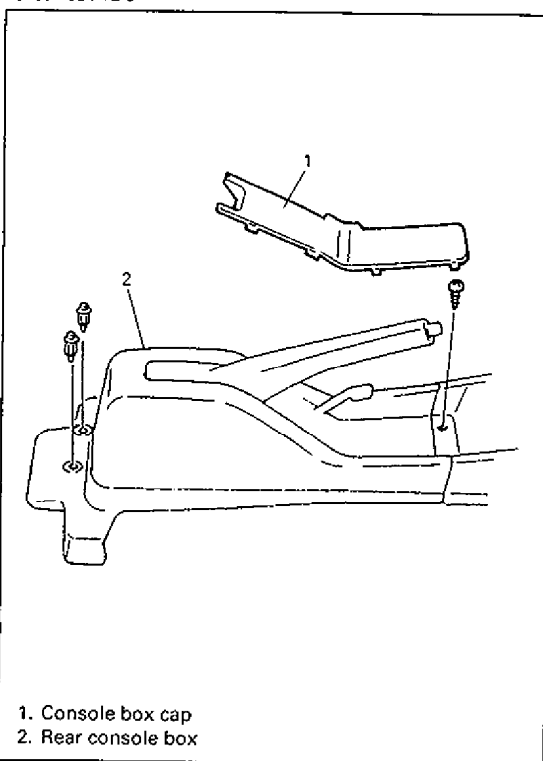
- 3) Tighten SDM bolts to specified torque.

Tightening Torque

(a): 5.5 N·m (0.55 kg·m, 4.0 lb·ft)

- 4) Connect SDM connector to SDM securely.

- 5) Install rear console box by installing screw and clips.
- 6) Connect negative cable to battery.
- 7) Enable air bag system. Refer to "Enabling Air Bag System" earlier in this section.



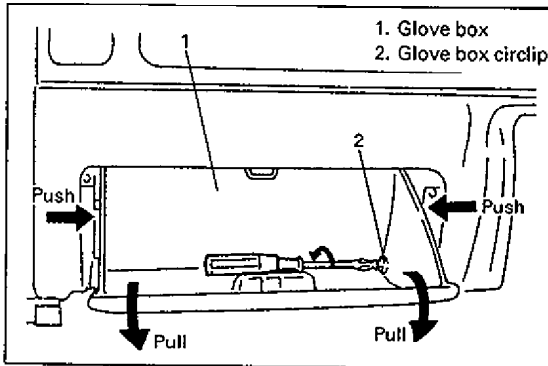
75F00-10B1-72-5

PASSENGER AIR BAG (INFLATOR) MODULE

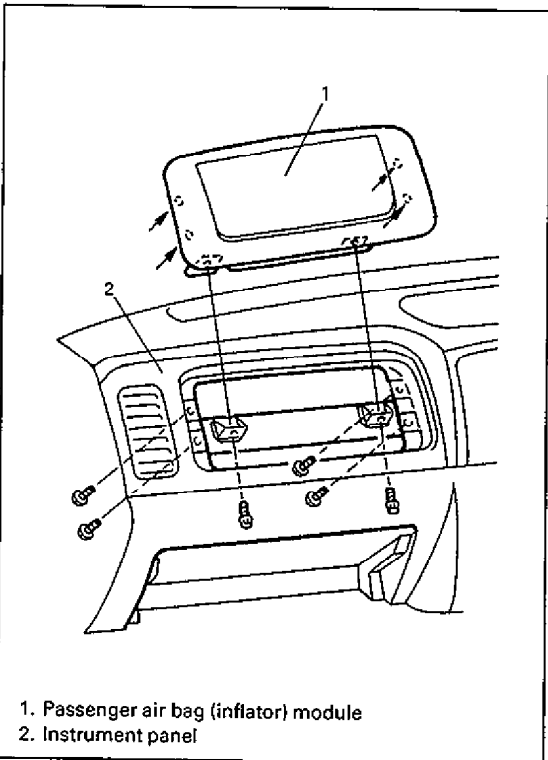
WARNING:

- 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 "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.

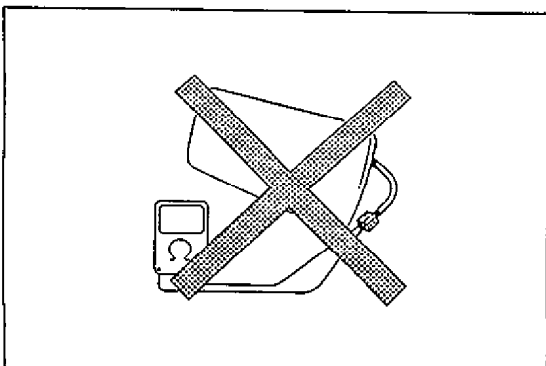
75F00-10B1-73-1



75F00-10B1-73-2



75F00-10B1-73-4



75F00-10B1-73-5

REMOVAL

- 1) Disconnect negative battery cable from battery.
- 2) Open glove box, then while pressing glove box stopper, pull out glove box from instrument panel and then remove glove box circlip and glove box from instrument panel.
- 3) Disable air bag system. Refer to "Disabling Air Bag System" earlier in this section.
- 4) Remove passenger air bag (inflator) module attaching bolts and screws, and passenger air bag (inflator) module from vehicle.

WARNING:

- When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. Never carry air bag (inflator) module by wires or connector on the side of the module. In case of an accidental deployment, the bag will then deploy with minimal chance of injury.
 - As the live passenger air bag (inflator) module must be kept with its bag (trim cover) facing up while being stored or left standing, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket. This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.
 - Observe "Handling Precautions" earlier in this section for handling and storing it.
- Otherwise personal injury may result.

INSPECTION

WARNING:

Never measure resistance of passenger air bag (inflator) module or disassemble it. Otherwise personal injury may result.

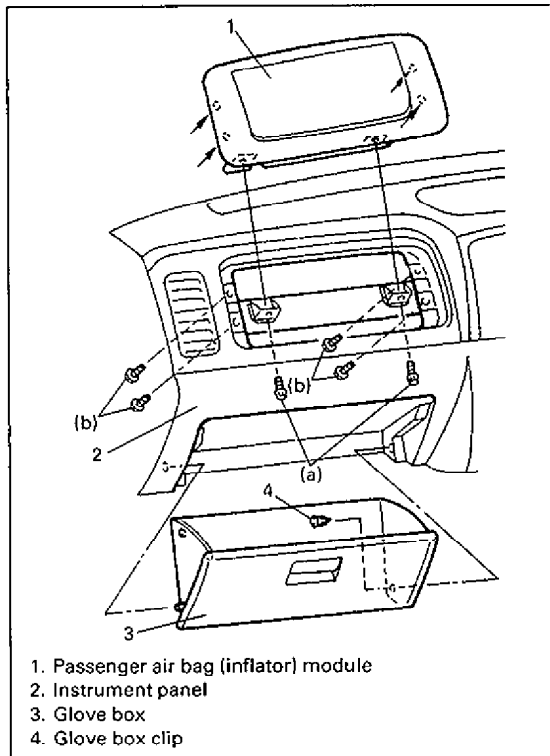
CAUTION:

If air bag (Inflator) module was dropped from a height or 91.4 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.

75F00-10B1-74-1



75F00-10B1-74-3

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.

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 8B for removal and installation.

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).

75F00-10B1-75-2

DEPLOYMENT OUTSIDE VEHICLE

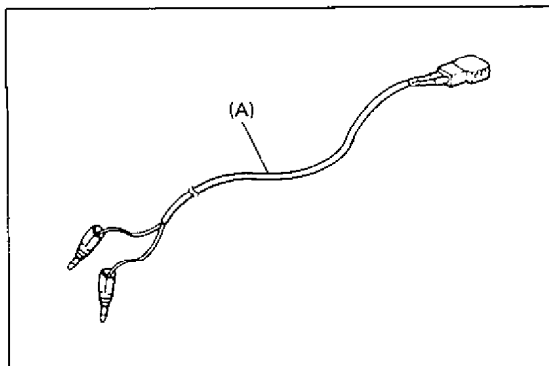
Use this procedure when the vehicle itself is used again (only the air bag (inflator) module(s) are disposed of).

WARNING:

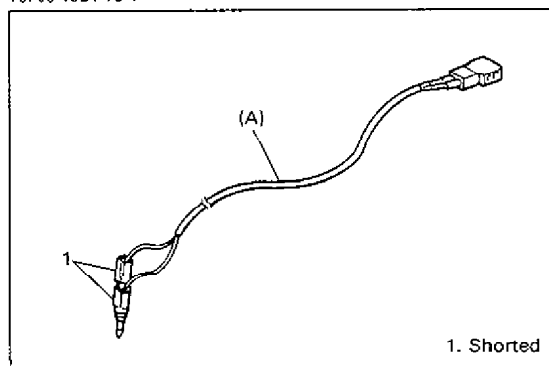
Following precautions must be observed for this work. Failure to observe any of them may result in personal injury.

- 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 "Precautions" in this section for the air bag (inflator) module beforehand.
- Never connect deployment harness to any power source before connecting deployment harness to the air bag (inflator) module. Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.
- Since a large amount of smoke is produced when air bag is deployed, select a well-ventilated area.
- The air bag (inflator) module will immediately deploy the air bag when a power source is connected to it. Wear safety glasses throughout this entire deployment and disposal procedure.
- Wear suitable ear protection when deploying air bag. Also, advise those who are in the area close to deployment site to wear suitable ear protection.
- Do not deploy driver and passenger air bag (inflator) modules at the same time.

The following procedure requires use of special tool(s) (deployment harness and passenger air bag (inflator) module deployment fixture). Do not attempt procedure without it (them).

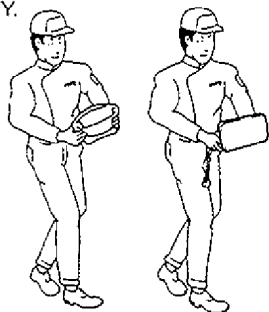


75F00-10B1-76-1

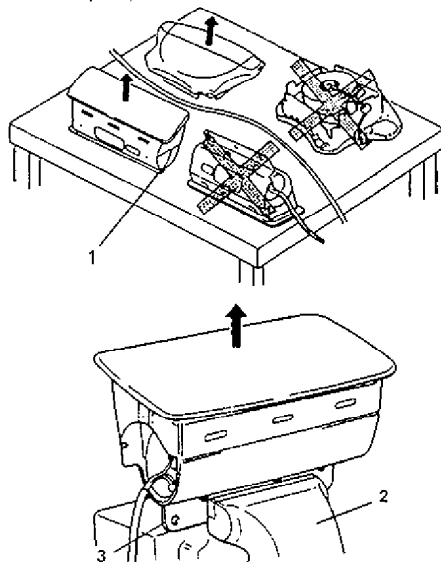


75F00-10B1-76-2

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

75F00-10B1-76-5

- 1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
- 2) Check that there is no open, short or damage in special tool (deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool (Deployment Harness)

(A): 09932-75030

- 3) Short the two deployment harness leads together by fully seating one banana plug into the other.

WARNING:

Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.

Special Tool (Deployment Harness)

(A): 09932-75030

- 4) Remove driver or passenger air bag (inflator) module from vehicle, referring to SECTION 3C1 or 10B1.

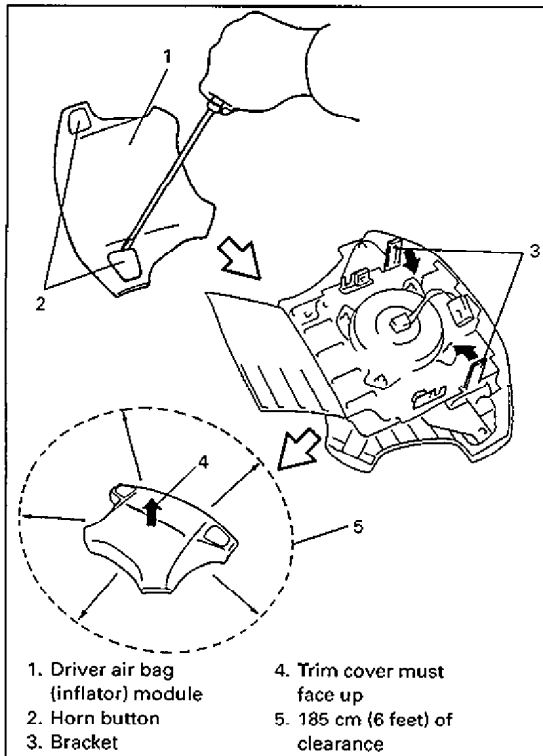
WARNING:

- 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.

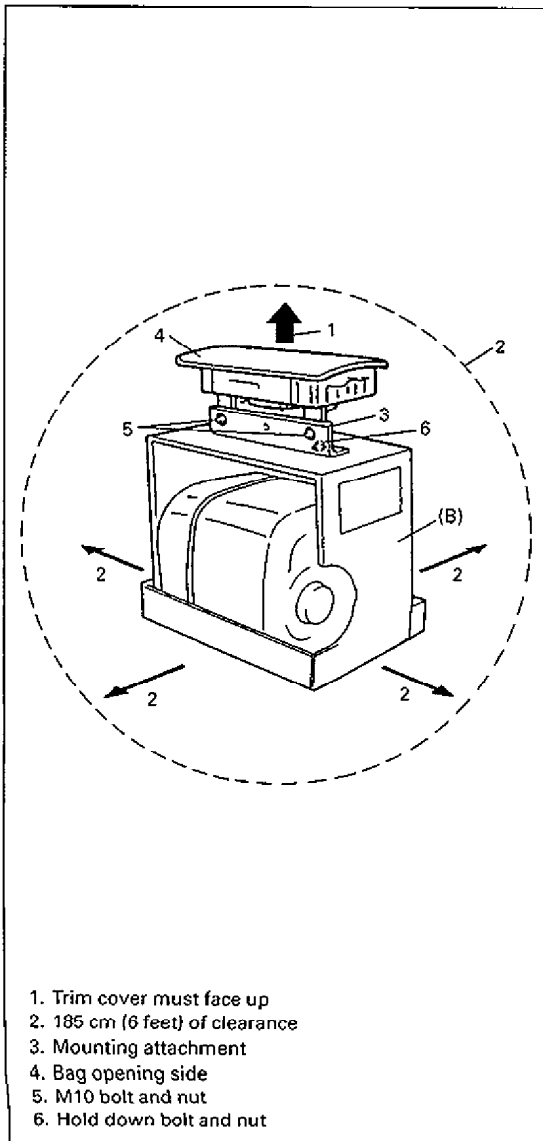
- 5) Temporarily place driver or passenger air bag (inflator) module on the workbench or the vise according to above WARNING.



75F00-10B1-77-2

In case of Driver Air Bag (Inflator) Module

- 6-1) Remove horn buttons from the driver air bag (inflator) module as shown in the figure.
- 6-2) Bend the bracket on the back side of the driver air bag (inflator) module fully in the direction of the arrow as shown in the figure.
- 6-3) 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.
- 6-4) Place the driver air bag (inflator) module, with its vinyl trim cover facing up, on the ground in the space just cleared.



75F00-10B1-77-5

In case of Passenger Air Bag (Inflator) Module

- 6-1) 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.
- 6-2) Place special tool (passenger air bag (inflator) module deployment fixture) on the ground in the space cleared in step 6-1), if it has not already been placed there.

Special Tool

(B): 09932-75040

- 6-3) Fill plastic reservoir in fixture (special tool) with water or sand. This is necessary to provide sufficient stabilization of the fixture during deployment.
- 6-4) Attach the passenger air bag (inflator) module in the fixture (special tool) using mounting attachment, hold-down bolts and nuts and M10 bolts and nuts.

CAUTION:

Be sure to use the following bolt and nut for fixing passenger air bag (inflator) module to mounting attachment. Size: M10, Strength: 7T

Air bag (inflator) module must be mounted so that the bag will deploy upward. Securely hand-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 (Inflator) Module

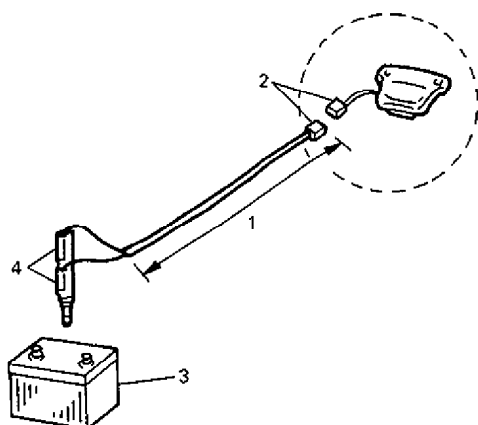
Verify that the driver air bag (inflator) module is resting with its vinyl trim cover facing up.

In case of Passenger Air Bag (Inflator) Module

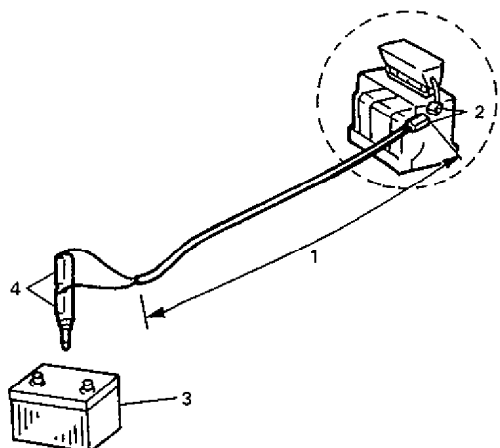
Verify that the passenger air bag (inflator) module is firmly and properly secured in passenger air bag (inflator) module deployment fixture (special tool).

75F00-10B1-78-2

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 (one foot) vertically. This is a normal reaction of the driver air bag (inflator) module to the force of the rapid gas expansion inside the air bag.
- After the air bag (inflator) module has been deployed, the surface of the air bag may contain a powdery residue. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and byproducts of the chemical reaction.

75F00-10B1-78-5

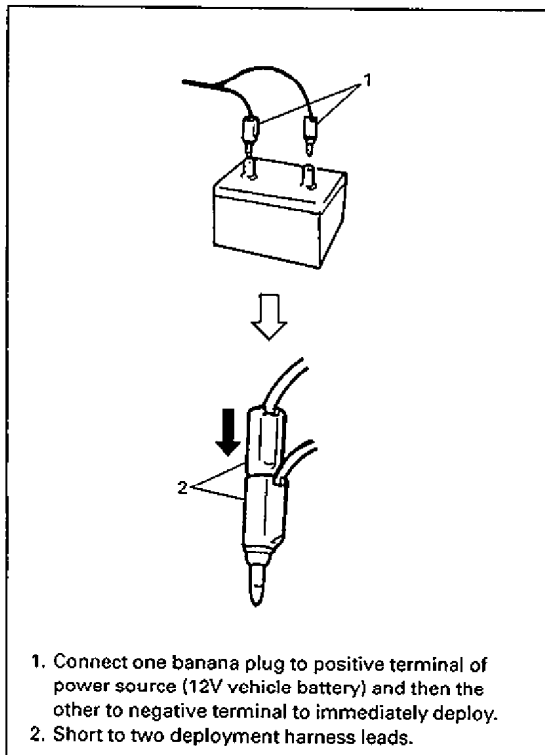
WARNING:

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 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.

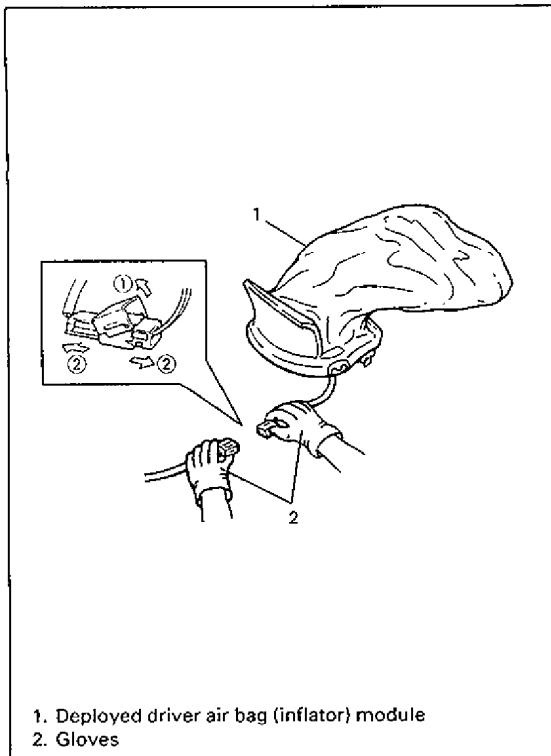
75F00-10B1-79-2



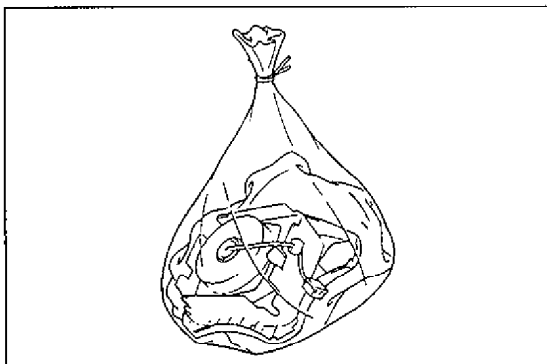
75F00-10B1-79-4

- 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).



75F00-10B1-80-2



75F00-10B1-80-3

- 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.

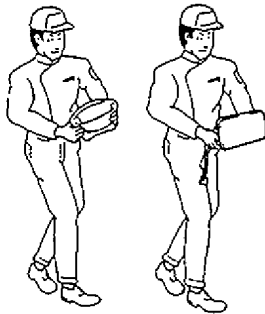
- 19) Dispose of the deployed air bag (inflator) module through normal refuse channels after it has cooled for at least 30 minutes and tightly seal the air bag (inflator) module in a strong vinyl bag. (Refer to "Deployed Air Bag (inflator) Modules Disposal" in detail.)
- 20) Wash your hands with mild soap and water afterward.

NOTE:

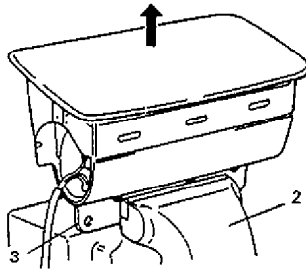
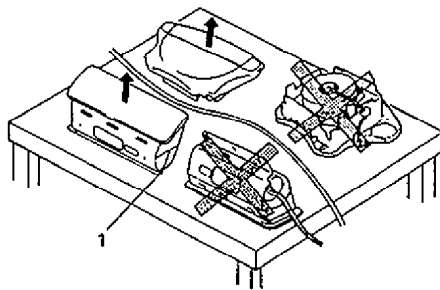
The remaining steps are to be followed in the unlikely event that the air bag (inflator) module did not deploy after following these procedures.

- 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 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.

- 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 "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.

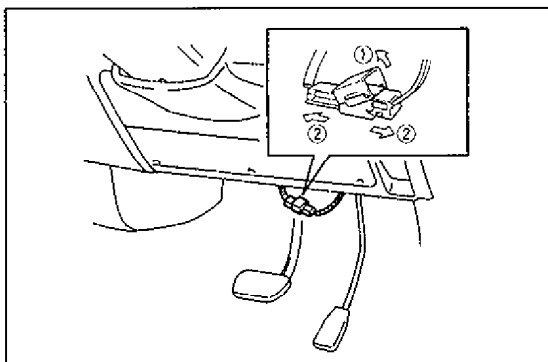
WARNING:

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 "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.

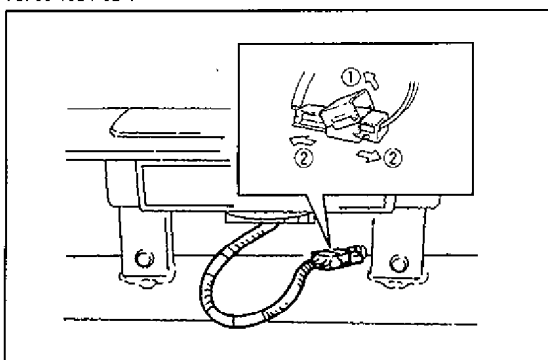
75F00-10B1-82-3



3) For driver air bag (inflator) module:

Disconnect contact coil connector (Yellow connector) located near the base of the steering column.

75F00-10B1-82-4



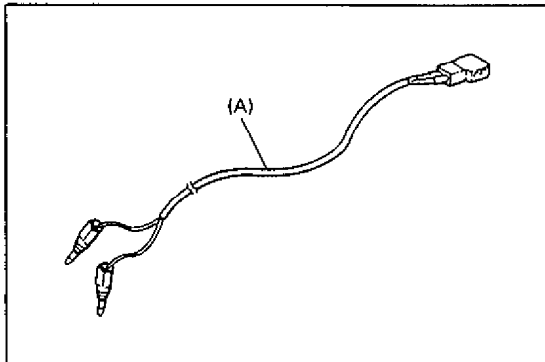
For passenger air bag (inflator) module:

Remove glove box from instrument panel and disconnect passenger air bag (inflator) module connector (Yellow connector).

75F00-10B1-82-5

- 4) Confirm that each air bag (inflator) module is securely mounted.

75F00-10B1-83-1

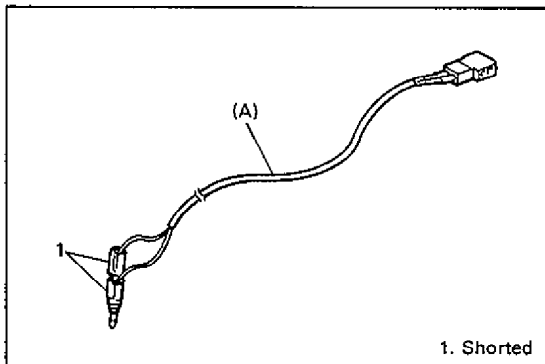


- 5) Check that there is no open/short or damage in special tool (deployment harness). If any faulty condition is found, do not use it and be sure to use new deployment harness.

Special Tool (Deployment Harness)

(A): 09932-75030

75F00-10B1-83-2



- 6) Short the two deployment harness leads together by fully seating one banana plug into the other.

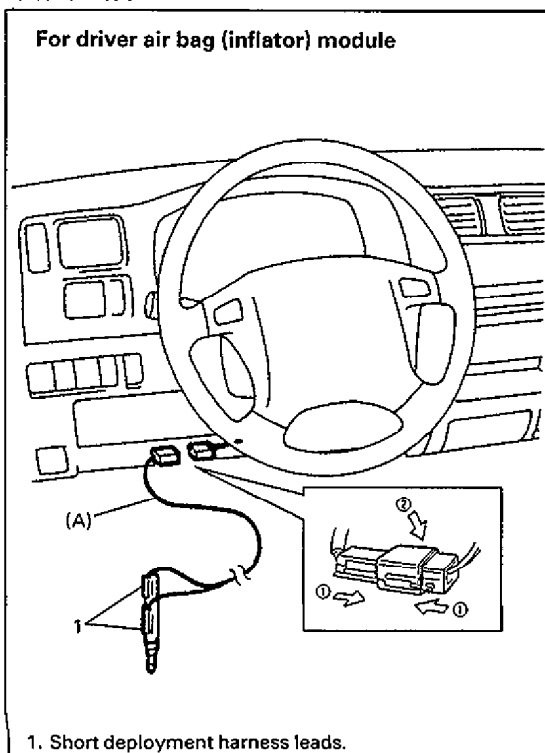
WARNING:

Deployment wires shall remain shorted and not be connected to a power source until the air bag is to be deployed.

Special Tool (Deployment Harness)

(A): 09932-75030

75F00-10B1-83-3

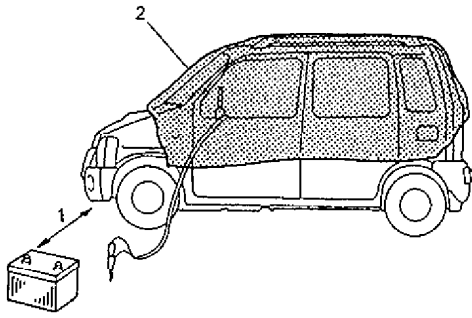
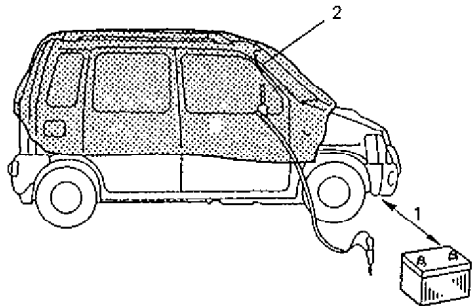


- 7) Connect deployment harness connector to air bag (inflator) module (driver or passenger) and lock connector with lock lever.

Special Tool (Deployment Harness)

(A): 09932-75030

75F00-10B1-83-5

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.

75F00-10B1-84-3

- 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.

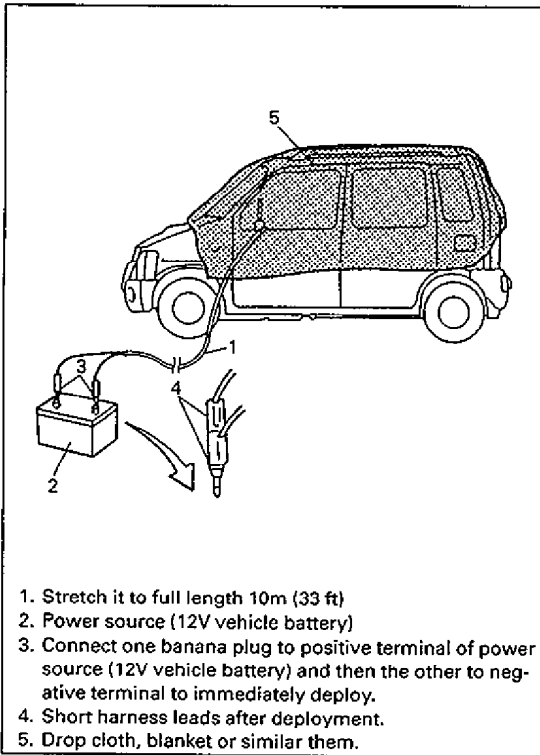
WARNING:

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.

75F00-10B1-84-5



75F00-10B1-85-2

- 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.

75F00-10B1-85-3

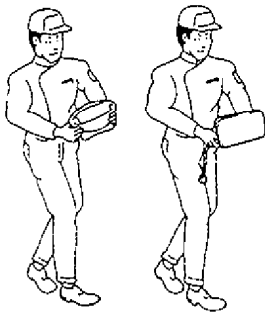
- 18) Disconnect the deployment harness from the air bag (inflator) module as soon after deployment as possible. This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module canister. The deployment harness are designed to be reused. They should, however, 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.

75F00-10B1-85-5

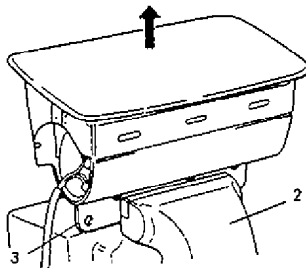
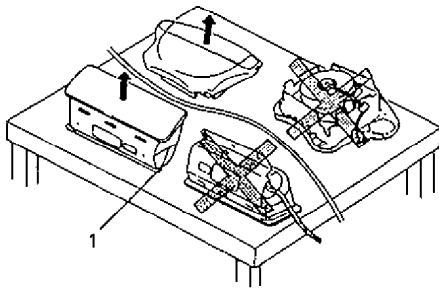
- 21) In the unlikely event that either or both of the air bag (inflator) modules proceed immediately with Steps 23) through 25). If the air bag (inflator) module did deploy, proceed with Steps 22).
- 22) With air bags deployed the vehicle may be scrapped in the same manner as a non-air bag system equipped vehicle.

75F00-10B1-86-1

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

75F00-10B1-86-5

- 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 "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 pretensioner(s) only (i.e., the vehicle itself will be used again).

Activation Inside Vehicle scrapping the entire vehicle including the seat belt pretensioners.

75F00-10B1-87-2

ACTIVATION OUTSIDE VEHICLE

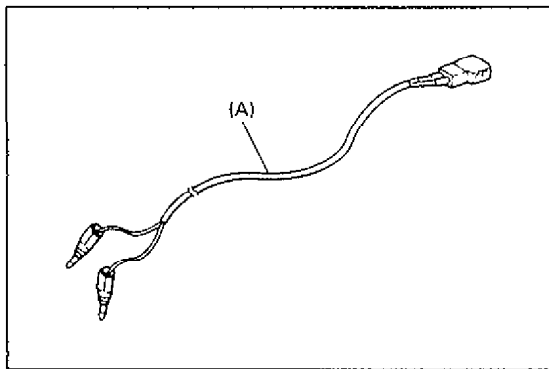
Use this procedure when the vehicle itself is used again (only the seat belt pretensioner(s) are disposed of).

WARNING:

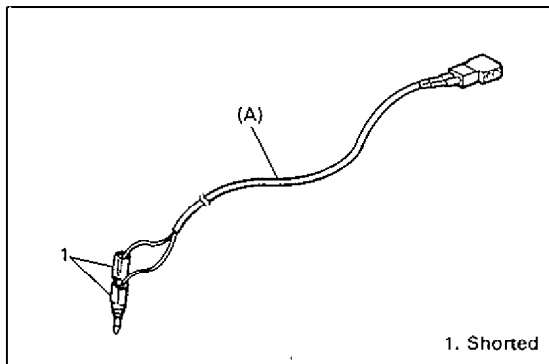
Following precautions must be observed for this work. Failure to observe any of them may result in personal injury.

- 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 "Precautions" in this section for the seat belt pretensioner beforehand.
- Never connect deployment harness to any power source before connecting deployment harness to the seat belt pretensioner. Deployment harness shall remain shorted and not be connected to a power source until the pretensioner is to be activated.
- Since a large amount of smoke is produced when pretensioner is activated, select a well-ventilated area.
- The seat belt pretensioner will immediately activate the pretensioner when a power source is connected to it. Wear safety glasses throughout this entire activation and disposal procedure.
- Wear suitable ear protection when activating pretensioner. Also, advise those who are in the area close to activation site to wear suitable ear protection.
- Do not activate driver and passenger seat belt pretensioners at the same time.

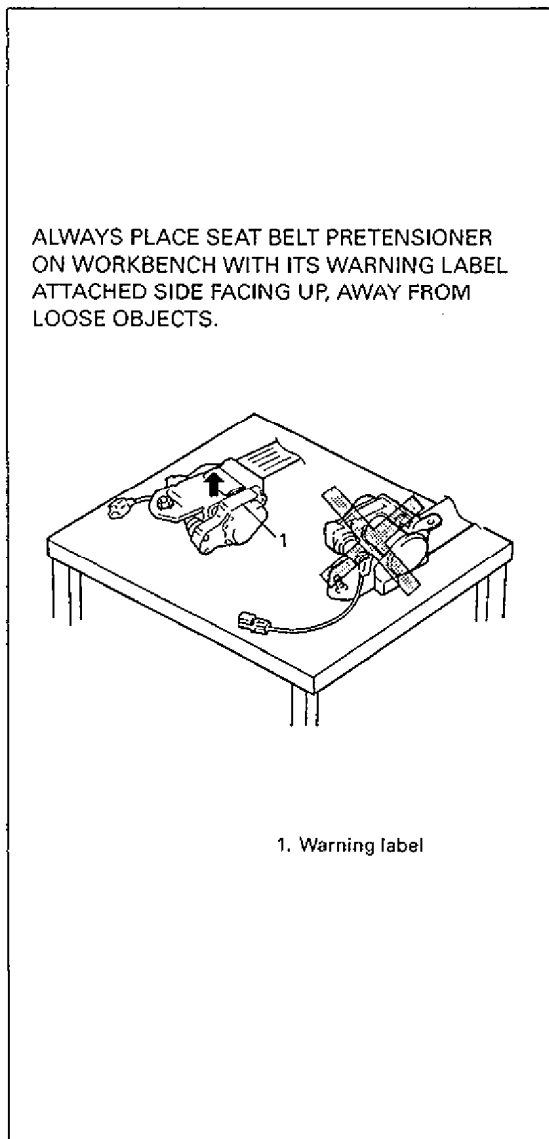
The following procedure requires use of special tools (deployment harness and pretensioner service adapter kit). Do not attempt procedure without them.



75F00-10B1-88-1



75F00-10B1-88-2



75F00-10B1-88-5

- 1) Turn ignition switch to "LOCK", remove key and put on safety glasses.
- 2) Check that there is no open, short or damage in special tool (deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool (Deployment Harness)

(A): 09932-75030

- 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 (Deployment Harness)

(A): 09932-75030

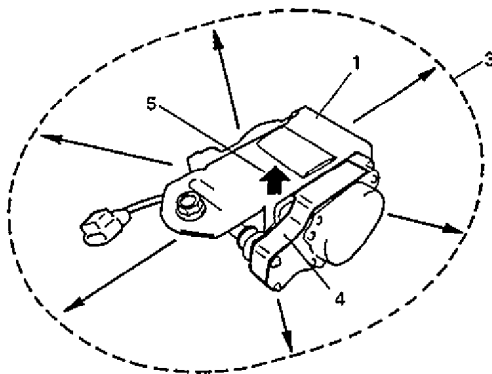
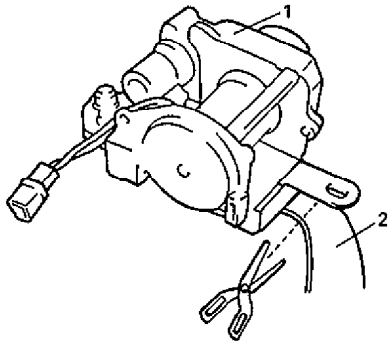
- 4) Remove driver or passenger seat belt pretensioner(s) from vehicle, referring to SECTION 10A.

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 bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner module must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.

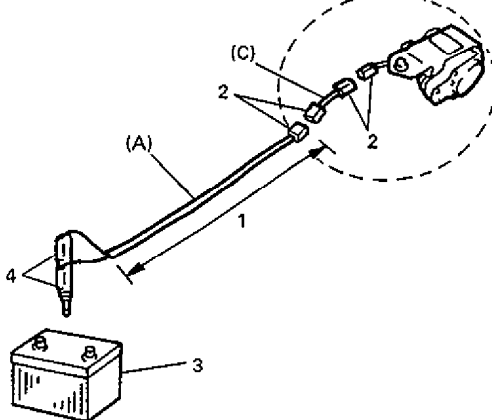
Otherwise, personal injury may result.

- 5) Temporarily place seat belt pretensioner on the workbench according to above WARNING.



1. Seat belt pretensioner (retractor assembly)
2. Webbing
3. 185 cm (6 feet) of clearance
4. Warning label
5. Warning label attached side face up

75F00-10B1-89-3



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.

75F00-10B1-89-5

- 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 with its warning label attached side facing up as shown in the figure on the ground in the space just cleared.

- 9) Stretch the deployment harness from the seat belt pretensioner to its full length 10 m (33 ft).
- 10) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
- 11) Verify that the area around the seat belt pretensioner is clear of all people and loose or flammable objects.
- 12) Verify that the seat belt pretensioner, with its warning label attached side facing up as shown in the figure on the ground in the space just cleared.
- 13) Connect the seat belt pretensioner to the deployment harness connector by using special tool (pretensioner service adapter) and lock the connector with lock lever.

Special Tools

(A): 09932-75030 (Deployment Harness)

(C): 09932-78020 (Pretensioner Service Adapter Kit)

- 14) Notify all people in the immediate area that you intend to activate the seat belt pretensioner.

NOTE:

- When the pretensioner activates, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to activate the seat belt pretensioner and suitable ear protection should be worn.
- When the pretensioner activates, the seat belt pretensioner may jump about 30 cm (one foot) vertically. This is a normal reaction of the seat belt pretensioner to the force of the rapid gas expansion inside the pretensioner.

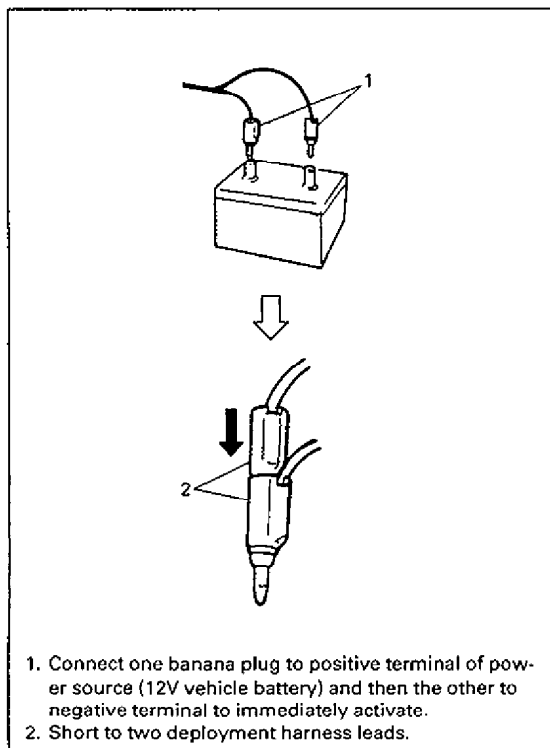
WARNING:

Safety precautions must be observed when handling an activated seat belt pretensioner.

- After activation, the metal surfaces of the seat belt pretensioner will be very hot. Do not touch the metal areas of the seat belt pretensioner for about 30 minutes after activation.
- Do not place the activated seat belt pretensioner near any flammable objects.
- Do not apply water, oil, etc. to the activated seat belt pretensioner.
- If the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle it by using nonmetal material.

Failure to follow procedures may result in fire or personal injury.

75F00-10B1-90-3

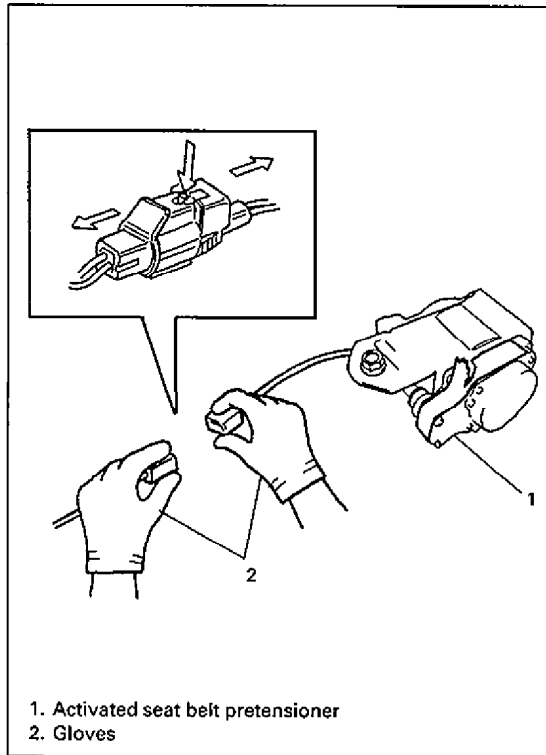


75F00-10B1-90-5

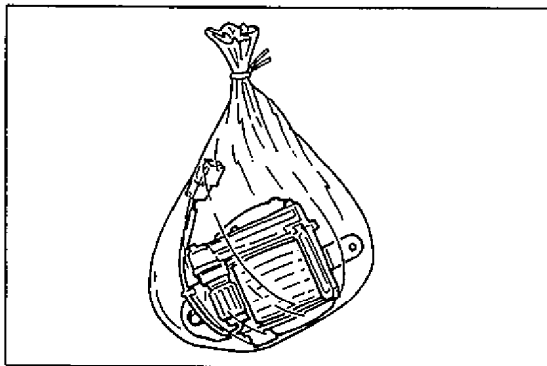
- 15) Separate the two banana plugs on the deployment harness.
- 16) Connect the deployment harness to the power source (12V vehicle battery) to immediately activate the pretensioner.
- 17) Disconnect the deployment harness from power source (12V vehicle battery) and short the two deployment harness 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).

75F00-10B1-91-1



75F00-10B1-91-3



75F00-10B1-91-4

- 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.

75F00-10B1-91-5

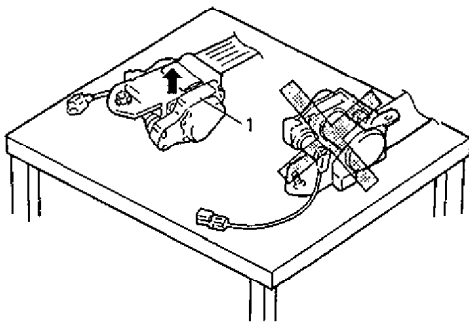
NOTE:

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.

75F00-10B1-92-2

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.
- When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner module must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners. Otherwise, personal injury may result.

- 25) Temporarily store the seat belt pretensioner with its warning label attached side facing up, away from the surface upon which it rests. Refer to "Precautions" in this section for details.
- 26) Contact your local distributor for further assistance.

75F00-10B1-92-5

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.

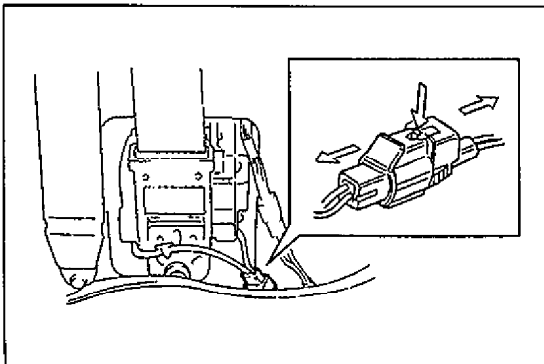
WARNING:

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 "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.

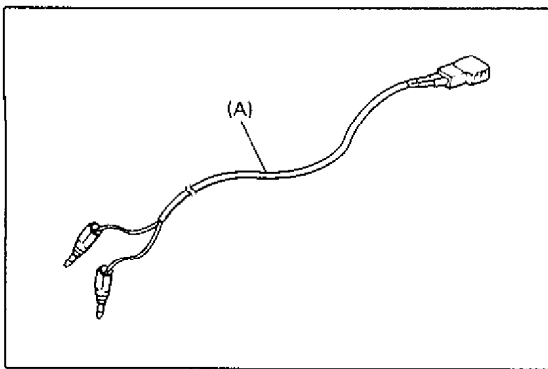
75F00-10B1-93-3



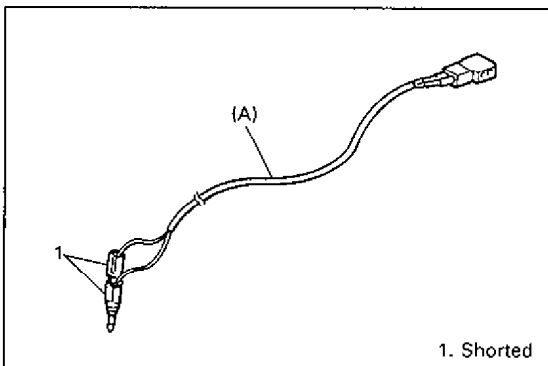
75F00-10B1-93-4

- 3) Remove both side (driver and passenger side) center pillar inner garnishes and disconnect seat belt pretensioner connectors.

- 4) Confirm that each seat belt pretensioner is securely mounted.

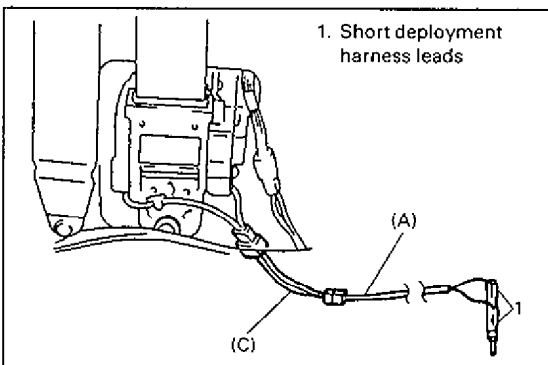


75F00-10B1-94-1



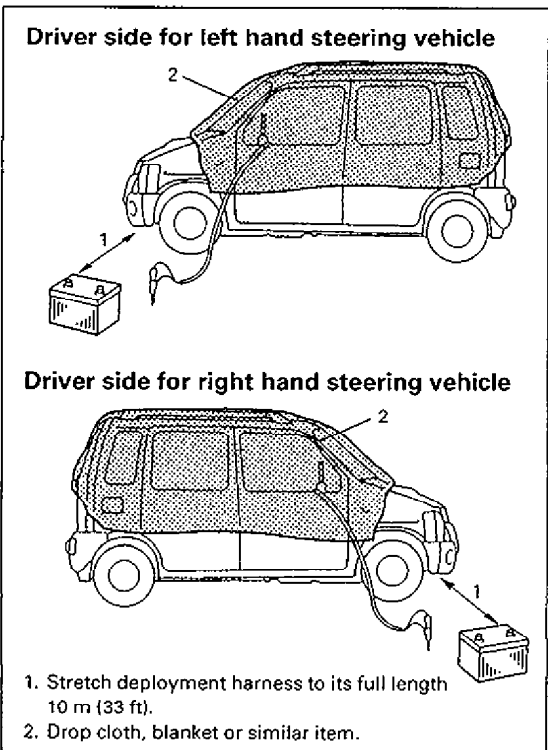
1. Shorted

75F00-10B1-94-2



1. Short deployment harness leads

75F00-10B1-94-3



75F00-10B1-94-5

- 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 (Deployment Harness)

(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 (Deployment Harness)

(A): 09932-75030

- 7) Connect the deployment harness connector to the seat belt pretensioner by using special tool (C) (pretensioner service adapter kit) and lock the connector with lock lever.

Special Tools

(A): 09932-75030 (Deployment Harness)

(C): 09932-78020 (Pretensioner Service Adapter Kit)

- 8) Route deployment harness out the vehicle.
- 9) Verify that the inside of the vehicle and the area surrounding the vehicle are clear of all people and loose or flammable objects.
- 10) Stretch the deployment harness to its full length 10 m (33 ft).
- 11) Place a power source near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
- 12) Completely cover windshield area and front door window openings with a drop cloth, blanket to similar item. This reduces the possibility of injury due to possible fragmentation of the vehicle's glass or interior.
- 13) Notify all people in the immediate area that you intend to activate the seat belt pretensioner.

NOTE:

When the pretensioner activates, the rapid gas expansion will create a substantial report. Wear suitable ear protection. Notify all people in the immediate area that you intend to activate the seat belt pretensioner and suitable ear protection should be worn.

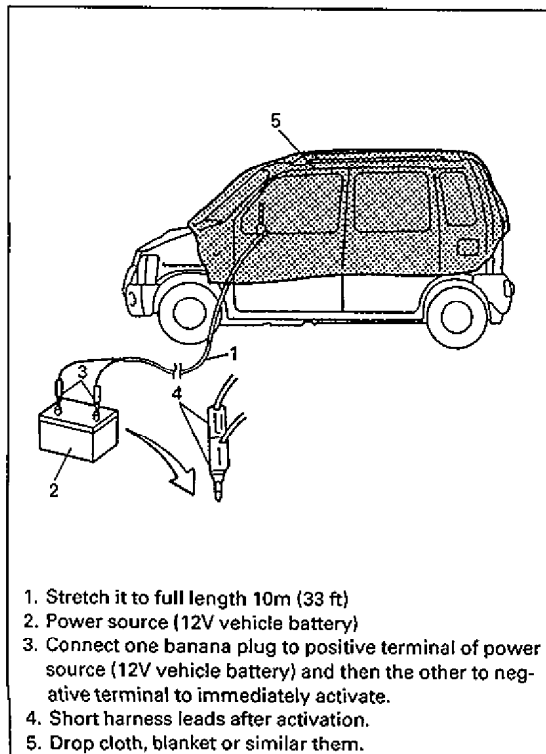
WARNING:

Safety precautions must be observed when handling an activated seat belt pretensioner.

- After activation, the metal surfaces of the seat belt pretensioner will be very hot. Do not touch the metal areas of the seat belt pretensioner for about 30 minutes after activation.
- Do not apply water, oil, etc. to activated seat belt pretensioner.
- If the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle by using nonmetal material.

Failure to follow procedures may result in fire or personal injury.

75F00-10B1-95-3



75F00-10B1-95-5

- 14) Separate the two banana plugs on the deployment harness.
- 15) Connect the deployment harness to the power source (12 V vehicle battery) to immediately activate the pretensioner.
- 16) Disconnect the deployment harness from the power source (12 V vehicle battery) and short the two deployment harness leads together by fully seating one banana plug into the other.

- 17) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the activated seat belt pretensioner.

NOTE:

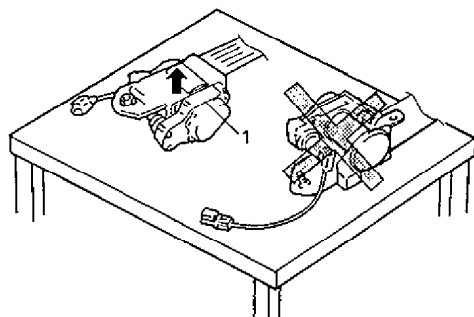
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

- 18) Disconnect the deployment harness from the seat belt pretensioner as soon after activation as possible. This will prevent damage to the deployment harness due to possible contact with the hot seat belt pretensioner canister. The deployment harness are designed to be reused. They should, however, be inspected for damage after each activation and replaced if necessary.
- 19) Carefully remove drop cloth from vehicle and clean off any fragments or discard drop cloth entirely.
- 20) Repeat Steps 2) through 19) to activate seat belt pretensioner which has not been activated, if any.
- 21) In the unlikely event that either or both of the seat belt pretensioners proceed immediately with Steps 23) through 25). If the seat belt pretensioner did activate, proceed with Step 22).
- 22) With pretensioners activated the vehicle may be scrapped in the same manner as a non-air bag system equipped vehicle.

- 23) Remove the inactivated seat belt pretensioner(s) from the vehicle. Refer to SECTION 10A.

75F00-10B1-96-3

ALWAYS PLACE SEAT BELT PRETENSIONER ON WORKBENCH WITH ITS WARNING LABEL ATTACHED SIDE FACING UP, AWAY FROM LOOSE OBJECTS.



1. Warning label

WARNING:

- For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.
- Never carry the seat belt pretensioner by the wires or connector on the underside of the pretensioner.
- When placing a live seat belt pretensioner on bench or other surface, always face its warning label attached side up, away from the surface. As the live seat belt pretensioner module must be placed with its warning label attached side facing up, place it on the workbench. It is also prohibited to place anything on the warning label attached side and stack seat belt pretensioners.

Otherwise, personal injury may result.

75F00-10B1-96-5

- 24) Temporarily store the seat belt pretensioner with its warning label attached side facing up, away from the surface upon which it rests. Refer to "Precautions" in this section for details.
- 25) Contact your local distributor for further assistance.

75F00-10B1-97-1

DEPLOYED AIR BAG (INFLATOR) MODULES DISPOSAL

WARNING:

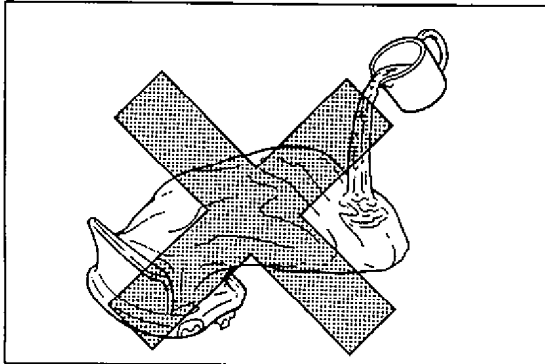
Failure to follow proper air bag (inflator) module disposal procedures can result in air bag deployment which may cause personal injury. Undeployed air bag (inflator) module must not be disposed of through normal refuse channels.

The undeployed air bag (inflator) module contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

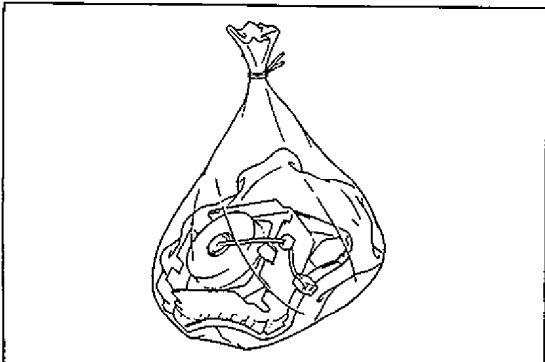
Deployed air bag (inflator) modules (driver/passenger) can be disposed of through normal refuse channels just like any other parts. For their disposal, however, following points should be noted.

- 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.

75F00-10B1-97-3



75F00-10B1-97-4



75F00-10B1-97-5

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.

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75F00-10B1-98-3



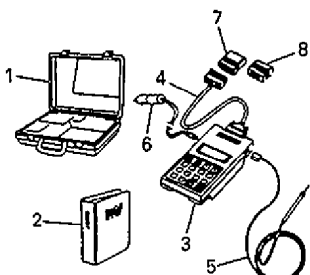
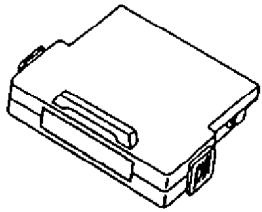
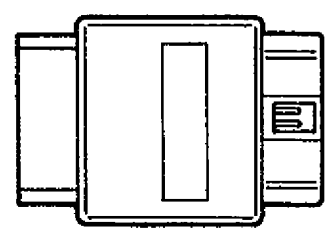
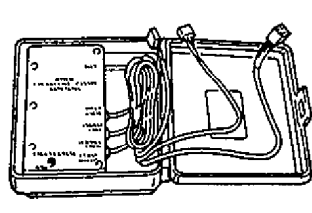
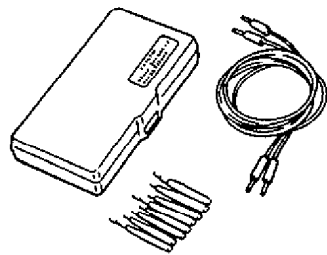
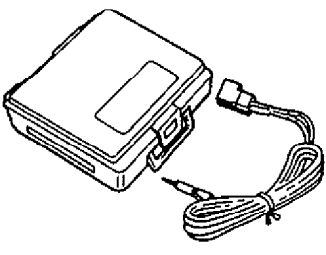
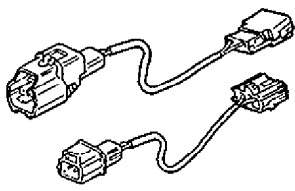
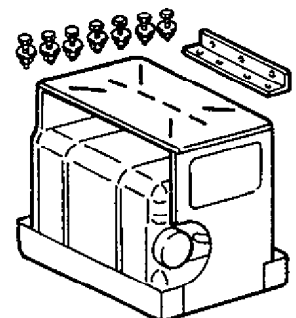
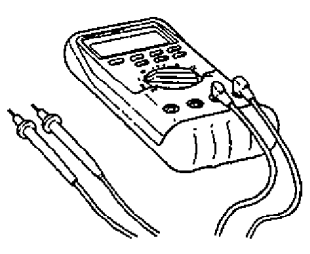
75F00-10B1-98-4

- 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		5.5	0.55	4.0
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		 Mass storage cartridge (including BCM 2.0 or later)	
 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
 09932-78020 Pretensioner service adapter kit	 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.	

Prepared by

SUZUKI MOTOR CORPORATION

Overseas Service Department

1st Ed, July, 1997

2nd Ed, Nov, 1998

Printed in Japan

Printing: Nov, 1998

936

EDIT Date: 17.10.2003

SUZUKI MOTOR CORPORATION

